ORIGINAL

MesquitePower
A SEMPRA ENERGY DEVELOPMENT

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February 8, 2005

Colleen Ryan, Supervisor
Document Control Center
Arizona Corporation Commission
1200 West Washington Street
Phoenix, Arizona 85007

Re: Mesquite Generating Station
CEC Decision No. 63232
Docket No. L-00000S-00-0101
2004 Annual Report

Dear Ms. Ryan:

On behalf of Mesquite Power, LLC, I am submitting the annual report outlining the status of the Comprehensive Land Management Plan per Stipulation 12 of the Certificate of Environmental Compatibility. Also included is the status of all of the remaining stipulations as agreed to in 2003.

Attached are thirteen copies of the Annual Report for 2004. Please contact me at (623) 327-0545 should you have any questions or need additional information.

Sincerely,

Merritt N. Brown
Plant Manager

cc: R. Carter, Sempra Generation

Certificate of Environmental Compatibility
2004 Annual Status Report
Mesquite Power Project
Docket No. L-00000S-00-0101

Submitted to

Arizona Corporate Commission

by

Mesquite Power, LLC

January 2005

Executive Summary

The Arizona Corporate Commission, on recommendation by the Line Siting Committee, approved a Certificate of Environmental Compatibility (CEC) for the construction of the Mesquite Generating Station, a 1,000-megawatt (MW) natural gas fired, combined cycle power plant. Stipulation 12 of the CEC requires Mesquite Power, LLC to submit an annual report outlining the implementation status of the Comprehensive Land Management Plan that was included with the application for this certificate. In June, 2003, Mesquite Power agreed to voluntarily submit a comprehensive overview of compliance to all the stipulations of the CEC.

The construction of the facility was completed in 2004. Block 1 of the facility was turned over to operations on May 20, 2003 and Block 2 of the facility was turned over to operations on November 12, 2003. Landscaping was started in November 2003 and was completed in Summer 2004. Five (5) permanent production wells supplied water to the plant for operations and the revegetation project at the water property.

The status of the implementation of the Comprehensive Land Management Plan is documented in the separate status report included as an attachment to this report.

List of Attachments

Attachment 1 .... Status Report on the Comprehensive Land Management Plan

Attachment 2 .... Correspondence with ADWR

Attachment 3 .... Noise Test Reports

Attachment 4 .... Site Landscaping Plan

Certificate of Environmental Compatibility 2004 Annual Status Report

1.0 Introduction

The Arizona Corporate Commission, on recommendation by the Line Siting Committee, approved a Certificate of Environmental Compatibility (CEC) for the construction of the Mesquite Generating Station, a nominal 1,000-megawatt (MW) natural gas fired, combined cycle power plant. Stipulation 12 of the CEC requires Mesquite Power, LLC to submit an annual report outlining the implementation status of the Comprehensive Land Management Plan that was included with the application for this certificate. In June, 2003, Mesquite Power agreed to voluntarily submit a comprehensive overview of compliance to all the stipulations of the CEC.

2.0 Compliance with the Stipulations

The following is the status of the project relative to the stipulations from CEC Decision # L-00000S-00-0101.

Stipulation 1
The applicant and its assignees will comply with all existing applicable air and water pollution control standards and regulations, and with all existing applicable ordinances, master plans and regulations of the State of Arizona, the County of Maricopa, the United States, and any other governmental entities having jurisdiction.

Mesquite Power is in compliance with all applicable air and water pollution control standards and regulations.

Stipulation 2
This authorization to construct the Mesquite Project will expire five (5) years from the date the Certificate is approved by the Arizona Corporate Commission ("Commission") unless construction of the Mesquite Project is completed to the point that the Mesquite Project is capable of operating at its rated capacity by that time; provided, however, that prior to such expiration Applicant or its assignee may request that the Arizona Corporation Commission extend this time limitation.

Both power blocks were operating commercially as of December, 2003. The outstanding construction issues such as fencing, asphalt, and landscaping were completed by Summer, 2004.

Stipulation 3
Applicant shall meet all applicable requirements for groundwater use set forth in the Third Management Plan for the Phoenix Active Management Area existing as of the date Applicant first begins withdrawing groundwater in connection with the Project. Applicant shall limit its aggregate annual withdrawal of groundwater to (i) 7,500 acre feet for the

Mesquite Project site, and (ii) such additional volumes available within its Type 1 Groundwater Right as may be needed to implement the portion of the Comprehensive Land Management Plan provided for at Condition 11 (ii) below.

The five (5) permanent productions wells have been supplying water to the plant for operations and irrigation. The wells were converted to non-exempt wells in an Active Management Area and all reports required by ADWR are current.

The well spacing has resulted in a limitation on the amount of water each well can pump annually as follows:

	Annual Limit	2004 Usage
Well no. 55-587025 (#1)	1,500 acre-feet	**1,112** acre-feet
Well no. 55-587026 (#2)	1,615 acre-feet	**1,224** acre-feet
Well no. 55-587021 (#3)	2,150 acre-feet	**1,548** acre-feet
Well no. 55-587022 (#4)	1,370 acre-feet	**509** acre-feet
Well no. 55-587023 (#5)	1,370 acre-feet	**1,014** acre-feet

A total of **5,405 acre-feet** of water was used for the plant therefore not exceeding the 7,500 acre-feet of annual withdrawal allowed. In addition to the plant use, a conservative estimate of 94 acre-feet of water was used for irrigation for the water property revegetation project in 2004. Flowmeters are being installed on the irrigation piping to give more accurate totals in the future.

Mesquite Power, LLC continues to submit periodic status reports to the ADWR for the modifications being implemented at Mesquite Generating Station in order to meet the requirements of the 3rd Management Plan of the Phoenix Active Management Area. As the ADWR is aware, groundwater quality issues have restricted the cooling tower cycles of concentration that could be attained with the originally installed equipment. In particular, operational silica levels are substantially higher than the test levels on which the original water treatment system design was based. Since Mesquite Power initially notified the ADWR in December 2003, significant progress has been made on researching, testing, and optimizing the strategy to overcome the limitations. Copies of the correspondence with ADWR are in Attachment 2.

Stipulation 4

Applicant will provide to the Commission, not more than 12 months prior to the commercial operation of the plant, a technical study regarding the sufficiency of transmission capacity from the plant to the wholesale electric market.

Stipulation requirements met in 2003.

Stipulation 5

The plant interconnection must satisfy the Western Systems Coordinating Council's ("WSCC") single contingency outage criteria (N-1) without reliance on remedial action such as generator unit tripping or load shedding.

Stipulation requirements met in 2003.

Stipulation 6
Applicant will within fifteen (15) days of reaching such an agreement, submit to the Commission an interconnection agreement with the transmission provider with whom it will be interconnecting.

Stipulation requirements met in 2003.

Stipulation 7
Applicant or one of its affiliates will become a member of WSCC, or its successor, and file a copy of its WSCC Reliability Criteria Agreement or Reliability Management System (RMS) Generator Agreement with the Commission.

Stipulation requirements met in 2003.

Stipulation 8
Applicant will use commercially reasonable efforts to become a member of the Southwest Reserve Sharing Group, or its successor, thereby making its units available for reserve sharing purposes, subject to competitive pricing.

This was provided to the ACC in a letter dated July 11, 2003.

Stipulation 9
Applicant will use low profile structures, moderate stacks, neutral colors, compatible landscaping, and low intensity directed lighting for the plant.

The plant was designed and constructed using low profile structures, moderate stacks, and neutral colors. The landscaping involved the replanting of many mesquite trees removed from the site during construction. A drawing of the landscaping plan is shown in **Attachment 4**. The outdoor lighting was designed and constructed by the engineering, procurement, and construction (EPC) contractor in accordance with Maricopa County and International Dark-Sky Association recommendations. The plant construction is complete and no other lighting is to be installed.

Stipulation 10
Applicant will operate the Project so that during normal operations the Project will not exceed (i) HUD residential noise guidelines or (ii) OSHA worker safety noise standards.

Noise emissions performance testing was performed on Block 1 on July 9, 2003 and Block 2 on November 10, 2003. To support compliance with OSHA worker noise exposure limits, in-plant sound pressure level measurements were conducted throughout the facility and those areas that experienced sound levels above 85 dBA during normal peak load operation were identified. In addition, A-weighted (L90) sound level measurements were taken at six property boundary locations during simultaneous base load operation of both blocks. Copies of the Block 1 and Block 2 Noise Test Reports are included in **Attachment 3**.

Stipulation 11
Applicant will implement its Comprehensive Land Management Plan as presented to the Committee in hearing Exhibit A-13 for the plant site and the 3,000 acre Water Property that includes:

(i) *Installation of a professionally designed landscape plan for the entrance of the facility and along Elliot Road.*

(ii) *Implementation of a comprehensive revegetation program designed to restore portions of the water property with plant communities similar to the adjacent desert lands.*

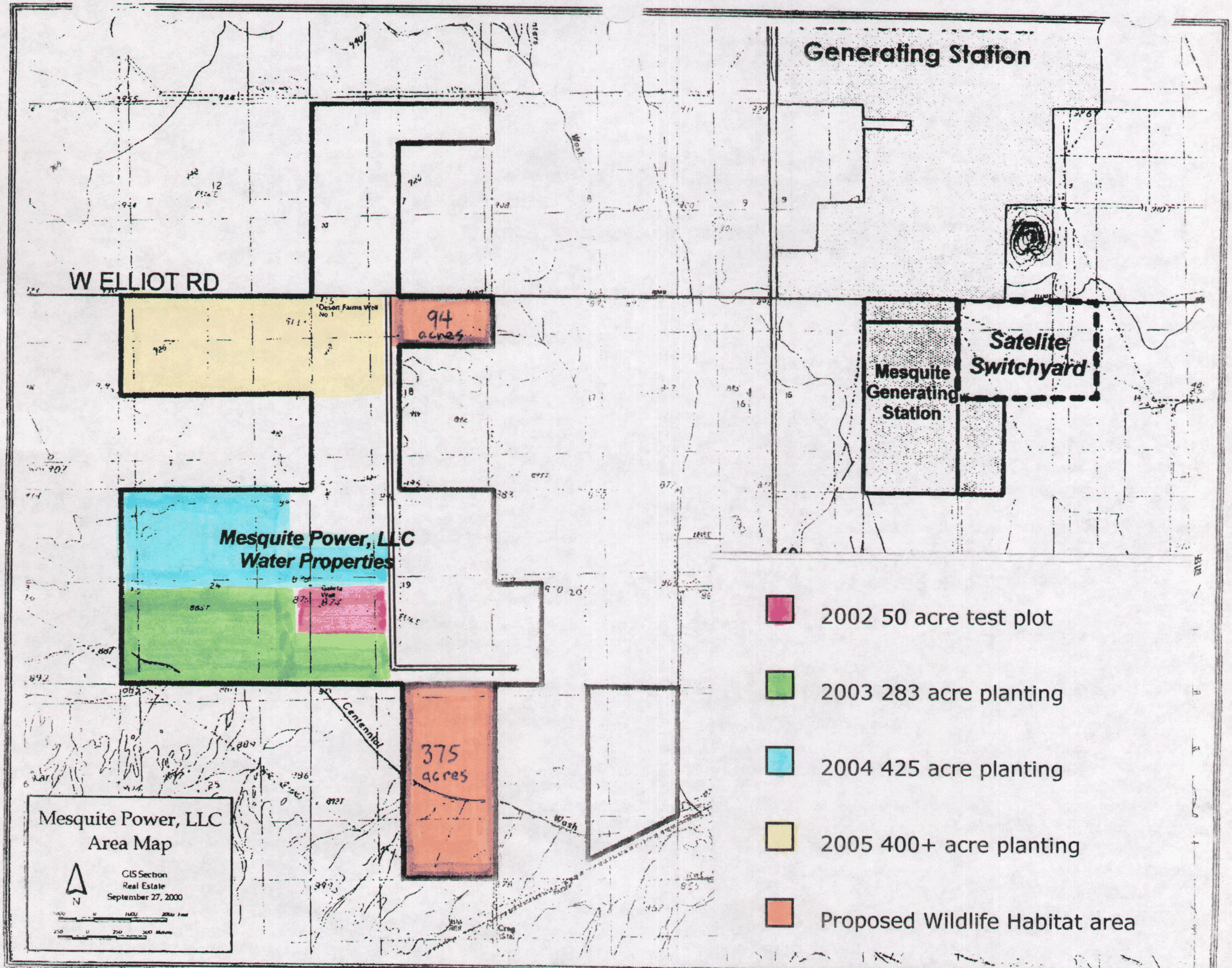
(iii) *Where feasible, the development of ongoing working relationships with the Phoenix Zoo, Southwest Wildlife Rehabilitation and Educational Foundation, Inc. and Arizona Game and Fish Department to develop alternative land uses for the water property that can be beneficial to the community and consistent with an "open space" land use designation; and*

In 2004, Mesquite Power, LLC evaluated proposals from three consultants for the design and development of an enhanced wildlife habitat consistent with the Comprehensive Land Management Plan. Logan Simpson Design, Inc. of Tempe was selected for project submittal and Mesquite Power has focused efforts with Arizona Game and Fish Department, the University of Arizona, and Logan Simpson Design in presenting a conceptual design to Maricopa County Board of Supervisors in 2005.

Stipulation 12
Applicant will submit annual reports (for 10 years) to the Commission setting forth the status of implementation of the Comprehensive Land Management Plan and any feasible alternative land uses which may have been identified and agreed upon by Applicant and the aforesaid organizations. The first annual report shall be filed one year from the date this Certificate is approved by the Commission.

The status of the implementation of the Comprehensive Land Management Plan is documented in the Status Report on the Comprehensive Land Management Plan provided in **Attachment 1**. The annual report also voluntarily provides the status of all the stipulations.

ATTACHMENT 1
Status Report on the Comprehensive Land Management Plan


Generating Station
W ELLIOT RD
Desert Farms Well No 1
94 acres
Satelite Switchyard
Mesquite Generating Station
Mesquite Power, LLC Water Properties
375 acres
Centennial
Wash
2002 50 acre test plot
2003 283 acre planting
2004 425 acre planting
2005 400+ acre planting
Proposed Wildlife Habitat area
Mesquite Power, LLC
Area Map
N
GIS Section
Real Estate
September 27, 2000

REPORT TO THE ARIZONA CORPORATION COMMISSION ON THE MESQUITE POWER/UNIVERSITY OF ARIZONA DESERT REVEGETATION EXPERIMENTAL PLANTING

Prepared by T.M. Bean and M.M. Karpiscak
25 November 2004

Introduction

As part of the land management plan for the Mesquite Power Project, in 2001 the University of Arizona began to study the implementation of a comprehensive revegetation program to restore a large portion of the Mesquite Power water property with self-sustaining native plant communities similar to the adjacent, unfarmed desert lands. The primary purpose of the revegetation program is to return these former agricultural lands to beneficial use as open space that will attract wildlife and enhance the surrounding environment.

An estimated 850 square miles of abandoned farmland exists in the Gila and Santa Cruz River Valleys of Arizona (Jackson *et al.*, 1991). Much of this barren land is dominated by exotic annuals such as Russian thistle (*Salsola kali*) and London rocket (*Sisymbrium irio*) (Karpiscak, 1980), existing in stark contrast to native desert lands dominated by creosotebush (*Larrea tridentata*) and saltbush (*Atriplex* spp.). This land is often associated with environmental problems such as dust pollution, a loss of wildlife habitat, accelerated soil erosion and downstream flooding caused by rapid runoff from barren surfaces, Russian thistle blowing onto roadways and adjacent properties, and auto accidents during dust storms. A typical retired farmland field is shown in Figures 1 and 2. Until recently, there has been little interest in restoring the lowland scrub that is native to this part of the Sonoran Desert, likely due to a general lack of knowledge about its ecology. Few studies have been done of the lowland desert vegetation, that of Shantz and Piemeisel (1924) to evaluate the soils and vegetation for their agronomic potential and that of Karpiscak (1980) to study the process of secondary succession on abandoned farmland, are the most well known.

The revegetation of former agricultural lands is a complex process involving many challenges and often little success. This in part because of establishing arid adapted vegetation on reclaimed agricultural lands is an evolving science and there is a general lack of an established methodology. Few examples exist of attempting revegetation on retired farmland (Jackson *et al.*, 1991; Munda, 1986) and even fewer on a site as large as the project area (Thacker and Cox, 1992). Other concerns include the management of dust and invasive weeds, salt cedar (*Tamarix chinensis*) in particular. Undisturbed or long-fallowed agricultural soils can develop a physical soil crust that limits the amount of dust that is capable of becoming airborne. Any soil-disturbing event breaks this crust and can increase the potential for dust problems and also provides an establishment site for invasive weeds. If not managed carefully, any irrigation used to establish native species can further aid in the establishment of undesired species. Additionally, new seedlings or transplants of native species can be particularly attractive to wildlife and losses to herbivory should be expected.

Inventory of Adjacent Unfarmed Areas

The unfarmed areas to the east and west of the site were inventoried by the University of Arizona to provide an estimate of local vegetation parameters. Vegetative density on these areas was estimated at 102 plants per acre and vegetative cover was estimated at four percent using line transects and the nearest individual distance method as described by Barbour *et al.* (1998). Average plant spacings were estimated at 21 feet from any random point to the nearest individual plant. The most abundant species on the adjacent unfarmed lands is creosotebush, which comprises about 60% of all plants on the inventoried areas. White bursage (*Ambrosia dumosa*) is the second most abundant species, comprising about 25% of all plants on the inventoried areas. Other important species occurring on the adjacent lands include velvet mesquite (*Prosopis velutina*), wolfberry (*Lycium exsertum*), desert saltbush (*Atriplex polycarpa*), diamond cholla (*Opuntia ramosissima*), catclaw acacia (*Acacia greggii*), white ratany (*Krameria grayii*), big galleta (*Pleuraphis rigida*), and fluffgrass (*Dasyochloa pulchella*), among others. Plant species were identified according to Kearney and Peebles (1960).

The "target" plant community

One challenge in revegetation of retired croplands in this region is determining the pre-disturbance (target) plant community. Reliable personal accounts are rare since much of the land was cleared more than 30 y ago, and any aerial photographs are of an inappropriate scale to accurately determine the plant species present. Often, the only clues that remain are the plant communities on lands adjacent to the cropland, although croplands in the Southwest typically are located adjacent to ephemeral watercourses (washes) and are lower in elevation and probably of a slightly different soil type than the areas that remain unfarmed. Early research by Shantz and Piemiesel (1924) in central Arizona supports this observation, stating that the best lands for agriculture were the desert saltbush-dominated shrub communities adjacent to washes, which transitioned into creosotebush-dominated communities as distance from a wash and elevation increased. As a bet-hedging strategy, we decided to select common species from both communities in composing the species list for our revegetation project.

Plant Material Sources

Unfortunately, many of the native species found in inventory are not yet commercially available. Of those that are, many are not readily available in sufficient quantities for a project of this scale. Special arrangements have been made with large nurseries specializing in desert plants, but orders must be made up to a year in advance. None of the available plant materials are source identified. Some researchers suggest that most desirable plant materials for use in restoration efforts would come from the primary restoration gene pool (Booth and Jones, 2001), which includes those populations that are genetically connected to local populations. Custom seed collection is very expensive and can be an unreliable source of seed during dry years. Others have argued that locally collected plant materials may no longer have an evolutionary advantage for revegetation of highly disturbed sites because current conditions are quite different from those found prior to its being brought into agriculture. In this effort the same plant species as those growing naturally on adjoining sites or in some instances on the revegetation site itself were used in the planting, their origins, however, are from various Arizona locals.

Techniques implemented and initial success

On March 6, 2002, approximately 50 acres of retired farmland was hand-planted using a mixture of 15 species of native shrubs, forbs, and grasses using rose pot transplants (Table 1). Rose pot transplants, measuring 2 x 2 x 3 inches, are commonly sold by wholesale nurseries to retail outlets, where they are then planted into larger size containers and sold to the consumer after a short period of growth. A seed mixture of 12 native species was hand-seeded (Table 1). The entire field is drip irrigated using a system designed after vegetable production in the Yuma area. Planting rates for transplants are 200 plants per acre, or double the vegetation density found on the adjacent unfarmed areas. This is to compensate for the higher mortality of the smaller transplant size. Seed was applied at a rate of 15 lbs per acre to selected areas (a two foot radius around each drip emitter) within a portion of the field. Seed was applied in known amounts and proportions to selected emitters, and this should allow us to estimate germination and establishment rates by species. With this information, we will be better able to predict the expected species composition of a given seed mix under similar field conditions. Planting survival was last estimated on November 24, 2004 (Table 2). Figure 3 shows the survival data of species planted in March 2002 over time. Photographs of this field are presented in Figures 2 and 4. Some species have much higher survival rates than others, probably reflecting their higher tolerance to being transplanted from such a small container, which may be related to their specific root physiology. Top performers include all *Atriplex* spp. (saltbush species), *Prosopis velutina* (mesquite), *Lycium exsertum* (wolfberry), and *Pleuraphis rigida* (big galleta). Initial germination and establishment of the seeded portions of the field was high, making it difficult to properly inventory the resulting stands. Table 3 displays the frequency at which seeded species are found at a given emitter in the seeded portion of the field. Note the high frequency of *Atriplex lentiformis* (quailbrush), which has performed consistently well across all treatments. Also note the low frequency of *Larrea tridentata* (creosotebush), which is a dominant species in surrounding unfarmed areas. A late frost was experienced by the plants just prior to planting, and may have increased mortality of certain species, especially *Baileya multiradiata* and *Ambrosia dumosa*. Irrigation was ceased in this field in early spring of 2003, due to the spread of the invasive exotic tree *Tamarix chinensis* (salt cedar), which had become established at more than 30% of the emitters in the field and the need to determine the survival of the planted natives in the field. Once irrigation was ceased, no further establishment of *Tamarix* was witnessed, and some of the smaller trees died. Most of the native species planted in this field have not exhibited any signs of drought stress, with the exception of *Atriplex lentiformis*, which was observed to drop leaves during the summer months but later recovered with the onset of cooler temperatures. Many "volunteer" (not intentionally planted) seedlings have been observed-these are most likely the progeny of the transplants. Species that have been particularly successful at reproducing include mesquite, all saltbush species, purple threeawn, big galleta, wolfberry, and desert globemallow. We found an average of at least one volunteer for every 4 emitters surveyed.

