nelsonacoustics

NELSON ACOUSTICS
POST OFFICE BOX 879, ELGIN, TX 78621
VOICE: +1.512.281.5535
E-MAIL: david@nelsonacoustical.com

product noise R&D • sound quality • noise and vibration control • test facility design • seminars

Report No. R1432-01: Acoustical analysis of ISP CISF
NRC Requests for Additional Information
RAI-01: Background noise assessment
RAI-02: Noise levels at receptors during construction and operation
RAI-03: Personnel noise exposure during construction and operation

2019 August 22

Jeff Glaser, PE
Cook-Joyce Inc.
812 W. 11th Street
Austin TX 78701

Dear Jeff,

REPORT SUMMARY

The following report conveys the results of acoustical analyses related to construction and operation of Interim Storage Partners' Consolidated Interim Storage Facility as requested by NRC. The intent of the analyses is to project the sound levels associated with each phase of activity at nearby receptors and for onsite personnel, to compare them with objective criteria (e.g., HUD, EPA, OSHA), and to recommend noise control measures as necessary.

Tables 1 – 3 summarize the ambient sound level at nine nearby receptors ("Noise Sensitive Areas"), along with CISF contributions during initial construction, operation, and later phases of construction.

Table 1: Estimated noise impact at NSA's during Phase 1 Construction

NSA	Type	Approx. Distance and Direction relative to ISP CISF	Estimated Ambient Ldn	Est'd ISP CISF Ph. 1 Construction Ldn	Est'd Total Ldn during Construction	EPA Recommended Ldn
1	Boundary	6100 ft. SW	47.9	43.2	49.1	70
2	Boundary	3900 ft. W	42.6	48.4	49.4	70
3	Boundary	4000 ft. WNW	41.6	48.6	49.4	70
4	ISP CISF	SW Corner Protected Area	39.1	69.9	69.9	(Onsite)
5	LSA Pad	NE Corner	39.8	60.0	60.1	(Onsite)
6	Residential	3.9 mi. WSW	64.5	30.2	64.5	55
7	Residential	4.1 mi. WSW	58.9	29.6	58.9	55
8	Residential	5.3 mi. WSW	47.0	27.1	47.0	55
9	Residential	4.9 mi. WSW	55.5	27.9	55.5	55

Table 2: Estimated noise impact at NSA's during Operation

NSA	Type	Approx. Distance and Direction relative to ISP CISF	Ambient Ldn (via Meas'd Ld & Est'd Ln)	Est'd Sound Level (Ldn) of ISP CISF during Operation	Est'd "Total" Ldn (ISP CISF + Ambient noise)	EPA Recommended Ldn
1	Boundary	6100 ft. SW	47.9	41.4	48.7	70
2	Boundary	3900 ft. W	42.6	39.9	44.5	70
3	Boundary	4000 ft. WNW	41.6	39.1	43.5	70
4	ISP CISF	SW Corner Protected Area	39.1	58.4	58.5	(Onsite)
5	LSA Pad	NE Corner	39.8	55.1	55.3	(Onsite)
6	Residential	3.9 mi. WSW	64.5	33.3	64.5	55
7	Residential	4.1 mi. WSW	58.9	28.8	58.9	55
8	Residential	5.3 mi. WSW	47.0	34.5	47.2	55
9	Residential	4.9 mi. WSW	55.5	33.2	55.5	55

Table 3: Estimated noise impact at NSA's during Phase 2-8 Construction

NSA	Type	Approx. Distance and Direction relative to ISP CISF	Estimated Ambient Ldn	Est'd ISP CISF Ph. 2-8 Construction Ldn	Est'd Sound Level (Ldn) of ISP CISF during Operation	Est'd Total Ldn during Construction	EPA Recm'd Ldn
1	Boundary	6100 ft. SW	47.9	37.7	41.4	49.1	70
2	Boundary	3900 ft. W	42.6	43.0	39.9	46.8	70
3	Boundary	4000 ft. WNW	41.6	43.7	39.1	46.6	70
4	ISP CISF	SW Corner Protected Area	39.1	57.8	58.4	61.2	(Onsite)
5	LSA Pad	NE Corner	39.8	52.2	55.1	57.0	(Onsite)
6	Residential	3.9 mi. WSW	64.5	25.0	33.3	64.5	55
7	Residential	4.1 mi. WSW	58.9	24.3	28.8	58.9	55
8	Residential	5.3 mi. WSW	47.0	21.8	34.5	47.2	55
9	Residential	4.9 mi. WSW	55.5	22.6	33.2	55.5	55

Table 4 summarizes the expected personnel noise exposure during various phases of CISF activity, expressed in terms of A-weighted Time Weighted Average (TWA).

Table 4: Estimated personnel noise exposure (TWA)

	Construction, Phase 1	Operations	Construction, Phases 2 - 8
General Earthwork	83	---	---
Cask Building	92	---	---
Security/Admin Building	94	---	---
SNF Pad 1	88	---	87
Protected Area	83	---	78
Storage Module Construction	---	92	---
Storage Module Transport	---	89	---

Acoustical analysis indicates that construction and operation of the CISF are expected to be well below EPA and HUD guidelines (55 L_{DN} residential, 70 L_{DN} industrial/rural) at offsite locations without noise mitigation efforts.

Personnel noise exposure is expected to be above the OSHA action level TWA of 85 in many cases, but well within ranges normally associated with construction activity and industrial operations. As is common in industry, personnel noise exposure can be mitigated through

the use of hearing protective devices (e.g., ear plugs or ear muffs), but can be further aided by reduction of back-up alarm output levels and selection of for quiet tools and equipment.

INTRODUCTION

In this report, Nelson Acoustics presents the results of acoustical analyses for the proposed Interim Storage Partners' (ISP) Consolidated Interim Storage Facility (CISF). Information is included that responds to NRC's information requests:

RAI-01: a pre-construction ambient survey along Waste Control Specialists' (WCS) western property line and for residential locations in Eunice NM,

RAI-02: an analysis of environmental sound (average and maximum) arriving at nearby receptors during construction and operation, and

RAI-03: an analysis of worker exposure to sound (average and maximum) from construction and operational activities.

