Appendix K
Noise

Appendix K1

Noise Measurement Site Data Logs and Equipment Calibration Records

FIELD MEASUREMENT DATA SHEET

URS

Project Name: HECA 2 Red

Job # 28067571.40211

ID

SITE IDENTIFICATION: LT-1 **OBSERVER(s):** RR & RM
START DATE & TIME: 3/2/09 10:56:00 3/3 11:58 am **END DATE & TIME:** 11:15AM 3/3/A
ADDRESS: Ackerman (Just East)

Meter Time = GPS Time + 11

GPS coordinates: 35° 20' 18.8 N 119° 23' 32.4 W

Weather

TEMP: 70 °F HUMIDITY: 56 % R.H. WIND: CALM LIGHT MODERATE VARIABLE
WINDSPEED: / MPH DIR: N NE E SE S SW W NW STEADY GUSTY ✓ MPH Sims Anemometer 95002
SKY: CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other:

Acoustic Measurements

INSTRUMENT: LD 820 **TYPE:** 1 2 **SERIAL #:** 1528 Red
CALIBRATOR: CAL 200 **SERIAL #:** 2794

CALIBRATION CHECK: **PRE-TEST** 93.7 **dBA SPL** **POST-TEST** 93.6 **dBA SPL** **WINDSCREEN** ✓

SETTINGS: A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:

	Rec #	Start Time	End Time	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
3/2	1	10:56 pm	11:15 am							
3/3	2	11:58 am								

COMMENTS:

Source Info and Traffic Counts

PRIMARY NOISE(S): TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER Birds
ROADWAY TYPE: Hard 55c Asphalt ADOHR Rd.

COUNT DURATION: -MINUTE

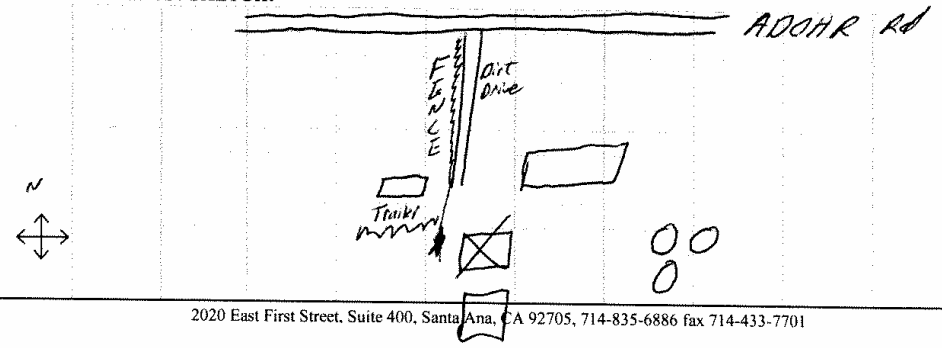
	SPEED (mph) NB / EB	SPEED (mph) SB / WB	SPEED (mph) NB EB	SPEED (mph) SB WB	#2 COUNT: NB / EB	#2 COUNT: SB / WB	SPEED (mph) NB EB	SPEED (mph) SB WB
AUTOS:								
MED. TRUCKS:								
HVY TRUCKS:								
BUSES:								
MOTORCYCLES:								

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Description / Sketch

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS: ✓
OTHER COMMENTS / SKETCH:



meastorm.xls

2020 East First Street, Suite 400, Santa Ana, CA 92705, 714-835-6886 fax 714-433-7701

FIELD MEASUREMENT DATA SHEET

URS **Project Name:** HECA 2 **Job #** 28067571.40211

ID

SITE IDENTIFICATION: LT-2 **OBSERVER(s):** RR + RM
START DATE & TIME: 3/2/09 17:30 **END DATE & TIME:** 3/3/09 12:35 Meter= GPS+30
ADDRESS: Adams (Tule House)
GPS coordinates: 36°19'58.7"N 119°22'21.0"

Weather

TEMP: 70 °F HUMIDITY: 66 % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED: / MPH DIR: N NE E SE S SW (W) NW **STEADY GUSTY** ____MPH
SKY: **CLEAR SUNNY DARK** (**PARTLY CLOUDY**) **OVRCST FOG DRIZZLE RAIN** Other: _____

Acoustic Measurements

INSTRUMENT: LD 820 **TYPE:** (1) 2 **SERIAL #:** 1597 Mic 2491 Green
CALIBRATOR: CAL 200 **SERIAL #:** 2794 101267

CALIBRATION CHECK: **PRE-TEST** 93.8 **dBA SPL** **POST-TEST** 93.8 **dBA SPL** **WINDSCREEN** ✓

SETTINGS (**A-WEIGHTED**) (**SLOW**) **FAST FRONTAL** (**RANDOM**) **ANSI OTHER:**_____

Rec #	Start Time / End Time							
1	3/2 17:30 3/3 12:35	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
2	3/3 13:09	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
	/ /	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
	/ /	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	

COMMENTS:

Source Info and Traffic Counts

PRIMARY NOISE(S): (**TRAFFIC**) **AIRCRAFT RAIL INDUSTRIAL** (**AMBIENT**) **OTHER**
ROADWAY TYPE: Hard Surface Asphalt [I-5 barely audible when quiet]
COUNT DURATION:_____**-MINUTE**

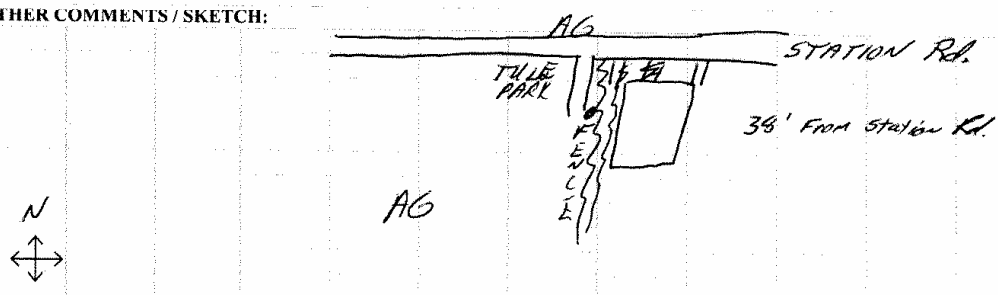
	SPEED (mph) NB / EB / SB / WB	NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	/	/	/	/
MED. TRUCKS:	/	/	/	/
HVY TRUCKS:	/	/	/	/
BUSES:	/	/	/	/
MOTORCYCLES:	/	/	/	/

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / (distant **BARKING DOGS**) (Occasional) (**BIRDS**)
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Description / Sketch

TERRAIN: **HARD SOFT** (**MIXED**) **FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:



measforms.xls

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FIELD MEASUREMENT DATA SHEET

URS **Project Name:** HECA 2 **Job #** 28067571.40211

ID

SITE IDENTIFICATION: LT-3 **OBSERVER(s):** RR & RM
START DATE & TIME: 3/2/09 14:15 **END DATE & TIME:**
ADDRESS: Along Stockdale Rd Telephone Pole Time = GPS + 30
GPS coordinates: 35° 21' 17.2" N 119° 22' 24.5" W

Weather

TEMP: 65 °F HUMIDITY: 53 % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED: / MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY** ____MPH
SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other: _____

Acoustic Measurements

INSTRUMENT: LD 820 **TYPE:** 2 **SERIAL #:** 1470
CALIBRATOR: CAL 200 **SERIAL #:** 2794
CALIBRATION CHECK: **PRE-TEST** 93.8 **dBA SPL** **POST-TEST** 93.8 **dBA SPL** **WINDSCREEN** ✓
SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:** _____

Rec #	Start Time / End Time	
1	13:15 / ≈14:30	L_{eq} ____, L_{max} ____, L_{min} ____, L_{90} ____, L_{50} ____, L_{10} ____, ____
2	≈14:30 / ____	L_{eq} ____, L_{max} ____, L_{min} ____, L_{90} ____, L_{50} ____, L_{10} ____, ____
____	____ / ____	L_{eq} ____, L_{max} ____, L_{min} ____, L_{90} ____, L_{50} ____, L_{10} ____, ____
____	____ / ____	L_{eq} ____, L_{max} ____, L_{min} ____, L_{90} ____, L_{50} ____, L_{10} ____, ____

COMMENTS:

Source Info and Traffic Counts

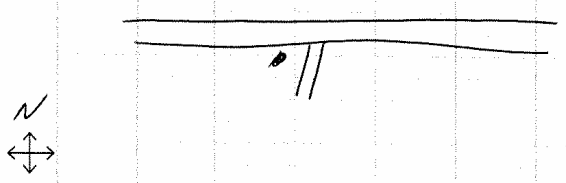
PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**
ROADWAY TYPE: Hard Surface Asphalt
COUNT DURATION: ____-**MINUTE** **SPEED (mph)** 35 **#2 COUNT:** **SPEED (mph)**

	NB / EB / SB / WB	NB EB / SB WB	NB / EB / SB / WB	NB EB / SB WB
AUTOS:	____ / ____	____ / ____	____ / ____	____ / ____
MED. TRUCKS:	____ / ____	____ / ____	____ / ____	____ / ____
HVY TRUCKS:	____ / ____	____ / ____	____ / ____	____ / ____
BUSES:	____ / ____	____ / ____	____ / ____	____ / ____
MOTORCYCLES:	____ / ____	____ / ____	____ / ____	____ / ____

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**
OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Description / Sketch

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:



measforms.xls

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FIELD MEASUREMENT DATA SHEET

URS **Project Name:** HECA 2 **Job #** 28067571.40211

ID

SITE IDENTIFICATION: NT-1/ST-1 **OBSERVER(s):** Ron + Ryan
START DATE & TIME: 3/4 on 3/2 9:40 on 3/3 **END DATE & TIME:**
ADDRESS:
GPS coordinates: ST-1 N 35° 20' 17.9" W 119° 23' 33.9"
NT-1 N 35° 20' 23.7" W 119° 23' 28.4"

Weather

TEMP:_____ ° F HUMIDITY:_____ % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED:_____MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY**_____MPH
SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other:_____

Acoustic Measurements

INSTRUMENT: B+K 2250 **TYPE:** 1 2 **SERIAL #:** 2672021
CALIBRATOR: CAL 200 **SERIAL #:** 2794
CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** 93.9 **dBA SPL** **WINDSCREEN** ✓
SETTINGS: **A WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**_____

	Rec #	Start Time / End Time	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
Heca2003	1	23:01 / 23:11	29.8	~~[illegible]~~ 48.8	25.4	27.1	28.5	31.3
Heca2004	2	23:12 / 23:22	34.5	52.2	26.4	29.2	32.1	36.3
Heca2009	3	12:04 / 12:14	43.8	57.3	34.3	38.2	41.3	46.2
Heca2010	4	12:15 / 12:25	42.4	52.7	31.0	36.6	41.3	45.4

COMMENTS: (1) sheep (2) distant traffic from Stockdale highway (3) birds; industrial (tractor, distant car (near) twice; dog barking, airplane overhead

Source Info and Traffic Counts

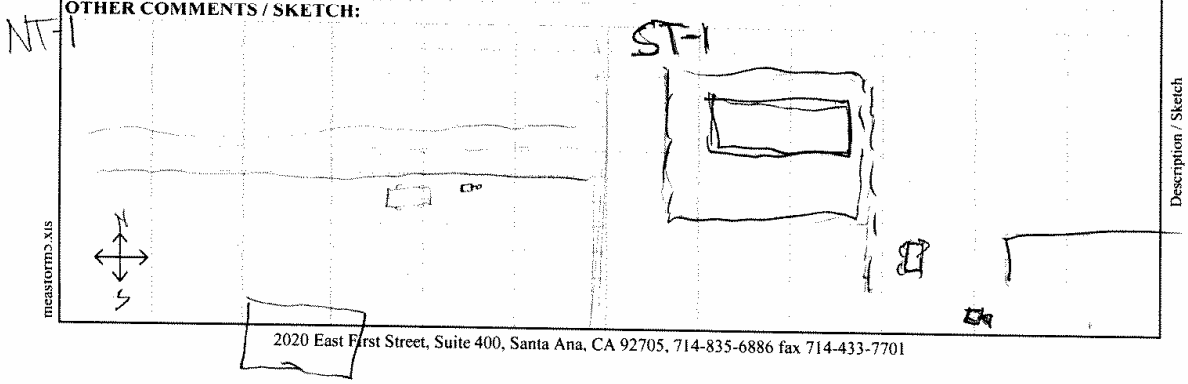
PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER** birds
ROADWAY TYPE:
COUNT DURATION:_____**-MINUTE**

	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:				
MED. TRUCKS:				
HVY TRUCKS:				
BUSES:				
MOTORCYCLES:				

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**
OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Description / Sketch

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:



measform3.xls

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FIELD MEASUREMENT DATA SHEET

URS

Project Name: HECA 2 **Job #** 28067571.40211

ID

SITE IDENTIFICATION: ~~ST~~ NT-1 (ST-1) **OBSERVER(s):** RA + RM
START DATE & TIME: 3/3 + 3/4 **END DATE & TIME:** 3/3 + 3/4
ADDRESS:
GPS coordinates: N 35° 20' 23.7" W 119° 23' 28.4"

Weather

TEMP:_____ °F HUMIDITY:_____ % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED:_____MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY**_____MPH
SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other: _____

Acoustic Measurements

INSTRUMENT: B + K 2250 **TYPE:** (1) 2 **SERIAL #:** 2672021
CALIBRATOR: CAL 200 **SERIAL #:** 2794

CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** 93.9 **dBA SPL** **WINDSCREEN** ✓

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**_____

	Rec #	Start Time	End Time	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
Heca 2029	1	21:10 (3/3)	21:20 (3/3)	45.8	61.4	37.2	40.5	44.2	49.0	
Heca 2030	2	21:21	21:31	46.5	57.4	38.4	42.0	44.9	49.2	

COMMENTS: (1) windy (11 mph) w/ gusts up to 15 mph, sheep

Source Info and Traffic Counts

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**
ROADWAY TYPE:

COUNT DURATION:_____**-MINUTE**

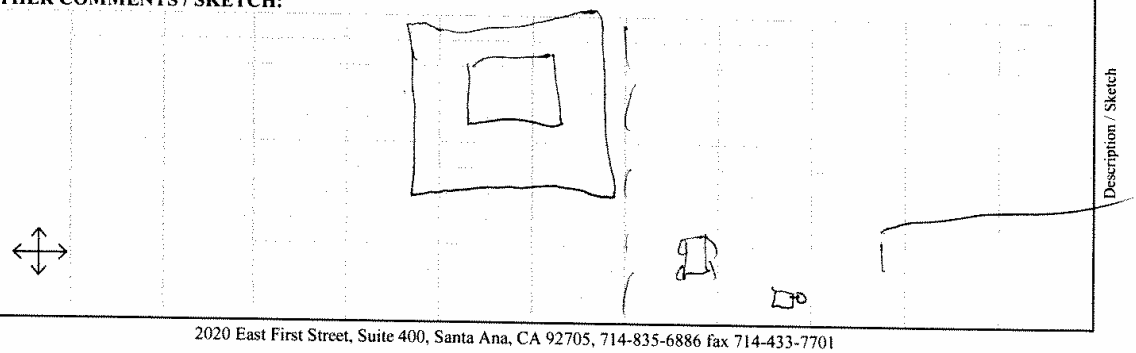
	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:				
MED. TRUCKS:				
HVY TRUCKS:				
BUSES:				
MOTORCYCLES:				

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS** distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Description / Sketch

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:



meastorm2.xls

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APPENDIX K1
NOISE MEASUREMENT SITE DATA LOGS AND EQUIPMENT CALIBRATION RECORDS

FIELD MEASUREMENT DATA SHEET

URS

Project Name: HECA 2 **Job #** 28067571.40211

SITE IDENTIFICATION: ST-2 **OBSERVER(s):** Ron + Ryan
START DATE & TIME: 3/3 below **END DATE & TIME:** 3/3 below
ADDRESS: Tule House
GPS coordinates: N 35° 19' 59.2" W 119° 22' 17.0"

ID

TEMP:_____ °F HUMIDITY:_____ % R.H. WIND: CALM LIGHT MODERATE VARIABLE
WINDSPEED: 11 MPH DIR: N NE E SE S SW W NW STEADY GUSTY 15 MPH
SKY: CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other: _____

Weather

INSTRUMENT: B+K 2250 **TYPE:** 1 2 **SERIAL #:** 2672071
CALIBRATOR: CAL 200 **SERIAL #:** 2794

CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** 93.9 **dBA SPL** **WINDSCREEN** ✓

SETTINGS: **A-WEIGHTED** **SLOW** **FAST** **FRONTAL** **RANDOM** **ANSI** **OTHER:**_____

	Rec #	Start Time	End Time	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
Heca 2007	1	0:00	0:10	42.4	61.5	32.2	34.0	35.3	37.1
Heca 2008	2	0:11	0:21	52.5	79.4	31.9	33.9	35.7	39.4
Heca 2025	3	20:12	20:22	53.4	75.1	38.5	43.0	48.3	55.8
Heca 2026	4	20:23	20:33	52.5	73.5	33.7	38.9	44.4	52.8

NT-2

COMMENTS: (1) + (2) low freq industrial distant (3) winds up to 11 mph gusting to 15 (4) same winds

Acoustic Measurements

PRIMARY NOISE(S): **TRAFFIC** **AIRCRAFT** **RAIL** **INDUSTRIAL** **AMBIENT** **OTHER**
ROADWAY TYPE:

COUNT DURATION:_____-MINUTE

	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	____/____	____/____	____/____	____/____
MED. TRUCKS:	____/____	____/____	____/____	____/____
HVY TRUCKS:	____/____	____/____	____/____	____/____
BUSES:	____/____	____/____	____/____	____/____
MOTORCYCLES:	____/____	____/____	____/____	____/____

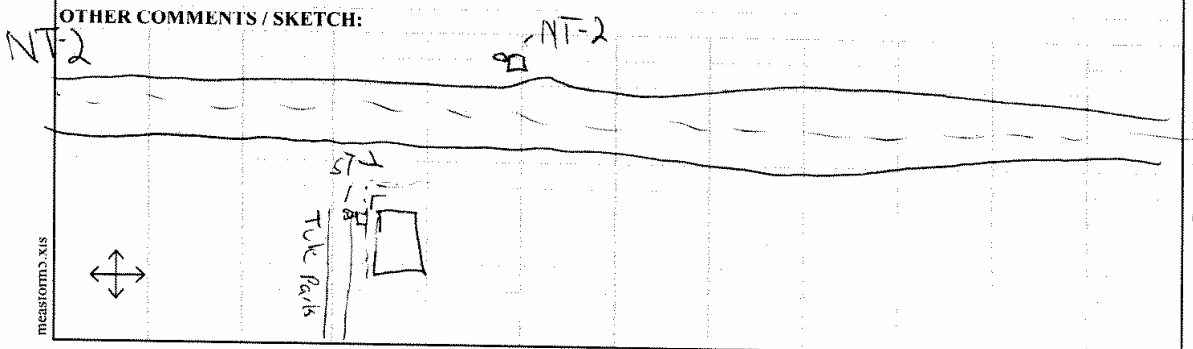
SPEED ESTIMATED BY: **RADAR** / **DRIVING** / **OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS** distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**

OTHER:

Source Info and Traffic Counts

TERRAIN: **HARD** **SOFT** **MIXED** **FLAT** **OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:



Description / Sketch

meastorm3.xls

2020 East First Street, Suite 400, Santa Ana, CA 92705, 714-835-6886 fax 714-433-7701

FIELD MEASUREMENT DATA SHEET

URS **Project Name:** HECA 2 **Job #** 28067571.40211

ID

SITE IDENTIFICATION: ~~ST~~ ST-3 **OBSERVER(s):** RR + RM
START DATE & TIME: 3/3 19:02, 19:~~13~~ 15 3/4 **END DATE & TIME:** 3/3 19:12, 19:25 / 3/4
ADDRESS: Stockdale
GPS coordinates: N 35° 21' 17.2" W 119° 22' 23.7

Weather

Evening 3/3

TEMP: 66 °F HUMIDITY: 38 % R.H. WIND: **CALM** **LIGHT** **MODERATE** **VARIABLE**
WINDSPEED: 0 MPH DIR: **N NE E SE S SW W NW** **STEADY** **GUSTY** ____ MPH
SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other: _____

Acoustic Measurements

INSTRUMENT: B+K 2250 **TYPE:** 1 2 **SERIAL #:** 2672071
CALIBRATOR: CAL 200 **SERIAL #:** 2794
CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** 93.9 **dBA SPL** **WINDSCREEN** ✓
SETTINGS: **A-WEIGHTED** **SLOW** **FAST** **FRONTAL** **RANDOM** **ANSI** **OTHER:** _____

Rec #	Start Time / End Time	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
1	1902 / 19:12	52.5	76.2	24.0	25.3	28.6	45.5	
2	19:15 / 19:25	58.5	79.8	23.2	24.9	29.2	54.9	
	/ /							
	/ /							