February 2003 planting

Approximately 283 acres were planted with some 60,000 transplants near the end of February 2003. The same methods were employed (drip irrigation, hand planting, rose pot transplants). The species composition remained the same. No seed was used in this planting. Data from the first planting was used to help adjust rates and composition of future seeding mixes, and we hope to incorporate seeding into a future planting. The results an associated study indicated that larger transplants may be more effective for revegetation than the small rose pot transplants (Bean *et al.* 2004), but data was unavailable until after the order for the smaller transplants had been made. This was not necessarily a problem, as the planting called for double the desired density, so most of the mortality was accounted for. Nonetheless, future plantings will include one-gallon transplants only. Some 1-gallon transplants, however, were available and were planted in selected parts of the field. Figures 5 and 6 show views of these areas. Quantitative data from this planting has not yet been collected.

Spring and Fall 2004 Plantings

A total of 425 acres will be planted in 2004 using the same mixture of fifteen native species that were transplanted in 2002 (Table 1). The 2004 planting will utilize one-gallon size transplants, which will allow us to compare survival between transplants of different container sizes (rose pot vs. one-gallon) on the Sempra property. The planting was split between the spring (72 ac) and fall (353 ac) months to compare the differential survival of species planted in different seasons. Seasonal differences in temperatures and animal activity are hypothesized to have significant effects on the survival of the transplants. We also expect the fall planting to have significantly less germination and establishment of salt cedar due to cooler temperatures and the 2004 planting scheme allows us to make this comparison. The fall planting is currently underway, and we will be taking initial measurements in the fields as they are planted to provide baseline data from which to measure long-term survival. Revegetation of such harsh environments is a difficult and slow process, but by studying our successes and failures in this project we have an opportunity to improve our success in additional plantings at this location and to establish a sound scientific and practical basis for future revegetation plantings in low desert environments in Arizona and the southwest.

References

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Munda, B. 1985. Vegetative treatment of abandoned cropland in the Sonoran Desert to reduce soil erosion. Plant Materials Technical Note No. 4, USDA-NRCS Tucson Plant Materials Center.

Thacker, G.W., and J.R. Cox. 1992. How to establish a permanent vegetation cover on farmland. Pima County Cooperative Extension, University of Arizona.

Table 1: Rose pot transplants used in the Mesquite Power March 2002 planting.

Species	Transplants: number planted	Seed: grams seeded
Acacia greggii	611	151
Ambrosia dumosa	611	234
Aristida purpurea	917	378
Atriplex canescens	611	272
Atriplex lentiformis	611	224
Atriplex polycarpa	611	237
Baileya multiradiata	917	350
Cassia covesii	917	316
Larrea tridentata	611	148
Lycium exsertum	917	Not seeded
Muhlenbergia porteri	611	224
Parkinsonia microphylla	611	Not seeded
Pleuraphis rigida	917	Not seeded
Prosopis velutina	611	154
Sphaeralcea ambigua	617	409
TOTAL	11,000	3,097

Table 2: Thirty-two-month survival of species planted at the Mesquite Power Property in March 2002.

Species	Mean survival	Standard error	Lower 95% CI	Upper 95% CI
Acacia greggii	20.4	5.8	8.7	32.1
Ambrosia dumosa	5.3	3.7	-2.2	12.7
Aristida purpurea	23.8	5.4	13.0	34.6
Atriplex canescens	76.7	6.5	63.6	89.9
Atriplex lentiformis	60.3	6.5	47.4	73.3
Atriplex polycarpa	72.1	6.9	58.1	86.1
Baileya multiradiata	0	0	0	0
Cassia covesii	0	0	0	0
Larrea tridentata	2.9	2.9	-2.9	8.7
Lycium exsertum	56.0	7.1	41.7	70.3
Muhlenbergia porteri	10.3	3.7	2.9	17.7
Parkinsonia microphylla	2.6	2.6	-2.7	8.0
Pleuraphis rigida	55.6	6.8	41.9	69.2
Prosopis velutina	69.2	7.5	54.1	84.4
Sphaeralcea ambigua	18.6	5.1	8.4	28.9
Across species	32.3	1.7	28.9	35.8

Table 3: Occurrence of species seeded in the March 2002 planting at Mesquite Power. Approximately 100 emitters were surveyed for the presence or absence of seeded species. All emitters contained one or more of the seeded species.

Species	Frequency 6/19/2003	Frequency 11/24/2004
Acacia greggii	1.1%	1.1%
Ambrosia dumosa	15.6%	0
Aristida purpurea	60.0%	54.0%
Atriplex canescens	67.8%	64.0%
Atriplex lentiformis	85.6%	91.0%
Atriplex polycarpa	45.6%	38.0%
Baileya multiradiata	53.3%	0
Larrea tridentata	0.0%	0
Lycium exsertum	0.0%	0
Muhlenbergia porteri	not seeded	not seeded
Parkinsonia microphylla	0.0%	0
Pleuraphis rigida	0.0%	0
Prosopis velutina	27.8%	37.0%
Senna covesii	13.3%	
Sphaeralcea ambigua	31.1%	3.0%

Figure 1. A typical un-revegetated field prior to planting. This small part of one field was left un-planted to use as a control site to compare to fields that were to be planted. Note the lack of any perennial plant cover in foreground. The March 2002 planting is visible in the background.

Figure 2. The boarder between the un-planted control field and the March 2002 planted field looking east. Note the single mesquite plant in the foreground.

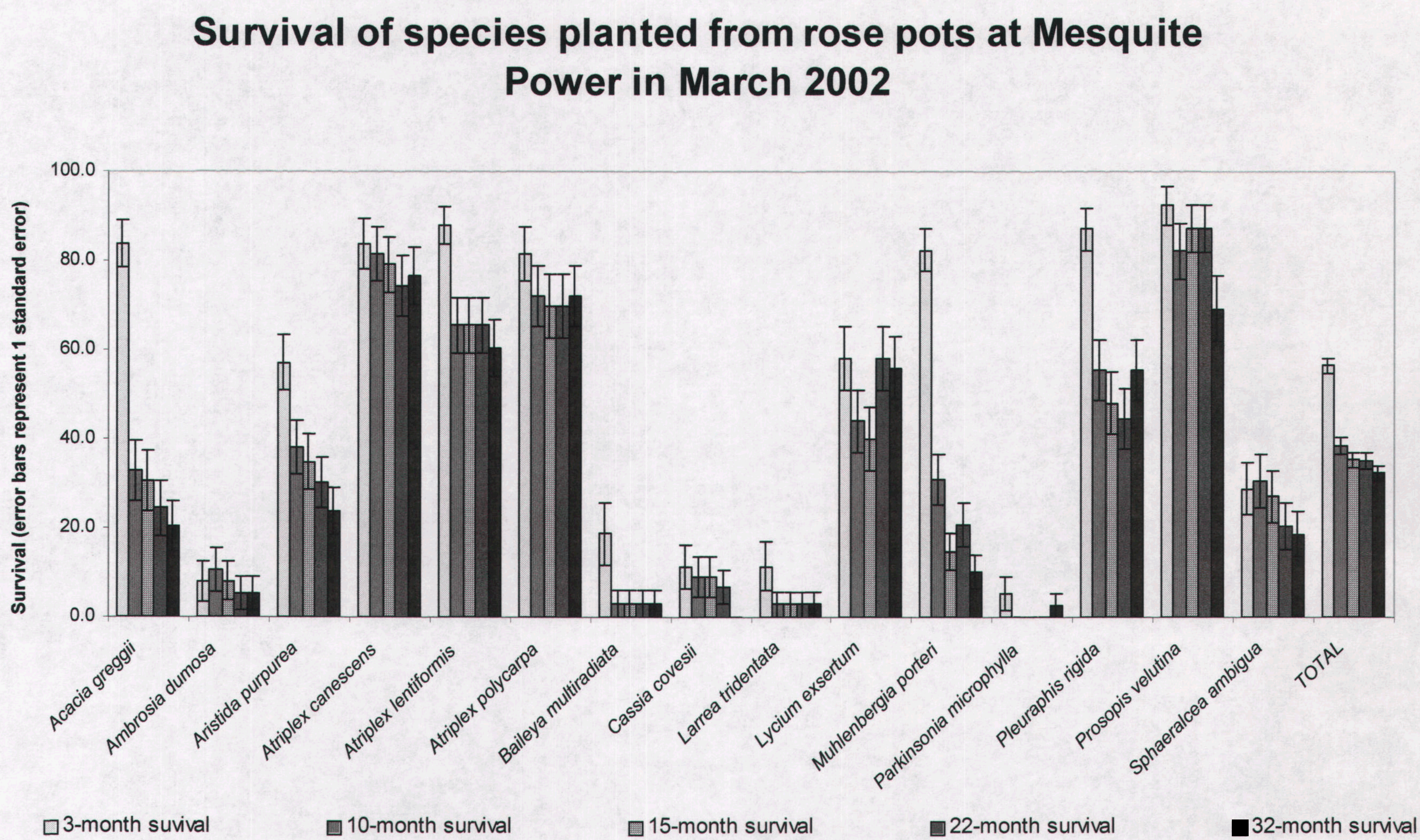
Survival of species planted from rose pots at Mesquite Power in March 2002
Survival (error bars represent 1 standard error)
100.0
80.0
60.0
40.0
20.0
0.0
Acacia greggii
Ambrosia dumosa
Aristida purpurea
Atriplex canescens
Atriplex lentiformis
Atriplex polycarpa
Baileya multiradiata
Cassia covesii
Larrea tridentata
Lycium exsertum
Muhlenbergia porteri
Parkinsonia microphylla
Pleuraphis rigida
Prosopis velutina
Sphaeralcea ambigua
TOTAL
3-month suvival
10-month survival
15-month survival
22-month survival
32-month survival

Figure 4. This view shows the March 2002 planted field. Most plants in this photograph are either quailbrush or other saltbush species. The abundant rains of October and November 2004 have germinated many annual plants from the un-planted seeds found in the fields.

Figure 5. This field was planted with 1-gallon creosotebush in February 2003. The plants are about 2 feet tall in this November 2004 photograph. Note the abundant annual plant germination resulting from the recent rains.

Figure 6. A view looking west from the February 2003 planting taken in November 2004.. Note the un-revegetated field in the background. The creosotebush plants were 1-gallon transplants at the time of planting. The annual plants are the result of the recent rains.

ATTACHMENT 2
Correspondence with ADWR

MesquitePower
a Sempra Energy company

Merritt N. Brown, Plant Manager
Mesquite Power. LLC.

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January 6, 2004

Gordon Wahl
Arizona Department of Water Resources
Phoenix Active Management Area
500 N. Third Street
Phoenix, AZ 85004

Re: Mesquite Generating Station – Cycles of Concentration Adjustment Request

Dear Mr. Wahl:

Thank you for taking the time to meet with us on December 29, 2003 regarding the Phoenix Active Management Area (AMA) groundwater conservation requirements. As we discussed, Mesquite Power LLC hereby requests an adjustment of the cycles of concentration requirement specified in Section 6-503 of the Phoenix AMA, Third Management Plan (TMP), for the Mesquite Generating Station in Arlington, Arizona. The following information will provide a brief description of the Facility, the historic, current, and projected water quality necessitating the adjustment, and documentation describing the potential damage that would result without the adjustment.

<u>Facility Description</u>

The Mesquite Generating Station (MGS) is a natural gas fired, combined cycle combustion turbine electric generating Facility. The Facility is comprised of two power blocks, each containing two combustion turbines with heat recovery steam generators and a common steam turbine. The maximum nominal power output from the Facility is 1,250 MW net. A single water pretreatment system serves the Facility while each power block includes a dedicated Cooling Tower.

Groundwater is used at MGS for several purposes including steam generation, service needs, fire protection, and cooling. Water used for cooling is continuously cycled through the condenser and other heat exchanging equipment and back to the Cooling Tower. A small portion of the cooling water is continuously removed from the Cooling Towers (blowdown water) and additional water is continuously added (makeup water) to maintain a constant water chemistry. Wastewater from MGS is managed using two on-site evaporation ponds.

The groundwater must undergo various stages of pretreatment before it can be safely used in the plant equipment. This pretreatment includes clarification to remove iron, silica, and calcium carbonate and magnesium ions (hardness). Further treatment includes filtering and demineralization for use in the steam cycle system. In the Cooling Towers, the pretreated water is regulated by adjustment of pH (acid injection), scale inhibitor, and the addition of chlorine and biocide to limit organic foulants.

The water pretreatment system at MGS is designed to condition the groundwater to a purity that will ensure safe and reliable operation of the Cooling Towers, steam condensers, and associated equipment. Each piece of equipment includes specific water quality limitations depending on its service, temperature, and flow rates. The primary water quality constituents that must be carefully balanced include silica, total dissolved solids (TDS), pH, and conductivity.

The design of the pretreatment equipment was based on a preliminary analysis of the groundwater. Samples that were taken in February 2002 were analyzed for silica, TDS and conductivity. These values were used to design the clarifiers, chemical injection system, and other related systems. Attachment 1 shows the make-up water analysis utilized in the design of the pretreatment system.

Installation and commissioning of the water pretreatment system was completed in May 2003. The power generation equipment and cooling water system were put into preliminary service in April 2003 for Power Block 1 and August 2003 for Power Block 2. After attempts were made to optimize the Power Block 1 cooling water system, it became apparent that the Cooling Tower cycles of concentrations were being limited by the silica level of the pretreated water. Mesquite Power personnel investigated the water chemistry and determined that the silica level in the groundwater was significantly higher than measured during the preliminary analysis and exceeded the design criteria for the pretreatment system.

Since MGS is located in the AMA, it is subject to the water conservation requirements described in the TMP, including the conservation requirements for large-scale power plants in production beginning after 1984. Section 6-503 of the TMP requires fully operational cooling towers at such large-scale power plants to achieve an annual average of 15 or more cycles of concentration when the plant is generating electricity.

The operating limitation of the Cooling Towers is 180 ppm of silica. This limit was determined based on the point at which silica will begin to "fall out" of solution, forming deposits of magnesium silicate or silica scale on exposed areas of the Cooling Tower and other plant equipment. To achieve 15 cycles of concentration as required by the TMP, the maximum silica level of the makeup water must be maintained below 12 ppm. Currently the lowest average silica level that can be achieved with the high silica groundwater is approximately 17-20 ppm. This has limited the Cooling Tower to between 4 and 6 cycles of concentration.

Potential Damage to Cooling Towers

Operating the cooling water system in excess of the silica limits can cause irreparable damage to the various components. Silica severely impedes heat transfer and is tenacious and costly (and potentially hazardous) to remove. Attachment 2 is an excerpt from industry literature that discusses the potential damage posed by silica. Operating at conditions outside of the manufacturer's specifications will also void the equipment warranty and could lead to unsafe operating conditions. The vendor design specifications for the circulating water quality limits, including silica, are included in Attachment 1.

Historic, Current and Projected Silica Data

Groundwater used by MGS is provided from five wells located west of the Facility. Well use is rotated sequentially to ensure equal usage up to the individual annual limits specified in groundwater withdrawal permits. Laboratory analysis of the well water was performed on February 18, 2002, October 11, 2002, December 19, 2002, January 13, 2003, April to May, 2003, and November 17, 2003 and included tests for silica, conductivity and TDS . The original design values were based on water from two sites on the water property before the wells were drilled. The summary results of these analyses, shown in Figure 1, show a significant difference in the silica content of the raw well water since project inception. As shown, the November 2003 analysis indicates that the average silica level in the groundwater is more than 50% higher than originally measured (39.5 ppm vs. 25.7 ppm). Following commissioning of the MGS Facility, water analyses indicate more consistency between well tests. For this reason, projected silica levels are not expected to vary significantly from the currently measured values.

Analyses have also been performed on the pretreated water to quantify the silica reduction that can be achieved considering the high silica raw water. The results of the pretreated water analyses compared to the design value are shown in Figure 2. As shown, the silica levels of the pretreated water remain markedly higher than the design basis.

Efforts to Increase Cooling Tower Cycles of Concentration

MGS is actively engaged in finding ways to increase the Cooling Tower cycles . Although silica in the well water is the primary limiting factor, during low flow conditions the silica in the makeup water was being adversely impacted by recycling the steam system Reverse Osmosis (RO) reject water to the surge tank (the storage source for the Cooling Tower makeup water). MGS contacted the Arizona Department of Environmental Quality in July 2003 and requested an amendment of the Aquifer Protection Permit to allow disposal of the RO reject water directly to the evaporation ponds. This amendment is currently being processed and MGS is prepared to implement the internal stream rerouting as soon as approval is granted.

Mesquite has also contacted several water treatment vendors that have reviewed the system limitations and proposed various chemical treatment options to accommodate the high silica levels in the raw water. These options include investigating alternatives to using hydrated lime and magnesium oxide for water conditioning and incorporating new Cooling Tower inhibitors and organic polymer addition.

Other possible alternatives to increase the MGS Cooling Tower cycles of concentration are being fully researched by MGS staff with the assistance of consulting engineers and water treatment vendors. MGS looks forward to working closely with the ADWR staff to resolve this issue.

Please contact me at (623) 327-0545 if you have any questions or need additional information.

Sincerely,

Merritt N. Brown
Plant Manager

cc:	M. LaBianca	S. Hirsch
	A. Abreu	
bcc:	M. Teague	C. Sterling
	S. Perrizo	M. Swartz

Attachment 1: Design Basis of Raw Well Water

(EPC Contract) APPENDIX J

MAKE-UP WATER ANALYSIS

The Design and Expected Range of well water quality is shown below. The Raw Water Pre-Treatment System shall be designed to provide hardness and silica reduction to levels which will allow the circulating water system to be operated at 15 cycles of concentration without exceeding the listed circulating water quality limits. The limiting factor for the circulating water cycles of concentration shall be the TDS limit of 30,000 mg/l. The materials selected for the Cooling Tower, Cooling Tower basin, circulating water pipe, circulating water pumps, and all components that may come in contact with the circulating water or mist from the Cooling Tower shall suitable for the high TDS service.

	Design Well Water Analysis(2)	Expected Range(2)	Treated Water Analysis	Circulating Water Quality Limits
Ca, mg/l as $CaCO_3$	75	50 to 400	53	800
Mg, mg/l as $CaCO_3$	58	10 to 500	23	350
Na, mg/l as $CaCO_3$	1308	630 to 1440		
K, mg/l as $CaCO_3$	13	5 to 30		
M-Alk, mg/l as $CaCO_3$	180	50 to 310		150(1)
SO_4, mg/l as $CaCO_3$	364	200 to 430		
Cl, mg/l as $CaCO_3$	705	460 to 830		
NO_3, mg/l as $CaCO_3$	3	0 to 10		
CO_2, mg/l as such	4	0 to 10		
SiO_2, mg/l as such	31	2 to 40	12	180
PH	8.1	7.8 to 8.9		7.8 to 8.2
TDS	1500	900 to 2000		30,000
F, mg/l as such	5.0			
Fe, mg/l as such	<0.05			
Ba, mg/l as such	0.025			
Sr, mg/l as such	0.55			
TOC, mg/l as such				

(1) Circulating water alkalinity will be adjusted by sulfuric acid feed

(2) The Design Water analysis is provided as a sizing criteria for the Pretreatment and RO Water Systems. The water quality stated as Design shall be the basis of equipment sizing with the exception of Pretreatment chemical feed systems. The Expected Ranges presented above are outlined for sizing of chemical feed systems for the Pretreatment system with the exception of storage tanks/silos. It is expected that the majority of raw water introduced to the plant will meet the Design Water Analysis and deviations from the Design are only transient.

Attachment 2: *Silica Scale Problems in Cooling Towers (Excerpts from Industry Literature)*

<u>Silica Scale Problems in Cooling Towers</u>

The solubility of amorphous silica is important to the operation of water-dominated production processes. In areas such as Texas, New Mexico, Arizona, and parts of California, the water used for industrial applications contains high silica concentrations (30 parts per million [ppm] to 100 ppm, expressed as silicon dioxide [SiO2]). These concentrations result from quartz (crystalline SiO_2) dissolution from rock formations into the groundwater.

The potential for silica-scale deposition poses serious problems in water with high dissolved silica content. Personnel responsible for power plants, evaporative cooling systems, semiconductor manufacturing and geothermal systems must monitor water silica levels very closely.

Silica precipitation/deposition frequently is encountered in evaporative cooling systems, where salt concentrations increase through partial evaporation of the cooling water. Silica solubility in water generally is 150 ppm to 180 ppm, depending on water chemistry and temperature. This imposes severe limits on water users, leading either to operation at very low cycles of concentration and consuming enormous amounts of water, or to use of chemical water treatment techniques that prevent silica-scale formation and deposition.

Silica speciation and deposition

Silica-scale formation is a highly complex process. It is usually favored at a pH of less than 8.5, whereas magnesium silicate scale forms at a pH of more than 8.5. Data suggest silica solubility is largely independent of pH in the range of 6 to 8. Silica exhibits normal solubility characteristics, which increase proportionally to temperature. In contrast, magnesium silicate exhibits inverse solubility.

Operation in a high-pH regime is not necessarily a solution for combating silica scale. Water system operators must take into account the presence of magnesium (Mg^{2+}) and other scaling ions such as calcium (Ca^{2+}). A pH adjustment to greater than 8.5 might result in massive precipitation of magnesium silicate if high levels of Mg^{2+} are present or in calcium carbonate ($CaCO_3$)or calcium phosphate if high levels of these ions are overlooked.

Mechanism of silica-scale inhibition

Silica polymerization is governed largely by pH. Unfortunately, silica is a foulant not easily cured through pH adjustments. For example, $CaCO_3$ scale virtually can be eliminated if a cooling tower system is operated at a lower pH. With water containing a high concentration of silica, operation at a higher pH generates the problem of magnesium silicate scale. Lowering the pH (by feeding acid) does not eliminate the problem; it just shifts it from magnesium silicate to silica.

A low operational pH also increases the corrosion rates of metallic surfaces, ultimately leading to material failure. Silica solubility is very high at a pH greater than10, but this pH regime is not an operational option for cooling tower systems.

Silica is an undesirable scale for several reasons. It severely impedes heat transfer. It is tenacious and costly (and potentially hazardous) to remove. It is extremely prone to co-precipitation with other scales, particularly iron (hydr)oxides. It is often the limiting factor for limiting high cycles of concentration.

The amorphous character of silica deposits precludes the use of conventional crystal modification technologies. Molecules such as phosphonates that are effective mineral-scale threshold inhibitors provide virtually no benefit for silica-scale inhibition. They provide only an indirect benefit by maintaining a cooling tower free of other deposits that can act as precipitation nuclei for silica or catalyze silica precipitation in the bulk.