The CISF is located to the north of WCS' current operations in a remote portion of Andrews County, Texas. WCS has three adjacent industrial neighbors immediately to the west:

- Urenco, which enriches uranium in a completely enclosed facility.
- Sundance Services, which operates a landfill for oilfield waste disposal, and
- Permian Basin Materials, which quarries aggregate materials.

Nine receptor points ("Noise Sensitive Areas" or NSA's) have been selected for study.

- One is onsite at the southwest corner of the CISF,
- One is at the northeast corner of WCS' adjacent LSA Pad,
- Three NSA's have been selected along the western boundary of WCS,
- Four NSA's have been selected to represent residential locations in and near the town of Eunice NM

An overview of the study area, along with locations of NSA's and background measurements are shown in Figures 1 – 3 in the attached Appendix, pages 19 - 20.

SOUND CRITERIA

The US Environmental Protection Agency promulgated guidelines[1] for environmental sound levels "requisite to protect the publich health and welfare *with an adequate margin of safety*". Values relevant to the present study for compatible land use are:

- 55 L_{dn} at residential properties, and
- 70 L_{dn} at industrial properties and general unpopulated land.

EPA's recommended approach is based on the Day-Night Sound Level L_{dn}, a weighted daily

[1] Information on levels of environmental noise requisite to protect public health and welfare with an adequate

energy average A-weighted sound level. The nighttime average sound level (L_n) is adjusted upwards by 10 dB to compensate for additional nighttime sensitivity between the hours of 22:00 and 07:00 local. The daytime sound level (L_d) is not adjusted.

$$L_{dn} = 10\log_{10}\left(\frac{15}{24}10^{0.1L_d} + \frac{9}{24}10^{0.1(L_n+10)}\right)$$

The effect of the nighttime adjustment is such that, for sounds that are continuous, L_{dn} is approximately 6.4 dB above the measured 24-hour $L_{A,eq}$.

The US Department of Housing and Urban Development subsequently issued guidelines for environmental sound levels[2] pursuant to it's mission to "provide decent housing and a suitable living environment for all Americans":

- Acceptable: $L_{dn} \leq 65$
- Normally Unacceptable: $65 < L_{dn} \leq 75$
- Unacceptable: $L_{dn} > 75$

Nelson Acoustics is not aware of any state, county, or local noise regulations affecting this project.

Workplace noise exposure is administered by the Occupational Safety and Health Administration (OSHA) of the US Department of Labor[3]. Maximum Permissible Noise Exposure is defined as the equivalent Time-Weighted Average (TWA) of 90 dBA for 8-hour duration. Above the Action Level of 85 dBA, employers must implement a hearing conservation program including hearing protectors, noise dosimetry, training, audiometric testing, and recordkeeping. An additional requirement prohibits unprotected transient events in excess of 140 dB(C). However, it should be noted that OSHA does not specify a maximum permissible A-weighted sound level.

Hearing protectors must be sufficient to attenuate employee exposure to an 8-hour TWA of 90 dBA or below. For employees that have already experienced a standard threshold shift, hearing protectors must attenuate to 85 dBA or below. Hearing protectors are rated in terms of "Noise Reduction Rating", but the nature of the laboratory rating and studies of actual benefit in the workplace suggest that actual dBA reduction can be notably less than the NRR rating implies.

[2] "The Noise Guidebook", US Department of Housing and Urban Development, Office of Community Planning and Development, publishing date listed as 2009 online, document certain predates this.
[3] 29 CFR 1910.95 "Occupational Noise Exposure"

SITE/FACILITY DESCRIPTION

An area layout around the CISF is provided by Figure 2 (Appendix, p. 19). The CISF will consist of eight concrete storage pads constructed in succession, a railroad spur to deliver casks, a Cask Handling building, and a Security/Administration building (see Figure 4, p. 20). Area landforms are generally flat with the exception earthworks such as storage pits, quarries, and large material storage piles.

During construction, the majority of noise will be generated by

- specific earthmoving and concrete work equipment, along with
- generic support equipment (air compressors and portable generators) and
- individual building construction activities (such as grinding, welding).

During operation, the primary noise sources include

- outdoor concrete delivery and pouring for Storage Module Construction,
- a slow-moving Storage Module Transport which must be closely accompanied in order to monitor radiation levels, and
- building mechanical equipment such as ventilation fans and roof-top A/C units.
- Rail activity associated with CISF operation is estimated on the basis of one additional train per day carrying five casks to be stored.

Away from the CISF, primary noise sources are roadway traffic on TX/NM 176 and NM 18 which carry a significant fraction of heavy trucks associated with oil and gas activity. Additional significant noise sources in and around Eunice include two gas plants with flares, and the Texas-New Mexico Railway along with the associated WCS siding.

AMBIENT SOUND STUDY (in response to RAI-01)

Current ambient sound levels were measured at locations between the proposed CISF and nearest industrial and residential properties during a site visit by David Nelson of Nelson Acoustics spanning 25 – 26 July, 2019. The general noise environment observed at each measurement location is described in Table 5. Measurement locations and their associated NSA's are depicted in Figures 1 – 3 (pp. 19-20). Measured A-weighted sound levels are summarized in Table 6 (dashes indicate that measurements were not made during that time period). Sunny, warm weather conditions prevailed during the measurements (Appendix, Table A-1, p. 21).

Experience and judgment has been exercised in order to decide which sounds constitute the "background". In general, sounds that are infrequent or whose schedule is difficult to discern (e.g., flaring at Eunice's North Gas Plant, rail operations) or seasonal (e.g., insects) are excluded in order to establish a baseline that is likely to be applicable all year (Table 7).