Heca 2021
Heca 2022

COMMENTS: (1) some traffic, motorcycle/moped

Source Info and Traffic Counts

PRIMARY NOISE(S): **TRAFFIC** **AIRCRAFT** **RAIL** **INDUSTRIAL** **AMBIENT** **OTHER**
ROADWAY TYPE:

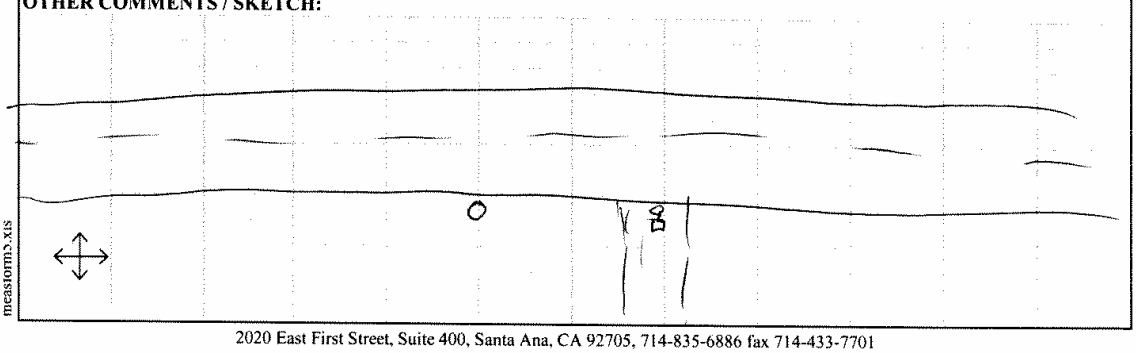
COUNT DURATION: ____-MINUTE	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	/	/	/	/
MED. TRUCKS:	/	/	/	/
HVY TRUCKS:	/	/	/	/
BUSES:	/	/	/	/
MOTORCYCLES:	/	/	/	/

SPEED ESTIMATED BY: **RADAR** / **DRIVING** / **OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Description / Sketch

TERRAIN: **HARD** **SOFT** **MIXED** **FLAT** **OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:



measform3.xls

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APPENDIX K1
NOISE MEASUREMENT SITE DATA LOGS AND EQUIPMENT CALIBRATION RECORDS

FIELD MEASUREMENT DATA SHEET

URS

Project Name: HECA 2 **Job #** 28067571.40211

SITE IDENTIFICATION: ~~[illegible]~~ 5T3 **OBSERVER(s):** RM + ~~[illegible]~~ RK
START DATE & TIME: **END DATE & TIME:**
ADDRESS: Stockdale Highway
GPS coordinates: N 35° 21' 17.2" W 119° 22' 23.7"

ID

Day time 3/3

TEMP: 72 °F HUMIDITY: 40 % R.H. WIND: CALM LIGHT MODERATE VARIABLE
WINDSPEED: 2.5 MPH DIR: N NE E SE S SW W NW STEADY GUSTY 5 MPH
SKY: CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other:

Weather

INSTRUMENT: B + K 2250 **TYPE:** 1 2 **SERIAL #:** 2672071
CALIBRATOR: CAL 200 **SERIAL #:** 2794

CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** 93.9 **dBA SPL** **WINDSCREEN** ✓

SETTINGS: **A-WEIGHTED** **SLOW** **FAST** **FRONTAL** **RANDOM** **ANSI** **OTHER:**

	Rec #	Start Time	End Time		L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
Heca2015	1	14:35	14:45	3/3	65.9	85.9	32.8	34.7	40.0	65.1	
Heca2016	2	14:48	14:58	3/3	64.4	82.8	32.3	34.7	38.6	61.6	
Evening on another sheet											

COMMENTS: birds, traffic,

Acoustic Measurements

PRIMARY NOISE(S): **TRAFFIC** **AIRCRAFT** **RAIL** **INDUSTRIAL** **AMBIENT** **OTHER**
ROADWAY TYPE:

COUNT DURATION: _____ **-MINUTE**

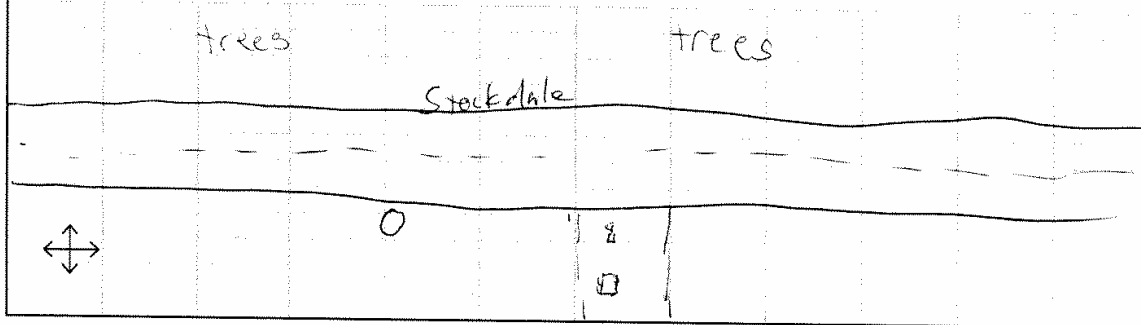
	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	/	/	/	/
MED. TRUCKS:	/	/	/	/
HVY TRUCKS:	/	/	/	/
BUSES:	/	/	/	/
MOTORCYCLES:	/	/	/	/

SPEED ESTIMATED BY: **RADAR** / **DRIVING** / **OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Source Info and Traffic Counts

TERRAIN: **HARD** **SOFT** **MIXED** **FLAT** **OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:



Description / Sketch

measform3.xls

2020 East First Street, Suite 400, Santa Ana, CA 92705, 714-835-6886 fax 714-433-7701

FIELD MEASUREMENT DATA SHEET

URS

Project Name: HECA 2 **Job #** 28067571.40211

ID

SITE IDENTIFICATION: ST-~~3~~4 **OBSERVER(s):** RM + GD
START DATE & TIME: 1245 4/28 **END DATE & TIME:** 2:00 AM 4/28
ADDRESS: ~~Topman South~~ Tule Reserve
GPS coordinates: ~~N 35° 19' 09.8"~~ ~~W 119° 21' 36.6"~~ N 35°20'00.3" W 119°21'55.0"

Weather

TEMP: 50 °F HUMIDITY: 50 % R.H. WIND: CALM LIGHT MODERATE VARIABLE
WINDSPEED: 2 MPH DIR: N NE E SE S SW W NW STEADY GUSTY 3 MPH
SKY: CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other:

Acoustic Measurements

INSTRUMENT: Yellow 820 LD **TYPE:** 1 2 **SERIAL #:** 1470
CALIBRATOR: CAL 200 **SERIAL #:** 2794
CALIBRATION CHECK: **PRE-TEST** 93.7 **dBA SPL** **POST-TEST** 93.7 **dBA SPL** **WINDSCREEN** ✓
SETTINGS: **A-WEIGHTED** **SLOW** **FAST** **FRONTAL** **RANDOM** **ANSI** **OTHER:**

Rec #	Start Time / End Time	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	L_{2s}	L_2
1	1245 / 2:00	41.1	56.2	33.6	36.9	39.9	43.4	41.7	45.5
	/ /								
	/ /								
	/ /								

COMMENTS: freeway, frogs, distant barking, generator

Source Info and Traffic Counts

PRIMARY NOISE(S): **TRAFFIC** **AIRCRAFT** **RAIL** **INDUSTRIAL** **AMBIENT** **OTHER**
ROADWAY TYPE:
COUNT DURATION: ____ **-MINUTE**

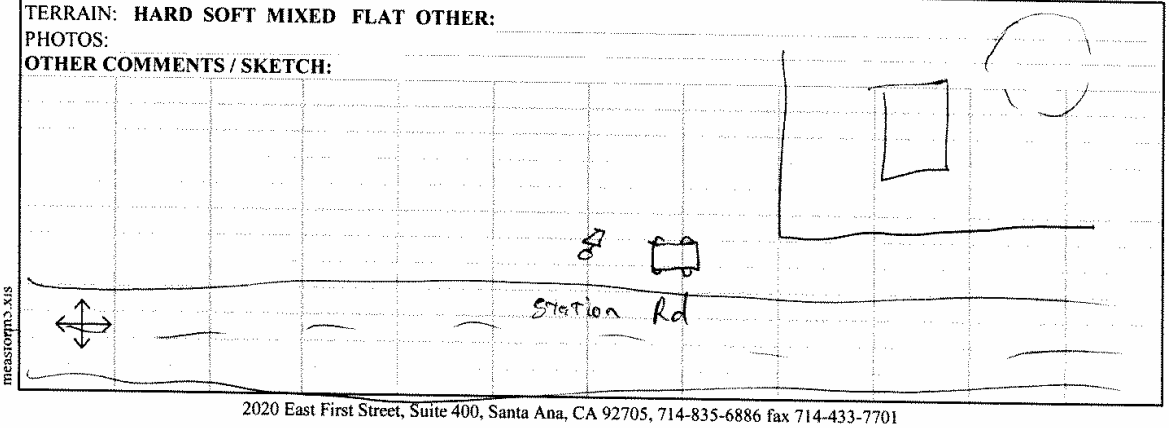
	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	/	/	/	/
MED. TRUCKS:	/	/	/	/
HVY TRUCKS:	/	/	/	/
BUSES:	/	/	/	/
MOTORCYCLES:	/	/	/	/

SPEED ESTIMATED BY: **RADAR** / **DRIVING** / **OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Description / Sketch

TERRAIN: **HARD** **SOFT** **MIXED** **FLAT** **OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:



measform3.xls

2020 East First Street, Suite 400, Santa Ana, CA 92705, 714-835-6886 fax 714-433-7701

APPENDIX K1
NOISE MEASUREMENT SITE DATA LOGS AND EQUIPMENT CALIBRATION RECORDS

FIELD MEASUREMENT DATA SHEET

URS Project Name: HECA 2 Job # 28067571.40211

ID

SITE IDENTIFICATION: ST-4 / NT-4 (Tule Reserve) OBSERVER(s): Ron + Ryan
START DATE & TIME: 23:33 (3/2) 13:49 (3/3) END DATE & TIME: 23:43 (3/2) 13:59 (3/3)
ADDRESS: Tule Elk Reserve
GPS coordinates: N 35° 20' 00.3" W 119° 21' 55.0"

Weather

TEMP:_____ °F HUMIDITY:_____ % R.H. WIND: CALM LIGHT MODERATE VARIABLE
WINDSPEED:_____MPH DIR: N NE E SE S SW W NW STEADY GUSTY____MPH
SKY: CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other: _____

Acoustic Measurements

INSTRUMENT: B+K 2250 TYPE: 1 2 SERIAL #: 2672071
CALIBRATOR: CAL 200 SERIAL #: 2794
CALIBRATION CHECK: PRE-TEST 93.9 dBA SPL POST-TEST 93.9 dBA SPL WINDSCREEN ✓
SETTINGS: A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:_____

	Rec #	Start Time	End Time		L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
Heca 2005	1	23:33	23:43	3/2	36.9	50.2	32.5	34.6	36.1	38.7
Heca 2006	2	23:45	23:55	3/2	37.2	49.2	33.6	35.3	37.0	38.7
Heca 2013	3	13:49	13:59	3/3	51.4	73.8	27.3	29.2	31.4	38.7
Heca 2014	4	14:01	14:11	3/3	51.3	75.9	26.5	28.4	29.8	34.1

COMMENTS: (1)+(2) crickets ; low freq, industrial, distant
(3) birds, cars, distant traffic, overhead aircraft (distant), wind interacting w/ fence

Source Info and Traffic Counts

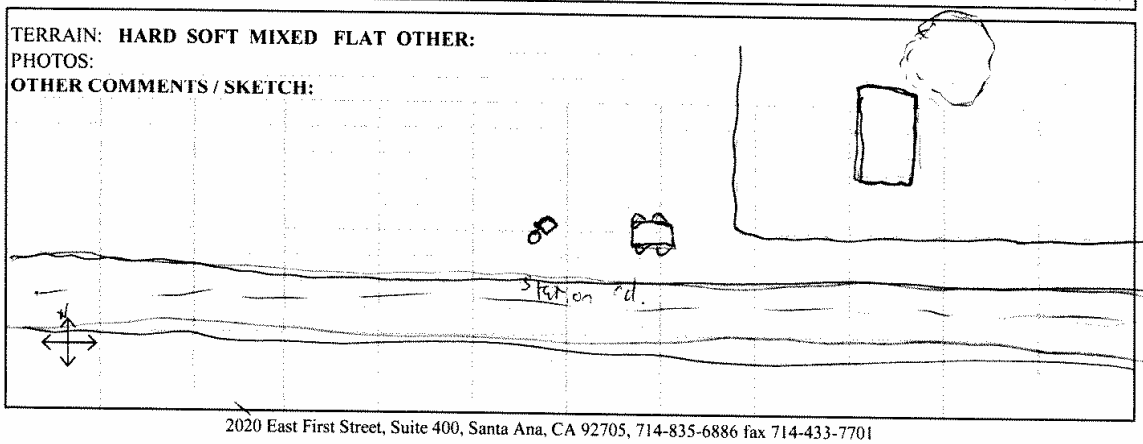
PRIMARY NOISE(S): TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER crickets
ROADWAY TYPE:
COUNT DURATION:_____-MINUTE

	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	____ / ____	____ / ____	____ / ____	____ / ____
MED. TRUCKS:	____ / ____	____ / ____	____ / ____	____ / ____
HVY TRUCKS:	____ / ____	____ / ____	____ / ____	____ / ____
BUSES:	____ / ____	____ / ____	____ / ____	____ / ____
MOTORCYCLES:	____ / ____	____ / ____	____ / ____	____ / ____

SPEED ESTIMATED BY: RADAR / DRIVING / OBSERVER
OTHER NOISE SOURCES: distant AIRCRAFT / overhead / RUSTLING LEAVES / distant BARKING DOGS / BIRDS
distant CHILDREN PLAYING / distant TRAFFIC / distant LANDSCAPING / distant TRAINS
OTHER:

Description / Sketch

TERRAIN: HARD SOFT MIXED FLAT OTHER:
PHOTOS:
OTHER COMMENTS / SKETCH:



measforms.xls

2020 East First Street, Suite 400, Santa Ana, CA 92705, 714-835-6886 fax 714-433-7701

evening / night (2)

URS **FIELD MEASUREMENT DATA SHEET**

Project Name: HECA 2 **Job #** 28067571.40211

SITE IDENTIFICATION: ST-4 **OBSERVER(s):** RR + RM
START DATE & TIME: 3/3 19:39 , 19:53 **END DATE & TIME:** 3/3 19:49 20:03 / 3/4
ADDRESS: Tule Elk Reserve 3/4

GPS coordinates: N 35° 20' 00.3" W 119° 21' 55.0"

ID

TEMP:_____ °F HUMIDITY:_____ % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED:_____MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY**_____MPH
SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other: _____

Weather

INSTRUMENT: B+K 2250 **TYPE:** 1 2 **SERIAL #:** 2672071
CALIBRATOR: CAL 200 **SERIAL #:** 2799

CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** 93.9 **dBA SPL** **WINDSCREEN** ✓

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**_____

	Rec #	Start Time	End Time	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
Heca2023	1	19:39	19:49	33.4	55.4	23.4	27.4	31.3	35.7	
Heca2024	2	19:53	20:03	48	71.2	29.6	32.7	36.0	44.1	

COMMENTS: (1) crickets, fence (interacting w/ wind or electric?)

Acoustic Measurements

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**
ROADWAY TYPE:

COUNT DURATION:_____**-MINUTE**

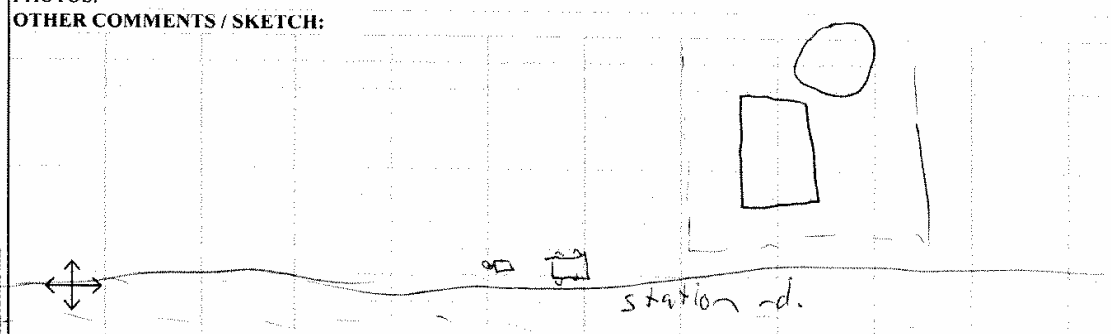
	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	/	/	/	/
MED. TRUCKS:	/	/	/	/
HVY TRUCKS:	/	/	/	/
BUSES:	/	/	/	/
MOTORCYCLES:	/	/	/	/

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Source Info and Traffic Counts

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:



Description / Sketch

six.quistoom

APPENDIX K1
NOISE MEASUREMENT SITE DATA LOGS AND EQUIPMENT CALIBRATION RECORDS

FIELD MEASUREMENT DATA SHEET

URS

Project Name: HECA 2 **Job #** 28067571.40211

ID

SITE IDENTIFICATION: ST-5 **OBSERVER(s):** RM + GD
START DATE & TIME: 12:45 AM 4/28 **END DATE & TIME:** 2:00 AM 4/28
ADDRESS: ~~[illegible]~~ Tupman South
GPS coordinates: ~~N 35° 20' 00.3"~~ ~~W 119° 21' 55.6"~~ N 35° 19' 09.8" W 119° 22' 36.6"

Weather

TEMP:_____ °F HUMIDITY:_____ % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED:_____MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY**_____MPH
SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other: _____

Acoustic Measurements

INSTRUMENT: 820 red ✓ **TYPE:** (✓) 1 2 **SERIAL #:** 1528
CALIBRATOR: CAL 200 **SERIAL #:** 2794
CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** 93.9 **dBA SPL** **WINDSCREEN** ✓
SETTINGS: (**A-WEIGHTED**) **SLOW FAST FRONTAL RANDOM ANSI OTHER:**_____

Rec #	Start Time / End Time	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
1	12:45 / 2:00	61.7	93.1	29.5	33.0	36.6	43.3	L_{25}
	/ /							L_2 55.2
	/ /							
	/ /							

COMMENTS: distant traffic, truck, 2 4-wheelers, frogs, distant generator, barking

Source Info and Traffic Counts

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**
ROADWAY TYPE:
COUNT DURATION:_____**-MINUTE**

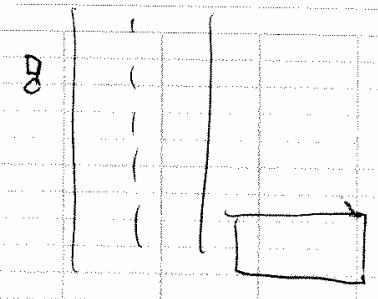
	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	/	/	/	/
MED. TRUCKS:	/	/	/	/
HVY TRUCKS:	/	/	/	/
BUSES:	/	/	/	/
MOTORCYCLES:	/	/	/	/

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Description / Sketch

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:



meastorm3.xls

2020 East First Street, Suite 400, Santa Ana, CA 92705, 714-835-6886 fax 714-433-7701

FIELD MEASUREMENT DATA SHEET

URS **Project Name:** HECA 2 **Job #** 28067571.40211

ID

SITE IDENTIFICATION: ST-5 **OBSERVER(s):** RR + RM
START DATE & TIME: 3/3 15:14 **END DATE & TIME:** 3/3 15:24
ADDRESS: Tupman (South)
GPS coordinates: N 35° 19' 09.8" W 119° 22' 36.6"

Weather

TEMP:_____ ° F HUMIDITY:_____ % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED:_____MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY**_____MPH
SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other: _____

Acoustic Measurements

INSTRUMENT: B+K 2250 **TYPE:** (1) 2 **SERIAL #:** 2672071
CALIBRATOR: CAL 200 **SERIAL #:** 2799

CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** 93.9 **dBA SPL** **WINDSCREEN** ✓

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**_____

	Rec #	Start Time	End Time		L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
Heca2017	1	15:14	15:24	3/3	57.3	82.4	21.2	23.5	27.7	47.9
Heca2018	2	15:25	15:35	3/3	62.8	83.1	21.0	24.5	38.9	59.0
Heca2027	3	20:39	20:49	3/3	55.0	79.8	29.5	34.2	38.9	49.0
Heca2028	4	20:50	21:00	3/3	38.5	52.0	27.1	31.9	36.2	41.9

COMMENTS: (1) traffic, occasional bird (2) tractor, traffic, birds (3) Wind 11 mph, gusts up to 15 mph, dog barking in distance (4) distant aircraft, wind