The solution of a silica problem might require non-conventional means. Several factors, unique to the individual system, must be taken into consideration. These factors include water chemistry (presence of other scaling ions), nature of the silica (colloidal and/or reactive) in the make-up water, target cycles of concentration (need for water conservation), feasibility of mechanical silica removal (filtration and softening), capital costs (for chemicals and/or equipment) and many others. Careful selection of a general scale treatment program, combined with a silica-scale inhibitor and/or dispersant, is a good starting point for attaining a silica deposit-free cooling water system.

Figure 1: Raw Water Silica Levels – Actual vs. Design

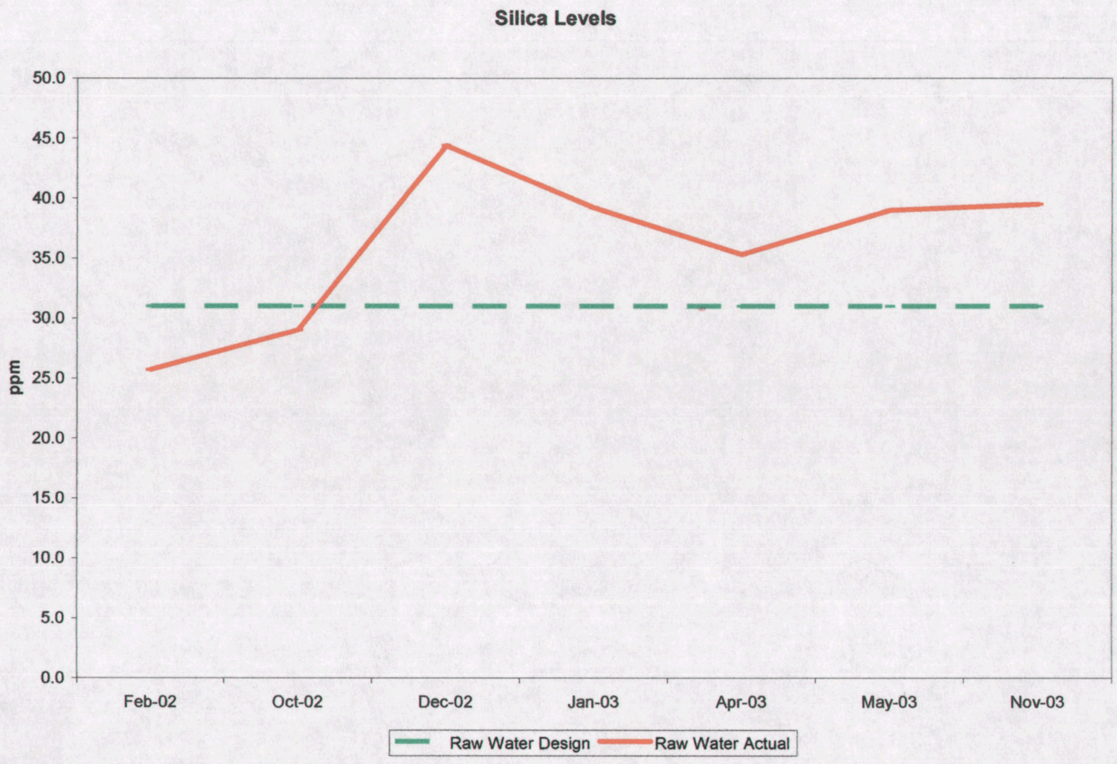

Figure 2. Pretreated Water Silica Levels – Actual vs. Design

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February 25, 2004

Gordon Wahl
Arizona Department of Water Resources
Phoenix Active Management Area
500 N. Third Street
Phoenix, AZ 85004

Re: Mesquite Generating Station – Summary of Proposed Water Pretreatment System Modifications

Dear Mr. Wahl:

In response to our telephone discussion on February 23, 2004, I have prepared a description of Mesquite Generating Station's current strategy for addressing the water quality issues limiting achievement of 15 cycles of concentration in the cooling tower. The various activities described below will be implemented immediately. However, please note that a staged implementation is planned which will allow detailed analysis of each activity. This staged implementation will ensure that each change to the water pretreatement system is optimized for reliable and long term performance.

Water Pretreatment System Modifications

A new vendor, Water Consultants & Laboratories, Inc., was recently awarded the contract to provide Water Pretreatment services at Mesquite Power. The following outlines the proposed changes that will be made to the Water Pretreatment System over the next several weeks, and the expected impact to the cooling tower make-up water:

- Inspect, characterize, and optimize groundwater wells.
  - Full characterization of the wells will be performed by the Service Vendor. This includes on and off-site laboratory testing during peak and off-peak flow demand periods. Information gathered from this analysis will be used to optimize pretreatment options described below.

- Improve cold lime softening process:
  - Change introduction point of Ferric Sulfate feed into Raw Water influent (clarifiers) to a more "upstream" location. Residence time of the chemicals used to precipitate silica from the Clarifiers is minimal by design. The current injection points of Ferric, MagO2, Lime, and coagulant are all physically within three feet of each other. New Ferric Sulfate testing points will be made at inlet and outlet of Raw Water discharge pumps to increase residence time of the Ferric compound (flocculant).

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- Replace Nalclear 7763 with an Anionic Polyacrylamide coalgulant. The groundwater at Mesquite Power is relatively high in alkalinity but low in turbidity, making the Ferric/Polyacrylamide solution ideal in reducing up to 50% of the silica in the incoming water. With a new Ferric injection point and a much longer residence time, the reaction of these two chemicals prior to the Clarifier is expected to greatly improve the precipitation of silica in the Clarifier reaction zone.
- Install a Static Mixer at each Clarifier inlet. These mixers will be an integral component of the inlet piping and will act as the primary mixing apparatus for Ferric Sulfate, coagulant, and the groundwater. The result of using these mixers will be a shortened mix time of the colloidal particles and a reduction in the amount of chemical needed for the clarifying process.
- Introduction of a Bioaugmentation, non-bacteria culture compound in the influent piping to each Raw Water tank. This chemical has the effect of further improving the silica reduction (and removal of organic salts) before Ferric Sulfate is injected but will not drop out of solution until activated in the Clarifier reaction zone.

Cooling Tower System Modifications

A new vendor, GE Water Technologies, was recently awarded the contract to provide Cooling Tower treatment services at Mesquite Power. The following outlines the monitoring and treatment program effective immediately:

- Introduction of Powerline 369190 to the cooling tower water. Powerline is an innovative silica dispersant used specifically for cooling water deposition control and is expected to maximize silica solubility at higher cycles of concentration. The insolubility of silica in the cooling tower has been the limiting factor in reaching 15 cycles of concentration to date.
- GE Water Technologies is providing the use of its Corporate Research and New Product Introduction teams during the trial period for Powerline at Mesquite Generating Station. During the introduction period, GE Water Technologies will observe and analyze performance while working with Mesquite personnel to optimize the treatment program.

Mesquite Generating Station believes the program described above will ensure positive progress toward achieving 15 cycles of concentration in the cooling towers during 2004. We invite the ADWR to visit the facility and observe these changes as they are implemented and validated.

As previously requested in our January 6, 2004 letter to you, Mesquite continues to seek an Adjustment to the Cycles of Concentration requirement in Section 6-503 of the Phoenix Third Active Management Area Plan. A written response from ADWR to our adjustment request is essential prior to March 31, 2004 in order for Mesquite to demonstrate full compliance with the AMA regulations.

Sincerely,

Merritt N. Brown
Plant Manger

MesquitePower

a Sempra Energy company

Merritt N. Brown, Plant Manager
Mesquite Power. LLC.

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July 28, 2004

Gordon Wahl
Arizona Department of Water Resources
Phoenix Active Management Area
500 N. Third Street
Phoenix, AZ 85004

Re: Mesquite Generating Station – Status Report
Groundwater Pretreatment System Modifications

Dear Mr. Wahl:

This letter is submitted as a brief status report for the modifications being implemented at Mesquite Generating Station in order to achieve 15 cycles of concentration in the cooling towers. As you know, groundwater quality issues have restricted the cooling tower cycles of concentration that could be attained with the originally installed equipment. Mesquite Power notified the ADWR in December 2003 that system modifications would be required to overcome these limitations. A strategy for addressing the water quality issues was submitted to you in February 2004. Since February, significant progress has been made on the staged implementation of these system changes. Current cooling tower cycles of concentration have improved from an average of 7 cycles to an average of 10 cycles. Additional improvements will be realized as our strategy continues to be put in service and the systems are optimized. Details of the modifications implemented to date are provided in the following discussion.

Water Pretreatment System Modifications

- Mesquite Power received approval of the Aquifer Protection Permit revisions in March 2004 that allowed the Reverse Osmosis (RO) Reject stream to be diverted directly to the evaporation ponds. Previously the RO Reject water was piped to the surge tank (the storage source for the cooling tower makeup water), increasing the silica loading in the cooling tower and adversely impacting the cycles of concentration. The modified piping was completed and the internal stream was redirected during first quarter 2004.
- A full characterization of the groundwater quality from each well was initiated and continues to date. This characterization has identified consistent differences at the various well locations. Quantifying these differences is allowing Mesquite Power to optimize the downstream water treatment systems.

- A static mixer (flocculator) was installed during the recent full plant outage on the common raw water line before the clarifiers, see Attachment A. The flocculator includes specially designed injection ports to introduce pretreatment chemicals (Ferric Sulfate, Magnesium Sulfate, Sodium Hydroxide, and coagulant) earlier in the system, improving chemical mixing and residence time. The enhanced mixing and residence time will reduce the amount of chemicals needed for the clarifying process.
- System modifications have been completed to change from using dry chemicals to liquid chemicals in the pretreatment system. Liquid chemical injection of magnesium sulfate and sodium hydroxide, in lieu of dry hydrated lime and magnesium oxide, is expected to improve performance of the clarifiers and expand the types of chemical treatment that can be used.
- The original coagulant, Nalclear 7763, was replaced with an Anionic Polyacrylamide coagulant. The new coagulant was chosen specifically to address the unique alkalinity and turbidity characteristics of the raw water. The reaction of the Anionic Polyacrylamide coagulant with the existing Ferric Sulfate injection has resulted in improved silica removal in the clarifiers.

Cooling Tower System Modifications

- A new inhibitor (Powerline NPC04) was introduced to the cooling tower water beginning in March 2004. This inhibitor improves silica solubility at higher cycles of concentration. The insolubility of silica in the cooling tower has been the limiting factor in reaching 15 cycles of concentration to date.
- Preparations have been completed for beginning a beta test of a high performance inhibitor to raise the allowable silica level in the cooling tower even further. Mesquite Generating Station is one of only three sites selected by GE Water Technologies where this treatment system is being tested.

Upcoming Activities

Additional water treatment system changes are planned to continue increasing the cooling tower cycles of concentration to the levels described in the Phoenix Third Active Management Area requirements. Upcoming activities include:

- A one-month test of the flocculator performance will commence at the end of July 2004. This test will include substituting dry chemical injection with liquid chemical injection as well as moving the chemical injection points much earlier in the process. Mesquite Power and the various water treatment system consultants will document the system performance and refine the treatment strategy during the testing phase.
- Beta testing of the proprietary high performance inhibitor will be initiated in August, 2004. Once in service, the inhibitor performance will be monitored and the cooling tower chemicals will be optimized to maximize the cycles of concentration.
- An innovative bioaugmentation process, Purefloc, will be initiated in early 2005. The Purefloc process is tailored to alter the molecular structure of the soluble silica in the

raw water, increasing the actual particle size. The increased particle size will facilitate silica removal in the clarifier with less chemical addition. The proprietary technology is the first of its kind and Mesquite Generating Station is the first power plant to implement the program. A secondary benefit expected from the Purefloc process will be a quantifiable reduction in sludge generation and disposal.

We appreciate the ADWR's cooperation throughout this process of characterizing, designing, and implementing the water pretreatment system improvements at Mesquite Generating Station. As indicated by the increase from 7 to approximately 10 cycles of concentration in the cooling towers, positive progress is being achieved. We invite the ADWR to visit the facility and observe the new systems as the optimization process continues.

Sincerely,

Merritt N. Brown
Plant Manager

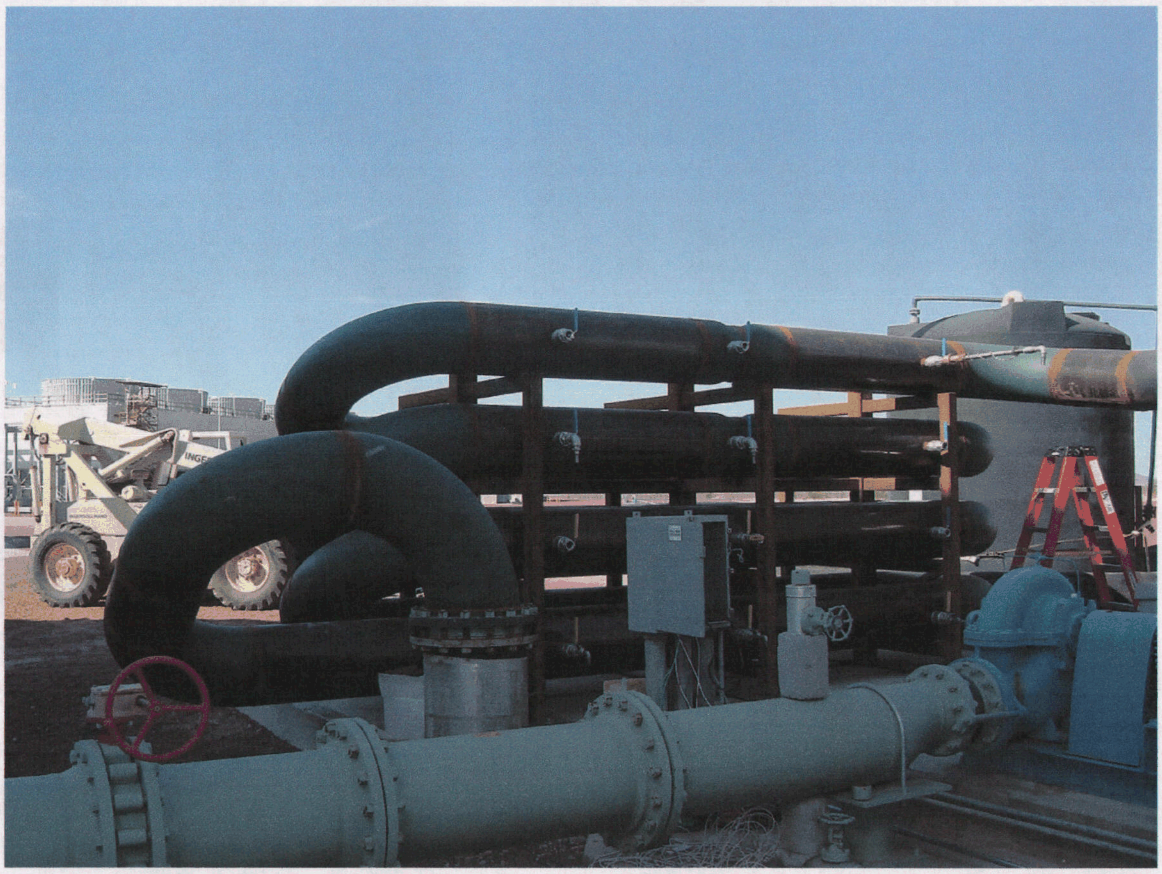
cc: K. Rose
M. Teague
R. Carter
A. Abreu

ATTACHMENT A

(Photodocumentation of System Enhancements)

Mr. Gordon Wahl
ADWR

July 28, 2004



Static Mixer (Flocculator) installed on raw water line at inlet to clarifiers.
Note ports for liquid chemical injection.

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January 14, 2005

Gordon Wahl
Arizona Department of Water Resources
Phoenix Active Management Area
500 N. Third Street
Phoenix, AZ 85004

Re: Mesquite Generating Station – Status Report No. 2
Groundwater Pretreatment System Modifications

Dear Mr. Wahl:

This letter is submitted as a periodic status report for the modifications being implemented at Mesquite Generating Station in order to achieve 15 cycles of concentration in the cooling towers. As the ADWR is aware, groundwater quality issues have restricted the cooling tower cycles of concentration that could be attained with the originally installed equipment. In particular, operational silica levels are substantially higher than the test levels on which the original water treatment system design was based. Since Mesquite Power initially notified the ADWR in December 2003, significant progress has been made on researching, testing, and optimizing the strategy to overcome the limitations. Currently an average of 10 cycles of concentration, as measured by conductivity, has been achieved and maintained for 2004 with potential for additional increases during 2005. This is a marked improvement over the 2003 annual average of 7 cycles. Details of the modifications implemented since the date of our last status report (July 28, 2004), as well as a description of the further efforts planned, are provided in the following discussion.

Water Pretreatment System Modifications

- Initial testing of liquid chemical injection and flocculator performance commenced on July 31, 2004 (Figure 1). This testing included substituting dry chemical injection with liquid chemical injection, as well as moving the chemical injection points much earlier in the process. System performance was documented during approximately 120 days of operation. The liquid chemical injection (Magnesium Sulfate, Sodium Hydroxide, and Ferric Sulfate) provided no measurable change in clarifier performance over dry chemical injection. Further testing of liquid chemical injection was discontinued prior to the November 2004 scheduled outage.

- Additional piping changes were implemented throughout the year to improve the water pretreatment process. These included clarifier cross-connections and bypasses to eliminate undesirable carry-over of chemicals into the cooling towers (Figure 2).
- A preliminary trial of a unique bio-augmentation process, Purefloc, was conducted during 3rd Quarter 2004. Purefloc™ D was first introduced into the system on September 27th; Purefloc™ E was injected on October 24th; and Purefloc™ F was put in use on October 27th. The bio-augmentation process requires culturing increasingly site-specific bacteria to achieve measurable system benefits (Figure 3). Preliminary results are inconclusive at this point. The Purefloc development process will continue in early 2005.
- Equipment installation and commissioning was completed to support testing of an alternative liquid chemical pretreatment process using Calcium Hydroxide/Magnesium Hydroxide slurry. This slurry will be injected upstream of the clarifiers in the flocculator tube (Figure 4). The slurry solution will be similar to the original cold lime softening process, but will have the added benefit of using purely hydrated compounds. Previously, these pretreatment chemicals were batch-mixed on-site and slaked directly into the clarifier units with minimal chemical reaction time.

Cooling Tower System Modifications

- The use of an improved silica inhibitor (Powerline NPC04) in the cooling tower water is continuing and has been a critical factor in achieving 10 cycles of concentration during 2004. This inhibitor improves silica solubility at higher cycles of concentration. In addition, a new chemical added to the cooling tower in 2004 supplements the silica inhibitor by specifically minimizing calcium sulfate drop-out.
- A detailed test protocol has been prepared to begin beta testing of a high performance inhibitor (Betz DE 20121) designed to raise the allowable silica level in the cooling tower even further. The test protocol requires at least four weeks of stable operation to quantify the effect of the product. Earlier investigation of the high performance inhibitor was delayed due to the instability of the pre-treatment system and a facility shutdown during 4th Quarter 2004.

Further Efforts

The extensive preparations and initial testing completed during 3rd and 4th Quarter 2004 are the foundation of the further efforts planned to achieve 15 cycles of concentration. Activities planned for 2005 include the following:

- Hydrated lime/magnesium hydroxide slurry injection testing will begin in early 2005. Results of the slurry injection will be documented and the system parameters will be refined to quantify the benefit of upstream injection of the pre-treatment chemicals.
- Beta testing of the high performance silica inhibitor has been scheduled for 1st Quarter 2005, when a four week period of stable operation is anticipated. Once in service, the inhibitor performance will be monitored and the cooling tower chemicals will be optimized to maximize the cycles of concentration.

- Development of the Purefloc bio-augmentation process will continue in 2005 as stability is gained in the pretreatment system.
- Depending upon the results achieved by the above efforts, additional measures may be evaluated, such as further modifications to chemical programs, further modifications to existing equipment, and/or major system additions (e.g., addition of clarifier capacity to increase residence time, installation of side-stream treatment to remove silica from the cooling tower circulating water, etc.).

We appreciate the ADWR's cooperation throughout this on-going process of researching and testing various water pretreatment system improvements at Mesquite Generating Station. As indicated by the increase from an annual average of 7 to 10 cycles of concentration in the cooling towers, progress is being achieved. We welcome an opportunity to meet with you again and discuss our strategy for 2005. Please do not hesitate to contact me if you have any questions or need additional information.

Sincerely,

Merritt N. Brown
Plant Manager

cc: K. Rose
M. Teague
R. Carter
A. Abreu

ATTACHMENT A

(Photodocumentation of System Enhancements)

Figure 1. Liquid chemical injection and clarifier systems.

Figure 2. Piping improvements made throughout pretreatment system.

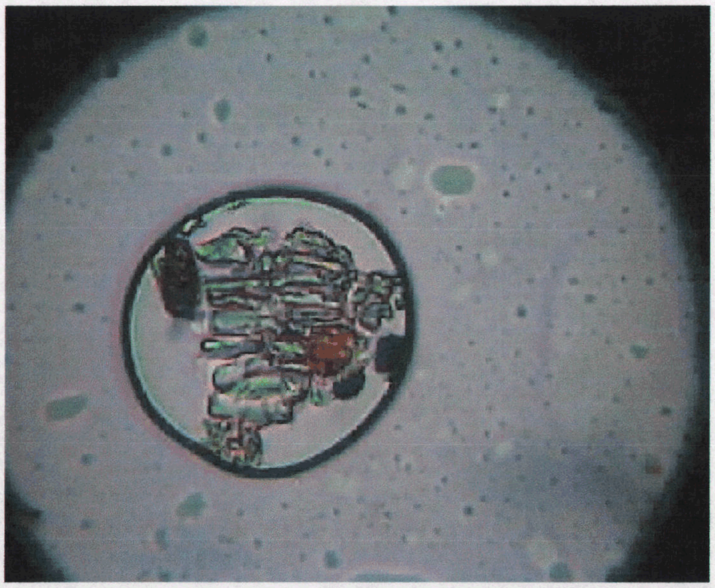

Figure 3. Purefloc bio-augmentation culture specific to Mesquite Power.

Figure 4. Slurry injection point in the flocculator tube.

Mesquite Power
A SEMPRA ENERGY DEVELOPMENT

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March 25, 2004

Arizona Department of Water Resources
Phoenix Active Management Area
500 N. 3rd St.
Phoenix, AZ 85004

Re: 2003 Annual Report

Dear Sir / Madam:

Attached is the Mesquite Power, LLC Annual Report required by the Phoenix Active Management Area (AMA) Third Management Plan, Section 6.5 - Large-Scale Power Plants, for the Mesquite Generating Station located in Arlington, AZ.