Table 5: Sources of ambient sound

Location	Description	Dominant Sources	Secondary Sources	Infrequent or Intermittent Sources (excluded)
M01	Near South Gas Plant	Gas Plant Operation		
M03	Near North Gas Plant, Flaring	Flare		
	Near North Gas Plant, Not Flaring	Urban Traffic	Nearby Pumpjack	
M04	Brunson Cemetery	Highway Traffic		Nearby Industrial Activity
M06	East End of Ave. S	Urban and Highway Traffic	Municipal Pool Equipment, Animals	
M07	Drinkard Ln near NM 18	Highway Traffic		Insects
M08	Picnic Area North of Love's Travel Center	Highway Traffic		
M14	West Boundary at Urenco	Highway Traffic	Wind in Vegetation	WCS Train, Insects
M15	Near West Boundary at Sundance	Highway Traffic	Sundance Operations, Wind in Vegetation	WCS Train, Insects
M16	Near ISP CISF SW Corner	Highway Traffic, Wind in Vegetation	WCS Operations	WCS Train, Insects
M17	N Side of Retention Pond	Highway Traffic	Wind in Vegegation, WCS Operations	WCS Train, Insects

Table 6: Measured Ambient Sound Levels

Location	Description	Details	Affects Estimates at NSA's	Morning [dBA]	Midday [dBA]	Afternoon/ Evening [dBA]
M01	Near South Gas Plant	1425 ft. N of Plant Center	7, 9	---	---	57.3
M03	Near North Gas Plant, Flaring	1300 ft. S of Flare	8, 9	---	---	75.9
	Near North Gas Plant, Not Flaring			---	---	42.1
M04	Brunson Cemetery	825 ft. W of NM 207	9	---	---	46.6
M06	End of Ave. S	East end of Materials Yard	8	46.3	37.3	42.1
M07	Drinkard Ln near NM 18	775 ft. SE of intersection	7	50.3	40.4	37.5
M08	NMDOT Picnic Area opposite Love's Travel Center	300 ft. N of roadway	6	57.2	58.0	57.6
M14	West Boundary at Urenco	4250 ft. N of NM 176	1	43.8	---	---
M15	Near West Boundary at Sundance	7725 ft. N of NM 176	2, 3	39.9	---	---
M16	Near ISP CISF SW Corner	300 ft. E of SW Corner	4, 5	36.3	---	---
M17	N Side of Retention Pond	1700 ft. N of TX 176	---	---	40.7	---

Table 7: Disposition of contributions to Ambient L_{dn}

Description	Schedule	Variability	Included in Ldn?
Roadway Traffic	Constant	Slowly varying	Yes
WCS Train	Irregular	Brief	No
Texas and New Mexico Railway	Irregular	Brief	No
Wind in Vegetation	Common	Fluctuating	Yes
South Gas Plant	Constant	Continuous	Yes
North Gas Plant Flare	Irregular	Continuous	No
Insects	Seasonal	Continuous	No
Vehicle Activities WCS	Daily	Continuous	Yes
Vehicle Activities Sundance Services	Daily	Continuous	Yes
Vehicle Activities Permiam Materials	Daily	Continuous	Yes

Measurements were made near the selected NSA's in accessible locations that respect residents' privacy. Daytime NSA values are derived from measured values adjusted for relative source-receptor distance. Nighttime NSA values were not measured but, because roadway traffic is the primary ambient noise contributor at all locations, are estimated as 4.8 dBA less than daytime values based on hourly traffic volumes provided by TxDOT. The overall ambient L_{dn} is estimated from L_d and L_n inputs given in Table 8.

Table 8: Derivation of Ambient L_{dn}

NSA	Related Measurement Positions	Description	Est'd Ambient Ld [dBA]	Est'd Ambient Ln [dBA]	Resulting Ambient Ldn [dBA]
1	M14	West Property Boundary near Urenco	45.1	40.3	47.9
2	M15	West Property Boundary near Sundance	39.9	35.1	42.6
3	M15	West Property Boundary near Permian	38.9	34.1	41.6
4	M16	Center of Phase 1 Pad	36.1	31.3	38.9
5	M16	NE Corner of LSA Pad	37.1	32.3	39.8
6	M08	Residences near intersection of NM 176 and NM 18	61.8	57.0	64.5
7	M07	Residence on NM 18 S of NM 176	56.2	51.4	58.9
8	M06	Residences at E edge of Eunice NM	44.2	39.4	47.0
9	M01, M04, M08	Residences along NM 176 near RR Crossing	52.8	48.0	55.5

The ambient sound levels described above compare favorably to results from a HUD Traffic Noise analysis based on traffic volume data obtained from TXDOT and NMDOT, as well as with a venerable estimating method based on population density (which predicts L_{DN} 51.4 for Eunice's 877.5 persons/square mile).

Industrial activity within WCS and nearby at Urenco, Sundance, and Permian Materials, exerted a minimal impact on the observed L_{dn} in comparison with highway traffic.

CONSTRUCTION AND OPERATIONAL SOUND AT RECEPTORS (in response to RAI-02)

Equipment types and counts for Construction and Operational Phases have been tabulated by Joe Pere of CJI and were used as the basis for this analysis (see Appendix, Table A-2, p. 21). Additional noise sources likely to exist on site have been added, including backup alarms, building mechanical equipment, construction support equipment, and some larger handtools.

Noise sources as classified, along with their presumed operational extent and acoustic centers, are tabulated in Appendix Tables A-3 through A-5 (pp. 21-22).

A-weighted Sound Power Level and temporal Usage Factors (UF) for construction vehicles were obtained from the FHWA's Road Construction Noise Model. Typical construction octave band spectral shapes and Sound Power Levels for other equipment were derived from ESEERCO (Empire State Electric Energy Research Corporation), the New York Dept. of Environmental Protection, and NIOSH Power Tool databases as well as Nelson Acoustics' project files. Noise emission levels from the WCS Train were extracted from direct measurements performed during the site visit.

Shift-average sound power levels (Appendix Table A-6, p. 22) combine operational sound power levels with the assumed percentage operational time. Maximum A-weighted sound power levels (Appendix Table A-7, p. 22) are presumed to occur in the rare event that all

equipment is operating simultaneously. The number of backup alarms involved in a maximum event is based on the largest number likely to sound simultaneously at least 1 second per shift. During operational phases, the maximum sound level occurs at some locations when the Train sounds its horn exactly at its nearest approach to the observation point. In the case of NSA #4, the distance is only 100 feet; maximum levels are elevated accordingly.