Source Info and Traffic Counts

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**
ROADWAY TYPE:

COUNT DURATION:_____-MINUTE

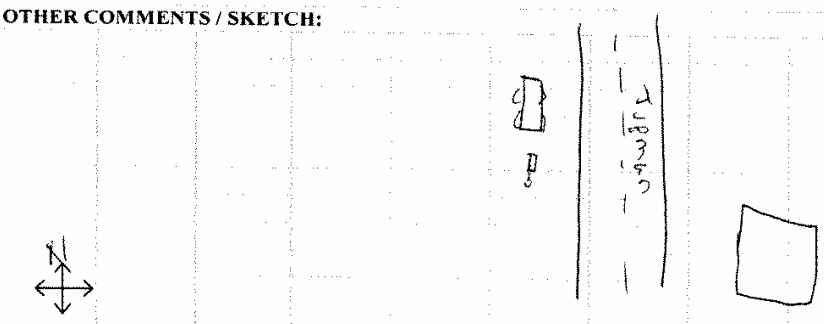
	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	____ / ____	____ / ____	____ / ____	____ / ____
MED. TRUCKS:	____ / ____	____ / ____	____ / ____	____ / ____
HVY TRUCKS:	____ / ____	____ / ____	____ / ____	____ / ____
BUSES:	____ / ____	____ / ____	____ / ____	____ / ____
MOTORCYCLES:	____ / ____	____ / ____	____ / ____	____ / ____

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS** distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Description / Sketch

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:



measformc.xls

APPENDIX K1
NOISE MEASUREMENT SITE DATA LOGS AND EQUIPMENT CALIBRATION RECORDS

URS

FIELD MEASUREMENT DATA SHEET

Night

Project Name: HECA 2 **Job #** 28067571.40211

ID

SITE IDENTIFICATION: NT-5 / ST-5 **OBSERVER(s):** RR + RM
START DATE & TIME: 3/3 **END DATE & TIME:** 3/3
ADDRESS: Tupman (South)
GPS coordinates: N 35° 19' 09.8" W 119° 22' 36.6"

Weather

TEMP:_____ °F HUMIDITY:_____ % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED:_____MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY**_____MPH
SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other: _____

Acoustic Measurements

INSTRUMENT: B+K 2250 **TYPE:** ✓ 2 **SERIAL #:** 2672071
CALIBRATOR: CAL 200 **SERIAL #:** 2794
CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** 93.9 **dBA SPL** **WINDSCREEN** ✓
SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**_____

	Rec #	Start Time / End Time								
teca2031	1	22:06 / 22:16	L_{eq} 66.7,	L_{max} 102.5	L_{min} 34.3,	L_{90} 38.9,	L_{50} 45.7,	L_{10} 52.7,	- meter fell
teca2032	2	22:17 / 22:27	L_{eq} 52.6,	L_{max} 79.4,	L_{min} 32.6,	L_{90} 37.9,	L_{50} 43.9,	L_{10} 51.2,	
	___	___ / ___	L_{eq} ___,	L_{max} ___,	L_{min} ___,	L_{90} ___,	L_{50} ___,	L_{10} ___,	
	___	___ / ___	L_{eq} ___,	L_{max} ___,	L_{min} ___,	L_{90} ___,	L_{50} ___,	L_{10} ___,	

COMMENTS:

Source Info and Traffic Counts

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**
ROADWAY TYPE:

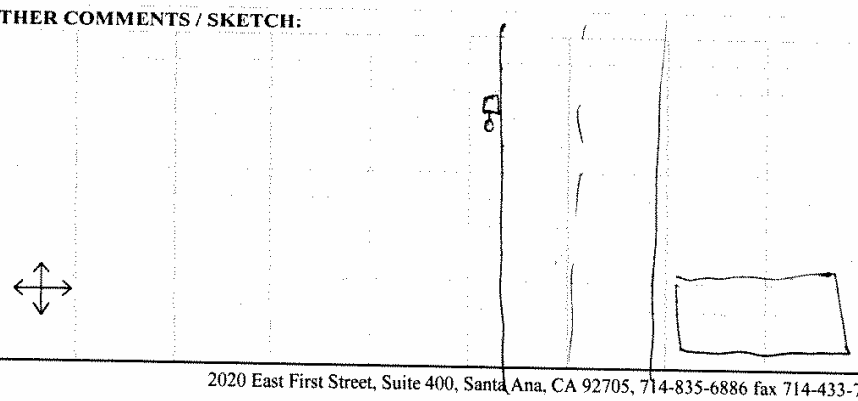
COUNT DURATION:_____-MINUTE	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	___ / ___	___ / ___	___ / ___	___ / ___
MED. TRUCKS:	___ / ___	___ / ___	___ / ___	___ / ___
HVY TRUCKS:	___ / ___	___ / ___	___ / ___	___ / ___
BUSES:	___ / ___	___ / ___	___ / ___	___ / ___
MOTORCYCLES:	___ / ___	___ / ___	___ / ___	___ / ___

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Description / Sketch

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:



measform3.xls

FIELD MEASUREMENT DATA SHEET

URS **Project Name:** HECA 2 **Job #** 28067571.40211

ID

SITE IDENTIFICATION: ST-6 **OBSERVER(s):** RR + RM
START DATE & TIME: 3/3 15:50, 16:02 **END DATE & TIME:** 16:00, 16:12
ADDRESS: Freeman

GPS coordinates: N 35° 20' 36.3" W 119° 25' 44.8"

Weather

TEMP:_____ °F HUMIDITY:_____ % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED:_____MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY**_____MPH
SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other: _____

Acoustic Measurements

INSTRUMENT: B+K 2250 **TYPE:** (1) 2 **SERIAL #:** 2672071
CALIBRATOR: CAL 200 **SERIAL #:** 2794

CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** 93.9 **dBA SPL** **WINDSCREEN** ✓

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**_____

	Rec #	Start Time / End Time	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
Heca 2019	1	15:50 / 16:00	35.2	51.2	24.7	30.0	30.9	39.1
Heca 2020	2	16:02 / 16:12	[illegible]	46.7	22.5	24.9	28.3	33.3
		/ /	30.1					
		/ /						

COMMENTS: helicopter constant (distant)

Source Info and Traffic Counts

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**
ROADWAY TYPE:

COUNT DURATION:_____**-MINUTE**

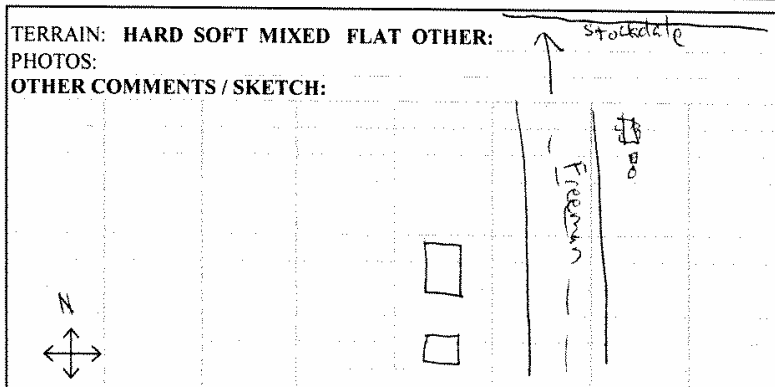
	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	/	/	/	/
MED. TRUCKS:	/	/	/	/
HVY TRUCKS:	/	/	/	/
BUSES:	/	/	/	/
MOTORCYCLES:	/	/	/	/

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Description / Sketch

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:



measform3.xls

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2008-108100

Instrument Model 820, Serial Number 1470, was calibrated on 27JUN2008. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 27JUN2008
Calibration due: 27JUN2010

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0277 / 0109	12 Months	01APR2009	2008-105087

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 27 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data same as shipped data.
Tested with 828-917

Signed:
Technician: Ron Harris

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2000 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2008-108099

Instrument Model 820, Serial Number 1528, was calibrated on 27JUN2008. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 27JUN2008
Calibration due: 27JUN2010

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2239	0099 / 0104	12 Months	23JAN2009	2008-102630

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 27 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data same as shipped data.
Tested with 828-2437

Signed: Ron Harris
Technician: Ron Harris

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2000 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2008-108097

Instrument Model 820, Serial Number 1597, was calibrated on 27JUN2008. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 27JUN2008
Calibration due: 27JUN2010

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2239	0099 / 0104	12 Months	23JAN2009	2008-102630

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 27 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data same as shipped data.
Tested with 828-2491

Signed: Ron Harris
Technician: Ron Harris

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ISO 9001-2000 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2008-112585

Instrument Model CAL200, Serial Number 2794, was calibrated on 07NOV2008. The instrument meets factory specifications per Procedure D0001.8190.

Instrument found to be in calibration as received: YES
Date Calibrated: 07NOV2008
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2560	2506	12 Months	16FEB2009	[illegible]
Schaevitz	2101 1595 A	17586	12 Months	26MAR2009	[illegible]
Larson Davis	2900	0361	12 Months	07APR2009	[illegible]
Hewlett Packard	3458A	US36030460	12 Months	06JUN2009	[illegible]
Hewlett Packard	3458A	3146A16062	12 Months	02JUL2009	[illegible]
Larson Davis	PRM915	0112	12 Months	15SEP2009	2008-110517
Larson Davis	PRM902	0180	12 Months	15SEP2009	2008-110513
Larson Davis	MTG100B2301	0111	12 Months	15SEP2009	2008-5V908

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as shown on calibration report.

Attestations

This Certificate attests that the instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturers published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in the certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Before: 113.97 dB, 93.9 in ch, 1000.0 Hz @ sea level.
After: Refer to Certificate of Measured Output.

Signed: Scott Montgomery
Technician: Scott Montgomery

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 718.926.6243 Fax: 718.926.6215
ISO 9001-2000 Certified

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

Larson Davis CAL200 Acoustic Calibrator, SN: 2794
Certificate of Measured Output

Performance at Reference Conditions

Nominal Level (dB SPL):	94	114
Measured Level (dB SPL):	93.99	113.99
Expanded Uncertainty (dB):	0.153	0.152
Level Error Limit (dB):	±0.35	±0.35
Nominal Frequency (Hz):	1000	1000
Measured Frequency (Hz):	1000.1	1000.0
Expanded Uncertainty (Hz):	0.2	0.2
Frequency Error Limit (Hz):	±10.0	±10.0
Measured Distortion (%):	0.40	0.30
Expanded Uncertainty (%):	0.25	0.25
Distortion Limit (%):	2.0	2.0

The data is acquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity.

Environmental Conditions

Temperature (°C):	24	24
Relative Humidity (%):	36	36
Static Pressure (kPa):	101.2	101.1

Reference Microphone
Model: Larson Davis 2559
Serial Number: 2506
Open Circuit Sensitivity: 12.417 mV/Pascal
Uncertainty: 0.130 dB

Influence of Static Pressure

Nominal Level (dB SPL): 114

Nominal Pressure (kPa)	Pressure (kPa)	Level Change (dB)	Frequency Change (Hz)	Distortion (%)
108.0	107.9	-0.06	0.00	0.31
101.3	101.2	0.00	0.00	0.30
92.0	92.0	0.05	0.00	0.29
83.0	82.9	0.05	0.00	0.28
74.0	73.9	0.02	-0.00	0.28
65.0	65.1	-0.08	-0.00	0.30
Expanded Uncertainty:	1.0	0.04	0.20	0.25
Limit:		±0.30	±10.0	2.0

Reference microphone corrections applied.

Environmental Conditions

Temperature (°C):	24
Relative Humidity (%):	37

Reference Microphone
Model: Larson Davis 2559
Serial Number: 2506

Static pressure was measured with a calibrated Motorola pressure sensor MPX2300AP.
Temperature and humidity was measured with a calibrated Dwyer 1020A sensor.
Expanded uncertainty of environmental measurements: 0.5°C, 3.5%RH, 0.5 kPa
Uncertainty values are given at 95% confidence (coverage factor = 2).

A Sound Level Meter can be calibrated to a true 2 Pascal sine wave. L = measured level - pressure sensitivity or L = Source Level Meter is calibrated using a reference level. The adjustments to data (X) are defined as: X = measured level - nominal level - pressure sensitivity

Scott Montgomery — Larson Davis Calibrator Calibration Specialist — 11 / 07 / 2006

Appendix K-2
Noise Technical Report

Hydrogen Energy California Project
Noise Evaluation Study

Prepared for:

Fluor Corporation Irvine, California

Prepared by:

Alliance Acoustical Consulting, Inc.

Irvine California

May 2009

APPENDIX K-2

NOISE TECHNICAL REPORT

TABLE OF CONTENTS

EXECUTIVE SUMMARY K-ES-1

1.0 INTRODUCTION AND GOALS K-1

2.0 SETTING K-2

3.0 NOISE DESCRIPTORS K-5

4.0 EXISTING CONDITIONS (FROM URS) K-7

5.0 NOISE CRITERIA K-11
- 5.1 Federal Criteria K-11
- 5.2 California Criteria K-12
- 5.3 Local Criteria K-13
- 5.4 Summary of Noise Design Goals and Criteria K-14

6.0 CONSTRUCTION-RELATED NOISE K-15
- 6.1 Main Facility Construction K-15
- 6.2 Linear Facility Construction K-18
- 6.3 Special Construction Activities K-18
- 6.4 Post-Commissioning Maturation Phase Noise K-19
- 6.5 Summary of Construction, Startup, and Commissioning Noise K-20

7.0 PROJECT NOISE ANALYSIS AND EVALUATION METHODS K-20

8.0 PROJECT OPERATIONS MODELING PROCEDURES, INPUTS, AND ASSUMPTIONS K-21

9.0 FUTURE CONDITIONS MODELING RESULTS K-22
- 9.1 Noise Modeling Results K-22
  - 9.1.1 Modeling Results Compared to Kern County Standards K-23
  - 9.1.2 Modeling Results Compared to CEC Standards K-24

10.0 NOISE CONTROL DESIGN FEATURES K-29

11.0 CONCLUSION K-31

12.0 TECHNICAL REFERENCES K-32

APPENDIX K-2

NOISE TECHNICAL REPORT

TABLE OF CONTENTS

Tables

Table 1 Summary of Pertinent Worker Noise Exposure Parameters
Table 2 Summary of Noise Design Goals
Table 3 Individual Equipment Noise Levels Generated by Project Construction
Table 4 Aggregate Estimated Noise Levels Generated by Phase for the Project Construction Activities
Table 5 Estimated Worst-case Steam Blow Noise Levels
Table 6a Summary of Project Base Case Noise Contributions Relative to Kern County Noise Element Standards (Exterior)
Table 6b Summary of Project Base Case Noise Contributions Relative to Kern County Noise Element Standards (Interior)
Table 7 Summary of Project Base Case Noise Contributions Relative to CEC Noise Impact Criteria Guidelines
Table 8a Summary of Project Noise Control Case 1 Noise Contributions Relative to Kern County Noise Element Standards (Exterior)
Table 8b Summary of Project Noise Control Case 1 Noise Contributions Relative to Kern County Noise Element Standards (Interior)
Table 9 Summary of Project Noise Control Case 1 Noise Contributions Relative to CEC Noise Impact Criteria Guidelines

Figures

Figure 1 General Location of the Project
Figure 2 Typical A-weighted Sound Levels for Various Noise Sources
Figure 3 Pertinent Community Receptor Locations
Figure 4 Predicted Noise Level Contours

Attachments

Attachment A Kern County General Plan – Noise Element, Chapter 3 Attachment B Noise Parameters Used as Modeling Inputs

EXECUTIVE SUMMARY

A Noise Technical Report was prepared by Alliance Acoustical Consulting (AAC) on the Hydrogen Energy California (HECA or Project) in Kern County, California. The study was undertaken to investigate the construction and operations noise environment; primarily with respect to off-site community receptors and secondarily, with respect to on-site worker health and safety concerns. The goals of the evaluation were to (a) predict future noise conditions associated with the Project; (b) support the Application for Certification (AFC) documentation to the California Energy Commission (CEC); and (c) contribute to noise control strategies, as needed, for the Fluor design to reduce expected noise-related impacts to being less than significant for the Project development.

Given the relatively long distances to the nearest noise-sensitive receptors, construction noise analysis results indicate that noise from expected construction activities at the Project Site would not be expected to exceed the Kern County General Plan requirements at any of the nearby receptor locations. The requirements are in terms of the A-weighted (dBA) day-night average sound level (L_{dn}) with the exterior standard being 65 L_{dn} and the interior standard being 45 L_{dn}. Thus, construction noise, although potentially audible at times, would be considered to be a less-than-significant impact.

Using reference data for similar equipment, vendor-supplied noise level information, and/or industry-accepted estimation techniques, the proposed Project equipment noise level emissions were determined. These predicted equipment levels were conservatively modeled to synthesize the expected future noise conditions for the power Project site and surrounding community areas. The modeling results for the plant were compared to the Project criteria to assess potential off-site impacts to community receptors.

Given the results of work performed during the development of the Project, it was clear that a notable amount of noise control features would be needed for the currently proposed site and Project layout. The noise reduction features were evaluated herein to arrive at a set of reasonable, effective, and balanced noise control methods for lowering the overall plant noise emissions into the community.

The currently configured Project Site layout should include these recommended noise control design features such that off-site compliance with the Kern County Noise Element and the CEC noise impact criterion[1] can be ensured.

These features will also help with on-site worker exposure concerns. Some areas within the process and power generation units of the Project, however, will need to be managed for appropriate worker health and safety regarding prudent noise exposures. This management can be accomplished via appropriate administrative controls regarding time spent around the noisiest equipment, as well as promoting the use of appropriate and qualified hearing protection devices.

[1] Adherence to CEC guidelines in this case includes considerations for extenuating circumstances of the local noise environment and the number of potentially impacted noise receptors.

The noise control treatments identified in this initial evaluation study should be refined during the course of more detailed engineering, such that the as-built installation maintains the expected overall noise emissions and achieves the desired noise compliance.

Following Project start-up and commissioning, it is recommended that a compliance verification noise level measurement survey be conducted to assess the as-built noise environments, to fine-tune worker exposure parameters (i.e., the allowable time in one or more noisy areas), and to verify equipment supply commitments. This survey will also satisfy a condition of approval that is routinely part of the CEC's permitting for the AFC process.

Noise Reduction Measures include:

- Putting open-top enclosures on selected non-enclosed compressors
- Putting an open-top enclosure on the (non-enclosed) expander
- Noise abatement for various noise sources associated with the gasifiers.
- Low-noise procurement or shrouded or blanketed pump trains
- Low-noise procurement or shrouded or blanketed blowers and dust handlers
- Reduced-noise cooling tower cells
- Use stack silencer on HRSG exhaust
- Use stack silencer on LMS100® SCR exhaust
- Use inlet silencer on LMS100® air inlet
- Specify low-noise casing on LMS100® SCR body
- Use silencers on selected gas and steam vents to atmosphere
- Specify low-noise package for the GTG train
- Specify low-noise package for the STG train
- Specify reduced-noise components on the HRSG system
- Additional acoustical paneling of feed, transfer, and crusher enclosures/buildings
- Refined noise emissions information for SRU burners
- Refined noise emissions information for Thermal Oxidizer

1.0 INTRODUCTION AND GOALS

Hydrogen Energy International LLC (HEI or Applicant) is jointly owned by BP Alternative Energy North America Inc. and Rio Tinto Hydrogen Energy LLC. HEI is proposing to build an Integrated Gasification Combined Cycle power generating facility called Hydrogen Energy California (HECA or Project) in Kern County, California. The Project will produce low-carbon baseload electricity by capturing carbon dioxide (CO_2) and transporting it for CO_2 enhanced oil recovery (EOR) and sequestration (storage)[2].

The 473-acre Project Site is located approximately 7 miles west of the outermost edge of the city of Bakersfield and 1.5 miles northwest of the unincorporated community of Tupman in western Kern County, California, as shown in Figure K-2-1, General Location of the Project. The Project Site is near hydrocarbon- producing area known as the Elk Hills Field.

This Noise Technical Report was initiated as part of Fluor Corporation's Preliminary Engineering Design effort that is supporting the Project's permitting and environmental impact review and assessment. Specifically, the environmental impact documentation will be part of the Application for Certification (AFC) to the California Energy Commission (CEC). This assessment is being coordinated by URS Corporation including technical support from URS noise staff. Besides being a technical contribution to the URS AFC documentation, this Noise Technical Report is intended to serve as part of Fluor's Basis of Design (BoD) documentation for the Project.

Alliance Acoustical Consulting (AAC) performed the Noise Technical Report reported herein, drawing on valuable information contained in Project documents generated by Fluor, HEI, and URS. This study was undertaken to investigate the construction and operations noise environment; primarily with respect to off-site community receptors and, secondarily, with respect to on-site worker health and safety concerns. The goals of the evaluation were to (a) predict future noise conditions associated with the Project; (b) support the AFC documentation to the CEC; and (c) contribute to noise control strategies, as needed, for the Fluor design to reduce expected noise-related impacts to being less than significant for the Project.