The Mesquite Generating Station (MGS) is a natural gas fired combined-cycle electric generating facility consisting of two power blocks. Each power block has a nominal 625 MW power output and consists of two gas turbines and a steam turbine. Two 60,000 ton cooling towers, one dedicated to each power block, provide cooling water for the steam system and auxiliary equipment.

The construction of MGS was performed in two phases. Power Block 1, its associated cooling tower (CT 1), and the water treatment equipment were commissioned in May, 2003 and became fully operational on June 1, 2003. Power Block 2 and its associated cooling tower (CT 2) became fully operational on December 4, 2003. During the commissioning process it was evident that the designed raw water pretreatment system was inadequate in reducing some of the undesirable elements, particularly silica, to levels necessary for safe and reliable use in the cooling tower. Further investigation found that the existing groundwater silica levels are significantly higher than those initially measured and used to design the system.

To prevent equipment damage, silica has become the conservative mineral constituent used to determine cycles of concentration. This is reflected in the attached report in which silica concentration is reported in lieu of TDS for the makeup and blowdown streams.

Mesquite Power and the ADWR are actively working together to resolve this water quality issue as it impacts the cycles of concentration in the cooling towers. MGS representatives met with Mr. Gordon Wahl, Arizona Department of Water Resources (ADWR) Water Resource Specialist, and subsequently, MGS submitted several letters to the ADWR describing the root cause of the issue, attempted remedial actions and a strategy of system refinements and optimization that is being implemented. By letter dated March 2, 2004, the ADWR expressed its support for MGS' proposed resolution to the pretreatment system limitations, and assured MGS that the ADWR does not intend to take action against MGS regarding this issue for 2003.

MGS supports the objectives of the Phoenix AMA Third Management Plan and appreciates the ADWR's assistance in working through this plant start-up issue. Please contact me if you have any questions regarding the enclosed information.

Sincerely,

Steven L. Perrizo
Plant Engineer

MesquitePower
A SEMPRA ENERGY DEVELOPMENT

PHOENIX AMA - THIRD MANAGEMENT PLAN ANNUAL REPORT

Mesquite Power, LLC
Arlington, AZ

Large-Scale Power Plant

Reporting Year: 2003

	CT #1	CT #2
Cooling capacity (tons):	60,000	60,000

Estimated water for other than electrical generation: 10,000,000 gal. Primarily construction

Makeup water source: Wells (5)

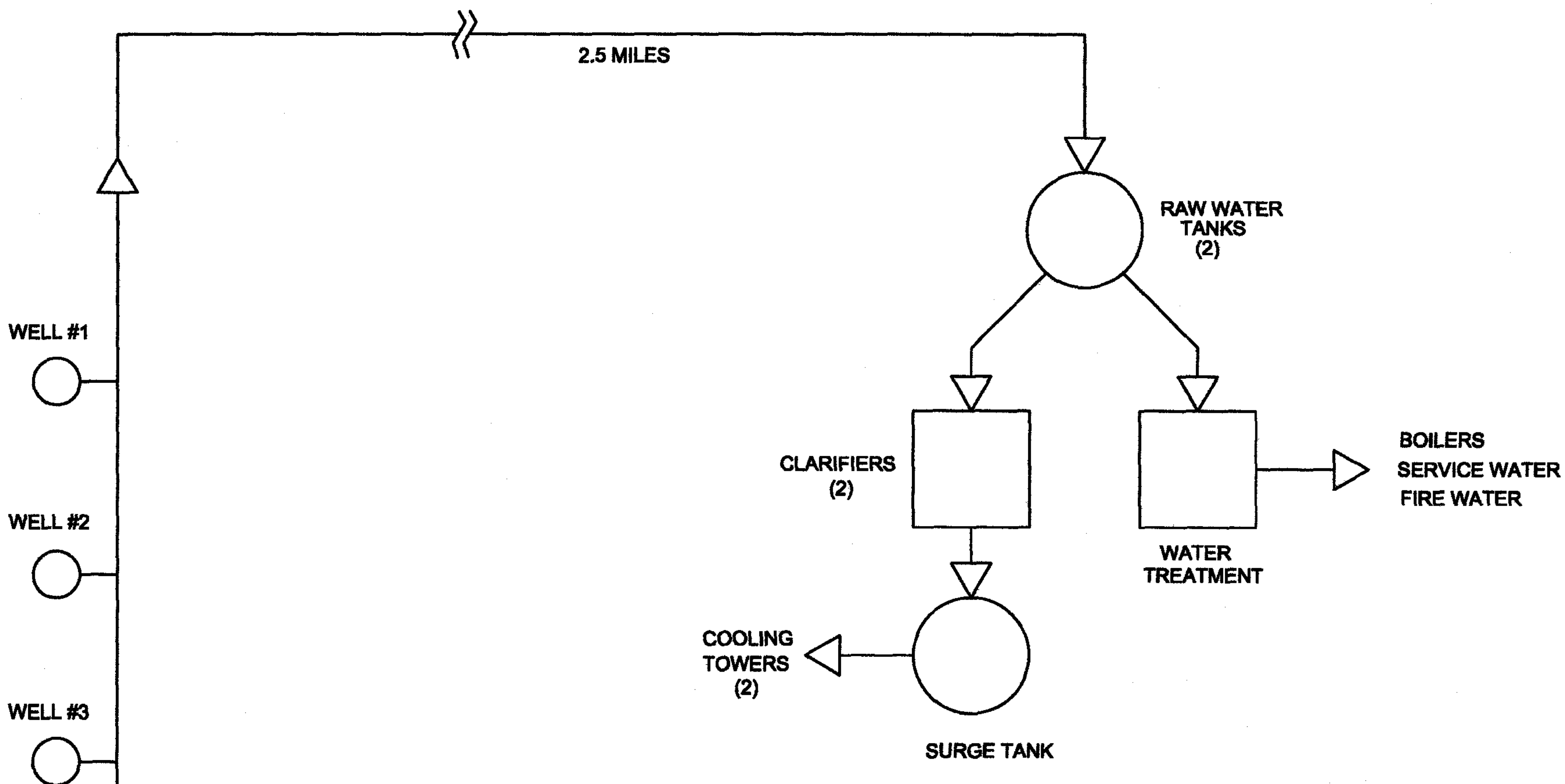
Frequency of use of each cooling tower: Whenever turbines of associated power block are operating

COOLING TOWER #1

Month	Blowdown water discharged (gal)	Makeup water used (gal)	Blowdown water Silica (mg/L)	Makeup water Silica (mg/L)	Days not producing electricity	Amount of electricity generated (MW)
January	---	---	---	---	---	---
February	---	---	---	---	---	---
March	---	---	---	---	---	---
April	---	---	---	---	---	---
May	---	---	---	---	---	---
June	20,042,976	77,902,106	90.3	25.2	2.1	236,871
July	11,448,358	100,468,432	148.9	24.2	1.8	336,526
August	12,208,792	79,618,128	122.1	24.5	6.4	257,252
September	11,136,056	82,885,632	142.7	26.3	3.2	276,500
October	8,085,395	25,385,837	110.9	26.9	16.3	127,153
November	12,435,722	45,553,176	109.9	20.2	0.0	304,423
December	6,301,714	43,897,128	142.8	23.9	0.0	327,069

COOLING TOWER #2

Month	Blowdown water discharged (gal)	Makeup water used (gal)	Blowdown water Silica (mg/L)	Makeup water Silica (mg/L)	Days not producing electricity	Amount of electricity generated (MW)
January	---	---	---	---	---	---
February	---	---	---	---	---	---
March	---	---	---	---	---	---
April	---	---	---	---	---	---
May	---	---	---	---	---	---
June	---	---	---	---	---	---
July	---	---	---	---	---	---
August	---	---	---	---	---	---
September	---	---	---	---	---	---
October	---	---	---	---	---	---
November	---	---	---	---	---	---
December	3,088,356	21,901,400	119.3	23.9	13.8	137,331



MESQUITE GENERATING STATION
RAW WATER FLOW DIAGRAM

37625 W. ELLIOT ROAD
ARLINGTON, AZ 85322

ATTACHMENT 3
Noise Test Reports

Noise Emissions Performance Test Report

Block 1 Combined Cycle
Mesquite Generating Station
Mesquite Power, LLC
Maricopa County, Arizona

BVZ Project 065162.0295
July 9, 2003

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Executive Summary

Noise emissions performance testing for Block 1 (during combined cycle generation) at the Mesquite Generating Station (Mesquite) was completed May 18 through May 20, 2003. The testing was conducted in accordance with the Noise Emissions Test Procedure (dated May 7, 2003) developed and agreed upon for Mesquite. The test results are summarized below.

In-plant sound pressure level measurements were conducted throughout the facility and those areas that experience sound levels above 85 dBA during normal operation have been identified herein. Any of these areas that may be normally occupied by a worker (specifically for more than 8 hours) should be posted with hearing protection warning signs in order to support compliance with OSHA worker noise exposure limits.

The cooling tower, circulating water pump and motor assembly, boiler feed pump and motor assembly, condensate pump and motor assembly, and closed cycle cooling water pump and motor assembly do not exceed their expected near-field equipment sound level. Measurement uncertainties prescribed in ISO 6190 have been included, as appropriate.

1.0 Introduction

Noise emissions performance testing for Block 1 at Mesquite was completed May 18 through May 20, 2003. The testing was conducted in accordance with the Noise Emissions Test Procedure (dated May 7, 2003). The noise emissions performance testing was conducted to confirm the following:

1. The location of all areas that experience sound pressure levels exceeding 85 dBA during normal operation. These areas shall be equipped with warning signs requiring hearing protection.

2. The average A-weighted near-field sound pressure levels of the cooling tower, circulating water pump and motor assembly, boiler feed pump and motor assembly, condensate pump and motor assembly, and closed cycle cooling water pump and motor assembly.

In addition and for informational purposes, sound level measurements were taken to quantify the following:

1. The A-weighted sound level (L_{90}) at five property boundary locations.

2. Indoor sounds levels (L_{90}) during operation of the Block 1 within the administration/control room building, the water treatment building, CT1 and CT2 generator enclosures, and the ST enclosures.

2.0 Contractual Requirements

The noise emission performance guarantees are set forth in Section 4 of Exhibit I of the Contract and are also included in Section 2 of the Noise Emissions Test Procedure.

3.0 Instrumentation and Personnel

3.1 Sound Level Meter

All sound level measurements were conducted using the test equipment listed in Table 1. The sound level meter is a Type 1 meter and meets the requirements of ANSI S1.4. All test equipment has been laboratory calibrated within the last 3 months. All equipment calibration certificates are included in Appendix A.

Table 1

Noise Emissions Test Equipment

Equipment	Serial Number	Laboratory Calibration Date
CEL-393 Sound Level Meter (Type 1)	112835	04/09/2003
CEL-177 Acoustical Calibrator	558038	04/09/2003

3.2 Field Calibration

The sound level meter was field calibrated immediately before and after each measurement series. The change in calibration level was less than 0.5 dB and supports a valid test.

3.3 Personnel

The noise emissions performance testing was conducted by Brian Klausner of BVZ and was witnessed by Jim Defoe, representing the owner. However, Mr. Defoe was not present during the background measurement (5/18/03) period or the cooling tower measurement period (5/19/03). Qualification and experience information for Mr. Klausner is provided in Appendix D of this report.

4.0 General Measurement Conditions

4.1 Facility Operation

During all operational sound level measurements, the facility was operating at full load (approximately 500 MW) under normal steady state conditions. The noise emissions performance testing was conducted simultaneously with the scheduled Base Load Performance Test.

4.2 Atmospheric Conditions

Weather conditions included clear skies with the ambient temperature at approximately 71 deg F and relative humidity about 20% during the Base Load Performance Test.

5.0 In-Plant Sound Levels

In-plant sound pressure level measurements were conducted throughout the facility to identify those areas that experience sound levels above 85 dBA during normal operation. These areas have been identified on the drawings included in Appendix B and are summarized below. Any of the areas described below that may be normally occupied by a worker shall be posted with hearing protection warning signs in order to support compliance with OSHA worker noise exposure limits. The signs shall be posted by BVZ.

- Areas adjacent to the HRSG packages. Particularly those ground level areas near the boiler feed pumps, the HRSG re-circulating pumps, and the ammonia injection skids.
- Areas adjacent to the CTG packages. Particularly those near the generators, between the generator and the turbine compartments, on the CTG platform near the corner between CTG accessory modules and the combustion turbine compartments. Also all areas within the CTG enclosures.
- Areas on the operating floor near the steam turbine generator and all areas within the STG enclosures. Areas on the STG mezzanine levels underneath the steam turbine generator and adjacent to the condenser. Ground level areas near the condensate pumps, the condenser vacuum pumps, the closed cycle cooling water pumps, and the steam turbine lube oil skid.
- Areas around the ground level of the cooling tower, the circulating water pump deck, and the fan deck near the fan motors.
- All stairway entries leading to above-ground platforms around the major equipment.
- All areas inside the water treatment building, especially the areas closest to the pumps located within the building.

In addition to the drawings, Appendix B also includes the measurement data in a tabular format. It is important to note that the table in Appendix B includes only those measurements representative of the equipment envelope. As such, the drawings may include measurement points that were taken to identify the 85 dBA contours but are not included in the equipment envelope spatial average.

As requested, drawings depicting the potential sound levels during simultaneous operation of various pumps have been included in Appendix C. These have been included for informational purposes at the request of SER.

6.0 Property Boundary Sound Levels

6.1 Measurement Locations

Sound level measurements were conducted at the property boundary locations indicated in Figure 1. The exact locations were previously identified and agreed to in the Test Procedure. In addition to the previously identified locations, one additional measurement location was added during the survey. The microphone was positioned approximately 1.5 meters (5 ft) above the ground for all measurements.

6.2 Property Boundary Measurement Results

The sound level measurements included the A-weighted equivalent-continuous sound level, L_{90}, as specified in the Noise Emissions Test Procedure. The duration of each measurement was a minimum of 60 seconds in order to capture a representative sound level at the measurement location. All sound level measurements were recorded during a period of minimal background influence, e.g. between vehicle passes, as much as possible. The sound levels recorded during operation of the facility are summarized in Table 2.

Table 2

Sound Pressure Levels at the Prescribed Property Boundary Locations.

Location	Measured Operational Sound Pressure Level[1] at the Measurement Location, L_{90}
1	55.0 dBA
2	60.5 dBA
3	52.5 dBA
4	53.5 dBA
5[2]	62.5 dBA

NOTE

1. These results do not include background corrections since the operational measurements did not exceed the maximum expected levels despite the background noise.
2. Measurement location 5 was added during the survey. The sound level at this location was dominated by substation noise emissions.

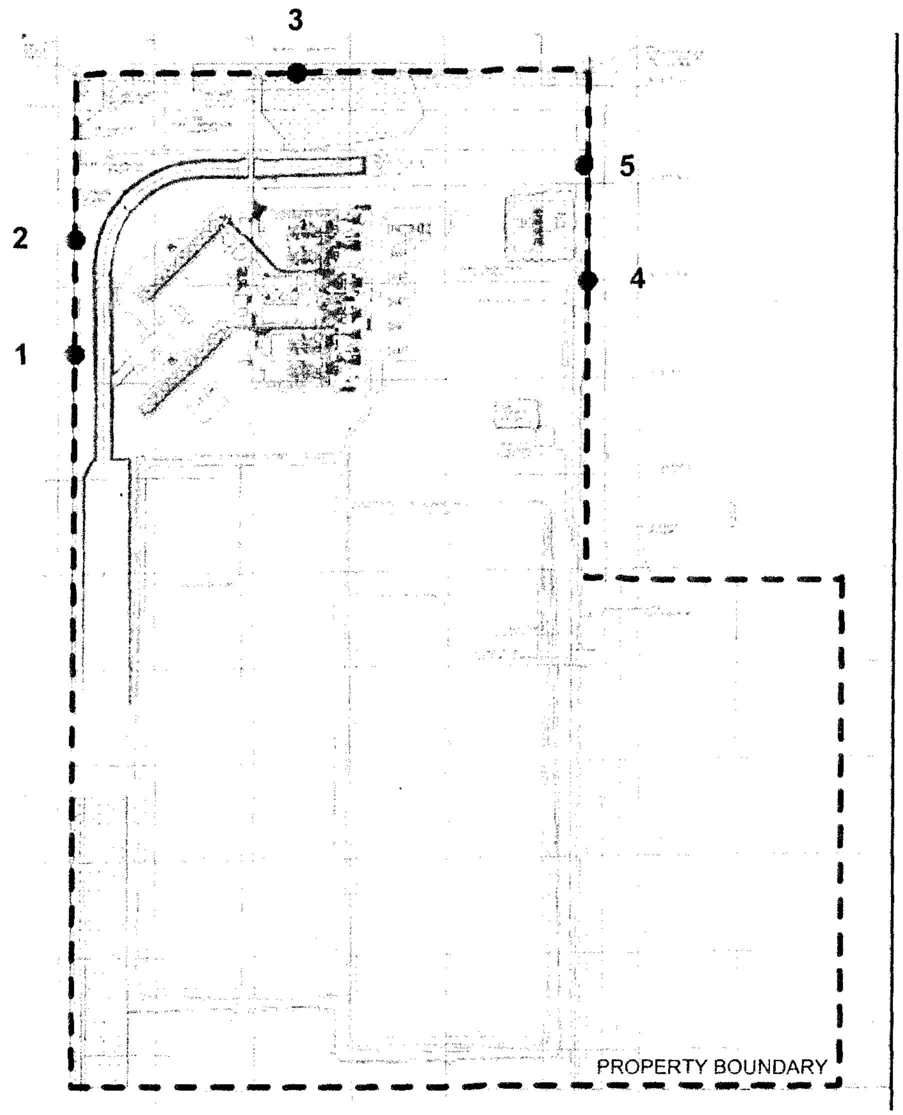

Figure 1

Property Boundary Sound Level Measurements

7.0 Indoor Sound Levels

7.1 Measurement Locations

Sound level measurements were conducted at locations within the control room and administration areas to determine the noise levels due to operating Block 1 at base load. At this time, there is no contractual agreement regarding noise levels associated with the operation of Block 1 only. The contractual agreement includes operating Blocks 1 and 2 simultaneously. As such, the measurement data provided here is for informational purposes only. Measurements were conducted at locations where personnel are normally positioned.

In addition to the normally occupied areas, measurements were also taken within buildings and equipment enclosures that are accessible by personnel. These areas included the combustion turbine generator enclosures, the steam turbine enclosure, and the water treatment building.

7.2 Measurement Parameters

The sound level measurements included the A-weighted 90-percentile exceedance sound level, L_{90}, as prescribed in the test procedure. All measurement durations were a minimum of 15 seconds.

7.3 Measurement Results

The results of the sound level measurements for normally occupied spaces are listed in Table 3. As shown, the average sound levels in these spaces were less than 55 dBA without any correction for background noise. As such, the indoor sound levels were not corrected for background noise since the measured sound levels during operation of Block 1 are below the the contractual limit of 55 dBA.

Table 3

Indoor Sound Level Measurements

Area[1]	Measured Sound Pressure Level[2], dBA			Avg
Kitchen/Lunch Room (304)	48.0	46.0	47.0	47.0
Control Room (312)	55.0	52.0		53.5
Conference Room (318)	42.5	43.0		42.8
Reception Area (324)	40.5	41.0		40.8
Office (310)	54.0			54.0
Office (320)	44.0			44.0
Office (321)	40.5			40.5
Offices (326-331)	Locked/No access			N/A
Library (319)	40.5			40.5

NOTES
1. See Drawing 065162-CBSD-A4301 for identification of the areas listed. Numbers listed in parentheses correspond to identification numbers on the referenced drawings.
2. Includes background noise not associated with Block 1 (e.g., computers, HVAC, etc).

The results of the sound level measurements for areas that are not normally occupied are listed in Tables 4 and 5. As shown, areas within the equipment enclosures experience sound levels above 85 dBA. In addition, some areas within the water treatment building experience sound levels that exceed 85 dBA. These areas shall be posted with hearing protection warning signs in order to support compliance with OSHA worker noise exposure limits. The signs shall be posted by BVZ.

Table 4

Sound Level Measurements within Enclosures

Enclosure	Measured Sound Pressure Level, dBA				Avg
CT1 Generator Enclosure	99.3		100.4		99.9
CT2 Generator Enclosure	98.2		98.7		98.5
HP Steam Turbine Enclosure	89.4		85.6		87.5
LP Steam Turbine Enclosure	84.3	84.8	98.4	100.3	92.0

Table 5

Sound Level Measurements within Water Treatment Building

Water Treatment Building	Measured Sound Pressure Level, dBA
Near line filter units	79.5
Near brackish water RO trains	82.5
Near BW RO pump skid	90.5
Near door to electrical room	75.0

Appendix A – Test Equipment Calibration

CERTIFICATE OF CALIBRATION

Certificate # 057655

Equipment Information

Model No.: CEL - 393
Serial No.: 112835
Manufacturer: CEL INSTRUMENTS

Calibration References

Casella USA hereby certifies that the above listed sound measuring instrument has been tested according to the manufacturer's specifications and meets the requirements of the relevant American National Standards Institute (ANSI) Standard for Sound Level Meters S1.4 Type 1 - 1983.

Calibration Information

This instrument was calibrated against standards which are either traceable to the National Institute of Standards and Technology (NIST) or they have been derived by approved ratio techniques.

Sound Pressure Acoustic Calibration Results

The data represents the response of the sound level meter to the reference source corrected for atmospheric conditions at the time of calibration.

	Nominal Value	Tolerance	As Received	As Adjusted
Level (dB)	113.1	±0.7	122.8	113.1

Note: Nominal Value reflects calibration with a CEL-177 and a ½ inch adapter.

Atmospheric Conditions

Temperature: 23 °C
Relative Humidity: 26 %
Static Pressure: 1022 mbar

Calibrated by: John J Brown
Service Engineer
Date: 4/9/03 Calibration Due: 4/9/04

Casella USA

17 Old Nashua Road #15
Amherst, NH 03031
Email Service@CasellaUSA.com

Tel: 800-366-2966
603-672-0031
FAX: 603-672-8053

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CASELLA USA

CERTIFICATE OF CALIBRATION

Certificate # 057564

Equipment Information

Model No.:	CEL - 177
Serial No.:	558038
Manufacturer:	CEL INSTRUMENTS

Calibration References

Casella USA hereby certifies that the above listed instrument has been tested according to the manufacturer's specifications and meets the requirements of the relevant American National Standards Institute (ANSI) Standard for Sound Calibrators S1.40 - 1984

Calibration Information

This instrument was calibrated against standards which are either traceable to the National Institute of Standards and Technology (NIST) or they have been derived by approved ratio techniques.