The modeled shift-average sound pressure level (for the i-th equipment type in the j-th octave band) is based on the operating sound power level (L_w), the number of units operating (N), and the usage factor (UF). Factors for geometric divergence due to distance (A_{div}) and excess attenuation due to air (A_{air}) and ground absorption (A_{gr}) were computed in accordance with ISO 9613-2 (1996). No "credit" is taken for attenuation from intervening terrain, buildings, or materials piles that could further reduce offsite levels (these barriers could be bypassed under certain weather conditions and are therefore considered unreliable in this application).

$$L_{p,eq,i,j} = L_{w,i,j} + 10\log_{10} N_i + 10\log_{10} UF_i - A_{div,i} - A_{air,i,j} - A_{gr,i,j}$$

The total j-th octave band sound pressure level from all equipment at a receptor point are aggregated as

$$L_{p,eq,j} = 10\log_{10} \sum_i 10^{0.1 L_{p,eq,i,j}}$$

The A-weighted overall sound pressure levels is then computed from the octave band sound pressure levels and the A-weighting octave band corrections as

$$L_{pA,eq} = 10\log_{10} \sum_j 10^{0.1(L_{p,eq,j}+A_j)}$$

Computed L_{DN}'s take into account the summertime work schedule (beginning 06:00 CDT), the shift lengths (10 hrs for construction, 8 hrs for operation), and time offset between MDT and CDT applying to NSA's 1 – 3 and 6 – 9.

Detailed computations of shift-average and maximum A-weighted sound pressure level at each NSA are tabulated in Appendix Tables A-8 through A-16 (pp. 23-27) for Construction phases, and A-17 through A-25 (pp. 27-30) for Operations.

Time-average noise impact at receptors is tabulated in Table 9 – 11 in terms of L_{dn}. Comparison is made to EPA guidelines for industrial and residential properties. No guideline value is tabulated for the NSA #4 or NSA #5 because WCS, whose adjacent land encloses the CISF, presumably considers itself closely allied with its operation. However, the L_{dn} 70 guideline would apply if NRC wishes to consider them as neighboring properties.

The L_{DN}'s contributed by the proposed CISF are expected to be well below EPA guidelines at the offsite locations. It should be noted that some of the residential locations already exceed EPA guidelines due to high levels of nearby roadway traffic, although they still fall within HUD's acceptability guideline.

Table 9: Estimated Noise Impact at NSA's during Phase 1 Construction

NSA	Type	Approx. Distance and Direction relative to ISP CISF	Estimated Ambient Ldn	Est'd ISP CISF Ph. 1 Construction Ldn	Est'd Total Ldn during Construction	EPA Recommended Ldn	Potential Noise Increase
1	Boundary	6100 ft. SW	47.9	43.2	49.1	70	1.3
2	Boundary	3900 ft. W	42.6	48.4	49.4	70	6.8
3	Boundary	4000 ft. WNW	41.6	48.6	49.4	70	7.8
4	ISP CISF	SW Corner Protected Area	39.1	69.9	69.9	(Onsite)	30.8
5	LSA Pad	NE Corner	39.8	60.0	60.1	(Onsite)	20.3
6	Residential	3.9 mi. WSW	64.5	30.2	64.5	55	0.0
7	Residential	4.1 mi. WSW	58.9	29.6	58.9	55	0.0
8	Residential	5.3 mi. WSW	47.0	27.1	47.0	55	0.0
9	Residential	4.9 mi. WSW	55.5	27.9	55.5	55	0.0

Table 10: Estimated Noise Impact at NSA's during Operation

NSA	Type	Approx. Distance and Direction relative to ISP CISF	Ambient Ldn (via Meas'd Ld & Est'd Ln)	Est'd Sound Level (Ldn) of ISP CISF during Operation	Est'd "Total" Ldn (ISP CISF + Ambient noise)	EPA Recommended Ldn	Potential Noise Increase
1	Boundary	6100 ft. SW	47.9	41.4	48.7	70	0.9
2	Boundary	3900 ft. W	42.6	39.9	44.5	70	1.9
3	Boundary	4000 ft. WNW	41.6	39.1	43.5	70	1.9
4	ISP CISF	SW Corner Protected Area	39.1	58.4	58.5	(Onsite)	19.4
5	LSA Pad	NE Corner	39.8	55.1	55.3	(Onsite)	15.5
6	Residential	3.9 mi. WSW	64.5	33.3	64.5	55	0.0
7	Residential	4.1 mi. WSW	58.9	28.8	58.9	55	0.0
8	Residential	5.3 mi. WSW	47.0	34.5	47.2	55	0.2
9	Residential	4.9 mi. WSW	55.5	33.2	55.5	55	0.0

Table 11: Est'd Noise Impact at NSA's during Ph. 2-8 Construction w/ Operation

NSA	Type	Approx. Distance and Direction relative to ISP CISF	Estimated Ambient Ldn	Est'd ISP CISF Ph. 2-8 Construction Ldn	Est'd Sound Level (Ldn) of ISP CISF during Operation	Est'd Total Ldn during Construction	EPA Recm'd Ldn	Potential Noise Increase
1	Boundary	6100 ft. SW	47.9	37.7	41.4	49.1	70	1.2
2	Boundary	3900 ft. W	42.6	43.0	39.9	46.8	70	4.2
3	Boundary	4000 ft. WNW	41.6	43.7	39.1	46.6	70	5.0
4	ISP CISF	SW Corner Protected Area	39.1	57.8	58.4	61.2	(Onsite)	22.1
5	LSA Pad	NE Corner	39.8	52.2	55.1	57.0	(Onsite)	17.2
6	Residential	3.9 mi. WSW	64.5	25.0	33.3	64.5	55	0.0
7	Residential	4.1 mi. WSW	58.9	24.3	28.8	58.9	55	0.0
8	Residential	5.3 mi. WSW	47.0	21.8	34.5	47.2	55	0.3
9	Residential	4.9 mi. WSW	55.5	22.6	33.2	55.5	55	0.0

Maximum sound levels are tabulated in comparison to the daytime average sound levels due to both the ambient and the denoted activities in Tables 12 – 14. The maxima tabulated in Table 14 for Phases 2 – 8 are from the construction activities only. Maxima due to Operation (in particular due to the Train) would also apply during the period but are tabulated separately in Table 13.