The remainder of this report is organized as follows: Section 2 provides background information on the Project setting. Section 3 explains the pertinent noise descriptors and Section 4 summarizes the existing conditions. Section 5 discusses the applicable noise criteria. Construction-related noise is summarized in Section 6. The Project operations noise analysis and evaluation methods; along with the modeling procedures, inputs, and assumptions, are presented in Sections 7 and 8. Predicted future condition results are provided in Section 9, the noise control features for the Project are highlighted in Section 10, and a summary of the Noise Technical Report is in Section 11. A list of Technical References used for this study follows the main text. The Kern County Noise Element and computer modeling inputs are in the attachments.

---

[2] This carbon dioxide will be compressed and transported via pipeline to the custody transfer point at the adjacent Elk Hills Field, where it will be injected. The CO_2 EOR process involves the injection and reinjection of carbon dioxide to reduce the viscosity and enhance other properties of the trapped oil, thus allowing it to flow through the reservoir and improve extraction. During the process, the injected carbon dioxide becomes sequestered in a secure geologic formation. This process is referred to herein as CO_2 EOR and Sequestration.

2.0 SETTING

The Project Site is located on a 473-acre tract in unincorporated Kern County at an approximate latitude of 35°19'50" North and longitude 119°23'12" West. The site is generally bounded on the west by the Dairy Road right of way, on the north by Adohr Road, on the east by Tupman Road, and on the south by an irrigation channel. Surrounding land uses include Limited Agricultural, Exclusive Agricultural, and Natural Resources. A small number of noise-sensitive receptors are located approximately 0.5 to 2.0 miles from the center of the Project Site and are comprised of widely-scattered farmhouses.

Figure K-2-1
General Location of the Project

Source: Google Maps and Alliance Acoustical Consulting, Inc., 2009

In this study, analyses were performed on the entire Project, including the:

- Feedstock Material Handling Systems
- Feedstock Grinding and Slurry Preparation
- Processed Material Handling Systems
- Air Separation Unit (ASU)
- Gasification Block
- Power Blocks
- Acid Gas Removal (AGR) Unit
- Sulfur Recover Unit (SRU)
- Sour Shift, Mercury Removal, and Sour Water Stripping Systems
- CO_2 Compression Systems
- Tail Gas Treatment Unit
- Plant Cooling
- Water Treatment Plant and ZLD Processing Units
- Site Support Systems and Utilities

3.0 NOISE DESCRIPTORS

To assess sound levels and noise impacts, several descriptors and metrics are used by the acoustical industry. Noise is usually defined as unwanted sound because it interferes with speech communication and hearing, or is otherwise annoying. Under certain conditions, noise may cause hearing loss, interfere with human activities at home and work, and in various ways, may affect people's health and well-being.

The decibel (dB) is the accepted standard unit for measuring sound levels because it accounts for the large variations in sound pressure amplitude. All noise levels in this study are relative to the industry-standard reference value of 20 micropascals. When describing sound and its effect on a human population, A-weighted (dBA) sound levels are typically used to account for the response of the human ear. The term "A-weighted" refers to a filtering of the noise signal in a manner corresponding to the way the human ear perceives sound. The A-weighted noise level has been found to correlate well with people's judgments of the "noisiness" of different sounds and has been used for many years as a measure of community and industrial noise (Harris 1998). The A-weighted sound level is denoted as "dBA" or "dB(A)."

Since most people do not routinely work with decibels or A-weighted sound levels, it is often difficult to appreciate what a given sound pressure level (SPL) number means. To help relate noise level values to common experience, Figure K-2-2 illustrates typical A-weighted sound pressure levels for various everyday indoor and outdoor noise sources.

In addition to the frequency characteristics, the human response to noise levels varies with the sound's distribution in time. When sound is measured for distinct time intervals, the statistical distribution of the overall sound level can be obtained for that period. The energy-equivalent sound level (denoted L_{eq}) is the most common parameter associated with such measurements. The L_{eq} metric is a single-number noise descriptor that represents the energy-average sound level over a given time period, where the actual sound level varies with time.

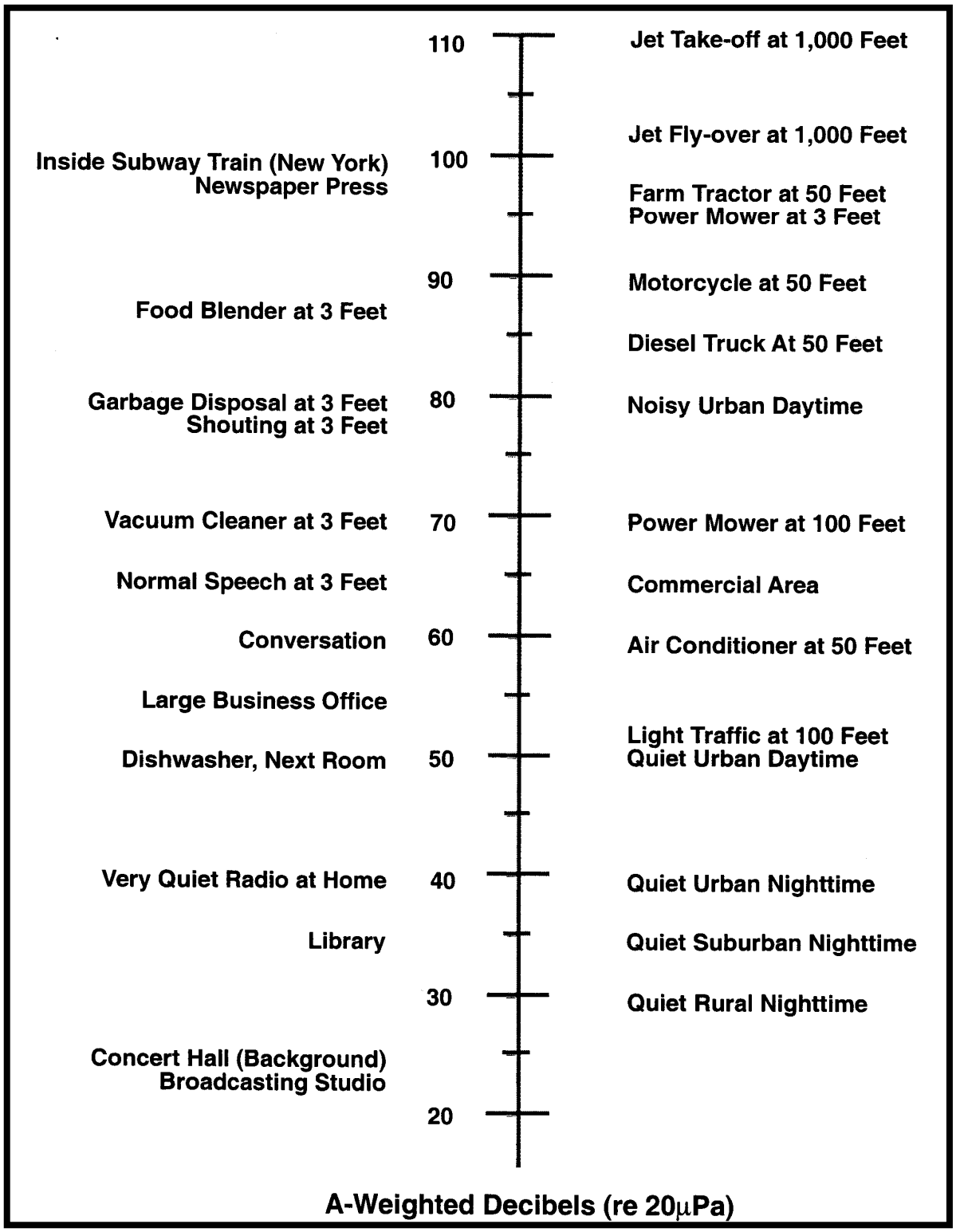


Figure K-2-2
Typical A-weighted Sound Levels for Various Noise Sources

Although the A-weighted scale and the energy-equivalent metric are commonly used to quantify the range of human response to individual events or general community sound levels, the degree of annoyance or other response effects also depends on several other perceptibility factors, including:

- Ambient (background) sound level
- General nature of the existing conditions (quiet, rural vs. busy, urban settings)
- Difference between the magnitude of the sound event level and the ambient
- Duration of the sound event
- Seasonality (e.g., likelihood of being indoors/outdoors and/or having windows open/closed)
- Number of event occurrences and their repetitiveness
- Time-of-day that the event occurs

Other temporal noise metrics include statistical sound levels, denoted L_n, where "n" is the percent of time during the sample period that the noise value is exceeded; for example, outdoor noise criteria often deal with the L_{50} and L_{10} levels[3].

L_{max} and L_{min} are also common noise descriptors. These are the maximum and minimum noise levels, respectively, over a given time period. With respect to the statistical sound level notation, L_{max} can also be represented as L_0 (i.e., the level never exceeded during the sample) and L_{min} can be represented as L_{100} (the level always exceeded).

Lastly, the day-night sound level (L_{dn}) is most commonly used to relate noise exposure over a 24-hour period. The L_{dn} noise metric provides a 24-hour average of A-weighted noise levels at a particular location, with a nighttime adjustment, which reflects increased sensitivity to noise during these times of the day. Specifically, L_{dn} adds a 10 dB penalty for any sounds occurring between the hours of 10:00 p.m. to 7:00 a.m. In California, a modification of the L_{dn} metric is often used. This additional 24-hour metric is known as the Community Noise Equivalent Level (CNEL) and is aimed at evaluating noise levels in residential communities. The CNEL is similar to the L_{dn}, but differs in that an additional penalty of 5 dB is applied to evening sounds that occur between 7 p.m. and 10 p.m. In a large percentage of cases for general community noise, the L_{dn} and CNEL are within 1 dB of each other and can be considered as equivalent.

4.0 EXISTING CONDITIONS (FROM URS)

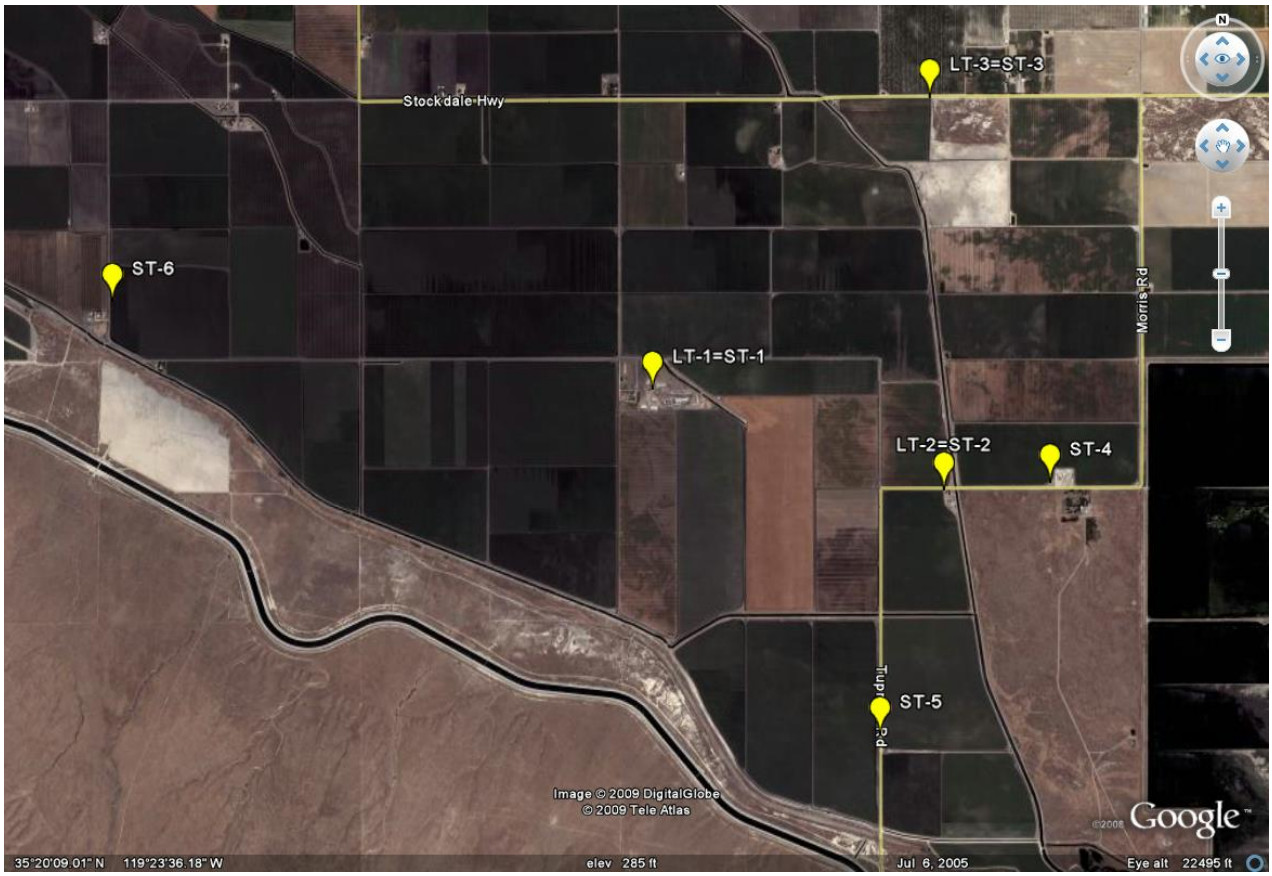
URS conducted an ambient noise monitoring survey from March 2 through March 4, 2009 to measure and document the existing noise environments in areas around the Project Site. Additional data were also collected in late April, 2009 at two of the original receptor locations due to inclement weather during the March survey. A total of six noise-sensitive receptors were identified that may be exposed to sound level increases as a result of the Project.

[3] The L_{50} level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time, they are below it. This is called the "median sound level." The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum) and this is often known as the "intrusive sound level."

The survey consisted of three long-term (greater than 25 hours continuous data) (denoted as "LT") and six short-term measurement locations (denoted as "ST"). Short-term measurements included two consecutive ten-minute measurements at each location during the day (7:00 a.m. – 7:00 p.m.), evening (7:00 p.m. – 10:00 p.m.) and night (10:00 p.m. – 7:00 a.m.). The selected measurement sites consisted of noise sensitive receivers located near the Project Site, or along the primary transportation corridor, and one site located along a proposed linear route for the purpose of assessing potential construction-related impacts. The selected sites are considered to be representative of the ambient noise environment in the vicinity of the Project. Short-term measurements at each long-term measurement site were conducted in order to verify the accuracy of long-term measurement data and to document ambient noise sources particular times of the day, evening, and night. Field measurement data sheets can be found in Appendix K-1.

These receptors and the associated noise measurement locations are shown in Figure K-2-3 and are summarized below (source: URS):

Figure K-2-3
Pertinent Community Receptor Locations



Source: Google-Earth, URS, and Alliance Acoustical Consulting, Inc., 2009

LT1/ST1: This location is approximately 480 feet northwest of the Project Site's nearest boundary, 3,400 feet northwest of the center of the Project Site, and is representative of the nearest noise sensitive receptor. There are two residences located near the measurement site consisting of one single-family residence and a mobile home. Long-term measurements were done near the east residence (mobile home). Noise levels at this location are representative of ambient noise levels at both residences. Long-term noise monitoring at LT1 was conducted from 2:00 a.m. on March 3, 2009 until 3:00 a.m. on March 4, 2009.

The hourly L_{eq} values at LT1 ranged from 35 dBA to 58 dBA. The average hourly L_{eq} was 49 dBA. The hourly L_{90} values ranged from 26 dBA to 52 dBA and the average hourly L_{90} over the period was 40 dBA. The lowest average L_{90} over a consecutive four-hour period for the entire 25-hour measurement was from 2:00 a.m. until 6:00 a.m. The average L_{90} during that period was 31 dBA. Table 5.5-2 displays the results of the measurements from LT1.

Six short-term measurements were completed at this location with two ten-minute measurements occurring consecutively during daytime hours, evening hours and nighttime hours. The average daytime L_{eq} at ST1 was 43 dBA and the average daytime L_{90} was 37 dBA. The average evening L_{eq} at ST1 was 46 dBA and the average evening L_{90} was 41 dBA. The average nighttime L_{eq} at ST1 was 32 dBA and the average nighttime L_{90} was 28 dBA. Noise sources during the short-term surveys consisted of distant traffic noise, barking dogs, birds, aircraft, agricultural equipment, and farm animals.

LT2/ST2: The LT2/ST2 location is approximately 1,400 feet northeast of the Project Site and 4,500 feet northeast of the center of the Project Site. There are two single family residences located at this measurement site. Long-term measurements were conducted on the northwest side of the residence (closest to the proposed project). Long-term noise monitoring at LT2 was conducted from 6:00 p.m. on March 2, 2009 until 7:00 p.m. on March 3, 2009.

The hourly L_{eq} values at LT2 ranged from 42 dBA to 61 dBA. The average hourly L_{eq} was 52 dBA. The hourly L_{90} values ranged from 25 dBA to 37 dBA and the average hourly L_{90} over the period was 29 dBA. The lowest average L_{90} over a consecutive four-hour period for the entire 25-hour measurement was from 1:00 a.m. until 5:00 a.m. The average L_{90} during that period was 30 dBA. Table 5.5-4 displays the measurement results at LT2.

Six short-term measurements were completed with two ten-minute measurements occurring consecutively during daytime, evening, and nighttime hours. The average daytime L_{eq} at ST2 was 50 dBA and the average daytime L_{90} was 26 dBA. The average evening L_{eq} at ST2 was 53 dBA and the average evening L_{90} was 41 dBA. The average nighttime L_{eq} at ST2 was 48 dBA and the average nighttime L_{90} was 34 dBA. Audible noise sources during the short-term noise measurements consisted of distant traffic, wildlife, and aircraft.

LT3/ST3: This location is approximately 5,400 feet northeast of the Project Site's nearest boundary and 9,900 feet northeast of the center of the Project Site. The primary purpose for this location is to determine existing noise levels along Stockdale Highway. The site is located 15 feet south of Stockdale Highway (23 feet south of the highway centerline), approximately 4,400 feet west of Morris Road. Short-term measurements were completed at the same location as LT3. Long-term noise monitoring at LT3 was conducted from 7:00 p.m. on March 2, 2009 until 8:00 p.m. on March 3, 2009.

The hourly L_{eq} values at LT3 ranged from 50 dBA to 69 dBA. The average hourly L_{eq} was 62 dBA. The hourly L_{90} values ranged from 28 dBA to 46 dBA and the average hourly L_{90} over the period was 35 dBA. The lowest average L_{90} during a consecutive four-hour period for the entire 25-hour measurement lasted from 7:00 p.m. until 11:00 p.m. The average L_{90} over that time period was 30 dBA. Table 5.5-6 displays the long-term measurement results from LT3.

Six short-term measurements were completed with two consecutive ten-minute measurements occurring during daytime, evening, and nighttime hours. The average daytime L_{eq} at ST3 was 65 dBA and the average daytime L_{90} was 35 dBA. The average evening L_{eq} at ST3 was 56 dBA and the average evening L_{90} was 25 dBA. The average nighttime L_{eq} at ST3 was 59 dBA and the average nighttime L_{90} was 30 dBA.

ST4: ST4 is located approximately 3,550 feet east of the Project Site's nearest boundary and 6,600 feet east of the center of the Project Site, at the northern extent of the Tule Elk State Natural Reserve. Short-term ambient noise level measurements were completed along Station Road near the Tule Elk State Natural Reserve. Short-term ambient noise level measurements were completed on March 2 and 3, 2009. Six short-term measurements were completed with two ten-minute measurements occurring back-to-back during daytime hours, evening hours and nighttime hours. Weather conditions, including gusty winds, had an undesirable effect on the original night-time ambient measurement results. An additional 1-hour and 15-minute short-term ambient noise level measurement was completed on April 28, 2009 during weather conditions that were acceptable for noise measurements.

The results from the April 28, 2009 noise measurement are the results that are used in the analysis phase of the proposed project. The L_{eq} was 41 dBA and the L_{90} was 37 dBA.

ST5: This location is approximately 3,000 feet southeast of the Project boundary and 5,000 feet southeast of the center of the Project Site in the vicinity of a single family residence. Short-term ambient noise level measurements were completed along Tupman Road near the residence. Measurements were not conducted at the residence due to the presence of domestic animals. Short-term ambient noise level measurements were completed on March 3, 2009. Six short-term measurements were completed with two consecutive ten-minute measurements conducted during daytime, evening and nighttime hours. Weather conditions, outside of industry standards, including gusty winds, had an negative effect on the original nighttime ambient measurement results. An additional 1-hour and 15-minute short-term ambient noise level measurement was completed on April 28, 2009 in weather conditions acceptable for noise measurements.

The results from the April 28, 2009 noise measurement – a late-night L_{eq} of 62 dBA and the associated late-night L_{90} of 33 dBA –are used in the analysis phase of the proposed project.