Sound Pressure Calibration Results

The data represents the Sound Pressure level and the Frequency of the calibrator corrected for atmospheric conditions at the time of calibration.

	Nominal Value	Tolerance	As Received	As Adjusted
Frequency (Hz)	1,000	±5.0	1006.4	1000.1
Level (dB)	113.10	±0.5	112.4	113.1
Voltage (mV)	100.0	±2.0	100.5	100.0

Note: Nominal Value reflects a ½ inch adapter.

Atmospheric Conditions

Temperature:	23	°C
Relative Humidity:	26	%
Static Pressure:	1022	mbar

Calibrated by: John G. Brown Date: 4/9/03 Calibration Due: 4/9/04
Service Engineer

Casella USA
17 Old Nashua Road #15
Amherst, NH 03031
Email Service@CasellaUSA.com
Tel: 800-366-2966
603-672-0031
FAX: 603-672-8053

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Appendix B – Near-Field and In-Plant Measurements

Field Data and Calculations
2x1 Combined Cycle Configuration - Block 1 of 2

Output : 504 MW
CT-101 : 166 MW
CT-201 : 167 MW
STG : 171 MW

Pre-Test CAL : 112.7
Post-Test CAL : 112.8

SLM : CEL-393

Measured A-Weighted Sound Pressure Level (SPL) along Equipment Envelope of Each Component.

	Unit 1				Unit 2				STG Package						Cooling Tower	
	CTG Pkg	HRSG	BFP	Main Xfmr	CTG Pkg	HRSG	BFP	Main Xfmr	Operating Floor	Mezzanine Floor	Ground Floor	Main Xfmr	CCCW Pmp	COND Pump	Tower Cells	CWP
	OUTDOOR	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*INDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*
	78.5	79.4	89.3	73.7	81.3	79.9	90.5	78.1	79.8	84.6	82.4	82.1	90.8	87.8	84.9	93.8
	79.3	78.2	87.5	84.6	80.5	79.1	87.4	85.1	78.0	89.6	81.7	84.5	90.6	86.6	86.3	91.3
	83.1	78.5	84.5	77.9	82.4	78.9	83.2	76.4	76.0	94.4	84.8	77.8	91.0	85.4	86.7	92.6
	83.6	79.7	88.8		84.2	78.8	87.9		82.5	85.9	84.7		90.4		86.3	
	85.2	81.3	88.1		86.6	81.3	88.5		85.5	84.1	82.6				87.1	
	87.8	82.8			95.8	82.9			77.9	81.6	82.2				87.4	
	94.6	83.8			92.6	85.6			73.2	81.0	84.6				87.4	
	92.4	95.4			88.7	98.3			74.4	83.1	85.3				87.5	
	85.0	83.2			83.6	84.7			75.8	85.6	85.1				87.6	
	81.5	73.9			82.9	79.9			71.6	85.9	84.1				87.6	
	80.8	76.2			79.0	83.8			71.2	85.6	86.1				87.6	
	79.1	77.8			79.9	84.9			72.2	84.1	86.9				87.3	
	77.7	78.9			81.5	84.8			74.4	83.3	86.6				87.4	
	79.8	75.0			88.9	78.6			73.8	81.4	85.3				86.9	
	90.6	74.5			85.4	79.4			74.8	80.7	82.5				86.3	
	87.1	76.7			84.8	81.6			76.6	82.0					86.3	
	83.7	79.6			83.9	82.3			74.9						86.3	
	79.1	79.9			82.9	82.4			75.1						85.9	
	79.7				84.1				76.4						86.9	
	84.5				80.9				82.4						86.3	
	79.6				79.9				84.5						86.4	
	79.2				80.6				80.6						83.3	
	73.9				80.8										86.6	
	80.3				84.6										83.1	
	85.3				85.1										86.2	
	84.1														86.8	
															87.4	
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															86.6	
															87.3	
															86.0	
															85.9	
															86.4	
															85.8	
															86.6	
Avg* SPL:	83 dBA	80 dBA	88 dBA	79 dBA	84 dBA	83 dBA	88 dBA	80 dBA	77 dBA	85 dBA	84 dBA	81 dBA	91 dBA	87 dBA	87 dBA	93 dBA
Max SPL:	95 dBA	95 dBA	89 dBA	85 dBA	96 dBA	98 dBA	91 dBA	85 dBA	86 dBA	94 dBA	87 dBA	85 dBA	91 dBA	88 dBA	88 dBA	94 dBA
Min SPL:	74 dBA	74 dBA	85 dBA	74 dBA	79 dBA	79 dBA	83 dBA	76 dBA	71 dBA	81 dBA	82 dBA	78 dBA	90 dBA	85 dBA	83 dBA	91 dBA

* Spatial average along the equipment envelope.

Appendix C – Potential Sound Emissions with Dual Pump Operation

Appendix D – Test Personnel Qualifications

BRIAN J. KLAUSNER

Acoustical Specialist

Specialization
Acoustical Design and Noise Control Engineering

Education

Bachelors, Environmental Science, University of Kansas, 1996
Masters, Environmental Science, University of Kansas, *Current*

Total Years Experience:

4

Joined B&V:

1999

Citizenship:

US

United States of America

Mr. Klausner is an acoustical specialist in the Environmental, Health and Safety Services Section of the Energy Services Division. As an acoustical specialist, he provides acoustical consulting services for projects nationwide. His responsibilities inc lude performing regulatory reviews of state and local noise regulations, conducting environmental noise surveys, preparing facility and environmental noise assessments, and designing noise mitigation. Typical studies involve evaluating noise regulations applicable to proposed projects, establishing acceptable acoustical design criteria, determining facility noise impacts, establishing noise mitigation measures, providing noise control specifications, and conducting post-construction acoustical compliance testing. In this capacity he is responsible for agency consultation, noise emission modeling and reporting, performance testing, and environmental compliance related to noise laws, ordinances, regulations, and standards. Mr. Klausner is experienced at preparing facility noise assessments, environmental noise assessments, noise emissions performance test procedures and reports, and mitigation design. Recent assignments include environmental noise impact analyses for electric power generating facilities and water treatment facilities located across the nation, including California, Oklahoma, Missouri, Wisconsin, Minnesota, Michigan, Ohio, New York, New Jersey, Georgia, and Florida. Additional assignments include reducing worker noise exposure both indoors and outdoors and addressing noise-related community complaints.

Prior to joining the acoustical consulting group at Black & Veatch, Mr. Klausner worked as an environmental scientist within Black & Veatch's Environmental Health and Safety Services group. In this position, he was responsible for developing permit applications for electric power plants and associated facilities pursuant to regulatory guidelines. His primary responsibility involved working with the licensing managers with the preparation and submittal of various permit applications and other approvals required for the construction and operation of energy generating facilities. Typical permit applications include those for EPA and state wastewater discharge permits, US Army Corps of Engineers (COE) permits, FAA Notice of Construction, and state environmental permits, including permits pursuant to California Energy Commission licensing requirements. In this capacity he was responsible for agency consultation and coordination of environmental and engineering support for document preparation and submittal. Mr. Klausner is experienced at preparing contingency plans, including facility response plans, spill prevention control and countermeasures (SPCC) plans, storm water pollution prevention (SWPP) plans for construction and operation, environmental resource permits, and major applications for certification.

Mr. Klausner is familiar with numerous state permitting, licensing, and environmental quality review processes, including those required in California, New York and Florida. Past assignments include assisting with preparing the applications for certification for three separate projects in California, ranging from 180 to 560 MW and pursuant to emergency 21-day review, 6-month review, and 12-month review processes. Additional assignments include assisting agency and engineering responses and preparing administrative hearing exhibits required by the complex Site

Certification process in Florida. Mr. Klausner was also responsible for responding to agency data requests during post-submittal technical reviews as well as being responsible for document control and production during preparation phases.

Relevant Project Experience

Hunterstown Combined Cycle Power Plant, Reliant Energy; Straban Township, Pennsylvania
2001-2002
Acoustical Specialist. The Hunterstown Project was an engineering, procurement, and construction (EPC) project in Pennsylvania. The facility is a 2-on-1 indoor natural gas-fired combined cycle power plant with heat rejection provided by a large air-cooled condenser. Acoustical design support included facility noise modeling, acoustical design / layout recommendations, and equipment sound level specifications as required to meet the local noise regulations. The local noise regulations limited the sound levels in the octave bands and required the facility be equipped with significant noise mitigation measures. These noise mitigation measures included low-noise equipment components, high performance building walls, and acoustical enclosures.

Person County Combined Cycle Power Project, Dominion Energy; Person County, North Carolina
2002
Acoustical Specialist. The Person County CCPP included a natural gas-fired combined cycle power plant proposed in a rural area of Person County, North Carolina. A facility noise assessment was conducted to support Dominion Energy's design efforts. The assessment included an environmental noise survey, predicting the facility noise emissions, evaluating potential impacts, and developing noise mitigation strategies to minimize impacts. The noise emissions associated with the proposed facility were predicted and evaluated with respect to applicable local regulations and the potential impacts on the nearest residences.

Michelson Water Reclamation Plant Power Project, Irvine Ranch Water District; Orange County, California
2002
Acoustical Specialist. MWRP Power Project included two natural gas-fired engine generator sets proposed in Irvine, California. A facility noise assessment was conducted to support Irvine Ranch Water District's permitting efforts pursuant to California Environmental Quality Act (CEQA) and the City of Irvine Noise Ordinance requirements. The assessment included predicting the facility noise emissions, evaluating potential impacts, and developing noise mitigation strategies to minimize impacts.

Hickman County Combined Cycle Power Project, Dominion Energy; Hickman County, Tennessee
2001
Acoustical Specialist. The Hickman County CCPP included a natural gas-fired combined cycle power plant proposed in a rural area of Hickman County, Tennessee. A facility noise assessment was conducted to support Dominion Energy's design efforts. The assessment included an environmental noise survey, predicting the facility noise emissions, evaluating potential impacts, and developing noise mitigation strategies to minimize impacts. The noise emissions associated with the proposed facility were predicted and evaluated with respect to applicable local regulations and the potential impacts on the nearest residences.

Kickapoo and Tazewell Substations, CILCO; Logan County, Illinois
2002
Project Acoustical Specialist. The Kickapoo and Tazewell Substations include diesel powered engine generators designed to provide electrical power during peak energy demand. A sound level survey was conducted at each substation site during operation of the engine generators to assess compliance with State of Illinois noise regulations, including octave band limits. A facility sound level survey report was developed and mitigation strategies were designed to minimize the noise impacts associated with each of the two substations.

Richmond Combined Cycle Power Plant, Newport Energy; Richmond County, North Carolina
2001
Acoustical Specialist. The Richmond CCPP included a natural gas-fired combined cycle power plant proposed in a rural area of Richmond County, North Carolina. A facility noise assessment was conducted to support Newport Energy's design efforts. The assessment included an environmental noise survey, predicting the facility noise emissions, evaluating potential impacts, and developing noise mitigation strategies to minimize impacts. The noise emissions associated with the proposed facility were predicted and evaluated with respect to applicable local regulations and the potential impacts on the nearest residences.

Fayetteville Combined Cycle Power Plant, Newport Energy; Cumberland County, North Carolina
2001
Acoustical Specialist. The Fayetteville CCPP included a natural gas-fired combined cycle power plant proposed in a rural area of Cumberland County, North Carolina. A facility noise assessment was conducted to support Newport Energy's design efforts. The assessment included an environmental noise survey, predicting the facility noise emissions, evaluating potential impacts, and developing noise mitigation strategies to minimize impacts. The noise emissions associated with the proposed facility were predicted and evaluated with respect to applicable local regulations and the potential impacts on the nearest residences.

Pegasus Power Project, Pegasus Power Partners, LLC; Chino, California
2001
Environmental Scientist. Provided coordination and technical support in developing and submitting an Application for Certification pursuant to the 21 Day Emergency Permitting Process as defined by the California Energy Commission.

Stanton – Unit A, Orlando Utilities Commission; Orlando, Florida
2001
Environmental Scientist. Responsible for fulfilling the requirements for an Environmental Resource Permit Application pursuant to Florida Department of Environmental Protection and US Army Corps of Engineers requirements. End product was filed as an appendix to the Site Certification Application as well as a stand-alone document filed with the US Army Corps of Engineers.

Magnolia Power Project, City of Burbank; Burbank, California
2001
Environmental Scientist. Provided document control support for the Application for Certification obligations. Involved in the project to ensure Black & Veatch responsibilities were met at each project schedule stage based on previous AFC experience.

Kaukauna Generating Station, Fox Energy Company, LLC; Kaukauna, Wisconsin 2000
Environmental Scientist. Supported the Facility Noise Assessment field survey for the proposed Kaukauna Generating Station. Assisted in the ambient noise survey at the project site and subsequent report development.

Osceola County Project, Reliant Energy Osceloa, LLC; Holopaw, Florida 2000
Environmental Scientist. Responsibilities involved compiling/creating the Environmental Resource Permit application for construction in wetlands pursuant to Florida Department of Environmental Protection and US Army Corps of Engineers requirements. Also generated an Application and Permit for tree removal pursuant to Osceola County Zoning requirements.

Nueva Azalea Project, Sunlaw Energy Partners; South Gate, California 1999-2000
Environmental Scientist. Support of the Application for Certification permitting process. The first stage involved compiling the final AFC application for submittal to the California Energy Commission and responding to data adequacy demands in preparation of the CEC's technical review. Subsequent to the CEC technical review, responses to the CEC data requests were formulated. Duties included coordination and technical assistance to the overall permitting process as well as responding to client requests.

Site Selection Study, Dominion Energy; New York Power Pool, New York 1999
Environmental Scientist. Conducted an air permit application study to determine recently filed applications regarding a new power generating facility within the specified region. This effort was part of a siting study to determine feasible locations for a combustion turbine generating facility.

Site Selection Study, Dominion Energy; East Central Area Reliability Council, New York 1999
Environmental Scientist. Conducted an air permit application study to determine recently filed applications regarding a new power generating facility within the specified region. This effort was part of a siting study to determine feasible locations for a combustion turbine generating facility.

Site Selection Study, Reliant Energy; Pennsylvania, New Jersey, Maryland 1999
Environmental Scientist. Conducted an air permit application study to determine recently filed applications regarding a new power generating facility within the specified region. This effort was part of a siting study to determine feasible locations for a combustion turbine generating facility.

Torne Valley Station, Sithe Energies; Ramapo, New York 1999
Environmental Scientist. Assisted in the development and management of the Article X Application. Researched socioeconomic factors regarding schools and taxes. Performed budget evaluations to determine costs per employee per phase of the permitting process.

Noise Emissions Performance Test Report

Block 2 Combined Cycle
Mesquite Generating Station
Mesquite Power, LLC
Maricopa County, Arizona

BVZ Project 065162.0297
November 18, 2003

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Executive Summary

Noise emissions performance testing for Block 2 (during combined cycle generation) at the Mesquite Generating Station (Mesquite) was completed on November 10, 2003. The testing was conducted in accordance with the Noise Emissions Test Procedure (dated May 7, 2003) developed and agreed upon for Mesquite. The test results are summarized below.

In-plant sound pressure level measurements were conducted throughout the facility and those areas that experience sound levels above 85 dBA during normal peak load operation have been identified herein. Any of these areas that may be normally occupied by a worker (specifically for more than 8 hours) should be posted with hearing protection warning signs in order to support compliance with OSHA worker noise exposure limits.

The cooling tower, circulating water pump / motor assembly, boiler feed pump / motor assembly, condensate pump / motor assembly, and closed cycle cooling water pump / motor assembly do not exceed their expected near-field equipment sound level. Measurement uncertainties prescribed in ISO 6190 have been included, as appropriate.

Property boundary sound level measurements were conducted at six locations during base load operation of Block 1 and Block 2. However, there are no contractual compliance issues related to the property boundary sound level measurements. The property boundary sound levels were surveyed for the Owner's information.

1.0 Introduction

Noise emissions performance testing for Block 2 at Mesquite was completed on November 10, 2003. The testing was conducted in accordance with the Noise Emissions Test Procedure (dated May 7, 2003). The noise emissions performance testing was conducted to confirm the following:

1. The location of all areas that experience sound pressure levels exceeding 85 dBA during normal peak load operation. These areas shall be equipped with warning signs requiring hearing protection.

2. The average A-weighted near-field sound pressure levels of the cooling tower, circulating water pump / motor assembly, boiler feed pump / motor assembly, condensate pump / motor assembly, and closed cycle cooling water pump / motor assembly.

3. Indoor sounds levels (L_{90}) during simultaneous operation of Block 1 and Block 2 within the administration/control room building, the water treatment building, chemical storage and pretreatment area, combustion turbine generator enclosures, and the ST enclosures.

In addition and for informational purposes, sound level measurements were taken to quantify the following:

1. The A-weighted sound level (L_{90}) at six property boundary locations during simultaneous base load operation of Block 1 and Block 2.

conditions during property boundary measurements included overcast skies with an ambient temperature at approximately 73 deg F and 30% relative humidity.

5.0 In-Plant Sound Levels

In-plant sound pressure level measurements were conducted throughout the facility to identify those areas that experience sound levels above 85 dBA during normal operation. These areas have been identified on the drawings included in Appendix B and are summarized below. Any of the areas described below that may be normally occupied by a worker shall be posted with hearing protection warning signs in order to support compliance with OSHA worker noise exposure limits. The signs shall be posted by BVZ.

- Areas adjacent to the HRSG packages. Particularly those ground level areas near the boiler feed pumps, the HRSG re-circulating pumps, the fuel gas performance heater, and the ammonia injection skids.
- Areas adjacent to the CTG packages. Particularly those near the generators, between the generator and the turbine compartments, on the CTG platform near the corner between CTG accessory modules and the combustion turbine compartments. Also, all areas within the CTG enclosures.
- Areas on the STG mezzanine levels underneath the steam turbine generator and adjacent to the condenser. Ground level areas near the condensate pumps, the condenser vacuum pumps, the closed cycle cooling water pumps, and the steam turbine lube oil skid. Although sound level measurements indicate that areas on the operating floor near the steam turbine generator are below 85 dBA, it is recommended that hearing protection be required within these areas. Also, all areas within the STG enclosures.
- Areas around the ground level of the cooling tower, the circulating water pump deck, and the fan deck near the fan motors.
- All stairway entries leading to above-ground platforms around the major equipment.
- Some areas inside the water treatment building, especially the areas closest to the pumps located within the building.

In addition to the drawings, Appendix B also includes the measurement data in a tabular format. It is important to note that the table in Appendix B includes only those measurements representative of the equipment envelope. As such, the drawings may include measurement points that were taken to identify the 85 dBA contours but are not included in the equipment envelope spatial average.

6.0 Property Boundary Sound Levels

6.1 Measurement Locations

Sound level measurements were conducted at the property boundary locations indicated in Figure 1. The locations were previously identified and agreed to in the Test Procedure. In addition to the previously identified locations, two additional measurement locations were added during the survey (6 total). The microphone was positioned approximately 1.5 meters (5 ft) above the ground for all measurements.

6.2 Property Boundary Measurement Results

The sound level measurements included the A-weighted 90-percentile exceedance sound level, L_{90}, as specified in the Noise Emissions Test Procedure. The duration of each measurement was a minimum of 60 seconds in order to capture a representative sound level at the measurement location. All sound level measurements were recorded during a period of minimal background influence, e.g. between vehicle passes, as much as possible. The sound levels recorded during operation of the facility are summarized in Table 2.

Table 2

Sound Pressure Levels at the Prescribed Property Boundary Locations.

Location	Measured Operational Sound Pressure Level[1] at the Measurement Location, L_{90}	Comments / Audible Noise Sources
1	62.2 dBA	Cooling towers, distant construction noise (reverse warning beepers).
2	62.4 dBA	Cooling towers.
3	56.4 dBA	Plant noise, cooling towers.
4	53.2 dBA	Substation, lay down activity (construction), transmission line noise.
5[2]	48.6 dBA	Transmission line, plant, fuel gas regulating station.
6[2]	45.9 dBA	Cooling towers (including thumping, possibly from fiberglass siding).

NOTE

1. These results do not include background corrections.
2. Measurement locations 5 and 6 were added during the survey.

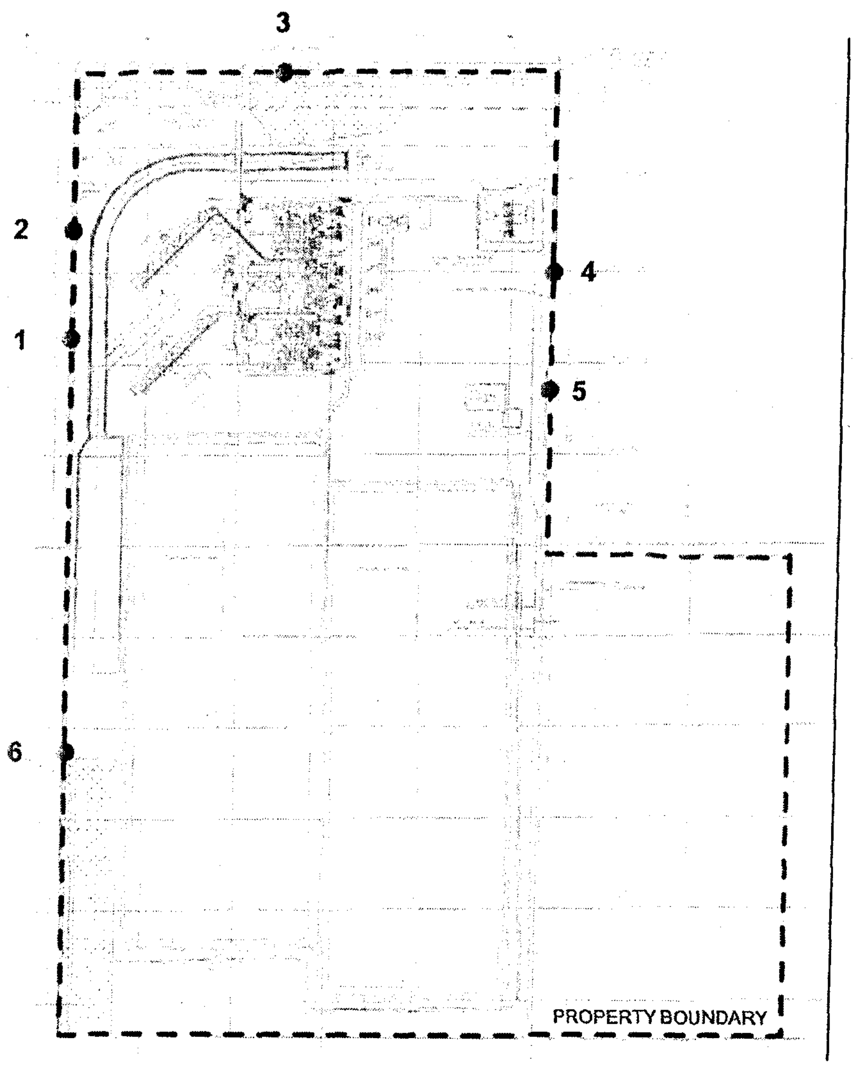

Figure 1

Property Boundary Sound Level Measurements

7.0 Indoor Sound Levels

7.1 Measurement Locations

Sound level measurements were conducted at locations within the control room and administration areas to determine the noise levels due to operating Block 1 and Block 2 simultaneously. Measurements were conducted at locations where personnel are normally positioned.