Table 12: Estimated Maximum Noise Levels at NSA's during Phase 1 Construction

NSA	Type	Approx. Distance and Direction relative to ISP CISF	Estimated Ambient Ld	Estimated Ph.1 Construction Ld	Total Ph. 1 Construction Ld	Estimated Max Lp during Ph. 1 Construction
1	Boundary	6100 ft. SW	45.1	40.7	46.5	48.0
2	Boundary	3900 ft. W	39.9	45.9	46.9	53.9
3	Boundary	4000 ft. WNW	38.9	46.2	46.9	54.2
4	ISP CISF	SW Corner Protected Area	36.4	69.1	69.1	75.9
5	LSA Pad	NE Corner	37.1	59.3	59.3	68.0
6	Residential	3.9 mi. WSW	61.8	27.8	61.8	33.5
7	Residential	4.1 mi. WSW	56.2	27.1	56.2	32.8
8	Residential	5.3 mi. WSW	44.2	24.6	44.3	30.3
9	Residential	4.9 mi. WSW	52.8	25.4	52.8	31.1

Table 13: Estimated Maximum Noise Levels at NSA's during Operation

NSA	Type	Approx. Distance and Direction relative to ISP CISF	Estimated Ambient Ld	Estimated Operational Ld	Total Operational Ld	Estimated Max Lp during Operation
1	Boundary	6100 ft. SW	45.1	38.4	46.0	75.3
2	Boundary	3900 ft. W	39.9	36.9	41.6	68.6
3	Boundary	4000 ft. WNW	38.9	36.1	40.7	63.1
4	ISP CISF	SW Corner Protected Area	36.4	55.4	55.5	96.3
5	LSA Pad	NE Corner	37.1	52.1	52.2	73.4
6	Residential	3.9 mi. WSW	61.8	30.3	61.8	62.9
7	Residential	4.1 mi. WSW	56.2	25.8	56.2	52.8
8	Residential	5.3 mi. WSW	44.2	31.5	44.5	65.3
9	Residential	4.9 mi. WSW	52.8	30.2	52.8	62.9

Table 14: Est'd Maximum Noise Levels at NSA's during Phase 2-8 Construction

NSA	Type	Approx. Distance and Direction relative to ISP CISF	Estimated Ambient Ld	Estimated Ph. 2-8 Construction Ld	Total Ph. 2-8 Construction Ld	Estimated Max Lp during Ph. 2-8 Construction
1	Boundary	6100 ft. SW	45.1	35.2	45.6	44.1
2	Boundary	3900 ft. W	39.9	40.6	43.3	50.9
3	Boundary	4000 ft. WNW	38.9	41.2	43.2	51.7
4	ISP CISF	SW Corner Protected Area	36.4	57.1	57.1	67.5
5	LSA Pad	NE Corner	37.1	51.5	51.6	62.8
6	Residential	3.9 mi. WSW	61.8	22.5	61.8	28.6
7	Residential	4.1 mi. WSW	56.2	21.9	56.2	27.9
8	Residential	5.3 mi. WSW	44.2	19.3	44.3	25.4
9	Residential	4.9 mi. WSW	52.8	20.1	52.8	26.2

Elevated sound levels may be noticeable from the property boundaries with Urenco, Sundance Services, and Permian Materials (NSA's #1 – 3) during construction. During Operation however the average sound levels increase less than 2 dBA; the additional activity is likely to go unnoticed. In any event, L_{DN}'s are well below the EPA guideline for industrial land use.

Residents of Eunice (NSA's #6 – 9) are expected to be unable to hear Construction activities during any Phase because of the relatively high level of traffic noise already present in the area. During Operation the only potentially audible impact from CISF is due to the passage of one additional Train per day. This is also likely to go unnoticed to the extent that it is infrequent and already familiar, and remains within current timeframes.

In any event, CISF contribution to L_{DN}'s are well below both the EPA guideline for residential properties and prevailing background levels.

NSA's on site are more strongly affected because of proximity. L_{dn}'s on adjacent WCS property only approach the EPA Guideline for Industrial land use during initial construction, otherwise they are well below. However it is clear that ISP CISF construction and operational phases cause negligible hearing conservation risk to WCS personnel at the nearby LSA Pad: the highest predicted shift average sound level is 60.6 dBA, well below the OSHA-mandated action level of 85.0 dBA. The sounding of the train horn at crossings can lead to brief moderately high sound levels, but these are familiar and are already factored into the reported averages.

PERSONNEL EXPOSURE TO CONSTRUCTION AND OPERATIONAL SOUND (in response to RAI-03)

Personnel noise exposure is a function of the time-average sound pressure level received during a shift. The source sound power levels, their percentage "on time" duration, and the "time and motion" aspect of location and orientation relative to individuals, all play a role in determining noise exposure. The distance and orientation may be relatively predictable during operations, but much less so during construction when vehicles and personnel are continuously changing.

Model inputs are based on the source strengths and assumptions given in Tables A-2 through A-7 (pp. 20-21), identical with the foregoing section (RAI-02).

The modeled shift-average A-weighted sound pressure level is based on the operating A-weighted sound power level for the i-th equipment type (L_{wA}), the number of units operating (N), and the usage factor (UF). Because of the relatively short distance involved, excess attenuation due to air and ground absorption are omitted. Because the remaining terms are independent of frequency, the sound pressure level can be estimated directly in A-weighted terms as:

$$L_{pA,eq,i} = L_{wA,i} + 10\log_{10} N_i + 10\log_{10} UF_i - D$$

The overall A-weighted sound pressure level from each equipment type (i) at a receptor point are aggregated as:

$$L_{pA,eq} = 10\log_{10} \sum_i 10^{0.1 L_{pA,eq,i}}$$

The divergence factor D is simply $20 \log (r/3.28) - 8$, where r is in feet, for well-defined source-receptor distances. In particular, relatively close standoffs of 20 ft. and 10 ft. are assumed for workers attending the ready-mix truck during Storage Module Construction and checking radiation levels while accompanying the Cask Transport vehicle during Storage Module Transport.