ST6: This location is approximately 10,500 feet northwest of the Project Site and 13,300 feet northwest of the center of the Project Site. Short-term ambient noise level measurements were completed during daytime hours along Freeborn Road near a single family residence. Two consecutive short-term ten-minute ambient noise level measurements were completed on March 3, 2009. Sound level measurements were completed at ST6 because of daytime construction of linear facilities taking place in the vicinity of residences located on Freeborn Road. The average L_{eq} from the two measurements was 60 dBA and the L_{90} was 24 dBA.

Additional information, including weather conditions during the ambient survey sessions, instrumentation specifics, and measurement results details, are given in the main text of the AFC noise section (Section 5.5) and in Technical Appendix K-1.

5.0 NOISE CRITERIA

Loud noise can be annoying and it can have negative health effects (USEPA 1978). The effects of noise on people fall into three general categories:

- Subjective effects of annoyance, nuisance, dissatisfaction
- Interference with activities such as speech, sleep, learning
- Physiological effects such as startling and hearing loss (both temporary and permanent)

In most cases, environmental noise produces effects in the first two categories only. However, unprotected workers in some industrial work settings may experience noise effects in the last category.

Federal and local governments have established noise guidelines and regulations for protecting citizens from potential noise-related impacts; hearing damage; and from various other adverse physiological, psychological, and social effects associated with noise. These pertinent guidelines and regulations are discussed below.

5.1 Federal Criteria

U.S. Environmental Protection Agency (USEPA). Guidelines are available from the USEPA (1978) to assist state and local government entities in development of state and local laws, ordinances, regulations, and standards (LORS) for noise. Because there are local standards that have been adopted and that apply to this Project (see below), these USEPA guidelines are for informational purposes only.

Occupational Safety & **Health Administration (OSHA).** In the U.S., worker noise exposure limits are regulated by OSHA under the Occupational Safety and Health Act of 1970[4]. The noise exposure level of workers is limited to 90 dBA, over a time-weighted average (TWA) 8-hour work shift to protect hearing[5]. If there are workers exposed to a $TWA_{8\text{-}hr}$ above 85 dBA (i.e., the OSHA Action Level), then the regulations call for a worker hearing protection program that includes baseline and periodic hearing testing, availability of hearing protection devices, and training in hearing damage prevention. A summary table of pertinent limits and parameters follows.

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[4] OSHA noise regulations are established in Code of Federal Regulation (CFR) Title 29, Part 1910-G, Section 1910-95, "Occupational Noise Exposure."

[5] In practice, workers are routinely exposed to varying noise levels for their 8-hour shift. So, to compute the entire shift's time-weighted-average (higher level means shorter duration and vice versa), the other key component of worker noise exposure – the exchange rate – comes into play. The exchange rate is simply the decibel trade-off factor for exposure duration. Under OSHA regulations, the exchange rate is 5 dB. Thus, for every 5 dB increase in sound level, the allowable exposure duration is halved (i.e., 90 dB(A) for 8 hours, 95 dB(A) for 4 hours, 100 dB(A) for 2 hours, etc.).

Table K-2-1
Summary of Pertinent Worker Noise Exposure Parameters

Maximum Permitted Daily Duration, hours (for 100 percent dose)	OSHA Limits (90 dBA criterion and 5 dB exchange rate)
8	90
4	95
2	100
1	105
½	110
¼	115

Notes:
OSHA = Occupational Safety & Health Administration
dB = decibel
dBA = A-weighted sound pressure level, in decibels

Given previous experience at similar chemical processing, air separation, and combined-cycle power facilities, on-site noise levels during normal operations are expected to be generally in the range of 70 to 85 dBA. The relatively few areas that may be above 85 dBA will be posted as high noise level areas and hearing protection will be required therein. The power Project will implement a hearing conservation program for applicable employees and maintain $TWA_{8\text{-}hr}$ exposure levels below 90 dBA.

5.2 California Criteria

State of California. The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified and that such impacts be eliminated or mitigated to the extent feasible. Section XI of Appendix G of CEQA Guidelines (California Code Regulations, Title 14, Appendix G) sets forth some characteristics that may signify a potentially significant impact. Specifically, a significant effect from noise may exist if a project would result in:

1 Exposure of persons to, or generation of, noise levels in excess of standards established in the local General Plan or noise ordinance, or applicable standards of other agencies.

2 Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

3 Substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

4 Substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

California Energy Commission (CEC). For power plants in California over 50 megawatts (nominal production capacity), the CEC is the lead agency for implementation of the above CEQA standards. The Commission has determined that a potential for a significant noise impact (point 3 above) exists where the noise of the project plus the background exceeds the background by 5 dB or more at the nearest sensitive receptor, including those receptors that are

considered a minority population. In previous findings, the CEC has considered it reasonable to assume that an increase in background noise levels up to 5 dB in a residential setting is insignificant and that an increase of more than 10 dB is clearly significant (Baker 1999, 2007). For the intermediate situation, an increase between 5 and 10 dB, the level of an impact depends on the particular circumstances of a case. The factors to be considered in determining the significance of an impact for this +5 to +10 dB situation include:

- Resulting noise level
- Duration and frequency of the noise
- Number of people affected
- Land use designation of the affected receptor sites
- Public concern or controversy (as demonstrated at workshops or hearings or by correspondence)

For noise from construction activities, the CEC usually considers a project to be in CEQA compliance if:

- Construction activity is temporary
- Use of heavy equipment and noisy activities is limited to daytime hours
- All industry-standard noise abatement measures are implemented for noise producing equipment

Cal/OSHA. The California Department of Industrial Relations, Division of Occupational Safety and Health, enforces California Occupational Safety and Health Administration (Cal/OSHA) regulations (found in Title 8 of the California Code of Regulations [CCR], General Industrial Safety Orders, Article 105, Control of Noise Exposure, § 5095, *et seq.]*. These California worker protection regulations are the same as the federal OSHA regulations described above.

California Vehicle Code. Noise limits for highway vehicles are regulated under the California Vehicle Code, § 23130 and § 23130.5. The limits are enforceable on the highways by the California Highway Patrol and by the County Sheriff Department.

5.3 Local Criteria

The California State Planning Law (California Government Code § 65302(f)) requires that all cities, counties, and entities (such as multi-city port authorities) prepare and adopt a General Plan to guide community change. In the case of the Project, the pertinent entity is the County of Kern.

Kern County. The County of Kern adopted their current General Plan, including the Noise Element, in June of 2004. In the introduction for the Noise Element of the Kern County General Plan, Section 3.1, states:

> *"The major purpose of the Noise Element is to: (1) establish reasonable standards for maximum desired noise levels in Kern County, and; (2) develop an implementation program which could effectively deal with the noise problem." ...."Of primary importance in controlling noise in Kern County is protection of the public health, particularly insuring against hearing loss*

resulting from community noise. Next in importance is minimization of adverse effects of noise on the economic well-being of the community, and third, minimization of annoyance caused by noise. Good land use planning should be employed to insure that the quality of the noise environment in Kern County does not deteriorate, and whenever practical be improved."

Section 3.2 establishes the following general goals for noise in the county:

> *"Ensure that residents of Kern County are protected from excessive noise and that moderate levels of noise are maintained."*
>
> *"Protect the economic base of Kern County by preventing the encroachment of incompatible land uses near known noise producing roadways, industries, railroads, airports, oil and gas extraction, and other sources."*

To implement these two goals, Section 3.2 later states: *"Implementation Measures...*

> *F) Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses*[6] *to exterior noise levels in excess of 65 dB LDN and interior noise levels in excess of 45 dB LDN."*

The entire Kern County Noise Element is provided in Attachment A.

Because of the weighting and averaging nature of the L_{dn} metric, a constant noise source would produce an L_{dn} approximately 6 dB higher than its 24-hour L_{eq}. Therefore, constant, 24-hour noise sources producing exterior noise levels up to 59 dBA L_{eq} would yield an L_{dn} value of 65 dBA and are, thus, compatible with residential land uses.

In reviewing the Kern County Ordinance Code (including Section 8.36 "Noise Control"), there are no specific noise limits for stationary or temporary construction noise sources which are applicable to this Project.

5.4 Summary of Noise Design Goals and Criteria

Generally, the design basis for noise control is the minimum, or most stringent, noise level required by any of the applicable LORS. Therefore, facility operational noise from this Project is evaluated against the CEC limit, where the Project noise level is considered insignificant if it does not exceed the ambient background noise level (L_{90}) by 5 dB or more at the nearest sensitive receptor as detailed below.

The ambient background noise levels and the associated Project design noise levels necessary to comply with CEC guidelines are shown in the following Table K-2-2.

[6] The Noise Element defines sensitive land uses as: residential areas, schools, convalescent and acute care hospitals, parks and recreational areas, and churches.

Table K-2-2
Receptor Ambient Sound Levels and CEC-related Design Goals

Noise Sensitive Receptor	Label	Measured, Late-night L_{90} ambient conditions, (dBA)	CEC's Late-Night L_{90} +5 dB Standard, (dBA)
LT1/ST1	Ackerman	31	36
LT2/ST2	Adams	30	35
LT3/ST3	Along Stockdale Hwy	30	35
ST4	Tule Elk Reserve	37	42
ST5	Along Tupman Rd	33	38
ST6[a]	Freeborne Rd	Not applicable	Not applicable

Source: URS and Alliance Acoustical Consulting, Inc. (2009)

Note a: This location is representative of the linear facility construction activities. Thus, no nighttime ambient data was obtained here. Given this location's distance from the Project site, (over 2 miles), if noise compliance is achieved at the other, closer locations, then compliance would be expected at ST6 also and the late-night criterion is deemed as not applicable here.

6.0 CONSTRUCTION-RELATED NOISE

6.1 Main Facility Construction

The Project construction process will be expected to generate noise during the following phases:

- Site Preparation
- Excavation
- Foundation Placement
- Plant and Building Construction
- Exterior Finish and Cleanup

Equipment used during the construction process will differ from phase to phase. In general, heavy equipment (bulldozers, dump trucks, and concrete mixers) will be used during excavation and concrete pouring activities. Most other phases involve the delivery and erection of the equipment and building components. The installation of piles (driven, augered, or vibrated) for some foundations may be needed on the Project, but insufficient information is available at this stage of Project development to ascertain what type of piling may be employed.

Noise levels of construction equipment typically used for this type of project are presented in Table K-2-3, Individual Equipment Noise Levels Generated by Project Construction. It is important to note that the equipment presented herein is not used in every phase of construction. Further, equipment used is not generally operated continuously, nor is the equipment necessarily operated simultaneously.

Table K-2-3
Individual Equipment Noise Levels Generated by Project Construction

Equipment Type	Equipment Noise Level at 50 feet, dBA	Estimated Equipment Noise Level at Each Receptor Location[a], dBA					
		LT1/ST1 (480 ft [0.09 mi] NW of Project) *Atten[b]= 20 dB*	LT2/ST2 (1,400 ft [0.27 mi] E of Project) *Atten[b]= 29 dB*	LT3/ST3 (5,400 ft [1.02 mi] NNE of Project) *Atten[b]= 42 dB*	ST4 (3,550 ft [0.67 mi] E of Project) *Atten[b]= 38 dB*	ST5 (3,000 ft [0.57 mi] SE of Project) *Atten[b]= 37 dB*	ST6 (10,500 ft [1.99 mi] WNW of Project) *Atten[b]= 47 dB*
Trucks	88	68	59	46	50	51	41
Crane	83	63	54	41	45	46	36
Roller	74	54	45	32	36	37	27
Bulldozers	85	65	56	43	47	48	38
Pickup Trucks	60	40	31	18	22	23	13
Backhoes	80	60	51	38	42	43	33
Jack Hammers	88	68	59	46	50	51	41
Pile Drivers	101	81	72	59	63	64	54
Rock Drills	98	78	69	56	60	61	51
Pneumatic Tools	85	65	56	43	47	48	38
Air Compressor	81	61	52	39	43	44	34
Compactor	82	62	53	40	44	45	35
Grader	85	65	56	43	47	48	38
Loader	85	65	56	43	47	48	38

Sources: EPA, 1971; FTA, 2006; and Alliance Acoustical Consulting, Inc., 2009

Notes:

[a] Distances shown are from the nearest site boundary line to each receptor structure (not necessarily the same as the representative monitoring location). This analysis assumes that an example piece of any given type of construction equipment could be, as a worst case, at or near any site boundary line during the various Project construction phases.

[b] This is the attenuation due to distance for sound propagating from 50' from each equipment type to the nearest indicated receptor location.

Site-average sound levels for each phase of construction (from EPA 1971, FTA 2006, and AAC 2009) are presented in Table K-2-4, Aggregate Estimated Noise Levels Generated by Phase for the Project Construction Activities. This analysis takes into account the expected number of construction equipment items, their nominal usage factors, and the average sound emissions factor for each. The highest site-average sound levels (89 to 91 dBA) are associated with Foundation and Site Clearing phases of the construction schedule[7].

[7] Excluding consideration for pile installation which is a short-term, temporary sub-set of the Foundation Phase.

Table K-2-4
Aggregate Estimated Noise Levels Generated by Phase for the Project Construction Activities

Equipment Type	Equipment Noise Level at 50 feet (dBA)	Estimated Equipment Noise Level at Each Receptor Location[a] Leq/Ldn[b] (dBA)			
		Receptor LT1 (4,850 feet [0.9 mi] NNE of Project)	**Receptor ST1 (9,810 feet [1.9 mi] SE of Project)**	**Receptor ST2 (11,440 feet [2.2 mi] NE of Project)**	**Receptor ST3 (11,000 feet [2.1 mi] N of Project)**
		Atten[c] = 40 dB	*Atten[c] = 46 dB*	*Atten[c] = 47 dB*	*Atten[c] = 47 dB*
Site Clearing	91	51/57	45/51	44/50	44/50
Excavation	83	43/49	37/43	36/42	36/42
Foundation	89	49/55	43/49	42/48	42/48
Pile Installation[d]	101	61/67	55/61	54/60	54/60
Building Construction	80	40/49	34/40	33/39	33/39
Finishing	60	20/26	14/20	13/19	13/19

Sources: EPA, 1971; FTA, 2006; and Alliance Acoustical Consulting, Inc., 2008

Notes:

a. Distances shown are from the Project construction activity centroid to each receptor location. This analysis, which differs slightly from the equipment analysis, assumes that the aggregation of construction equipment for each phase would be, on average, at the centroid of the Project Site during the overall construction schedule.

b. An L_{dn} calculation was made by adding 6 dB to the receptor L_{eq} value under the worst-case premise of 24-hour construction at a constant level of activity. See also Section 2.10 of the main AFC document for further information on Project Construction .

c. This is the attenuation due to distance for sound propagating from 50' from each phase's equipment aggregation to the nearest indicated receptor location. Note that this analysis only considers spherical spreading loss and no other attenuation effects.

d. Pile installation is a sub-set of the Foundation Phase and would only be expected to last 2 to 4 months within the overall Foundation Construction Phase. For a conservative analysis, the worst-case, impact-type pile driving was assumed.

dB = decibel
dBA A-weighted sound pressure level
mi = mile
N = north
NE = northeast
NNE = north-northeast
SE = southeast

The noise levels presented in Tables K-2-3 and K-2-4 use the equipment-specific and phase-aggregate sound levels, respectively, at 50 feet from the construction activity to predict the noise levels at the nearest noise sensitive receptor locations that surround the Project Site. Noise associated with the construction of the Project will be attenuated by a variety of mechanisms. The most significant of these is the diversion of the sound waves with distance (attenuation by divergence). This attenuation mechanism results in a 6 dB decrease in the sound level with every doubling of distance from the source. For example, the 83 dBA average sound level associated with excavation will be attenuated to 77 dBA at 100 feet, 71 dBA at 200 feet, and to 65 dBA at 400 feet. Attenuation for atmospheric absorption, earthen berm barriers, and/or ground effects was not included in the construction noise analysis to allow for a conservative worst-case analysis. The few noise-sensitive receptors in the vicinity of the Project are located approximately 3,400 feet to 2.5 miles from the center of the Project process area wherein the predominant amount of future construction activity will be located.

Because of the nature of construction noise and with common fluctuations in the background noise level, construction activity would be occasionally discernable at the nearest receptors. Given some occasional atmospheric conditions, construction noise could also be discernable at the receptors located farther from the Project Site because of inversion effects. Under certain circumstances, the construction noise could be a source of annoyance to noise-sensitive individuals. Nighttime construction activities are not planned for this Project, but may be needed to meet the construction schedule. However, if nighttime construction is needed, the Project will limit noisy construction activities (particularly pile driving work) to daytime hours in order to minimize nighttime noise levels to the extent practical.

Given the intermittent and temporary nature of construction activities, potential noise impacts are considered to be less than significant.

6.2 Linear Facility Construction

Construction for the majority of the Project-related linear facilities (i.e., the water pipelines and natural gas supply pipeline) will be located farther away from noise-sensitive receptors compared to the Project Site construction. Only the installation of the transmission structures may be located near a few residences. Linear facility construction noise may be audible during the short periods that the linear construction operation is nearest to these receptors. Because of the short-term nature of the linear construction operation, pipeline and transmission line construction noise will be less than significant and will diminish once the construction operations move away from the individual receptors.

6.3 Special Construction Activities

During final construction, a method used to clean piping and testing called “steam blows” creates substantial noise. A steam blow results when high-pressure steam is allowed to escape into the atmosphere through the steam piping to clean the piping. The intent of the steam blows is to heat and sweep the piping systems to remove any debris or fine particles that could damage the steam turbine generator or other equipment. Each steam blow is followed by a cool-down period. The heating and cooling cycles are expected to last 2 or 3 hours each and will be performed several times daily over a period of 2 or 3 weeks.

Unattenuated steam blows can produce noise very loud noise levels at the steam discharge/clean-out point. However, for this Project, temporary silencing systems will be employed to minimize these short-term, temporary noise impacts. Typical steam blow silencing should be able to reduce noise levels by 20 dBA to 30 dBA at each receptor location. Table K-2-5 summarizes the potential, noise levels at each receptor location for this temporary construction activity, including the use of silencers.

Table K-2-5
Estimated, Silenced Steam Blow Noise Levels

Receptor	Estimated Distance to Future Project Steam Blow[a]	Expected, Silenced Steam Blow Noise Level (dBA)[b]
LT1=ST1	3,400 feet [0.65 mi]	63 – 73
LT2=ST2	4,500 feet [0.85 mi]	61 – 71
LT3=ST3	9,875 feet [1.9 mi]	54 – 64
ST4	6,600 feet [1.3 mi]	58 – 68
ST5	5,000 feet [0.95 mi]	60 – 70
ST6	13,350 feet [2.5 mi]	51 – 61

Notes: Sources: Alliance Acoustical Consulting, Inc, 2009.

[a] Distances shown are from the Project centroid to each receptor location.

[b] This is the attenuation due to distance for sound propagating from 100 feet from a given steam blow to the nearest indicated receptor location. For conservatism, no other attenuation factors are considered.

In general, steam blow events will be short-term, intermittent, and temporary and are, therefore, not considered to result in significant impacts.

6.4 Post-Commissioning Maturation Phase Noise

As described in AFC Section 2.6.4. Commissioning, the major process units will be commissioned sequentially. For this Project, the power block will be commissioned about 6 months ahead of the Gasification Block. The commissioning for the project will require four distinct phases: (1) Combined Cycle Unit Commissioning on natural gas; (2) Commissioning of the auxiliary Simple Cycle CTG on natural gas; (3) Gasification Block and Balance of Plant (BOP) Commissioning Combined Cycle Block; and (4) Commissioning on Hydrogen-Rich Fuel. The steps involved in the commissioning of these four phases are given in AFC Sections 2.6.4.1 to 2.6.4.4.

As described in AFC Section 2.10 Facility Reliability, the startup and commissioning period of the power plant (CTG, ASU, process block and BOP, IGCC) is expected to be completed within 1 year from mechanical completion. Commercial operation will start when the commissioning and startup activities are completed and the licensor/contractor guarantees and milestones have been achieved. The ramp-up period to maturity is estimated to be 3 years from the start of commercial operation. The hydrogen-rich fuel availability for mature operation is estimated to be greater than 80 percent. The power availability for mature operation is estimated to be greater than 90 percent.

While considerable data exists on commissioning periods on power generation involving natural gas, and mature operation is reached within a few months for NGCC type systems, the power generation involving hydrogen-rich fuel from solid feedstock such as petroleum coke or coal requires a longer ramping duration due to the shakedown periods involved in the various technologies employed in the process block; in particular, the solid feedstock gasification. For this reason, the process block will have an availability less than 80 percent during the first 3 years.