In addition to the normally occupied areas, measurements were also taken within buildings and equipment enclosures that are accessible by personnel. These areas included the combustion turbine generator enclosures, the steam turbine enclosure, the water treatment and fire pump building, and the chemical storage and pretreatment area.

7.2 Measurement Parameters

The sound level measurements included the A-weighted 90-percentile exceedance sound level, L_{90}, as prescribed in the test procedure. All measurement durations were a minimum of 15 seconds.

7.3 Measurement Results

The results of the sound level measurements for normally occupied spaces are listed in Table 3. As shown, the average sound levels in these spaces were less than 55 dBA without any correction for background noise. As such, the indoor sound levels were not corrected for background noise since the measured sound levels during simultaneous operation of Block 1 and Block 2 are below the contractual limit of 55 dBA.

Table 3

Indoor Sound Level Measurements

Area[1]	Avg SPL, dBA
Control Room (312)	54.7
Conference Room (318)	45.9
Shop (301)	49.7

NOTES
1. See Drawing 065162-CBSD-A4301 for identification of the areas listed. Numbers listed in parentheses correspond to identification numbers on the referenced drawings.
2. Includes background noise not associated with Blocks 1 and 2 (e.g., computers, HVAC, personnel etc).

The results of the sound level measurements for areas that are not normally occupied are listed in Tables 4, 5 and 6. As shown, areas within the equipment enclosures experience sound levels above 85 dBA. In addition, some areas within the water treatment building experience sound levels that exceed 85 dBA. These areas shall be posted with hearing protection warning signs in order to support compliance with OSHA worker noise exposure limits. The signs shall be posted by BVZ.

Measurements recorded within the control room, conference room, shop, water treatment, and pretreatment areas were completed as the peak load performance test was prematurely halted due to water chemistry issues. As such, these indoor levels were recorded as Block 2 was just beginning to come down in load. Nonetheless, these levels are expected to be consistent with peak load.

Table 4

Sound Level Measurements within Enclosures

Enclosure	Measured Sound Pressure Level, dBA
CT5 Generator Enclosure	97.6
Combustion Turbine 5 Enclosure	110.5
CT6 Generator Enclosure	98.5
Combustion Turbine 6 Enclosure	110.8
HP Steam Turbine Enclosure	92.9 (Avg)
LP Steam Turbine Enclosure	81.5

Table 5

Sound Level Measurements within Water Treatment / Fire Pump Building

Water Treatment Building	Measured Sound Pressure Level, dBA
Fire Pump Room	58.1
Near brackish water RO trains	82.8
Near BW RO pump skid	90.9
Electrical room	66.2

Table 6

Sound Level Measurements within Pretreatment / Chemical Storage Building

Water Treatment Building	Measured Sound Pressure Level, dBA
Sludge recirculation pump (0004A)	79.5
Sludge recirculation pump (0004B)	80.0
Filtrate recovery sump pump	84.1
Chemical silos	80.1 (Avg)
Near chemical storage area	74.5
Pretreatment area	65.4
Filter press area	83.3 (Avg)
Electrical room	59.8

Appendix A – Test Equipment Calibration

Scantek, Inc.

CALIBRATION
LABORATORY

Calibration Certificate No.11672

Instrument:	**Sound Level Meter**	*Date Calibrated:*	**November 4, 2003**
Model:	**NA27**		
Manufacturer:	**Rion**		
Serial number:	**01191119**		
Tested with:	**Microphone UC-53 s/n 99858** **Preamplifier NH-20 s/n 94641**		
Customer:	**Black & Veatch**	*Address:*	**11401 Lamar Ave.** **Overland Park, KS 66211**
Tel/Fax:	**913-458-2675**		

Status	**Received**	**Sent**
In tolerance	X	X
Out of tolerance		
See comments		

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., 01/28/2002 that describes the pertinent tests from the following standards: IEC 60651/1979, and ANSI S1.4/1983; IEC 60804/1985 and ANSI S1.43/1997; IEC 1260/1995 or IEC225/1966 or ANSI S1.11/1986

Instrumentation* used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal date	Traceability evidence Cal. Lab / Accreditation
[illegible]	SME Cal Unit	[illegible]	May [illegible], 2003	Scantek Inc.
DS-360-SRS	Function Generator	33584	Oct 8, 2003	Scantek Inc.
34401A-Agilent Technologies	Digital Voltmeter	MY410[illegible]	Oct 2, 2003	Agilent Technologies / A2LA
DPI 145-Druck	Pressure Indicator	[illegible]	Nov 21, 2002	Transcat / A2LA
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	[illegible]	Oct [illegible], 2003	Transcat / A2LA
PC Program 1019 Norsonic	Calibration software	[illegible]	Validated Jan 2003	-
1253-Norsonic	Calibrator	[illegible]	May 15, 2003	Scantek Inc.

*Traceable to SI- BIPM through NIST (USA).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
24 ±2.0 °C	100.371 ±2.0 kPa	42.3 ±5 %RH

Calibrated by	Mariana Buzduga	**Checked by**	Richard J. Peppin
Signature	[illegible]	Signature	[signature]
Date	[illegible]	Date	[illegible]

Calibration Certificates or Test Reports shall not be reproduced, except in full, without written approval of the laboratory.

[illegible] Page 1 of 2

Scantek, Inc.

CALIBRATION
LABORATORY

Calibration Certificate No.11671

Instrument:	**Acoustical Calibrator**	*Date Calibrated:*	**2003-11-04**	
Model:	**1251**	*Status:*	**Received**	**Sent**
Manufacturer:	**Norsonic**	*In tolerance*	X	X
Serial number:	**25762**	*Out of tolerance:*		
Class (IEC 60942):	**1**	*See comments:*		
Barometer type:				
Barometer s/n:				
Customer:	**Black & Veatch**	*Address:*	**11401 Lamar Ave.**	
Tel/Fax:	**913-458-2675**		**Overland Park, KS 66211**	

Tested in accordance with the following procedures and standards:
Procedure for calibration of Acoustical Calibrators, Scantek Inc., 01/28/2002 that details the pertinent tests from the following standards: IEC 60942/1997, annex B; ANSI S1.40/1984

Instrumentation* used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal date	Traceability evidence Cal. Lab / Accreditation
4830 Norsonic	SME Cal Unit	25747	May 16,2003	Scantek, Inc.
DS-360 SRS	Function Generator	33584	Oct.8, 2003	Scantek, Inc.
34401A Agilent Technologies	Digital Voltmeter	MY41022043	Oct.2, 2003	Agilent Technologies
DPI 140-Druck	Pressure Indicator	790020	Nov 21, 2002	Transcat / A2LA
8903-HP	Audio Analyzer	2514A05691	Jan 8, 2003	Scantek, Inc.
HMP233-Vaisala Oyj	Humidity& Temp.	V3820001	Oct.7, 2003	Scantek, Inc.
PC Program 1018 Norsonic	Calibration	v 4.23	Validated Jan	-
1253 Norsonic	Calibrator	22939	Aug.25, 2003	Scantek, Inc.
1203-Norsonic	Preamplifier	14051	Aug.1, 2003	Scantek, Inc.
4134-Brüel&Kjær	Microphone	173368	Aug 26, 2003	Scantek, Inc.

*Traceable to SI - BIPM through NIST (USA), NFT (Norway), SP (Sweden)

Calibrated by	Mariana Buzduga	**Checked by**	Richard J. Peppin
Signature		Signature	
Date		Date	11/05

[illegible]

[illegible]

Appendix B – Near-Field and In-Plant Measurements

Field Data and Calculations
2x1 Combined Cycle Configuration - Block 2

Output : 650 MW

Pre-Test CAL : 114.0
Post-Test CAL : 114.0

SLM : RION NA-27

Measured A-Weighted Sound Pressure Level (SPL) along Equipment Envelope of Each Component and within In-Plant Areas.

	Unit 5					Unit 6					STG Package							Cooling Tower	
	CTG Pkg	HRSG	BFP	BFP	Main Xfmr	CTG Pkg	HRSG	BFP	BFP	Main Xfmr	Operating Floor	Mezzanine Floor	Ground Floor	Main Xfmr	CCCW Pmp	COND Pump	COND Pump	Tower Cells	CWP
	OUTDOOR	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*INDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*	*OUTDOOR*
	85.6	83.6	89.3	91.3	76.2	83.5	84.5	86.6	91.4	78.5	79.1	90.9	85.0	74.7	89.3	90.2	91.7	85.9	89.6
	86.2	77.8	91.3	90.4	75.7	88.9	78.5	88.5	88.5	73.7	75.5	87.3	85.0	82.6	85.5	91.7	90.8	85.8	88.0
	84.5	78.8	89.5	86.1	76.5	84.9	82.5	88.0	87.7		75.4	85.0	85.0	77.3				86.1	
	84.0	79.7	87.2	88.1		82.6	84.5	87.7	81.6		76.7	85.0	85.0					85.5	
	81.7	84.3	90.5	91.1		81.5	85.0	88.5	85.2		79.0	85.0	85.0					85.5	
	82.3	86.5	91.3	93.3		81.4	87.2	92.1	86.1		83.4	85.0	85.0					85.4	
	80.7	87.8				80.7	88.8		88.9		77.7	87.3	85.6					84.9	
	79.9	92.4				82.2	92.0				83.6	93.8	85.0					83.0	
	80.1	86.4				84.5	87.6				81.3	93.6	85.0					85.8	
	80.3	84.7				83.7	84.7				81.0	85.0	85.5					85.1	
	80.2	84.6				77.8	85.9				81.0	83.3	85.0					86.0	
	85.0	83.7				80.5	84.3				79.7	83.0	89.3					85.4	
	83.8	82.8				82.5	83.3				82.0	85.0	84.9					86.2	
	80.0	81.8				88.1	78.9				81.6	90.5	82.0					85.7	
	80.5	83.8				87.9	81.5				81.9	87.8	85.0					86.1	
	84.3	85.0				82.0	82.9				79.4		85.0					86.2	
	87.2	86.1				80.1	84.4				79.1		85.0					87.0	
	91.8	84.3					85.6				79.2		85.0					86.1	
	92.7	86.9					83.0				76.3		85.0					86.6	
	87.5	87.3					81.8				76.9		85.0					86.4	
	84.1	88.3					83.9						85.8					87.0	
	84.1	86.4					84.6						85.0					86.3	
	82.1	86.2					84.2						85.0					86.5	
		85.2					86.0						85.1					86.4	
		89.4					85.9						84.9					86.8	
		94.2					87.3						86.2					86.7	
		89.3					94.2						85.6					86.4	
							93.3						85.0					86.6	
													85.0					81.1	
													85.0					86.3	
													85.0					80.0	
													85.0					86.3	
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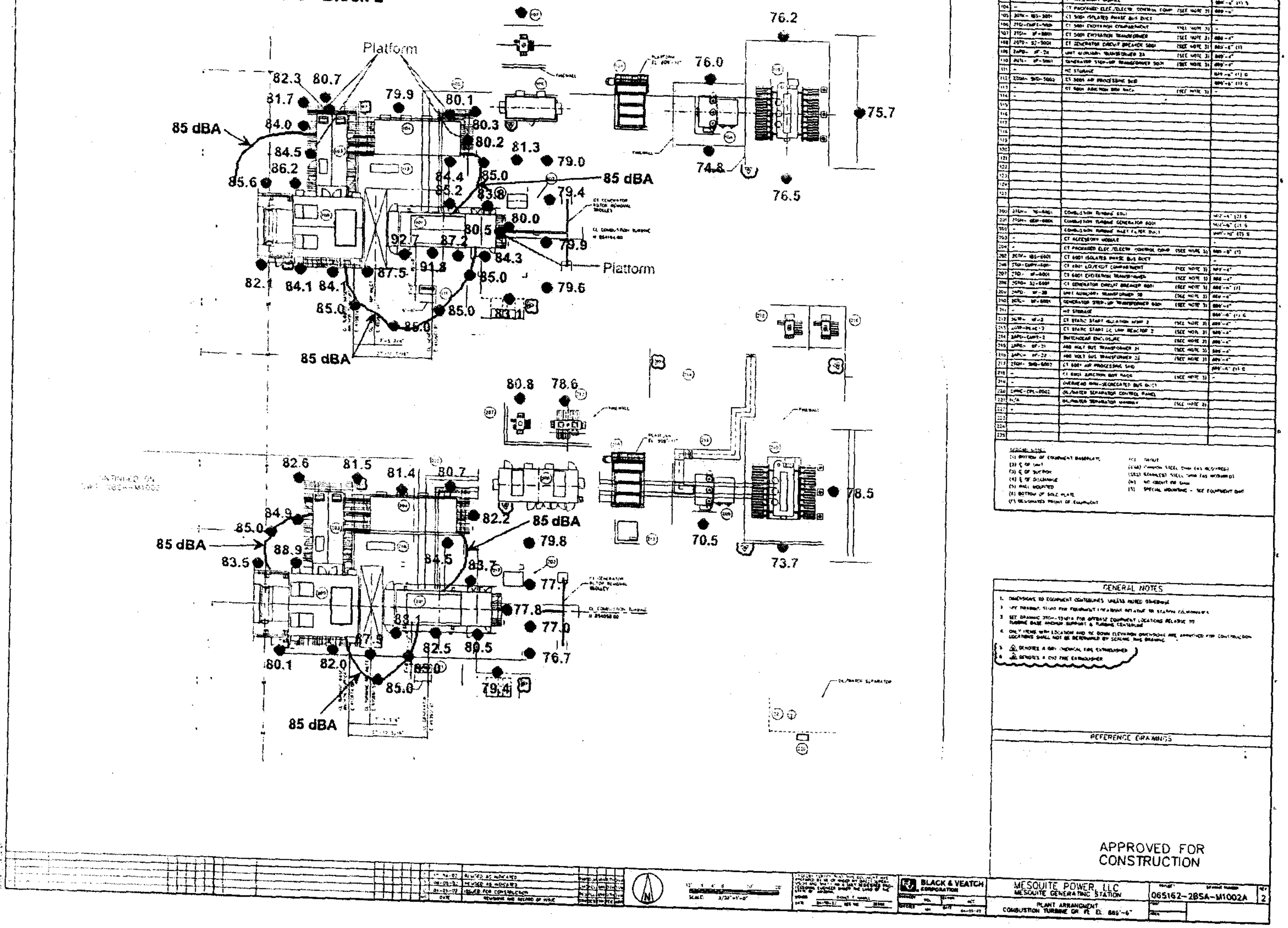
																		86.0	
																		86.8	
																		86.2	
																		86.3	
																		86.2	
																		87.4	
																		86.7	
Avg* SPL:	84 dBA	85 dBA	90 dBA	90 dBA	76 dBA	83 dBA	85 dBA	89 dBA	87 dBA	76 dBA	79 dBA	87 dBA	85 dBA	78 dBA	87 dBA	91 dBA	91 dBA	86 dBA	89 dBA
Max SPL:	93 dBA	94 dBA	91 dBA	93 dBA	77 dBA	89 dBA	94 dBA	92 dBA	91 dBA	79 dBA	84 dBA	94 dBA	89 dBA	83 dBA	89 dBA	92 dBA	92 dBA	87 dBA	90 dBA
Min SPL:	80 dBA	78 dBA	87 dBA	86 dBA	76 dBA	78 dBA	79 dBA	87 dBA	82 dBA	74 dBA	75 dBA	83 dBA	82 dBA	75 dBA	86 dBA	90 dBA	91 dBA	80 dBA	88 dBA

* Spatial average along the equipment envelope.

NEAR-FIELD AND IN-PLANT A-WEIGHTED SOUND PRESSURE LEVELS

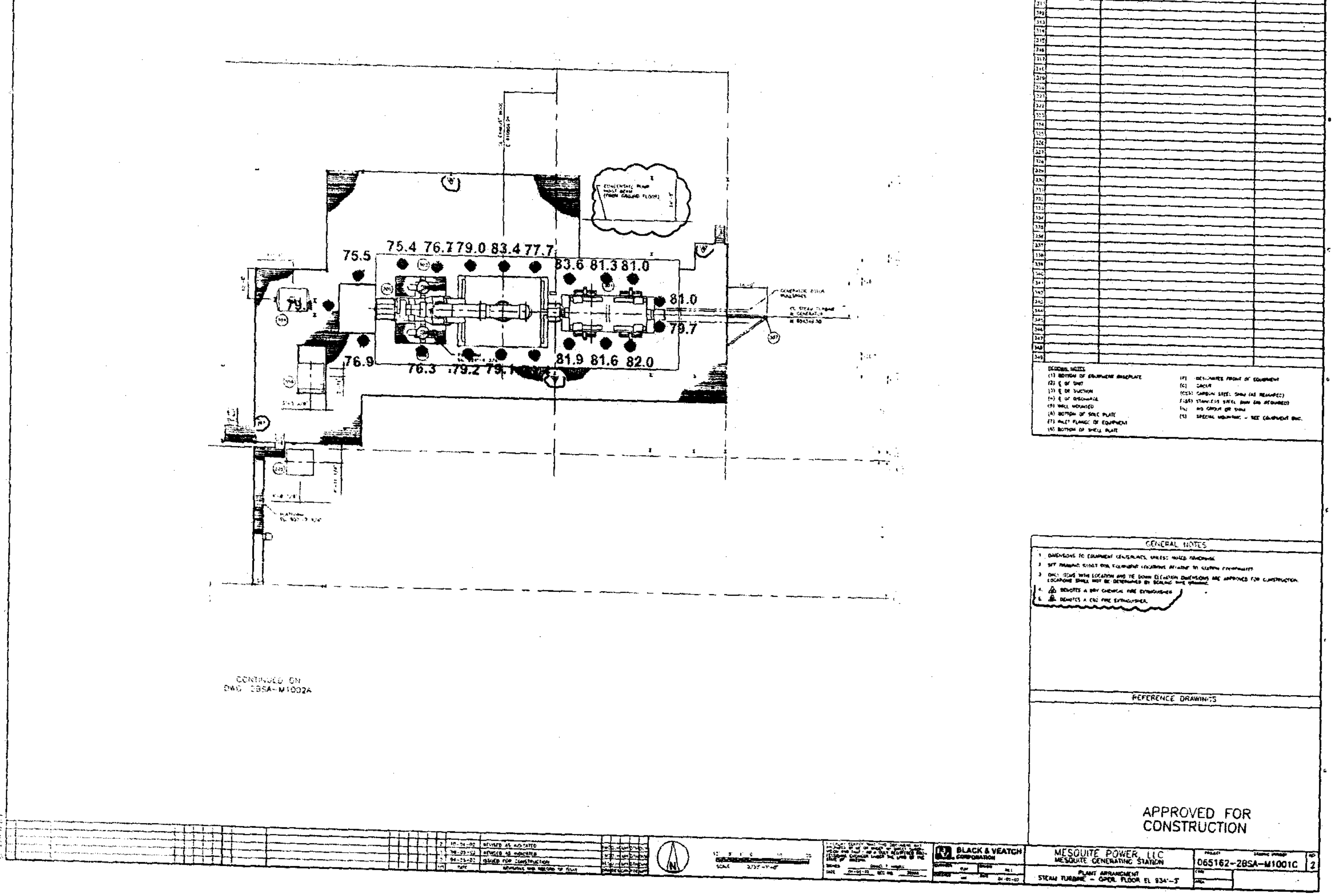
Combustion Turbine Generators - Block 2



NEAR-FIELD AND IN-PLANT A-WEIGHTED SOUND PRESSURE LEVELS

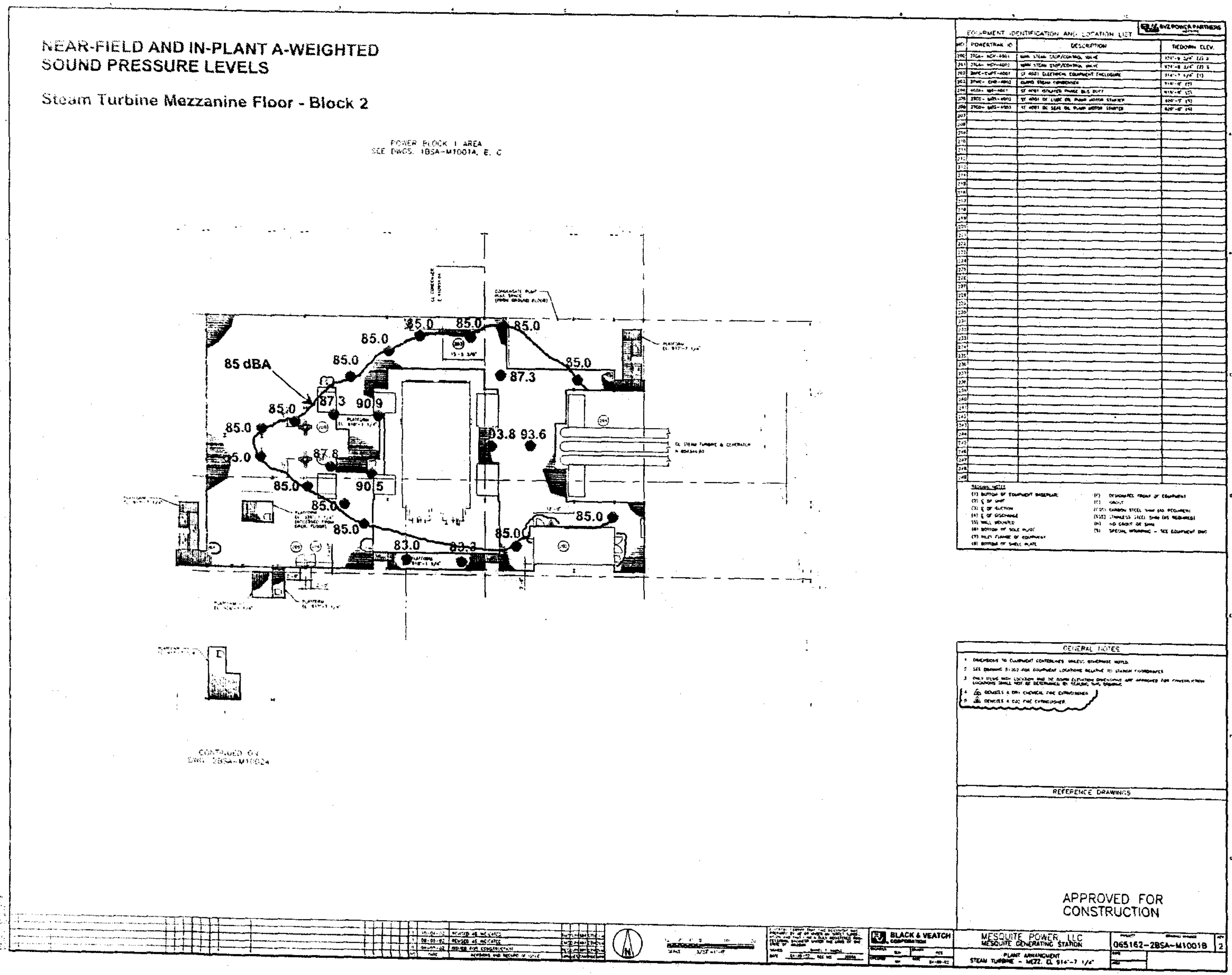
Steam Turbine Operating Floor - Block 2

NOTE: ST compartment roof was not installed during test.