A different approach is required for construction activities that are distributed across a large area. Each of the designated construction subprojects is assumed to take place within a work area that extends 50 feet beyond the building or area footprint on all sides. One quadrant of the rectangular area is then divided into a 10x10 array of rectangles to simulate a "maximum scenario" in which the observer is located in the center of the work area with equipment all around. The divergence of sound power for a given array element is:

$$D_{m,n} = -20\log_{10}\frac{r_{m,n}}{3.28} - 8$$

The value at $D_{0,0}$ (for which $r = 0$) is set to -10 dB. The average geometric divergence for equipment evenly distributed across the site to a central observer is:

$$D_{central} = \frac{1}{100}\sum_{m}\sum_{n} 10^{0.1D_{m,n}}$$

The "minimum scenario" by contrast would occur when the observer is located at an outside corner of the overall work area. Because the distances are all double relative to the "maximum case", the minimum-case result would be $D_{central} - 6$ dB. An intermediate value is used in this analysis:

$$D = D_{central} - 3$$

This analysis addresses baseline noise levels in each work area. Individual noise exposure may be increased and highly sensitive to details of particular work practices, including events like sound radiating from extended workpieces or unexpectedly close long-term positioning relative to a piece of heavy equipment.

RAI-03 makes reference to "peak" noise levels. The technical definition of "peak" is the instantaneous maximum pressure, which is not perceptible by humans nor is it hazardous unless the levels exceed 140 dB(C). That latter occur primarily in the context of explosions, firearms, and artillery, which are not expected for this project. They could occur during accidental impacts such as dropping a tool or wooden pallet nearby. By their nature such accidental events are impossible to predict or estimate. They are rare on a typical job site and are usually easily avoided. The concept of "peak" has therefore been interpreted to mean "maximum" on a human timescale.

Personnel noise exposure is a function of the Time-Weighted Average (TWA). When evaluated according to the OSHA paradigm ("5-dBA exchange rate"), TWA is identical to shift-average $L_{A,eq}$ for continuous noise source but less for fluctuating, intermittent, and transient sources. It includes the $L_{pA,max}$ events tabulated below. The TWA's reported here are simply the modeled shift-average $L_{A,eq}$'s. The small difference (~ 1 – 2 dBA) anticipated for the construction and activities contemplated in this report has been retained as a safety factor.

OSHA's most basic requirement is that workers not receive an unprotected noise dose in excess of 100% in any given shift. This corresponds to 90.0 dBA TWA for an 8-hr shift and 88.4 dBA for a 10-hour shift. OSHA does not specify a maximum permissible A-weighted sound pressure level.

Less obvious perhaps is fact that multiple requirements (periodic dosimetry and audiometric testing, providing hearing protective devices, training and recordkeeping) become active when the TWA reaches 85.0 dBA for 8 hrs or 83.4 dBA for a 10-hr shift. For this reason, 85.0 TWA is the recommended target value.

As will be seen, some of the estimated TWA's exceed 90 dBA in large part because of backup alarms. Generic backup alarms are typically adjusted to maximum power output, roughly 115 dBA at 4 ft. However this is usually considerably more than necessary to assure awareness of moving vehicles. It is recommended that these alarm levels be reduced in order to limit unnecessary personnel noise exposure. It turns out that OSHA regulations permit backup alarm levels to be reduced as long as they are readily audible, or to use a dedicated observer behind each vehicle and eliminate the alarms altogether.

Because of their significant impact, a parallel analysis has been performed on the assumption that they can be reduced 10 dBA, which sounds approximately ½ as loud (on some jobsites it has been possible to reduce them by as much as 20 dBA). The reduced level would correspond to 97 dBA at 10 ft., which is still likely to be sufficient for workplace safety, especially if *all* backup alarms on the site are similarly adjusted.

Results for Estimated Personnel TWAs are given below in Tables 15 – 17, including a parallel set of values associated with backup alarm noise reduction ("NC B/U Alarms"). Estimated shift-average construction levels are notably elevated in the work areas for the Cask and Security/Admin Buildings because of the large amount of equipment assumed to be active in a relatively small area. Construction levels are lower in other, more extended work areas.

Maximum sound levels occur under the rare circumstance that all equipment and several backup alarms are operating simultaneously and, for locations near the railroad tracks, that the Train also sounds its horn simultaneously. These values are expected to be conservative in the sense that they are unlikely to be exceeded. It bears repeating that OSHA does not mandate a maximum permissible A-weighted sound level.

Detailed computations of shift-average sound pressure level at each NSA are tabulated in Appendix Tables A-26 through A-34 (pp. 30-32), and for maximum A-weighted sound pressure level, Appendix Tables A-35 through A-43 (pp. 32-34).

Table 15: Estimated Baseline Personnel Noise Exposure during Ph. 1 Construction

Activity	TWA	TWA w/ NC B/U Alarms	Benefit	Max LpA	Max LpA + NC B/U Alarms	Benefit
General Earthwork	83	78	4	89	83	6
Cask Building	92	89	3	99	93	5
Security/Admin Building	94	91	3	100	95	5
SNF Pad 1	88	83	5	96	89	7
Protected Area	83	78	4	89	83	6

Table 16: Estimated Baseline Personnel Noise Exposure during Operation

Activity	TWA	TWA w/ NC B/U Alarms	Benefit	Max LpA	Max LpA + NC B/U Alarms	Benefit
Storage Module Construction	92	89	3	103	95	8
Storage Module Transport	89	89	0	97	96	1

Table 17: Estimated Baseline Personnel Noise Exposure during Phase 2-8 Construction including Operation

Activity	TWA	TWA w/ NC B/U Alarms	Benefit	Max LpA	Max LpA + NC B/U Alarms	Benefit
SNF Pad 1	87	81	6	97	88	9
Protected Area	78	73	5	89	79	10

RECOMMENDATIONS

1. Dosimetry

Onsite sound levels are expected to be highest during construction. If contractors are used for this purpose, they should already have their own hearing conservation program in place.