After the 1-year initial Startup and basic Commissioning Phase, there will be multiple gasifier starts per year. These will occur over the lifespan of the Project, and therefore, can be considered as part of the 'normal' operations of the Project, from a noise standpoint. Consequently, these gasifier (and related systems) startup noise sources will need noise control treatments such that their contribution to the overall plant noise profile is no greater than the contributions from the plant equipment and systems that are operating between gasifier starts. That is, steam or gas discharges, by-pass valves, eductor systems, atmospheric vents, increased flaring rates, and the like that will be used beyond the initial startup efforts will have noise reduction features (such as casing treatments, lagging, and discharge silencers) to keep the Project's aggregate sound energy at or below the level needed to comply with the Project's noise goals.

With this general noise control philosophy for the Project equipment and systems (as detailed in AFC Main Text Table 5.5-15), the aggregate noise emissions into the adjacent community should be comparable between the post-Commissioning Maturation Phase and the "normal" Operations Phase, discussed below.

6.5 Summary of Construction, Startup, and Commissioning Noise

Short-term noise levels during construction activities will not be significant due to the following factors:

- The distance separating the residential areas from the site will result in substantial attenuation of construction noise. As shown in Tables K-2-3 and K-2-4, construction sound levels will often be below measured ambient levels (even while neglecting excess ground attenuation effects).
- The construction equipment will not normally be operating simultaneously.
- During construction activities, there will be periods of time when no equipment will be operating, and when noise will be near or below ambient levels.
- To reduce construction noise to the greatest extent possible and practical, functional mufflers will be maintained on construction equipment.

The sound levels presented in Tables K-2-3, K-2-4, and K-2-5 are those which will be experienced by people outdoors. A building provides significant attenuation for those who are indoors. Sound levels can be expected to be up to 27 dBA lower indoors, with windows closed. Even in homes with the windows open, indoor sound levels can be reduced by up to 17 dBA (EPA 1978).

7.0 PROJECT NOISE ANALYSIS AND EVALUATION METHODS

To evaluate the expected noise emissions from the Project and to identify the need for noise control measures, a noise modeling study of the power Project has been performed. A computerized noise prediction program was used to simulate and model the future equipment noise emissions throughout the area. The modeling program uses industry-accepted propagation

algorithms based on ANSI and International Organization for Standardization (ISO) standards[8]. The calculations account for classical sound wave divergence (spherical spreading loss with adjustments for source directivity from point sources) plus attenuation factors due to air absorption, minimal ground effects, and barrier/shielding.

Calculations were performed using octave band sound power levels (abbreviated PWL or L_w) as inputs from each noise source. The computer outputs are in terms of octave band and overall A-weighted noise levels (sound pressure levels, abbreviated SPL or L_p) at discrete receptor positions or at grid map nodes (in preparation for computing a contour map). The output listing is ranked by relative noise contribution from each noise source. This model has been validated over the years via noise measurements at several operating plants that had been previously modeled during the engineering design phases.

The Project Plot Plan (Figure 2-54 in Section 2.0 of the main AFC) and process area drawings were used to establish the position of the noise sources and other relevant physical characteristics of the site. Receptor locations were found using Project environmental documentation provided by Fluor, URS, and HEI. The noise source locations and noise sensitive receptor locations were translated into input x, y, z coordinates for the noise modeling program.

8.0 PROJECT OPERATIONS MODELING PROCEDURES, INPUTS, AND ASSUMPTIONS

For conservatism, and as is standard practice in the description of environmental noise, the modeling assumed stable atmospheric conditions suitable for reproducible measurements (under "standard-day" conditions of 59° F and 70 percent relative humidity), that are favorable for propagation. These inherent conservative factors and assumptions result in a noise model that will tend to be biased to higher predicted values than will be expected in the actual environment around the Project.

All currently planned, continuous-operation equipment items that were deemed to be significant noise sources at the Project were included in the noise model. The major process areas of the Project include the Air Separation Unit, the Feed Handling Unit, the Gasification Island, the Gas Treating Unit, the Sulfur Recovery and Tail Gas Treatment Unit, the Power Block, and General Facilities (such as cooling, utilities, and auxiliary/support systems). Within these overall units, the set of modeled sources included:

- Power Block Cooling Towers and Air Separation Unit (ASU) Cooling Towers
- Main Power Block – "F class," combined-cycle, outdoor installation (Gas Turbine + Steam Turbine + Heat Generator Recovery Steam Generator [HRSG])
- Secondary Power Block – "LMS100® class," simple-cycle, outdoor installation (Gas Turbine + Selective Catalytic Converter)
- CTG and Steam Turbine Generator (STG) Main Transformers, plus several facility auxiliary transformers

[8] ANSI is the American National Standards Institute, while ISO is the International Standards Organization. Algorithms and methods for this program are included in the ISO 9613, ISO 1913 (Part 1), ANSI 126, or ISO 3891 standards.

- Cooling Tower Main Water Pumps and Motors
- Boiler Feed Water Pumps and Motors
- ASU systems[9], primarily an outdoor installation
- ASU vents
- Material Handling Systems, including crushers, conveyors, and transfer towers
- Flares and process vents
- Syngas and Tail Gas Compressors and Blowers
- Acid Gas and Tail Gas Burners
- Various sources in the Gasification Areas
- Slurry Feed systems, as radiated from Slurry Feed building walls
- Grinding Mill systems, as radiated from Mill building walls
- IGCC facility transformers
- Various significant Pump systems (over 25 hp each)

The Project is assumed to operate 24 hours per day at its design capacity, which means its noise output will nominally be constant, regardless of time-of-day (and, thus, the statistical sound levels should all be the same – that is, $L_{100} = L_{90} = L_{50} = L_{10} = L_0$). Given the early stages of the Project, only limited vendor data are available for use as noise model inputs. Therefore, every effort was made to use noise emission values that were obtained from equipment vendors on previous design efforts for similar-sized IGCC power plant configurations. As a secondary information source, model inputs derived from generic industry reference information were used. No special noise control options were initially assumed. These "standard-design" levels from the significant noise sources were converted into sound power levels (in decibels re 1 pico Watt) to serve as the initial inputs for the noise modeling program. Major buildings and structures were included as barriers to account for propagation losses due to shielding between a given noise source and a receptor location. However, for conservatism, low-lying buildings/structures (such as power distribution centers) were neglected for providing shielding benefits. Temporary feedstock piles were also neglected for shielding benefits. Earthen berms, at assumed heights of 10 feet, were included in the noise analysis to account for many noise sources breaking the direct, line-of-sight propagation pathway to the off-site receptors.

9.0 FUTURE CONDITIONS MODELING RESULTS

9.1 Noise Modeling Results

To ensure complying with Kern County and CEC criteria during ongoing Project operations, extensive noise reduction features were incorporated into the Project design. These features were included in the noise modeling configuration for the Project Site.

To address the Project-controlled noise emissions, the ranked listing of noise contributors was studied to evaluate which set of equipment should have additional noise control options applied for an efficient mix of noise mitigation treatments. Then, an iterative process of reducing the highest contributors, via the effective application of noise control treatments was performed.

[9] Major equipment inside the ASU will include ~70,000 hp main air compressor, ~15,000 hp booster air compressor, ~38,000 hp N_2 compressor, and related support pumps, valves, and other systems.

This took the form of making reasonable adjustments to the input noise levels to account for such treatments as installing silencers on inlets/exhausts or using low-noise equipment. This process was continued to achieve an efficient and reasonably-achievable[10] mix of noise course characteristics that will result in predicted compliance at all receptor locations. This mixture of treatments included the specification of known low-noise designs for some equipment items, using available noise control technologies (such as stack silencers), and applying external treatments such as enclosures or noise control panels on selected building walls. This mix of noise reduction measures focused on the following generalized treatments:

- Putting open-top enclosures on selected non-enclosed compressors
- Putting an open-top enclosure on the (non-enclosed) expander
- Noise abatement for various noise sources associated with the gasifiers.
- Low-noise procurement or shrouded or blanketed pump trains
- Low-noise procurement or shrouded or blanketed blowers and dust handlers
- Reduced-noise cooling tower cells
- Use stack silencer on HRSG exhaust
- Use stack silencer on LMS100® SCR exhaust
- Use inlet silencer on LMS100® air inlet
- Specify low-noise casing on LMS100® SCR body
- Use silencers on selected gas and steam vents to atmosphere
- Specify low-noise package for the GTG train
- Specify low-noise package for the STG train
- Specify reduced-noise components on the HRSG system
- Additional acoustical paneling of feed, transfer, and crusher enclosures/buildings
- Refined noise emissions information for SRU burners (using vendor information)
- Refined noise emissions information for Thermal Oxidizer (using vendor information)

Noise source sound levels used for modeling inputs are given in Attachment B.

9.1.1 Modeling Results Compared to Kern County Standards

The Project is predicted to comply with the Kern County standards, as shown in the following two tables for exterior and interior results, respectively.

[10] Assessment of achievability was based on mitigation experience efforts on similar industrial projects.

Table K-2-6
Summary of Project Contributions with Noise Control Features Relative to Kern County Noise Element Standards (Exterior)

Location *[column 1]*	Kern County Noise Element Exterior Standards, L_{dn} *[column 2]*	Existing Exterior L_{dn} Environment *[column 3]*	Predicted Project L_{eq} Contributions, dBA *[column 4]*	Predicted Project L_{dn} Contributions, *[column 5]*[a]	Total, Future Calculated L_{dn} (existing plus Project)[f] *[column 6]*[b]	Project Contribution / Project Compliance[c,f] *[column 7]*
LT1/ST1	65	58	38	44	58	0 / Yes
LT2/ST2	65	61	38	44	61	0 / Yes
LT3/ST3	65	70	26	32	70	0 / Yes
ST4	65	51 [e]	34	40	51	0 / Yes
ST5	65	68 [e]	38	44	68	0 / Yes

Source: HECA Project

Notes:

[a] Using 24 hourly Leq values to calculate the equivalent L_{dn} metric, assuming continuous operations at steady-state, design conditions. Thus, $L_{dn} = L_{eq} + 6$ dB.

[b] Summing sound levels from column 3 plus column 5

[c] Is column 6 less than or equal to columns 3 and 2?

[d] Footnote not used

[e] Estimated L_{dn} from short-term data in Tables 5.5-8 and 5.5-9.

[f] Result is completely controlled by the existing noise environment.

Table K-2-7
Summary of Project Contributions with Noise Control Features Relative to Kern County Noise Element Standards (Interior)

Location *[column 1]*	Kern County Noise Element Interior Standards, L_{dn} *[column 2]*	Existing Interior L_{dn} Environ-ment[a] *[column 3]*	Predicted Project Exterior L_{dn} Contributions, *[column 4]*[b]	Predicted Project Interior L_{dn} Contributions, *[column 5]*[c]	Total, Future Calculated L_{dn} (Existing plus Project)[f] *[column 6]*[d]	Project Contribution / Project Compliance[e,f] *[column 7]*
LT1/ST1	45	41	44	27	41	0 / Yes
LT2/ST2	45	44	44	27	44	0 / Yes
LT3/ST3	45	53	32	15	53	0 / Yes
ST4	45	34	40	23	34	0 / Yes
ST5	45	51	44	27	51	0 / Yes

Source: HECA Project

Notes:

[a] Applying -17 dB to results from Table 5.5-16 above.

[b] Using results of column 5 from Table 5.5-16 above.

[c] Applying -17 dB to column 4.

[d] Summing sound levels from column 3 plus column 5.

[e] Is column 6 less than or equal to columns 3 and 2?

[f] Result is completely controlled by the existing noise environment.

9.1.2 Modeling Results Compared to CEC Standards

With receptor Locations LT1/ST1 and ST2/ST2 being the closest locations with residential structures, they are the critical locations for achieving compliance with CEC standards. While Location LT1/ST1 is the nearest receptor, it has the benefit of being behind the proposed earthen berm in the northwest corner of the Project site. The next nearest receptor, Location LT2/ST2

does not benefit from the current configuration of earthen berms breaking line-of-sight propagation, but it is approximately 4,500 feet from the center of the Project process areas and would experience on the order of 39 dB of divergence attenuation, plus a notable amount of ground attenuation over soft or vegetated ground. The other noise sensitive receptors locations are from 5,000 to over 13,000 feet away from the Project process areas and would receive less noise than the two nearest locations due to sizable distance attenuation factors.

The results of the Noise Control Case are shown in Table K-2-8 with respect to CEC Noise Impact Criteria Guidelines.

Table K-2-8
Summary of Project Contributions with Noise Control Features, Relative to CEC Noise Impact Criteria Guidelines

Location	Distance from Project Site (feet)		Measured, Late-night L_{90} ambient conditions, (dBA)	CEC's +5 dB Late-Night L_{90} Standard[a] (dBA)	Predicted, Project Contri-butions[b], (dBA)	Predicted Project Contributions plus Existing Ambient (dBA)	Comparison to Design Goal
	From Approx. Nearest Boundary	From Process Area Centroid					
Off-Site Receptors							
LT-1=ST-1	480	3,425	31	36	37	38	2 dB over
LT-2=ST-2	1,400	4,475	30	35	37	38	3 dB over
LT-3=ST-3	5,400	9,875	30	35	24	31	4 dB under
ST4	3,550	6,600	37	42	33	38	4 dB under
ST5	3,000	5,000	33	38	36	38	at standard
ST6	10,500	13,325	N.A.	N.A.	24	N.A.	N.A.
Project Site Boundary							
N	–	3,686	–	–	41	41[c]	N.A.
E	–	3,235	–	–	39	39[c]	N.A.
S	–	1,293	–	–	56	56[c]	N.A.
W	–	2,339	–	–	45	45[c]	N.A.

Notes: Source: HECA Project
N.A. = Not applicable
[a] Also see Table 5.5-11 at the end of Section 5.5.1.4 in the main AFC document.
b This is the nighttime plant configuration, which excludes operations of the auxiliary GTG system (LMS-100 unit).
[c] assuming that the plant contributions dominate the rural noise environment along the Project Site Boundary.

This table shows that with the extensive design features for controlling Project noise emissions, receptor locations LT3=ST3. ST4, and ST5 are predicted to be at or below the design goal needed to achieve compliance with the CEC nighttime standard. The two closest receptor locations, LT1=ST1 and LT2=ST2, are predicted to be 2 and 3 dB above the L_{90}+5 dB guideline, respectively. That is, they are predicted to be +7 and +8 dB, respectively, as referenced to the existing, late-night ambient conditions.

For these two locations, an increase between 5 and 10 dBA may be either significant or insignificant, depending on the particular circumstances (see Section 5.2 above for more discussion). For this case, the resulting noise levels (i.e., 38 dBA) are still very quiet and the number of people affected – only two households – is small. Although the Project noise

contributions during late-night operations can be expected to be discernible at these two locations, the extenuating circumstances of a very low ambient environment and a low number of affected persons indicates that the increase would not be significant.

After the results for the discrete receptor locations were predicted, the same modeling process (including the noise control features) was used to calculate plant noise levels at regularly-spaced grid points. From these grid results, a noise level contour map was generated. This contour map is a plot of constant, A-weighted sound levels in 5 dB increments for just the Project noise sources and is shown in Figure K-2-4, Noise Contours at the Project Site.

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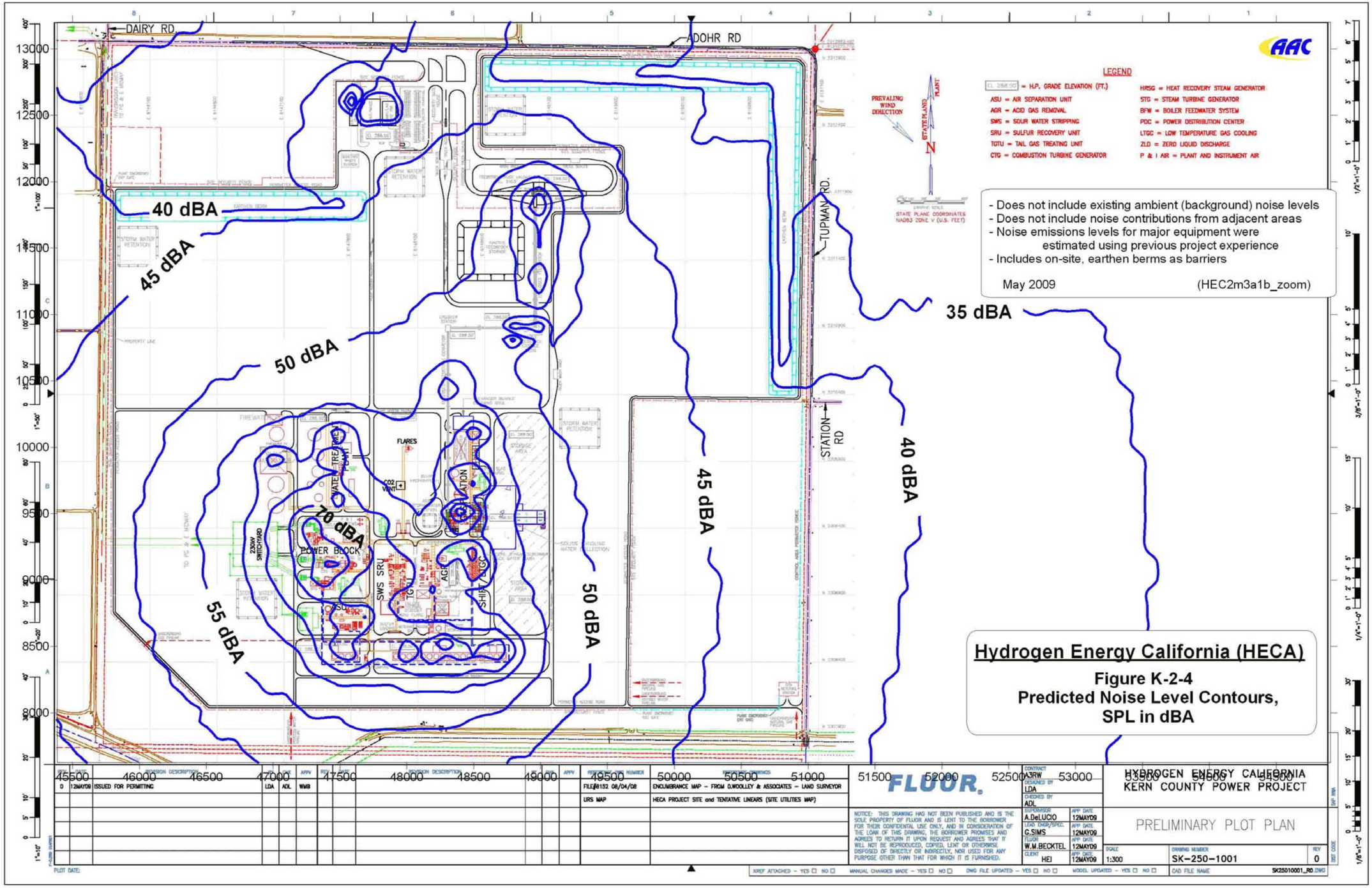
DAIRY RD
ADOHR RD
TUPMAN RD.
STATION RD
40 dBA
45 dBA
50 dBA
55 dBA
70 dBA
35 dBA
45 dBA
40 dBA
50 dBA
POWER BLOCK
FLARES
PREVAILING WIND DIRECTION
STATE PLANE
N
LEGEND
ASU = AIR SEPARATION UNIT
AGR = ACID GAS REMOVAL
SWS = SOUR WATER STRIPPING
SRU = SULFUR RECOVERY UNIT
TGTU = TAIL GAS TREATING UNIT
CTG = COMBUSTION TURBINE GENERATOR
HRSG = HEAT RECOVERY STEAM GENERATOR
STG = STEAM TURBINE GENERATOR
BFW = BOILER FEEDWATER SYSTEM
PDC = POWER DISTRIBUTION CENTER
LTGC = LOW TEMPERATURE GAS COOLING
ZLD = ZERO LIQUID DISCHARGE
P & I AIR = PLANT AND INSTRUMENT AIR
- Does not include existing ambient (background) noise levels
- Does not include noise contributions from adjacent areas
- Noise emissions levels for major equipment were estimated using previous project experience
- Includes on-site, earthen berms as barriers
May 2009
(HEC2m3a1b_zoom)
Hydrogen Energy California (HECA)
Figure K-2-4
Predicted Noise Level Contours, SPL in dBA
FLUOR
HYDROGEN ENERGY CALIFORNIA
KERN COUNTY POWER PROJECT
PRELIMINARY PLOT PLAN
SK-250-1001
1:300

10.0 NOISE CONTROL DESIGN FEATURES

The effective noise control treatments that were used in the Project design modeling are a combination of vendor specification limits, acoustical designs in specific systems, and/or external treatments on selected equipment items or systems. These noise control design features are summarized in Table K-2-9 below and will serve as part of the Project's Basis of Design (BoD) documentation for subsequent engineering efforts.