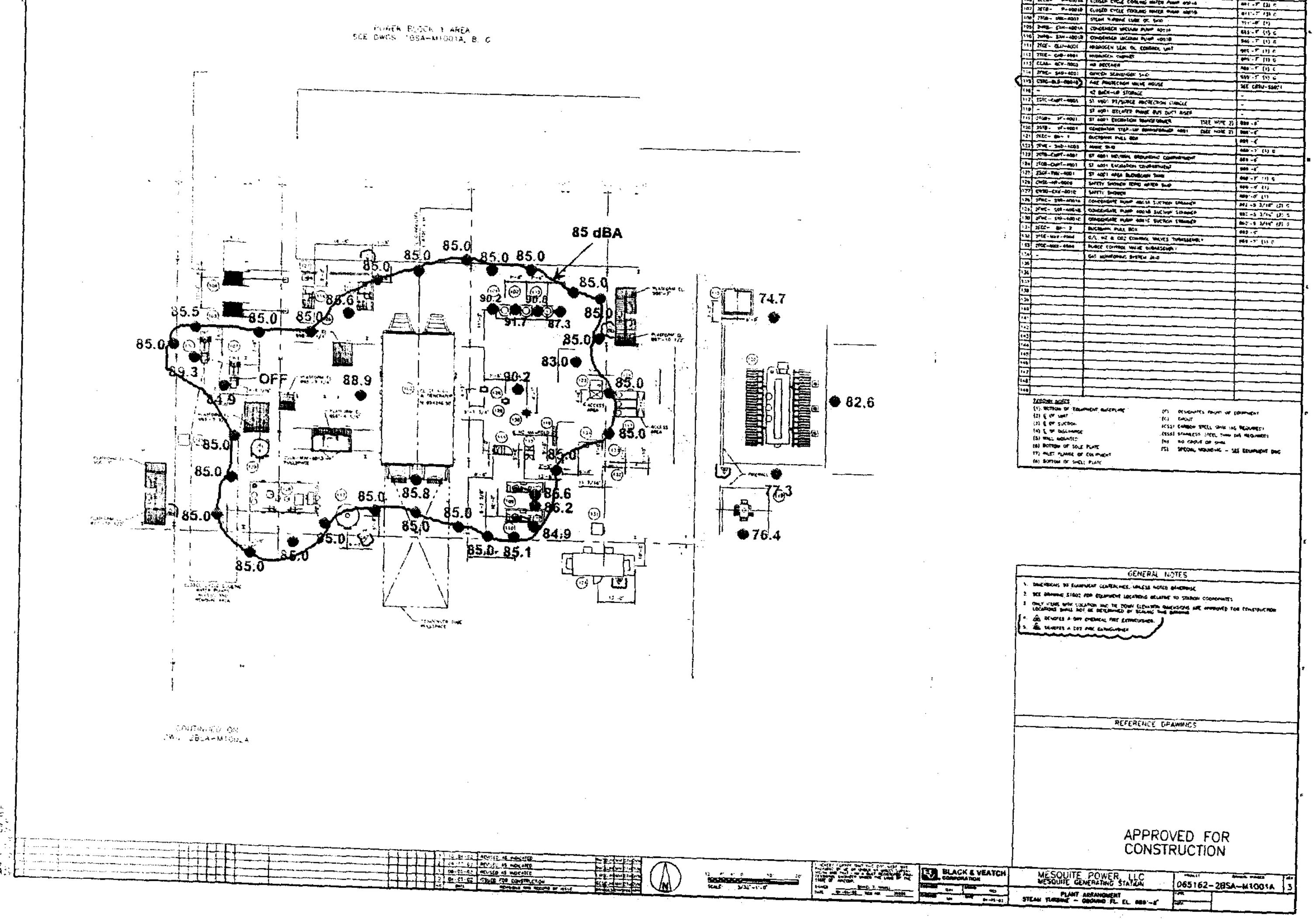
NEAR-FIELD AND IN-PLANT A-WEIGHTED SOUND PRESSURE LEVELS

Steam Turbine Mezzanine Floor - Block 2



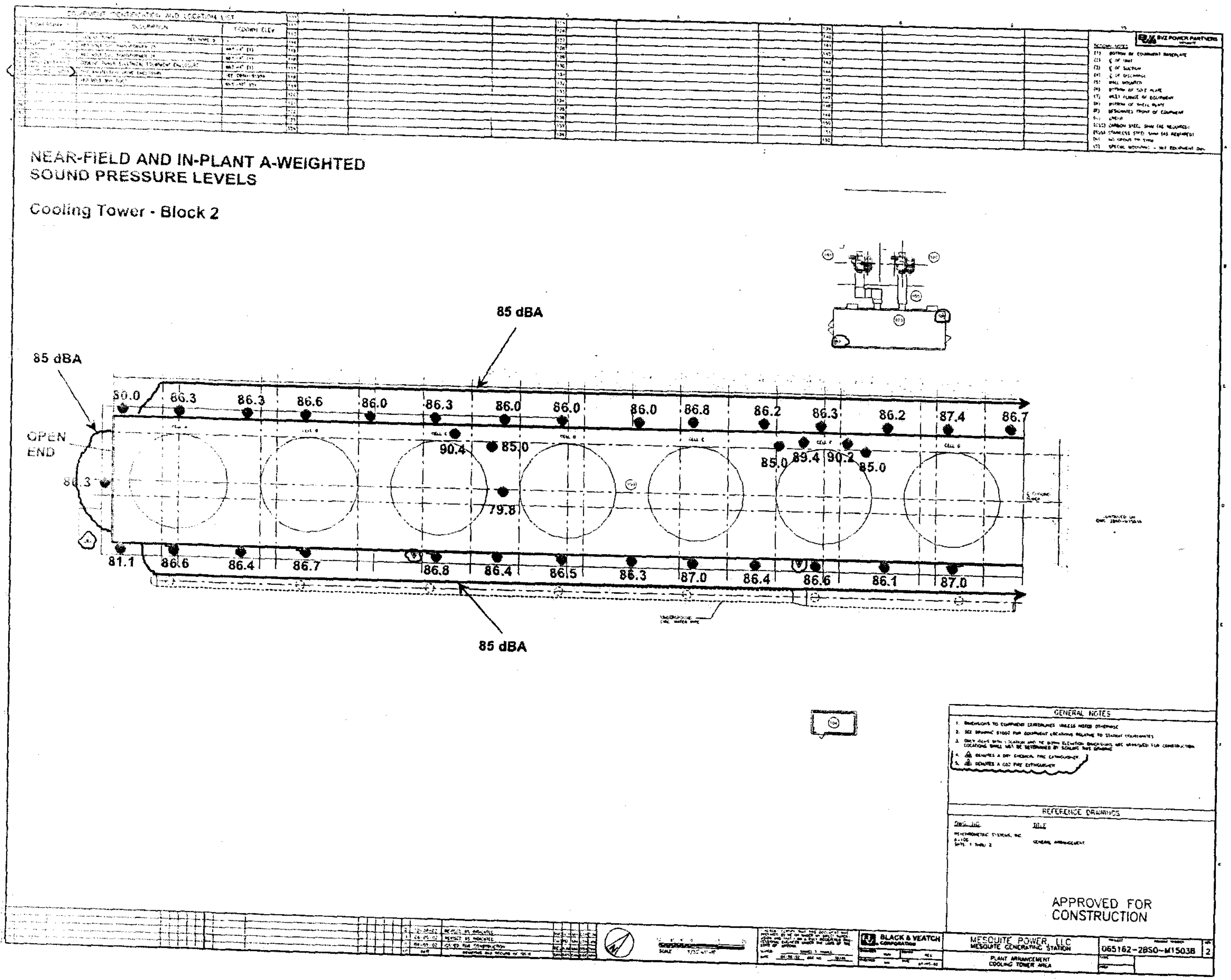
NEAR-FIELD AND IN-PLANT A-WEIGHTED SOUND PRESSURE LEVELS

Steam Turbine Ground Floor - Block 2



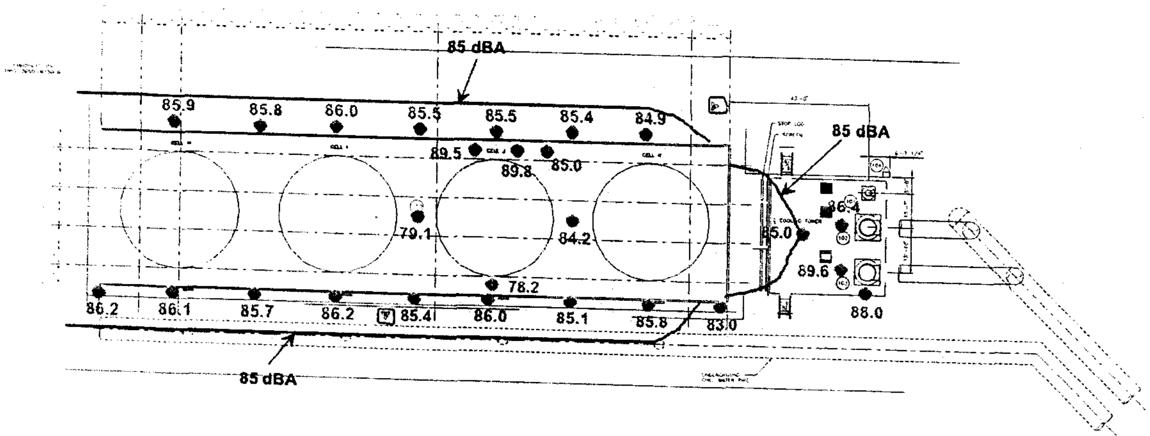
NEAR-FIELD AND IN-PLANT A-WEIGHTED SOUND PRESSURE LEVELS

Cooling Tower - Block 2



NEAR-FIELD AND IN-PLANT A-WEIGHTED
SOUND PRESSURE LEVELS

Cooling Tower - Block 2



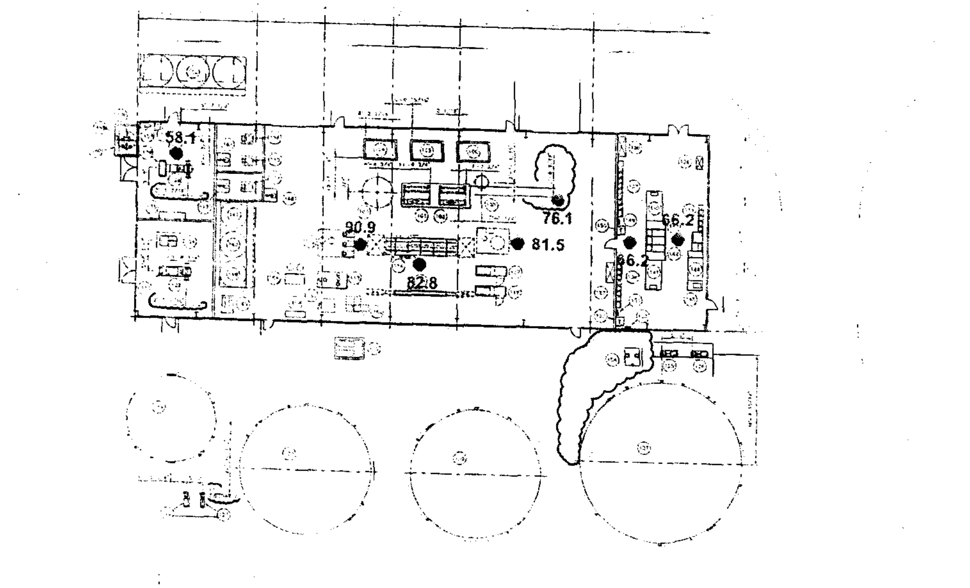
APPROVED FOR
CONSTRUCTION

MESOUITE POWER, LLC
MESQUITE GENERATING STATION
PLANT ARRANGEMENT
COOLING TOWER AREA
065162-2BSO-M1503A 2

BLACK & VEATCH

NEAR-FIELD AND IN-PLANT A-WEIGHTED SOUND PRESSURE LEVELS

WATER TREATMENT / FIRE PUMP BUILDING



APPROVED FOR CONSTRUCTION

BLACK & VEATCH CORPORATION

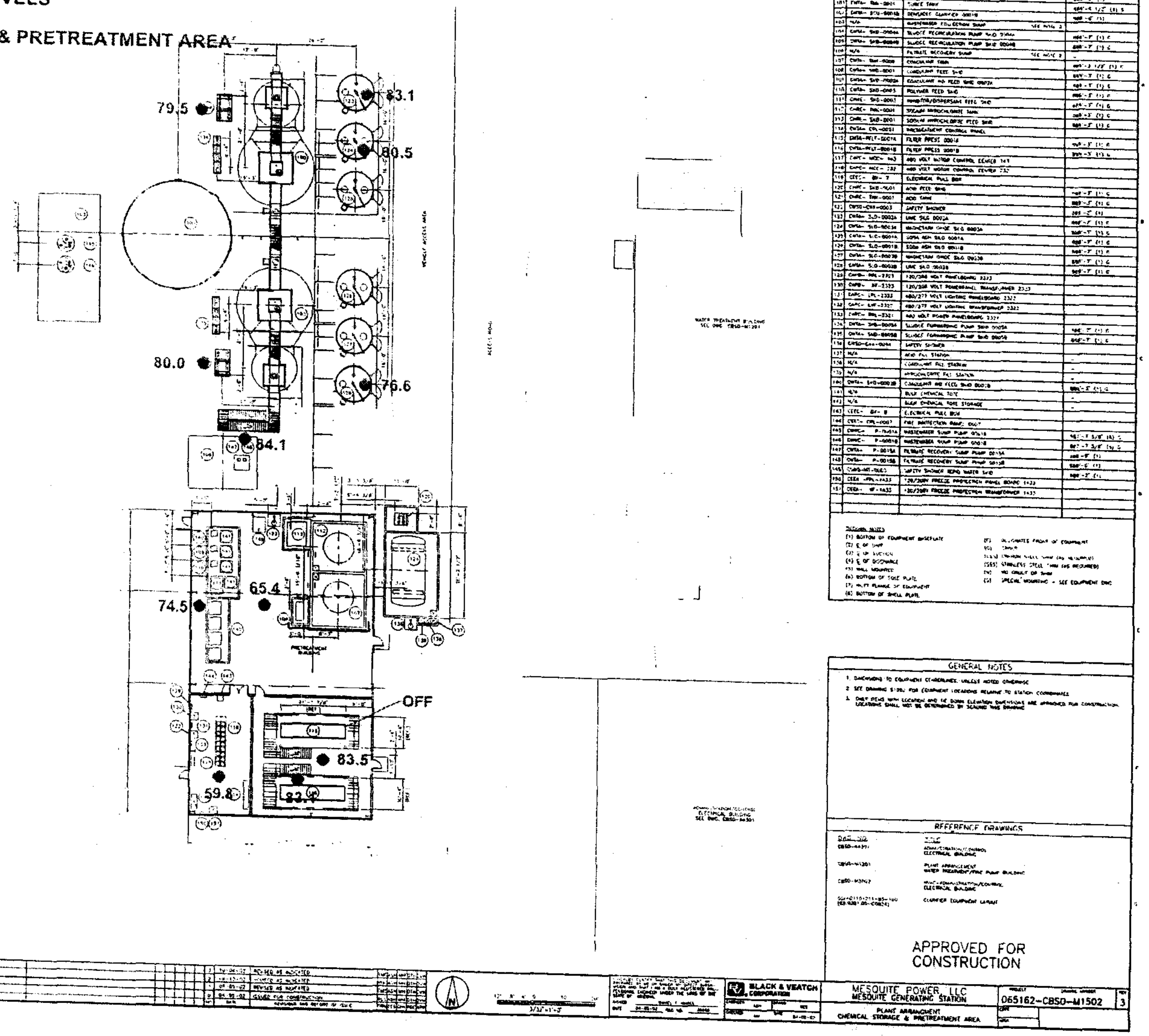
MESQUITE POWER, LLC
MESQUITE GENERATING STATION

PLANT ARRANGEMENT
WATER TREATMENT/FIRE PUMP BUILDING

065162-CBS0-M1201 2

NEAR-FIELD AND IN-PLANT A-WEIGHTED SOUND PRESSURE LEVELS

CHEMICAL STORAGE & PRETREATMENT AREA



Appendix C – Test Personnel Qualifications

Senior Acoustical Engineer

Acoustical Design

Noise Control Engineering

Education
Bachelors, Mechanical, Southern Methodist University, 1989
Masters, Mechanical – Acoustics/Noise Control, Purdue University, 1991

Professional Registration
Kansas

Professional Associations
Acoustical Society of America, American Society of Heating, Refrigerating, and Air-conditioning Engineers, Inc., Institute of Noise Control Engineering

Total Years Experience
13

Joined B&V
1995

Language Capabilities
English

As an acoustical design and noise control engineering specialist, Mr. Ferren is responsible for managing and coordinating the acoustical requirements for commercial and industrial projects throughout the world. Responsibilities involve facility noise assessments, noise regulation reviews, community noise evaluations, land-use compatibility planning, environmental noise assessments, traffic noise analyses, room acoustics design, architectural sound isolation design, and building systems noise control. Typical studies involve evaluating applicable local, federal, and international noise regulations; establishing acceptable acoustical design criteria; determining the noise impact of the facility; designing noise mitigation measures as required to meet the established design criteria; providing noise control specifications; coordinating requirements with project design engineers and equipment suppliers; and conducting acoustical compliance testing. Mr. Ferren's experience includes domestic facilities throughout the United States as well as international facilities in Argentina, Australia, Canada, Columbia, Egypt, Ghana, India, Italy, Philippines, South Korea, Thailand, United Arab Emirates, and Venezuela. In addition, Mr. Ferren provides consultation to governing authorities on noise regulations and ordinances, most recently World Bank.

Before joining Black & Veatch, Mr. Ferren provided acoustical consulting involving environmental acoustics, architectural acoustics, and mechanical system noise and vibration control. He gained extensive experience in the built environment involving architectural acoustics as well as mechanical system noise and vibration control. He provided sound isolation and room acoustics design for concert halls, performing arts centers, auditoriums, schools, universities, churches, convention centers, and office buildings throughout the Rocky Mountain and western states. In addition, Mr. Ferren, developed noise and vibration control procedures for numerous heating, ventilating, and air-conditioning systems, which provided functional working, listening, and living environments in occupied spaces. He performed numerous field tests including Sound Transmission Classification (STC), Noise Reduction (NR), Reverberation Time (RT), and Room Criteria/Noise Criteria (RC/NC) as specified by the American Society for Testing and Materials (ASTM). Mr. Ferren also conducted many environmental noise impact studies involving the evaluation of community noise, industrial noise, aircraft and traffic noise, and construction noise with respect to land use compatibility and zoning regulations for projects throughout the Hawaiian Islands. These impact studies involved community noise surveys, traffic noise surveys, and environmental noise testing.

Before Mr. Fe rren's position as an acoustical consultant, he conducted research in the area of active noise control at the Ray W. Herrick Laboratories of Purdue University. His research included theoretical and experimental investigations to determine the feasibility of utilizing active noise control techniques to reduce the impact of road noise within automobile cabins. Additional investigations included the active control of sound radiating from ducts with particular applications to vehicle exhaust noise and building ventilation system noise.

Representative Project Experience

Systems Conveyance and Operations Program – Effluent Interceptor, Clean Water Coalition; Clark County, Nevada.
2003
Senior Acoustical Engineer. The proposed 10 mile effluent interceptor pipeline will convey treated effluent from the City of Las Vegas Water Pollution Control Facility, the Clark County Water Reclamation District, and the City of Henderson Water Reclamation Facility. A noise assessment was conducted to evaluate the potential impact of the construction noise on the nearby residential areas. The construction activities were based on installing the pipeline using both tunneling and cut-and-cover methods.

Rancho Penasquitos Pressure Control and Hydroelectric Facility, San Diego County Water Authority, San Diego County, California.
2002-2003
Senior Acoustical Engineer. This pressure control and hydro-electric project includes a hydroelectric generating unit and four 42-inch sleeve valves. The major equipment is located indoors to help reduce the noise emissions and support compliance with the property boundary sound level limit. A facility noise analysis will be conducted to identify the noise mitigation strategies necessary to comply with the applicable noise limits.

San Vicente Pump Station, San Diego County Water Authority, San Diego County, California.
2002-2003
Senior Acoustical Engineer. This pump station project included four 7,000 Hp pumps and two 54-inch sleeve valves. The major equipment is located indoors to help reduce the noise emissions and support compliance with the property boundary sound level limit. A facility noise analysis was conducted to identify the noise mitigation strategies necessary to comply with the noise limit. Mitigation strategies were developed and included designing a sound-rated wall assembly, optimizing louver locations, and establishing low-noise specifications for the major equipment.