CISF operational noise exposures can be estimated in advance by finding or making dosimetry readings on similar activities at WCS. Given that the current "pessimistic" estimates documented in this report suggest TWAs of 89, actual TWAs may be close enough to 85 that administrative or engineering controls can yield further reductions. If the TWAs are below 85, the OSHA mandate for a hearing conservation program falls away. Even without it however, periodic dosimetry is recommended in order to identify, assess and mitigate any changes in work practices that could elevate TWAs.

2. Hearing Protectors

Hearing protection is recommended for all the onsite activities contemplated in this report. Noise Reduction Ratings (NRR's) of hearing protectors capable of reducing at-the-ear exposure to 85.0 dBA (8-hour, Operation) and 83.4 dBA (10-hour, Construction) are determined following a method recommended by the National Institute of Occupational Safety and Health:

$$NRR = \frac{(TWA - L + 7)}{C}$$

where L is the target level, and C takes the values 0.75 for earmuffs and 0.5 for expanding foam earplugs (due to imperfect fit in actual practice). Recommended NRRs are provided in Tables 18 – 20.

Note that these recommendations incorporate the "best practice" of targeting 85 dBA rather than 90 dBA. This reduces the risk of noise-induced hearing loss, and obviates the need to track which personnel have a pre-existing STS when distributing hearing protectors.

Table 18: Recommended HPD NRRs for Phase 1 Construction

Activity	TWA	NRR Muffs	NRR Foam	TWA + NC B/U Alarms	NRR Muffs	NRR Foam
General Earthwork	83	9	13	78		
Cask Building	92	22	32	89	17	25
Security/Admin Building	94	24	36	91	19	29
SNF Pad 1	88	16	23	83	9	14
Protected Area	83	9	13	78		

Table 19: Recommended HPD NRRs for Operation

Activity	TWA	NRR Muffs	NRR Foam	TWA + NC B/U Alarms	NRR Muffs	NRR Foam
Storage Module Construction	92	19	28	89	15	23
Storage Module Transport	89	16	23	89	16	23

Table 20: Recommended HPD NRRs for Phase 2-8 Construction

Activity	TWA	NRR Muffs	NRR Foam	TWA + NC B/U Alarms	NRR Muffs	NRR Foam
SNF Pad 1	87	15	22	81	7	10
Protected Area	78			73		

3. Backup Alarms

Reduction of backup alarm sound levels has a significant effect on personnel noise exposure and should be seriously considered. Besides the reduced risk of hearing loss, lower sound levels permit lesser-performing HPDs to be worn. This allows approaching vehicles, verbal instructions, and other communications to be more readily heard. It also reduces the sense of isolation some workers report which, ironically, may lead them to partially or completely remove their earplugs. This is especially true of workers who already have hearing loss.

Backup alarm noise control is expected to reduce TWAs by 3 to 6 dBA and maxima by 5 to 10 dBA during construction.

"Smart" backup alarms have been developed over the years that adjust to the prevailing background or have a different noise spectrum. See the OSHA regulation that allows this for specifics: 29 CFR Part 1926, Subpart "O", 1926.601.b.4 and 1926.602.a.9. The following devices are approved by the NYC Department of Environmental Protection:

BACKUP ALARMS		
• Preco Electronics	45, 200 and 6000 Series	www.precosafety.com
• Ecco Group	Smart Alarms, 500 and 700 Series	www.eccolink.com
• Grote Industries	Model 73040	www.grote.com
• Brigade Electronics	BBS-TEK Series	www.bbs-tek.com

4. Vehicles

Vehicles should be turned off when not in use. However if they must be left running, they should preferably be parked at least 25 feet away from workers.

Vehicles should be selected from among those with lower tabulated sound power levels and interior operator sound pressure levels ("Buy Quiet"). This information ust be requested by model from manufacturers.

Most vehicles have Operator sound pressure levels of 80 dBA or below. However Operators' actual exposure can vary widely due to one or more factors:

- Operating closed-cab trucks with windows open, which elevates the sound level to roughly that of the surrounding work area,
- Playing music or other entertainment, in order to be audible, must be at least 5 dBA above the vehicle's interior noise, and
- Use of communications radios which, in order to be intelligible, must in turn be set at least 5 dBA above the vehicle's interior noise including the entertainment.

Thus the best results are obtained when operators are required to keep windows closed (which of course requires an air conditioned cab) and communicate by radio. No entertainment music players or headsets should be allowed. Experience has shown that vehicle operator exposure can be highly individualized. For this reason vehicle operator noise exposure should be evaluated for each individual operator of a closed-cab vehicle.

Diligent vehicle maintenance is strongly recommended. Factors such as damaged exhaust systems, failing fan belt clutches or idler bearings, elevated engine idle speeds, and rattling covers or guards, can all unnecessarily elevate a vehicle's exterior noise emission. Within the operator cab, sound-absorbing ceiling linings and sound-isolating floor mats typically suffer significant wear and tear on a normal jobsite. These should be replaced periodically to reduce the unnecessary buildup of interior vehicle sound.

The impact of additional noise exposure due to exceptional work practices or circumstances is tabulated below in absolute (Table 21) and relative (Table 22) terms. For example, adding 85 dBA TWA music to an 80 dBA closed-cab vehicle has the potential to cause a TWA of 86

(Table 21), an effective exposure increase of 6 dBA (Table 22).