Table K-2-9
Summary of Project Noise Control Design Features

Noise Source (Original Noise Emissions Rating)	Conceptual Noise Control Feature(s)
Power Block Cooling Tower (13 cell) (64 dBA at 400 feet from tower edge)	This is a low-noise design and tower vendors can use a combination of slower-speed fans with special blade design, low-noise drive systems, splash control features, and/or tower baffling materials to achieve the specification.
ASU Area Cooling Tower	Same as above on a per-cell basis.
Gasifier System Cooling Tower	Same as above on a per-cell basis.
F-class Gas Turbine Train,	Vendor specification so as to meet an overall train limit of 59 dBA at 400 feet (this is a low-noise design relative to nominally standard offerings).
Steam Turbine Train	Vendor specification so as to meet an overall train limit of 58 dBA at 400 feet (this is a low-noise design relative to nominally standard offerings).
HRSG System	Vendor specification so as to meet an overall train limit of 58 dBA at 400 feet (this is a low-noise design relative to nominally standard offerings).
HRSG Stack Exit (alone)	Inclusion of a stack silencer so as to meet a stack exit-only limit of 50 dBA at 400 feet from stack base.
Main Power Block Transformers	Vendor specification so as to meet an limits of 46 dBA at 400 feet or 59 dBA at 100 feet.
Secondary Power Island: LMS100®-class Gas Turbine	Include 6 dB of silencing on air inlet (relative to nominal reduction for this class of turbine).
Secondary Power Island: Simple-cycle SCR and exhaust	(a). Include stack silencer for 10 dB reduction relative to nominal noise emissions (b). Specify SCR body design to achieve 10 dB reduction relative to nominal noise emissions
Secondary Power Block Transformers	Specify low-noise package (i.e., -10 dB relative to nominal noise emissions for this size transformer).
Selected Pump Trains (pump+motor) [for trains <100 hp, PWLA should be <83; for 150 to 750 hp trains , PWLA should be <91; and for trains >750 hp, PWLA should be <96]	Specify reduced noise emissions, relative to nominal offerings, for each size train (motor plus driven equipment item). Can be accomplished via noise limit specification to equipment vendor (for a quiet design). Alternatives include the installation of an acoustical enclosure around the pump and drive mechanics or blanketing around the main rotating equipment.
Miscellaneous Rotating Equipment Trains (e.g., blowers, dust collectors, agitators, etc.) [investigate all such sources for noise control, having PWLA > 83]	Specify reduced noise emissions, relative to nominal offerings, for each size train (motor plus driven equipment item). Can be accomplished via noise limit specification to equipment vendor (for a quiet design). Alternatives include the installation of an acoustical enclosure around the item and drive mechanics or blanketing around

Table K-2-9
Summary of Project Noise Control Design Features

Noise Source (Original Noise Emissions Rating)	Conceptual Noise Control Feature(s)
	the main rotating equipment.
Material Handling Structures (including Truck Dumping Area, Transfer Towers, Feedstock Silo Building, Slurry Prep Building, Slag Handling Building, and Crushing/Milling Buildings)	Specify reduced noise emissions, relative to nominal offerings, for sheet metal building with several openings such that they are ≤60 dBA at 50 feet from any building façade (to be verified during detailed design phase). Assumes acoustical panel specifications for building walls in the detailed design such that interior space noise levels are adequately absorbed and encased within the building shell to meet the assumed emissions levels.
Conveyors (assumed to be enclosed for noise and dust control)	Specify reduced noise emissions, relative to nominal offerings, such that they are ≤61 dBA at 50 feet).
Open Compressors and Expanders	Employ 4-sided, open-topped enclosures on selected, large trains. Remaining Compressor and Expander Trains above 500 hp or above 86 PWLA should be investigated for noise control such that they achieve noise reduction features for a nominal 15 dB reduction (relative to nominal designs).
Sulfur Recovery Unit Burners	Specify low-noise burners to equipment vendors or use noise control enclosures/plenums around burner systems.
Gasifiers	Specify low-noise fuel deliver systems (slurry injectors or fuel gas aspirators) or use noise control enclosures/plenums such that noise emissions are reduced to below 90 PWLA.
Elevated Gasifier Flare (mainly used for Gasifier start-up)	None indicated at this time (provided vendors can supply equipment meeting Petrochem industry standards). (Assumes normal operations will be pilot flame only.)
Elevated Acid Gas Flare (mainly used for infrequent cold start-up of the SRU)	None indicated at this time (provided vendors can supply equipment meeting Petrochem industry standards). (Assumes normal operations will be pilot flame only.)
Elevated Rectisol Flare (emergency use only)	None indicated at this time (provided vendors can supply equipment meeting Petrochem industry standards). (Assumes normal operations will be pilot flame only.)
CO_2 Vent	None indicated at this time (preliminary pressure drop and flow velocities indicate that this will not be a noteworthy noise source).
Thermal Oxidizer (mainly used for miscellaneous tank vent discharges)	None indicated at this time (provided vendors can supply equipment meeting Petrochem industry standards). (Assumes normal operations will be 'low' flow; negligibly different than pilot flame only.)
Various Atmospheric Vents	Used of exhaust silencers, as applicable, such that noise emissions are below 83 PWLA.
Other Pump Sets (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3 feet.
Other Mechanical Equipment not specified above (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3 feet.
Other Electrical Equipment not specified above (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3 feet.
Building HVAC units and fans (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3 feet.

Source: HECA Project, Alliance Acoustical Consulting, Inc. (2009)

These extensive and comprehensive design features for controlling Project noise emissions are considered to be technically feasible, as well as reasonable and cost-effective for overall plant noise reduction. These noise reduction measures and features will be updated, refined, and confirmed during detailed design efforts to ensure producing as-low-as-reasonably-achievable noise emissions, as well as fit-for-purpose cost control.

The Project is currently planning to use HEI Engineering Practices as part of the detailed design phase. In these documents, the per-item limit for noise emissions is 80 dBA at 1 m (3 feet); for use as the standard for equipment selection and procurement. Note that this level is 5 dB lower than is commonly used for large-scale industrial design efforts.

With these engineering practices and with the noise control design features noted above, the noise control design of the Project should provide a compliant environment at the pertinent off-site receptor locations. Further, this noise control strategy, coupled with a high degree of plant automation, should also achieve an acceptable work setting for on-site Project personnel with respect to occupational safety and health regulations for worker noise exposure[11].

Following the engineering and construction phases, the noise control design should be tested via a compliance verification field survey to measure the as-built Project noise emissions along the boundary and at selected off-site receptor locations.

11.0 CONCLUSION

The investigations and analyses indicate several key points and conclusions:

- The existing noise environment around the Project is a quiet, rural setting with sparsely-spaced residential uses. As such, significant increases in noise levels would be a considerable change to the acoustic environment of the area. Thus, the most restrictive noise design goals are using the CEC late-night increase of 5 dB above the existing L_{90} noise level standard. For these remote residential receptors, compliance with the Kern County Noise Element limits (exterior L_{dn} of 65 dBA and interior L_{dn} of 45 dBA) would be achieved if the (more restrictive) CEC standards are met. The determining receptor locations in meeting the CEC standard were LT1 and LT2; these locations were used as the conservative design criterion for this Noise Technical Report.

- All currently planned, continuous-operation equipment items that were deemed to be significant noise sources at the Project Site were included in the noise model.

- A conservative methodology was used for modeling the future conditions from the power plant noise sources, including all material handling, process, and power generation equipment operating at full capacity at all times of the day and night.

- Given the development experience with the Project and given the very low ambient conditions in the general area, a noise control design case will be needed for achieving compliance with CEC's nighttime standard. A reasonable and practical set of noise control

[11] Per Title 8, California Code of Regulations, § 5095-5100 (Article 105) for Cal-OSHA and Title 29, Code of Federal Regulations, Part 1910 for U.S. OSHA.

features was employed to reduce the overall Project aggregate noise emissions such that nominal compliance (while considering extenuating circumstances) is predicted at the pertinent sensitive receptors during both the daytime and nighttime.

To ensure noise compliance, both to the letter and to the spirit of the CEC and Kern County noise standards, the currently planned, extensive amounts of equipment noise controls should be refined during the course of more detailed engineering, such that the as-built installation maintains the expected noise emissions and achieves the desired noise compliance.

A compliance verification noise level measurement survey is recommended following power plant startup and commissioning to assess the as-built noise environments, to fine-tune worker exposure parameters (i.e., the allowable time in one or more noisy areas), and to verify equipment supply commitments. This will also satisfy a condition of approval that is routinely part of CEC's permitting for the AFC process.

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Attachment A

Kern County General Plan

Originally Adopted, June 15, 2004

Noise Element

Chapter 3

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Noise Element

Chapter 3

3. NOISE ELEMENT

3.1 INTRODUCTION

The Noise Element is a mandatory element of the General Plan (California Government Code Section 65302 (f)). The State, recognizing the effects of noise upon people's health and well being, required that local jurisdictions prepare statements of policy indicating their intentions regarding noise and noise sources, establish desired maximum noise levels according to land use categories, set standards for noise emission from transportation facilities and fixed-point sources, and prepare a program for implementation of noise control measures. Noise Elements are prepared in accordance with Guidelines for the Preparation and Content of Noise Elements of the General Plan published by the California Office of Noise Control in 1976. Those Guidelines are found in Appendix A of the General Plan Guidelines prepared by the State Office of Planning and Research (OPR).

The major purpose of the Noise Element is to: (1) establish reasonable standards for maximum desired noise levels in Kern County, and; (2) develop an implementation program which could effectively deal with the noise problem.

Considerable research has been done to determine the effects of various sound pressure levels on human health and on the successful performance of various human activities. It is known that noises of 120 dB(A) and higher will cause ear pain in most people; much lower levels may have permanent adverse effects on hearing.

The federal standards for industrial safety regulate the amount of time workers may be exposed to sound levels above 90 dB(A). This level was selected on the assumption that inability to hear at frequencies above 2,000 Hz is unimportant to speech communication. Tests show, however, that hearing loss of this extent will have an adverse effect on hearing low-level conversation and on hearing ordinary speech in the presence of background noise levels which commonly occur in everyday listening conditions.

It is desirable to control ambient noise level to reduce the adverse effects of noise. Ambient noise is the all-encompassing noise associated with a given environment; it usually is a composite of sounds from many sources, near and far.

The U.S. Environmental Protection Agency and the California Department of Health have suggested standards for ambient noise. These suggestions have been utilized in developing noise standards in Kern County.

Of primary importance in controlling noise in Kern County is protection of the public health, particularly insuring against hearing loss resulting from community noise. Next in importance is minimization of adverse effects of noise on the economic well-being of the community, and third, minimization of annoyance caused by noise.

Good land use planning should be employed to insure that the quality of the noise environment in Kern County does not deteriorate, and whenever practical be improved. Where noise sensitive uses are proposed, appropriate noise control measures shall be required as a condition of approval for discretionary projects. Measures to control the quality of the noise environment could include architectural design to reduce noise impact, acoustical insulation of exterior walls and construction of sound barriers.

The following major noise sources were considered in the preparation of the Noise Element:

- Highways and freeways
- Primary arterial and major local streets
- Railroad operations
- Aircraft and airport operations
- Local industrial facilities
- Other stationary sources

Railroad noise, although louder than highway noise, generally affects smaller areas. Railroad yards and rail alignments adjacent to residential areas should have noise barriers. Acoustical noise barriers could reduce existing rail noise up to 20 dB (A).

Little can be done to control airport noise. Through Federal standards more rigid noise controls are being required on aircraft. By adjusting the times of arrival and departure, flight patterns, and the time of day that high noise levels occur, noise levels from airports can be made more tolerable.

Noise contours have been prepared for all airports in the County, major railroad and highways within urban areas. Airport noise contours should be used to determine where noise insulation might be required and are located in the Airport Land Use Compatibility Plan (ALUCP). Any new airport or airport extension will be required to provide estimates of noise impact in conjunction with the required Master Plan updates to the ALUCP. The highway noise contours are contained in Appendix G. Noise contours for Interstate 5; State Routes 14, 33, 43, 58, 99, 119, 155, 166, 178, 184, 202, 204, 223, and 395 are shown in Appendix G. Noise contours for the AT & SF Railroad, Southern Pacific Railroad, and Sunset Railroad are shown in Appendix G. The highway and railroad contours are not intended to provide distinct boundaries between noise levels, but as approximations of noise levels that can serve as the basis for further studies. As these studies are completed, noise treatment may be needed to compensate for higher noise levels.

Definitions

1 Community Noise Equivalent Level (CNEL) — A measure of the cumulative noise exposure in the community, with greater weights applied to evening and nighttime periods. For CNEL

calculations, day is defined as 7 a.m. to 7 p.m., and this period has a weighting factor of one; evening is 7 p.m. to 10 p.m. and has a weighting factor of three; and night is from 10 p.m. to 7 a.m. and has a weighting factor of ten. Noises occurring at night are given a substantially heavier weight, since for most people, this is the time when noise is most disturbing.

2 Day Night Average Sound Level, L_{dn} — The same as CNEL except that the evening time period is not considered separately, but instead it is included as part of the daytime period. Noise contours developed using CNEL and Ldn procedures will normally agree within 1 dB(A), which is an insignificant difference. The Ldn is a computational simplification of the CNEL.

3.2 NOISE SENSITIVE AREAS

The following noise sensitive land uses have been identified in the County:

- Residential areas
- Schools
- Convalescent and acute care hospitals
- Parks and recreational areas
- Churches

Goals

1 Ensure that residents of Kern County are protected from excessive noise and that moderate levels of noise are maintained.

2 Protect the economic base of Kern County by preventing the encroachment of incompatible land uses near known noise producing roadways, industries, railroads, airports, oil and gas extraction, and other sources.

Policies

1. Review discretionary industrial, commercial, or other noise-generating land use projects for compatibility with nearby noise-sensitive land uses.

2. Require noise level criteria applied to all categories of land uses to be consistent with the recommendations of the California Division of Occupational Safety and Health (DOSH).

3. Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise.

4. Utilize good land use planning principles to reduce conflicts related to noise emissions.

5. Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into the project design. Such mitigation shall be designed to reduce noise to the following levels:

a. 65 dB Ldn or less in outdoor activity areas;

b. 45 dB Ldn or less within interior living spaces or other noise sensitive interior spaces.

6. Ensure that new development in the vicinity of airports will be compatible with existing and projected airport noise levels as set forth in the ALUCP.

7. Employ the best available methods of noise control.

8. Enforce the State Noise Insulation Standards (California Administrative Code, Title 24) and Chapter 35 of the Uniform Building Code concerning the construction of new multiple-occupancy dwellings such as hotels, apartments, and condominiums.

Implementation Measures

The following are programs to be carried out by the Kern County to implement the goals and policies of the Noise Element.

1. Utilize zoning regulations to assist in achieving noise-compatible land use patterns.

2. Require proper acoustical treatment of transportation facilities, including highways, airports, and railroads.

3. Review discretionary development plans, programs, and proposals, including those initiated by both the public and private sectors, to ascertain and ensure their conformance to the policies outlined in this element.

4. Review discretionary development plans for proposed residential or other noise sensitive land uses in noise-impacted areas to ensure their conformance with the noise standards of 65 dB L_dn or less in outdoor activity areas and 45 dB L_dn or less within interior living spaces.

5. Review discretionary development plans to ensure compatibility with adopted Airport Land Use Compatibility Plans.

6. Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65 dB L_dn and interior noise levels in excess of 45 dB Ldn.

7. At the time of any discretionary approval, such as a request for a General Plan Amendment, zone change or subdivision, the developer may be required to submit an acoustical report indicating the means by which the developer proposes to comply with the noise standards. The acoustical report shall:

   a. Be the responsibility of the applicant.

   b. Be prepared by a qualified acoustical consultant experienced in the fields of environmental noise assessment and architectural acoustics.

c. Be subject to the review and approval of the Kern County Planning Department and the Environmental Health Services Department. All recommendations therein shall be complied with prior to final approval of the project.

8. Encourage cooperation between the County and the incorporated cities within the County to control noise.

9. Noise analyses shall include recommended mitigation, if required, and shall:

   a. Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions.

   b. Include estimated noise levels, in terms of CNEL, for existing and projected future (10 to 20 years hence) conditions, with a comparison made to the adopted policies of the Noise Element.

   c. Include recommendations for appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element.

   d. Include estimates of noise exposure after the prescribed mitigation measures have been implemented. If compliance with the adopted standards and policies of the Noise Element will not be achieved, a rationale for acceptance of the project must be provided.

10. Develop implementation procedures to ensure that requirements imposed pursuant to the findings of an acoustical analysis are conducted as part of the project permitting process.

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Attachment B

Noise Parameters Used as Modeling Inputs

Modeling inputs are using Fluor drawing SK-250-1001, "Preliminary Plot Plan, Rev F1 of March 31, 2009. Coordinate system is State Plane Coordinates NAD 83, Zone V (U.S. Feet); with leading two digits removed for brevity [example: Project's Process Area centroid is 47921, 9336 in modeling coordinates, but is 6147921, 239336 in NAD 83 coordinates]

RECEPTORS

Name	X	Y	Z
Plant_W	45784	10287	295
Plant_N	48314	13001	295
Plant_E	50997	10338	295
Plant_S	47921	8043	295
LT-1_Ackerman	46464	12437	290
LT-2_Adams	52317	10285	295
LT-3_Stockdale	52172	18235	295
ST-4_Tule Elk Res	54452	10391	295
ST-5_Tupman	50937	5329	295
ST-6_Freeborn	35597	14433	285

BARRIERS

Name	Start X	Start Y	End X	End Y	Base Elev.	Height
Feed Stock Storage_N	48794	10967	49028	10965	290	150
Feed Stock Storage_E	49028	10965	49026	10859	290	150
Feed Stock Storage_S	49026	10859	48791	10854	290	150
Feed Stock Storage_W	48791	10854	48795	10965	290	150
Medical Bldg_W	47589	12552	47588	12426	290	15
Medical Bldg_S	47588	12426	47647	12430	290	15
Warehouse_W	47669	12628	47668	12424	290	35
Warehouse_S	47668	12424	47818	12426	290	35
Warehouse_E	47818	12426	47818	12626	290	35
Admin_S	47836	12425	47936	12426	290	25
Admin_E	47936	12426	47935	12607	290	25
Berm 1_S	45877	11743	47682	11742	290	10
Berm 1_E	47682	11742	47681	11904	290	10
Berm 2_S	48623	12719	50754	12724	290	10
Berm 3_W	50754	12724	50751	10437	290	10
Berm 3_S	50751	10437	50895	10435	290	10

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HECA Project Modeling Inputs – Noise Control Case