Kickapoo Substation, Ameren Cilco, Logan County, Illinois.
2002-2003
Senior Acoustical Engineer. The existing Kickapoo Substation is comprised of eight 1.6 MW diesel-powered engine generators capable of a total capacity of 12 MW of peak-demand electrical power. A sound level survey was conducted to evaluate compliance with the State of Illinois noise regulations. Retrofit noise mitigation options for the generators were developed and recommended to achieve compliance with the regulations.

Osceola County Simple Cycle Power Plant, Reliant Energy, Osceola County, Florida.
2001-2003
Senior Acoustical Engineer. Conducted facility noise modeling, acoustical design, equipment testing, and overall facility performance testing for Osceola County Simple Cycle Power Plant project, which consists of three simple cycle combustion turbine generators and a 230 kV switchyard at a green field site near Holopaw,

Florida. Black & Veatch's scope included engineering, procurement, construction, and startup of the nominal 500 MW natural gas and oil fueled power plant.

Kiamichi Energy Facility, Kiowa Power Partners, L.L.C., Pittsburg County, Oklahoma.
2001-2003
Senior Acoustical Engineer. Conducted facility noise modeling and performance testing for this facility, which consists of two 2 x 1 combined cycle power blocks located on a green field site in southeastern Oklahoma. Black & Veatch's overall scope included engineering, procurement, construction, and startup of the nominal 1200 MW natural gas fueled combined cycle power facility. Commercial operation was achieved two months ahead of the contract schedule.

City if Irvine, California, Orange County Great Park Plan, Orange County, California.
1998-2003
Senior Acoustical Engineer. Conducted a complete environmental noise impact assessment for a proposed non-aviation reuse of the Marine Corps Air Station (MCAS) El Toro that currently occupies approximately 4,700 acres in southern Orange County, California. The proposed non-aviation reuse, the Great Park Plan, transforms the site into a mixed-use urban center following realignment and closure of the base in 1999. The potential fir increased environmental noise levels within the existing surrounding areas and the potential for noise impacts on the project itself were evaluated in accordance with the California Environmental Quality Act (CEQA). Potential noise impacts included traffic, construction, and mixed land uses.

Hunterstown Combined Cycle Power Plant, Reliant Energy; Straban Township, Pennsylvania
2001-2002
Senior Acoustical Engineer. The Hunterstown Project was an engineering, procurement, and construction (EPC) project in Pennsylvania. The facility is a 2-on-1 indoor natural gas-fired combined cycle power plant with heat rejection provided by a large air-cooled condenser. Acoustical design support included facility noise modeling, acoustical design / layout recommendations, and equipment sound level specifications as required to meet the local noise regulations. The local noise regulations limited the sound levels in the octave bands and required the facility be equipped with significant noise mitigation measures. These noise mitigation measures included low-noise equipment components, high performance building walls, and acoustical enclosures.

Garnet Energy Facility, Ida-West Energy LLC; Canyon County, Idaho
2001-2002
Senior Acoustical Engineer. The Garnet Energy Facility included a natural gas-fired combined cycle power plant proposed in a rural area of Canyon County, Idaho. A facility noise assessment was conducted to support Ida-West Energy's permitting efforts. The assessment included predicting the facility noise emissions, evaluating potential impacts, and developing noise mitigation strategies to minimize impacts. In addition, expert testimony was provided at numerous public hearings held by the local planning and zoning commission as well as the county commission. The facility noise emissions became a critical

issue in the permitting process. Ida-West Energy successfully obtained a permit for construction.

Michigan City Unit 12 SCR Project, Northern Indiana Public Service Company; Michigan City, Indiana
2001-2002
Senior Acoustical Engineer. The NIPSCO Michigan City Unit 12 SCR Project included a noise study as part of the engineering efforts to replace the existing Unit 12 induced-draft fans. The noise study was prompted by noise complaints from the community. An ambient noise survey was conducted to determine the existing acoustical environment with the current fans. The survey data was used to develop sound level specifications for the proposed fans in an effort to minimize the future impacts on the surrounding community. The sound level specifications required that the new fans be equipped with discharge silencers and be surrounded by a noise barrier wall.

KCI Aircraft Rescue Fire Fighting (ARFF) Facility, Kansas City Aviation Department; Kansas City, Missouri
2001
Senior Acoustical Engineer. The KCI ARFF Facility Project included the evaluation and design of a new ARFF Facility. A sound level survey was conducted at the Kansas City International Airport to quantify the potential noise impact of aircraft operations on the proposed new ARFF Facility. The sound levels associated with approximately 30 aircraft operations, including arrivals and departures, were quantified at on-site airport locations representative of the proposed ARFF facility location.

Rolling Hills Project, Rolling Hills Generation LLC (Dynegy); Wilkesville, Ohio
2001
Senior Acoustical Engineer. The Rolling Hills Generation Project includes a natural gas -fired simple cycle power plant proposed in Kentucky. The facility includes five simple cycle combustion turbine units located outdoors. A facility noise assessment was conducted to support this engineering, construction, and procurement (EPC) project. The assessment included a prediction of the facility noise emissions based on the equipment sound level specifications provided by the owner.

Stewart International Airport Noise Study, New York Department of Transportation; Newburgh, New York
2001
Senior Acoustical Engineer. The Stewart International Airport Noise Study was part of a master plan update for the airport. Noise modeling was conducted for the existing airport operations and planned future airport operations. The Federal Aviation Administration's Integrated Noise Model (INM) was utilized to perform the airport noise modeling.

Bluegrass Generation Project, Bluegrass Generation LLC (Dynegy); Oldham County, Kentucky
2001
Senior Acoustical Engineer. The Bluegrass Generation Project includes a natural gas-fired simple cycle power plant proposed in Kentucky. The facility includes three simple cycle combustion turbine units located outdoors. A facility noise assessment was conducted to support this engineering, construction, and procurement (EPC) project. The assessment included a prediction of the facility noise emissions based on the equipment sound level specifications provided by the owner.

Augusta Regional Airport Noise Study, Augusta Regional Airport Aviation Commission; Augusta, Georgia
2001
Senior Acoustical Engineer. The Augusta Regional Airport Noise Study was part of an environmental assessment of a master plan for the airport. Noise modeling was conducted for the existing airport operations. The Federal Aviation Administration's Integrated Noise Model (INM) was utilized to perform the airport noise modeling.

Great Plains Energy Project, Energetix; Comanche County, Oklahoma
2001
Project Acoustical Engineer. The Eagle Energy Project included a natural gas-fired combined cycle power plant proposed in a rural area of Muskogee County, Oklahoma. An environmental noise assessment was conducted in support of siting efforts for the 3-on-1 850 MW power generation facility. An environmental noise survey was conducted to assess the existing acoustical environment within the quiet rural setting. The noise emissions associated with the proposed facility were predicted and evaluated with respect to applicable local regulations and the potential impacts on the nearest residences.

Eagle Energy Project, Energetix; Muskogee County, Oklahoma
2001
Project Acoustical Engineer. The Great Plains Energy Project included a natural gas-fired combined cycle power plant proposed in a rural area of Comanche County, Oklahoma. An environmental noise assessment was conducted in support of siting efforts for the 2-on-1 600 MW power generation facility. An environmental noise survey was conducted to assess the existing acoustical environment within the quiet rural setting. The noise emissions associated with the proposed facility were predicted and evaluated with respect to applicable local regulations and the potential impacts on the nearest residences.

Cedar Bluff Power Project, Cedar Power Partners, L.P. (Sempra Energy Resources); Liberty County, Texas
2000
Project Acoustical Engineer. The Cedar Bluff Power Project included a natural gas-fired combined cycle power plant proposed in a rural area of Liberty County, Texas. An environmental noise assessment was conducted in support of full permitting efforts for the 2on-1 500 MW power generation facility. An environmental noise survey was conducted to assess the existing acoustical environment within the quiet rural setting. The noise emissions associated with

the proposed facility were predicted and evaluated with respect to the potential impacts on the nearest residences.

Montgomery County Power Project, MC Energy Partners, L.P. (Sempra Energy Resources); Montgomery County, Texas
2000
Project Acoustical Engineer. The Montgomery County Power Project included a natural gas-fired combined cycle power plant proposed in a rural area of Montgomery County, Texas. An environmental noise assessment was conducted in support of full permitting efforts for the 2-on-1 500 MW power generation facility. An environmental noise survey was conducted to assess the existing acoustical environment within the quiet rural setting. The noise emissions associated with the proposed facility were predicted and evaluated with respect to the potential impacts on the nearest residences.

Berryman East Pumping Plant, East Bay Municipal Utility District; Oakland, California
2000
Project Acoustical Engineer. The Berryman/Summit Pump Station and Rate Control Station are proposed for the Oakland, California area. Complete acoustical design and noise control engineering services were provided for the proposed facility. Design recommendations were developed to ensure the facility noise emissions along the adjacent residential boundaries comply with the local noise regulations. Design recommendations included architectural features and equipment noise control strategies to reduce the noise from the pump assemblies, the ventilation fans, and the sleeve valves.

Rock Springs Power Project, Reliant Energy; Rock Springs, Maryland
2000
Project Acoustical Engineer. The Rock Springs Power Project was proposed for a site located in Rock Springs (Cecil County), Maryland. The facility included six natural gas-fired combustion turbine generators. The facility design limited noise emissions to comply with a low nighttime sound level limit prescribed by the State of Maryland. Black & Veatch provided environmental permitting support including evaluation of potential noise mitigation measures and associated cost impacts as well as coordination between equipment suppliers and the owner.

Mesquite Generating Station, Mesquite Energy, LLC (Sempra Energy Resources); Maricopa County, Arizona
2000
Project Acoustical Engineer. The Mesquite Generating Station included a natural gas-fired combined cycle power plant proposed in a rural area of Maricopa County, Arizona. An environmental noise assessment was conducted in support of full permitting efforts for the proposed 1000 MW power generation facility. An environmental noise survey was conducted to assess the existing acoustical environment within the quiet rural setting. The noise emissions associated with the proposed facility were predicted and evaluated with respect to the potential impacts on the nearest residences.

Lakeland Hills Pump Station, King County Department of Natural Resources; King County, Washington
2000

Project Acoustical Engineer. The Lakeland Hills Pump Station was proposed in King County, Washington at a location adjacent to a recreational area. Complete acoustical design and noise control engineering for the proposed pump station and emergency generator facility were provided. Design recommendations were developed to minimize the noise impact at the recreational park. Design recommendations included architectural features and equipment noise control strategies to reduce the noise from the odor control fan units, the engine generator, and the HVAC system.

Lower Mount Bethel Combined Cycle Facility, PP&L Global, Inc.; Northampton County, Pennsylvania
1999 - 2000

Project Acoustical Engineer. The existing PP&L Martins Creek facility is located on the Delaware River in Lower Mount Bethel Township within Northampton County, Pennsylvania. The facility includes two coal-fired and two gas-fired generating units. PP&L proposed to add a 2-on-1 combined cycle power plant near the existing facility. An ambient noise survey was conducted to quantify the existing acoustical environment. The noise emissions from the proposed facility were evaluated to determine the potential noise impact on the surrounding areas. The major noise sources associated with the proposed facility included combustion turbine generators, heat recovery steam generators, steam turbine generators, and a cooling tower. Additionally, the occupational noise exposure levels from the proposed facility were evaluated with respect to protecting worker's hearing and providing a comfortable work environment.

Kenmore Pump Station Emergency Generator, King County Department of Natural Resources; King County, Washington
1999- 2000

Project Acoustical Engineer . An emergency generator installation was proposed for the Kenmore Pump Station in King County, Washington. Complete acoustical design and noise control engineering services were provided for the proposed emergency generator. Design recommendations and equipment specifications were developed to ensure the facility complies with the local noise regulations. Design recommendations included architectural features and equipment noise control strategies to reduce the noise from the emergency generator package and the HVAC system.

Tenaska Frontier Generating Station, Tenaska Frontier Partners, Ltd.; Grimes County, Texas
1998 – 2000

Project Acoustical Engineer. The Tenaska Frontier Generating Station project included the engineering, procurement, and construciton of a 830 MW 3-on-1 combined cycle power plant in Grimes County, Texas . Noise control engineering services were provided for the facility. Facility noise modeling was conducted to establish the facility noise emissions design criteria. Noise mitigation strategies and equipment sound level specifications were developed to ensure the facility noise emissions met the noise guarantees. A noise emissions test procedure was developed and, upon plant completion, performance compliance testing was

conducted. The overall facility noise emissions complied with the facility noise guarantees.

Takoradi 2 Thermal Power Project, Takoradi International Company; Aboadze, Ghana, Africa
1998 – 2000

Project Acoustical Engineer. The Takloradi 2 Thermal Power Project included the engineering, procurement, and construction of two 110 MW simple cycle power plants in Ghana, Africa. Noise control engineering services were provided for the power plants. Noise mitigation strategies were developed to ensure the overall facility noise emissions complied with the facility noise requirements, which were based on World Bank guidelines. Upon plant completion, a noise emissions test procedure was developed and performance testing was coordinated. The overall facility noise emissions complied with the facility noise requirements.

Cancarb Waste Heat Recovery Facility, TransCanada Power Limited; Medicine Hat, Alberta, Canada
1998

Project Acoustical Engineer. Conducted an ambient noise survey and facility noise assessment for the proposed Cancarb Waste Heat Recovery Facility. The existing Cancarb facility, a carbon cracking facility, produces carbon black from natural gas. Reform gas, a high temperature byproduct of the process, is reused to heat the incoming natural gas. Cancarb is proposing to further harness the waste heat by adding a waste heat recovery system to their future processes in order to generate electricity. Local regulations limit the noise impact on the nearby residences. The noise associated with the proposed power generation equipment was evaluated and noise mitigation measures were developed to ensure compliance with the local regulations.

McAleer Odor Control Facility, King County Department of Natural Resources; Lake Forest Park, Washington
1998

Project Acoustical Engineer . Provided noise control engineering for improvements tothe McAleer Odor Control Facility. King County had received complaints from local residents regarding the appearance, odor, and noise levels generated by the facility. Improvements to the facility have resolved the odor and noise issues. Black & Veatch designed and improved the aesthetic appearance of the McAleer Odor Control Facility, while minimizing noise and odor levels. Noise control measures included creating a sound-absorptive discharge plenum and a corresponding baffle wall. Black & Veatch worked with the residents to reach a consensual cost effective solution.

Simple Cycle Peaker Plant, Virginia Power; Caroline and Fauquier Counties, Virginia
1998, 2000

Project Acoustical Engineer . Conducted an environmental noise assessment of a simple cycle combustion turbine facility proposed to provide approximately 775 MW of power during periods of peak load. The study included assessing the existing acoustical environment at two potential facility locations in northeastern Virginia. The expected noise emissions were determined based on the normal operation of five simple cycle combustion turbines at each potential site. The need for noise mitigation measures was determined based on the existing acoustical environment and the local noise regulations at each location. The environmental noise impact assessment results were provided to Virginia Power for use in public presentations and in selecting the facility location. In 2000, under contract as owner's engineer, noise emissions performance testing was conducted at the Fauquier County site to confirm the Contractor's compliance with the performance guarantees.

Elliott West Combined Sewer Overflow Control Facility, King County Department of Natural Resources; Seattle, Washington
1998
Project Acoustical Engineer. Provided complete acoustical design and noise control engineering for the new Elliott West Combined Sewer Overflow (CSO) Control Facility, which is part of the single largest CSO discharge in the King County system. The facility consists of a 72 million gallon storage tunnel, a 250 million gallons per day (mgd) pumping station, and two outfalls. All acoustical design and noise control engineering was developed to ensure compliance with the local noise regulations.

Highway 183 Improvements, Oklahoma Department of Transportation; Southwestern, Oklahoma
1998
Project Acoustical Engineer. Conducted traffic noise impact assessments for proposed improvements along State Highway 183 in Custer, Washita, and Kiowa Counties within Oklahoma. Assessed existing and future traffic noise levels to determine potential noise impacts based on Federal Highway Administration and Oklahoma Department of Transportation noise abatement criteria.

La Paloma Generating Project, U.S. Generating Company; Kern County, California
1998
Project Acoustical Engineer. Conducted a complete environmental noise impact study for a proposed 1000 MW combined cycle power generating facility to meet the Application for Certification (AFC) requirements in the state of California. Conducted regulatory review, coordinated ambient survey, conducted facility noise modeling, and developed mitigation measures to comply with the regulations.

Joffre Cogeneration Plant, NOVA Chemicals, Ltd.; Red Deer, Alberta, Canada
1997-2000
Project Acoustical Engineer. As part of a fast-track engineering-procurement-construction (EPC) contract, conducted a facility noise assessment to evaluate the potential noise impact of a large combined cycle power plant. The assessment included developing equipment noise level specifications to ensure the facility noise emissions complied with the facility requirements. The plant is within an existing petrochemical manufacturing facility and provides 400 MW of electrical power and 350,000 pounds per hour of process steam to the petrochemical manufacturing facility. The plant will provide the electrical and steam/heat needs for the entire Joffre site, as well as excess power to the provincial grid. Construction is underway and compliance testing will be conducted after completion

Alfred Merritt Smith Water Treatment Plant, Southern Nevada Water Authority; Lake Mead, Nevada
1997-1998
Project Acoustical Engineer. Provided acoustical design for a 600 million gallon per day ozonation plant. Once completed, the water treatment plant will dramatically increase water deliveries into the Las Vegas Valley. Equipment noise mitigation was developed to ensure the facility complies with the local noise regulations that required low noise levels along the lake's shoreline. Additional, acoustical treatments were developed to reduce the noise exposure to workers within the facility.

Lujan De Cuyo Unit 13 Repowering, Centrales Termicas Mendoza, SA; Mendoza, Argentina
1996-1998
Project Acoustical Engineer. Conducted a facility noise assessment to evaluate the potential noise impact of a combined cycle power plant. Developed equipment noise level limits to ensure the overall facility noise emissions complied with the facility noise requirements. The project included a new 200+ MW combustion turbine and heat recovery steam generator to repower an existing steam turbine within an existing power plant. Upon plant completion, developed noise emissions test procedure and conducted the performance compliance testing. The overall facility noise emissions complied with all noise performance requirements.

Lagoven El Furrial Gas Injection Facility, Wilpro Energy Services, Ltd.; Venezuela;
1997
Project Acoustical Engineer. Evaluated the potential noise impact of the High Pressure Station which included three 20,000 Hp centrifugal gas compressors driven by gas turbines and three 9,000 Hp reciprocating compressors driven by electric motors. Noise mitigation measures were developed to reduce the facility noise emissions to comply with the established facility noise requirements. Noise mitigation included an acoustically treated building to house the centrifugal compressors.

Central Genelba Generation Facility, Compania Naviera Perez Companc; Canuelas, Argentina
1995-1999
Project Acoustical Engineer. Designed noise control measures for a new 686 MW power station. Facility noise sources including combustion turbines, heat recovery steam generators, a steam turbine, a 10-cell cooling tower, transformers, and miscellaneous cooling equipment were acoustically modeled to predict the noise impact within the facility and at the property boundary. Equipment noise control measures were developed in order for the facility to comply with the property boundary noise criteria. Additionally, architectural acoustic design was provided to ensure acceptable background noise levels in the occupied office spaces. Upon plant completion, performance testing was conducted in accordance with an established test procedure. The overall facility noise emissions complied with all noise performance requirements.

Marmara Ereglisi Power Plant, Enron Power Corporation; Ereglisi, Turkey
1995-1997
Acoustical Engineer . Evaluated the potential noise impact of a 500 MW combined cycle power plant. Developed equipment noise level spe cifications in order for the facility noise emissions to comply with the facility noise requirements. Other noise mitigation measures included the noise barrier walls and generation building acoustical treatment.

Asab Gas Development, Abu Dhabi National Oil Company (ADNOC); Abu Dhabi, United Arab Emirates
1996
Project Acoustical Engineer . Conducted a complete facility noise assessment of the front-end design of a natural gas processing facility in the U.A.E. The facility will process sour natural gas extacted from reservoirs in the Arab oil fields. The liquid condensate will be removed from the extracted sour natural gas and transported by pipeline to a refinery for processing. The lean, sour natural gas will be compressed and reinjected into the reservoir formations. The noise impact from combustion turbine compressor units, heat recovery steam generators, air cooler fans, air compressors, pumps, flares, and piping were evaluated with respect to established environmental and worker exposure noise criteria. Equipment noise limits and noise mitigation procedures were developed for each process area within the facility.

Yonggwang Nuclear Power Plant - Cooling Tower Environmental Impact Assessment, Korea Power Engineering Company, Inc.; Yonggwang, South Korea
1996
Project Acoustical Engineer . Prepared an Environmental Impact Statement (EIS) for the addition of three natural draft cooling towers to an existing nuclear power plant. The environmental study involved coordinating a field survey of the existing acoustical environment, reviewing applicable local noise regulations, developing a noise prediction model of the proposed towers, evaluating the noise impact of the towers, and developing noise mitigation as required to meet the applicable regulations.

Energy Dissipation Facility, Eastern Municipal Water District; Lake Elsinore, California
1996
Project Acoustical Engineer. Designed noise mitigation for sleeve valves associated with a reclaimed water pump station. The valves were located within a facility building and were required to meet stringent nighttime noise regulations at the facility property boundaries. Determination of the sleeve valve noise impact required evaluating the building construction as well as the sleeve valve noise levels. In order to meet the noise regulations, the values and associated piping required specialized acoustical lagging.

Mid-Georgia Cogeneration Facility, Mid-Georgia Cogen, L.P.; Kathleen, Georgia
1995-1996
Project Acoustical Engineer . Assessed the noise impact of a 300 MW combined cycle cogeneration facility. The facility includes 2-100 MW combustion turbines

with 1-100 MW steam turbine. Electric power is supplied to Georgia Power's grid and steam to the adjacent Frito-Lay snack food plant. The major noise sources were evaluated with respect to complying with property boundary limits and mitigating the noise at the nearest residential area. Additionally, a procedure was developed for compliance/verification testing.

South Bangkok Combined Cycle Stage II, Electricity Generating Authority of Thailand; Bangkok, Thailand
1995
Acoustical Engineer. Developed noise control design to mitigate the noise impact of four new gas compressors each with fan coolers. The noise due to the compressors and associated equipment was analyzed and determined to significantly impact a nearby residential area. Special low-noise units in conjunction with substantial noise barrier walls were necessary to provide adequate sound attenuation to meet the noise criteria at the residential area.

ATTACHMENT 4
Site Landscaping Plan

(original only)

OVERSIZED MAP SEE DOCKET

L-00000S-00-0101