Area	Item	Notes	X	Y	Z	Dir'y	Octave Band Sound Power Levels, PWL								Overall	Noise Control
							63	125	250	500	1k	2k	4k	8k	PWL(A)	w/ "*"
AGR	CO_2 Compressor	40,250 hp – per Project "C"	48278	8800	298	3	72	68	73	75	78	80	76	69	*84.3*	*
	CO_2 Recycle Compressor	900 hp	48283	9175	297	3	82	86	86	85	84	81	77	74	*88.6*	*
	Refrigerant Compressor A	2,500 hp – int	48246	9061	297	3	87	78	73	70	69	68	67	66	*75.6*	*
	Refrigerant Compressor B	2,500 hp – int	48245	9025	297	3	87	78	73	70	69	68	67	66	*75.6*	*
	Flash Gas Recycle Comp	800 hp – ext	48521	9021	297	3	82	86	86	85	84	81	77	74	*88.6*	*
	Loaded Methanol Pump A	250 hp	48489	9193	293	3	84	86	87	87	87	84	81	78	*91.3*	*
	Loaded Methanol Pump B	250 hp	48488	9128	293	3	84	86	87	87	87	84	81	78	*91.3*	*
	Loaded Methanol Pump C	250 hp	48482	9074	293	3	84	86	87	87	87	84	81	78	*91.3*	*
	Loaded Methanol Pump D	250 hp	48552	9162	293	3	84	86	87	87	87	84	81	78	*91.3*	*
	Lean Methanol Pump	2,000 hp	48550	9080	293	3	107	98	93	90	89	88	87	86	*95.6*	*
	Reflux Pump Methanol/Water Separation	50 hp	48254	9123	295	3	86	87	90	90	88	85	81	79	*92.8*	
	Syngas Turbo Expander	3,000 hp	48234	8879	296	3	102	93	88	85	84	83	82	81	*90.6*	*
ASU	Main Air Compressor Motor	70,000 hp – per Project "C"	47492	8667	305	3	87	83	88	90	93	95	91	84	*99.3*	
	Main Air Compressor (MAC)	70,000 hp – per Project "C"	47556	8665	305	3	87	83	88	90	93	95	91	84	*99.3*	
	Booster Air Compressor Motor	14,750 hp – per Project "C"	47628	8656	305	3	84	88	87	91	93	93	90	85	*98.3*	
	Booster Air Compressor (BAC)	15,000 hp – per Project "C"	47628	8683	305	3	84	88	87	91	93	93	90	85	*98.3*	
	Med Pressure Nitrogen Compressor Motor	38,000 hp – per Project "C"	47671	8665	305	3	87	83	88	90	93	95	91	84	*99.3*	*
	Med Pressure Nitrogen Compressor	38,000 hp – per Project "C"	47674	8691	305	3	87	83	88	90	93	95	91	84	*99.3*	*
	Expander	2,000 hp – per Project "F"	47430	8759	300	3	102	93	88	85	84	83	82	81	*90.6*	*
	Dense Fluid Expander	500 hp	47677	8788	299	3	79	81	82	82	82	79	76	73	*86.3*	*
	Liquid Oxygen Pump	650 hp	47488	8754	295	3	84	86	87	87	87	84	81	78	*91.3*	*
	Liquid Oxygen Pump	650 hp	47532	8755	295	3	84	86	87	87	87	84	81	78	*91.3*	*
	ASU Cooling Water Pump 1	750 hp	47468	8485	294	3	84	86	87	87	87	84	81	78	*91.3*	*
	ASU Cooling Water Pump 2	750 hp	47468	8507	294	3	84	86	87	87	87	84	81	78	*91.3*	*
	ASU CCW Pump	150 hp	47488	8509	294	3	84	85	90	89	88	85	80	77	*92.4*	*
	Auxiliary Cooling Water Pump	200 hp	47494	8482	294	3	84	85	90	89	88	85	80	77	*92.4*	*
	ASU Cooling Tower, 4 cells	Each 4 cell set	47554	8441	315	3	114	112	104	98	93	94	97	95	*103.8*	*
Common Cooling	Gasification Cooling Water Pump 1	750 hp	48651	8482	295	3	84	86	87	87	87	84	81	78	*91.3*	*
	Gasification Cooling Water Pump 2	750 hp	48660	8505	295	3	84	86	87	87	87	84	81	78	*91.3*	*
	Power Block Cooling Water Pump 1	2,500 hp – per Project "F"	48673	8486	295	3	107	98	93	90	89	88	87	86	*95.6*	*
	Power Block Cooling Water Pump 2	2,500 hp – per Project "F"	48226	8495	295	3	107	98	93	90	89	88	87	86	*95.6*	*
	Power Block Clsd Clg Wtr Pump	500 hp	48247	8497	295	3	84	86	87	87	87	84	81	78	*91.3*	*
	Aux Cooling Water Pump	185 hp	48276	8495	295	3	84	85	90	89	88	85	80	77	*92.4*	*
	Gasification Clsd Clg Wtr Pump	150 hp	48297	8495	295	3	84	85	90	89	88	85	80	77	*92.4*	*
	HRSG FWH Recirculation Pumps	50 hp	47540	9182	294	3	76	77	80	80	78	75	71	69	*82.8*	*
	Condensate Transfer Pump	75 hp	47444	8955	293	3	76	77	80	80	78	75	71	69	*82.8*	*

HECA Project Modeling Inputs – Noise Control Case

Area	Item	Notes	X	Y	Z	Dir'y	Octave Band Sound Power Levels, PWL								Overall	Noise Control
							63	125	250	500	1k	2k	4k	8k	PWL(A)	w/ "*"
	Hotwell Pump	600 hp	47462	9078	293	3	84	86	87	87	87	84	81	78	*91.3*	*
	Low Pressure Boiler Feed Water Pump	250 hp	47725	9123	293	3	84	86	87	87	87	84	81	78	*91.3*	*
	Process Intrmd Press BlrFdWtr Pumps	350 hp	47702	9140	294	3	84	86	87	87	87	84	81	78	*91.3*	*
	High Pressure Boiler Feed Water Pump	2,500 hp – per Project "F"	47703	9153	294	3	107	98	93	90	89	88	87	86	*95.6*	*
	Process High Press BlrFdWtr Pumps	4,000 hp – per Project "F"	47704	9170	294	3	107	98	93	90	89	88	87	86	*95.6*	*
	Power Block Cooling Tower	cells A-D	48012	8439	315	3	114	112	104	98	93	94	97	95	*103.8*	*
	Power Block Cooling Tower	cells E-H	48215	8439	315	3	114	112	104	98	93	94	97	95	*103.8*	*
	Power Block Cooling Tower	cells I-M	48439	8441	315	3	114	112	104	98	93	94	97	95	*103.8*	*
	Gasification Cooling Tower	Each 4 cell set	48664	8441	315	3	114	112	104	98	93	94	97	95	*103.8*	*
Flaring	Thermal Oxidizer	Vendor information	47977	8816	455	0	100	97	95	93	92	89	84	78	*96.6*	
	Rectisol Flare Stack	not used – not normal ops	48030	10001	540	0	94	90	82	74	71	74	78	78	*83.8*	
	Gasification Flare Stack	from Project "A"	48030	9985	540	0	94	90	82	74	71	74	78	78	*83.8*	
	SRU Flare Stack	not used – not normal ops	48029	10012	540	0	94	90	82	74	71	74	78	78	*83.8*	
Shift/LGTC	Hot Process Condensate Pumps	500 hp	48488	9140	293	3	84	86	87	87	87	84	81	78	*91.3*	*
	Contact Condenser Air Cooler	from Project "E"	48517	9169	315	0	98	95	85	78	72	63	56	48	*82.7*	
	Regen Overhead Air Cooler	from Project "E"	48518	9070	315	0	98	95	85	78	72	63	56	48	*82.7*	
SRU	SRU furnace 1	Vendor information	47901	9073	310	3	96	93	91	89	88	85	82	74	*92.7*	
	SRU furnace 2	Vendor information	47990	9061	310	3	96	93	91	89	88	85	82	74	*92.7*	
	HP Flare Knock-out Drum Pump	300 hp	47970	8991	293	3	84	86	87	87	87	84	81	78	*91.3*	*
TGTU	TGTU Treated Gas Compressor	1,200 hp	48171	9022	297	3	75	77	76	78	81	85	79	73	*88.4*	*
	Lean Amine Air Cooler	from Project "E"	48171	9103	315	0	98	95	85	78	72	63	56	48	*82.7*	
Gasification	Injector Cooling Water Pump 1	50 hp	48497	9582	293	3	76	77	80	80	78	75	71	69	*82.8*	*
	Injector Cooling Water Pump 2	50 hp	48499	9506	293	3	76	77	80	80	78	75	71	69	*82.8*	*
	Filter Feed Pumps	50 hp	48498	9424	293	3	76	77	80	80	78	75	71	69	*82.8*	*
	Mill Discharge Tank Pumps	40 hp	48344	9408	293	3	76	77	80	80	78	75	71	69	*82.8*	*
	Slurry Booster Pump 1	50 hp	48359	9409	293	3	76	77	80	80	78	75	71	69	*82.8*	*
	Slurry Booster Pump 2	50 hp	48386	9408	293	3	76	77	80	80	78	75	71	69	*82.8*	*
	Slurry Charge Pump 1	500 hp	48395	9453	293	3	84	86	87	87	87	84	81	78	*91.3*	*
	Slurry Charge Pump 2	500 hp	48398	9506	293	3	84	86	87	87	87	84	81	78	*91.3*	*
	Quench Water Pump 1	350 hp	48350	9782	293	3	84	86	87	87	87	84	81	78	*91.3*	*
	Quench Water Pump 2	350 hp	48367	9780	293	3	84	86	87	87	87	84	81	78	*91.3*	*
	Settler Bottom Pump	50 hp	48471	9670	293	3	76	77	80	80	78	75	71	69	*82.8*	*
	Settler Feed Pump	50 hp	48472	9687	293	3	76	77	80	80	78	75	71	69	*82.8*	*
	Grey Water Pump 1	1,800 hp – per Project "F"	48485	9732	293	3	107	98	93	90	89	88	87	86	*95.6*	*
	Grey Water Pump 2	1,800 hp – per Project "F"	48485	9744	293	3	107	98	93	90	89	88	87	86	*95.6*	*
	Grinding Water Tank Pump 1	50 hp	48396	9756	293	3	76	77	80	80	78	75	71	69	*82.8*	*

HECA Project Modeling Inputs – Noise Control Case

Area	Item	Notes	X	Y	Z	Dir'y	Octave Band Sound Power Levels, PWL								Overall	Noise Control
							63	125	250	500	1k	2k	4k	8k	PWL(A)	w/ "*"
	Grinding Water Tank Pump 2	50 hp	48420	9757	293	3	76	77	80	80	78	75	71	69	*82.8*	*
	Deaerator Bottoms Pump 1	100 hp	48514	9801	293	3	79	81	82	82	81	78	75	72	*85.6*	*
	Deaerator Bottoms Pump 2	100 hp	48514	9809	293	3	79	81	82	82	81	78	75	72	*85.6*	*
	Mill Discharge Tank Agitator	50 hp	48453	9525	293	3	76	77	80	80	78	75	71	69	*82.8*	*
	Slurry Tank Agitator 1	325 hp	48437	9483	300	3	84	86	87	87	87	84	81	78	*91.3*	*
	Slurry Tank Agitator 2	325 hp	48441	9430	300	3	84	86	87	87	87	84	81	78	*91.3*	*
	Settler Rake	50 hp	48465	9621	296	3	76	77	80	80	78	75	71	69	*82.8*	*
	Filtration Skid	250 hp	48458	9491	294	3	84	86	87	87	87	84	81	78	*91.3*	*
	Vacuum Pump Package	60 hp	48460	9443	294	3	76	77	80	80	78	75	71	69	*82.8*	*
	Slurry Prep Bldg	from Project "A"	48369	9392	395	3	114	104	94	87	80	71	69	73	*92.9*	
	Gasifiers (one of three)	from Project "A"	48559	9566	390	0	102	95	90	85	82	81	81	82	*90.0*	*
	Gasifiers (two of three)	from Project "A"	48558	9484	390	0	102	95	90	85	82	81	81	82	*90.0*	*
Mat'l Handling	Pneumatic Conveyor Blower	from Project "A"	48996	11925	300	3	98	91	86	81	78	77	77	78	*86*	*
	Impact Crusher	EPPENG w/ adjustment	48976	11828	337	3	100	100	98	96	95	93	87	80	*99.8*	*
	Belt Conveyors	EPPENG w/ adjustment	48978	11742	350	3	93	93	91	89	88	86	80	73	*92.8*	*
	Belt Conveyors	EPPENG w/ adjustment	48974	11597	420	0	93	93	91	89	88	86	80	73	*92.8*	*
	Belt Conveyors	EPPENG w/ adjustment	48980	11467	490	0	93	93	91	89	88	86	80	73	*92.8*	*
	Belt Conveyors	EPPENG w/ adjustment	48975	11328	305	3	93	93	91	89	88	86	80	73	*92.8*	*
	Belt Conveyors	EPPENG w/ adjustment	48979	11171	315	3	93	93	91	89	88	86	80	73	*92.8*	*
	Belt Conveyors	EPPENG w/ adjustment	48977	10988	380	0	93	93	91	89	88	86	80	73	*92.8*	*
	Crusher Bldg	from Project "A" w/ adj.	48322	10908	445	3	114	104	94	88	80	71	69	73	*93.0*	*
	Feedstock Silo wall_N	from Project "A" w/ adj.	48903	10973	462	3	109	99	89	83	75	66	64	68	*88.0*	*
	Feedstock Silo wall_E	from Project "A" w/ adj.	49035	10906	462	3	109	99	89	83	75	66	64	68	*88.0*	*
	Feedstock Silo wall_S	from Project "A" w/ adj.	48912	10847	462	3	109	99	89	83	75	66	64	68	*88.0*	*
	Feedstock Silo wall_W	from Project "A" w/ adj.	48779	10906	462	3	109	99	89	83	75	66	64	68	*88.0*	*
	Feedstock Unloading Shed	EPPENG w/ adjustment	48322	9483	337	3	95	95	93	91	90	88	82	75	*94.8*	*
	Feedstock Transfer Tower 1	EPPENG w/ adjustment	48978	11536	374	3	98	98	96	94	93	91	85	78	*97.8*	*
	Feedstock Transfer Tower 2	EPPENG w/ adjustment	48976	11218	462	3	98	98	96	94	93	91	85	78	*97.8*	*
	Crushed Feedstock Transfer Tower 1	EPPENG w/ adjustment	48327	10434	345	3	98	98	96	94	93	91	85	78	*97.8*	*
	Crushed Feedstock Transfer Tower 2	EPPENG w/ adjustment	48326	9929	395	3	98	98	96	94	93	91	85	78	*97.8*	*
	Mat'l Handling Dust Collector 1	estimate	48770	10943	302	3	79	81	82	82	81	78	75	72	*85.6*	*
	Mat'l Handling Dust Collector 5	estimate	48360	10928	302	3	79	81	82	82	81	78	75	72	*85.6*	*
	Mat'l Handling Dust Collector 6	estimate	48353	10555	302	3	79	81	82	82	81	78	75	72	*85.6*	*
	Mat'l Handling Dust Collector 7	estimate	48353	10159	302	3	79	81	82	82	81	78	75	72	*85.6*	*
	Mat'l Handling Dust Collector 8	estimate	48346	9737	302	3	79	81	82	82	81	78	75	72	*85.6*	*
	Mat'l Handling Dust Collector 9	estimate	48337	9548	302	3	79	81	82	82	81	78	75	72	*85.6*	*

HECA Project Modeling Inputs – Noise Control Case

Area	Item	Notes	X	Y	Z	Dir'y	Octave Band Sound Power Levels, PWL								Overall	Noise Control
							63	125	250	500	1k	2k	4k	8k	PWL(A)	w/ "*"
Power Block	GTG Transformer	from Project "A"	47247	9172	302	3	99	101	96	96	90	85	80	73	*96.4*	
	GTG Air Inlet	from Project "A"	47348	9128	320	3	104	93	84	71	57	47	69	73	*82.5*	*
	GTG Inlet Plenum	from Project "A"	47360	9128	320	3	89	86	88	87	88	97	87	76	*99.2*	*
	GTG Generator	from Project "E"	47384	9126	300	3	102	101	98	100	99	98	93	84	*104*	*
	GTG Main Body	from Project "E"	47443	9125	308	3	110	104	103	100	98	103	99	94	*107.2*	*
	GTG Load Compartment	from Project "E"	47384	9171	300	3	105	105	100	95	93	96	93	86	*101.4*	*
	GTG Accessory Bay	from Project "E"	47404	9171	300	3	106	99	97	96	95	98	92	86	*102.2*	*
	GTG Exhaust Diffuser	from Project "E"	47463	9128	300	3	109	103	97	92	85	83	79	74	*94.5*	*
	HRSG Transition	from Project "B"	47482	9129	310	3	115	111	107	102	101	99	95	57	*106.6*	*
	HRSG Main Body	from Project "A"	47557	9130	330	3	111	108	104	99	96	94	90	64	*102.5*	*
	HRSG StackWall-low	from Project "A"	47640	9129	320	3	90	91	89	86	84	78	62	25	*88.3*	*
	HRSG Stack Exhaust	from Project "A"	47631	9127	450	0	107	109	109	102	91	77	62	57	*103.4*	*
	STG Main Body	from Project "D"	47389	8987	325	3	114	112	107	103	99	96	88	82	*105.4*	*
	STG Generator	from Project "D"	47353	8987	320	3	107	114	105	94	95	92	96	99	*104.5*	*
	STG Transformer	from Project "A"	47249	9035	302	3	99	101	96	96	90	85	80	73	*96.4*	
	STG Condenser	from Project "A"	47375	8987	302	3	99	101	96	96	90	85	80	73	*96.4*	*
	LMS100® Air Inlet **	from Project "E"	47341	9314	315	3	112	111	100	88	94	80	80	85	*99.1*	*
	LMS100® Main Body **	from Project "E"	47341	9282	305	3	116	113	103	99	93	91	91	89	*102.6*	
	LMS100® Generator **	from Project "E"	47340	9363	305	3	106	113	104	93	94	91	95	98	*103.5*	
	LMS100® SCR Body **	from Project "E"	47300	9358	318	3	118	115	108	96	90	83	66	48	*103.3*	*
	LMS100® Stack Exhaust **	from Project "E"	47266	9361	350	0	128	122	108	96	91	83	79	71	*108.2*	*
	LMS100® Transformer **	from Project "E"	47282	9434	302	3	103	107	100	101	98	87	82	75	*102*	
	LMS100® Fuel Gas Compressor **	estimate	47465	9316	295	3	80	82	81	83	86	90	84	78	*93.4*	*
Water Treat	Demin Water Pump	250 hp	47395	10057	293	3	84	86	87	87	87	84	81	78	*91.3*	*
	Storm Water Sump Pump	75 hp	47396	9895	293	3	76	77	80	80	78	75	71	69	*82.8*	*
	Sump Pump	75 hp	47397	9689	293	3	76	77	80	80	78	75	71	69	*82.8*	*
	Water Treat Pumps	12 x 75 hp = 11 dB	47536	10108	293	3	87	88	91	91	89	86	82	80	*93.8*	*
	R/O Feed Pump-1stg	1,500 hp – per Project "F"	47530	9939	294	3	107	98	93	90	89	88	87	86	*95.6*	*
	R/O Feed Pump-2stg	500 hp	47525	9766	294	3	84	86	87	87	87	84	81	78	*91.3*	*
Process ZLD	Vapor Compressor	500 hp	48424	10055	297	3	79	81	82	82	82	79	76	73	*86.3*	*
	Exhaust Fan	50 hp	48424	9948	297	3	76	77	80	80	78	75	71	69	*82.8*	*
	ZLD pumps	16 x 75 hp = 12 dB	48534	10108	293	3	88	89	92	92	90	87	83	81	*94.8*	*
	Dryer	60 hp	48532	10056	295	3	86	87	90	90	88	85	81	79	*92.8*	
Wastewater ZLD	Vapor Compressor	500 hp	46981	9951	297	3	79	81	82	82	82	79	76	73	*86.3*	*
	Exhaust Fan	50 hp	47067	9951	297	3	76	77	80	80	78	75	71	69	*82.8*	*
	ZLD pumps	16 x 75 hp = 12 dB	46975	9866	293	3	88	89	92	92	90	87	83	81	*94.8*	*

HECA Project Modeling Inputs – Noise Control Case

Area	Item	Notes	X	Y	Z	Dir'y	Octave Band Sound Power Levels, PWL								Overall	Noise Control
							63	125	250	500	1k	2k	4k	8k	PWL(A)	w/ "*"
	Dryer	60 hp	47062	9868	295	3	86	87	90	90	88	85	81	79	*92.8*	
Misc	Aux Transformer 01	~15 MVA-per Project "B"	47620	12616	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 02	~15 MVA-per Project "B"	47623	12592	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 03	~15 MVA-per Project "B"	48801	10820	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 04	~15 MVA-per Project "B"	48819	10819	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 05	~15 MVA-per Project "B"	48605	9769	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 06	~15 MVA-per Project "B"	48608	9708	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 07	~15 MVA-per Project "B"	48549	9733	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 08	~15 MVA-per Project "B"	47810	9457	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 09	~15 MVA-per Project "B"	47813	9398	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 10	~15 MVA-per Project "B"	47870	9436	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 10	~15 MVA-per Project "B"	48353	9271	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 12	~15 MVA-per Project "B"	48423	9273	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 13	~15 MVA-per Project "B"	48395	9212	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 14	~15 MVA-per Project "B"	47508	8981	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 15	~15 MVA-per Project "B"	47562	8947	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 16	~15 MVA-per Project "B"	47569	9008	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 17	~15 MVA-per Project "B"	48405	8518	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 18	~15 MVA-per Project "B"	48425	8518	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 19	~15 MVA-per Project "B"	47603	9841	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Aux Transformer 20	~15 MVA-per Project "B"	47627	9843	298	3	87	89	84	84	78	73	68	61	*84.4*	
	Atmospheric Vent	Service A	47439	9107	355	0	95	88	83	78	75	74	74	75	*83.0*	*
	Atmospheric Vent	Service B	47558	8691	355	0	95	88	83	78	75	74	74	75	*83.0*	*
	Atmospheric Vent	Service C	47974	8958	355	0	95	88	83	78	75	74	74	75	*83.0*	*
	Atmospheric Vent	Service D	48271	9107	355	0	95	88	83	78	75	74	74	75	*83.0*	*
	Atmospheric Vent	Service E	48479	9166	355	0	95	88	83	78	75	74	74	75	*83.0*	*
	Atmospheric Vent	Service F	48479	9790	355	0	95	88	83	78	75	74	74	75	*83.0*	*
														Total Project PWL(A) =	**118.9**	*

Source: Alliance Acoustical Consulting, 2009.

Notes:

* Items shown with an asterisk include noise control treatments

** LMS-100 system is not envisioned to be run at night…not included in CEC assessment of late-night L_{90} + 5 dB

AGR = Acid Gas Removal Area

ASU = Air Separation Unit

Power Block = (includes both Main 7F-class and LMS100® trains)

Shift/LTGC = Sour Shift + Low-Temp Gas Cooling + Mercury Removal

SRU = Sulfur Recovery Unit

TGTU = Tail Gas Treating Unit

Water Treat = Water Treatment Area

ZLD = Zero Liquid Discharge Area