Table 21: New TWA due to adding a new TWA contribution to an existing TWA

TWA	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
Add 80	83	84	84	85	85	86	87	88	89	90	90	91	92	93	94	95
Add 85	86	86	87	87	88	88	89	89	90	90	91	92	93	94	95	95
Add 90	90	91	91	91	91	91	91	92	92	93	93	94	94	95	95	96
Add 95	95	95	95	95	95	95	96	96	96	96	96	96	97	97	98	98

Table 22: Increase in TWA due to adding a new TWA contribution

TWA	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
Add 80	3	3	2	2	1	1	1	1	1	1	0	0	0	0	0	0
Add 85	6	5	5	4	4	3	3	2	2	1	1	1	1	1	1	0
Add 90	10	10	9	8	7	6	5	5	4	4	3	3	2	2	1	1
Add 95	15	14	13	12	11	10	10	9	8	7	6	5	5	4	4	3

5. Individual construction activities

Power tools should be selected from among those with lower tabulated sound power levels ("Buy Quiet"). Listings can be found at:

- https://www1.nyc.gov/assets/dep/downloads/pdf/air/noise/noise-vendor-guidance-small-construction-jobs.pdf, and
- https://www.cdc.gov/niosh/topics/noise/noise_levels.html.

Position relative to vehicles during concrete pouring and steel erection can have a significant effect. These distances should be maximized when possible through activity planning within the work area.

Individual activities such as welding, installing sheet metal roof and wall panels, and particularly grinding can cause unpredictable and very high individual noise exposure. If necessary these activities should be dispersed physically to minimize the number of affected individuals, and rotated among workers in order to avoid a few individuals being overexposed. Special care should be taken to avoid grinding on or hammering extended resonant objects like sheet metal panels without applying local mechanical damping (e.g., small bags of shot or sand roughly 6" diameter by 1" thick).

For example, adding 90 dBA TWA due to grinding a large resonant workpiece in an otherwise 88 dBA environment has the potential to cause a TWA of 92 (Table 21), an effective exposure increase of 4 (Table 22).

SUMMARY AND FINAL COMMENT

The ambient environment throughout the survey area is dominated by significant roadway traffic noise, more than might be expected for the remoteness of the Site and the population of nearby Eunice NM. This appears to be due in large part to trucking activity related to oil- and gas exploration and production.

Construction and operational CISF sound levels at offsite receptors are expected to be well below EPA and HUD recommendations, aided significantly by the relatively large distances involved.

Worker noise exposures during construction are expected to be above OSHA's action level of 85 dBA TWA in many cases, but well within the expected range for such activities. Practical noise control recommendations are provided to reduce noise exposures along with appropriate levels of hearing protection. Attention to backup alarm levels alone can reduce TWAs 3 to 6 dBA.

Worker noise exposures during operations, including Storage Module Construction and Storage Module Transport, are also above 85 dBA. An initial dosimetry study is recommended to assess actual exposures in advance of CISF operations. Practical noise control recommendations are provided to reduce noise exposures and for appropriate levels of hearing protection.

Sincerely,

NELSON ACOUSTICS (Member NCAC, TX F-3001)
www.nelsonacoustical.com

David A. Nelson, INCE Bd. Cert., P.E. (OR 17635, TX 81329)
Principal Consultant

Figure 1: Overview of Study Area, North Up (approximately 8 miles by 3 miles)

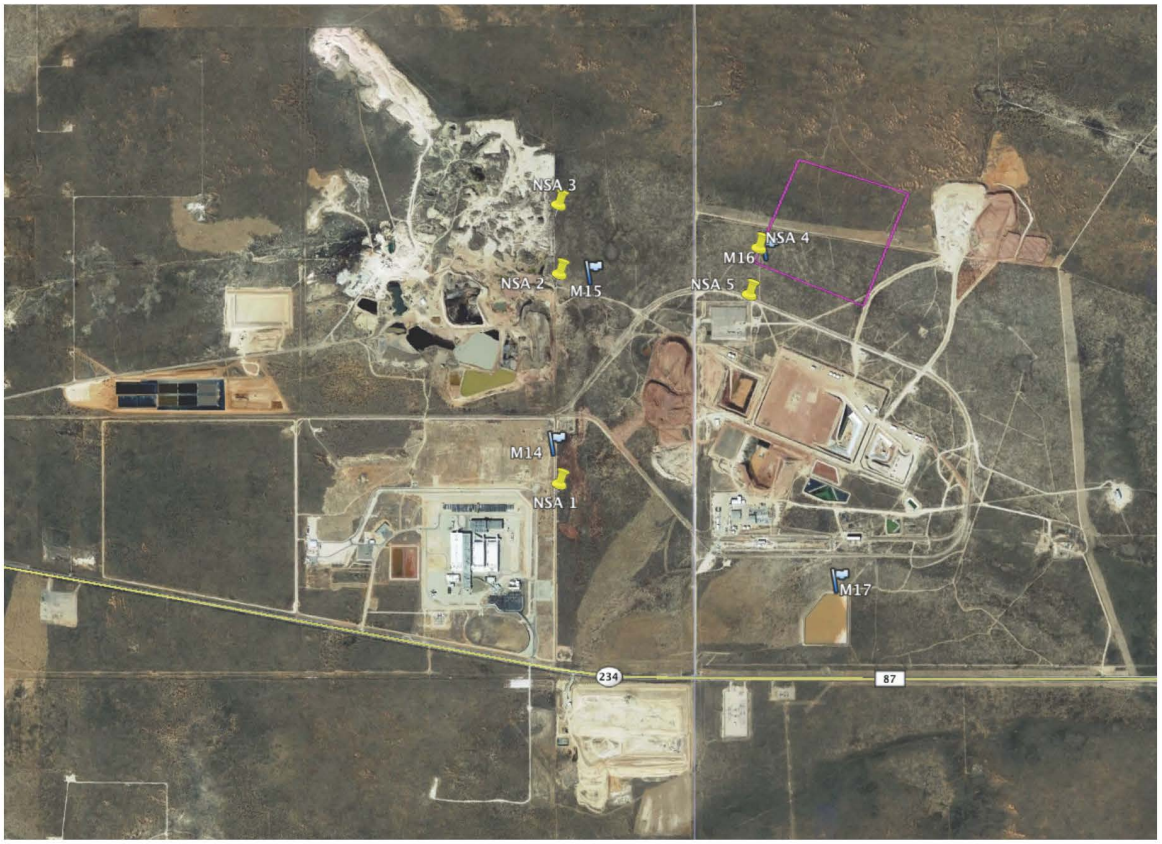

Figure 2: Overview of Study Area, North Up, around WCS

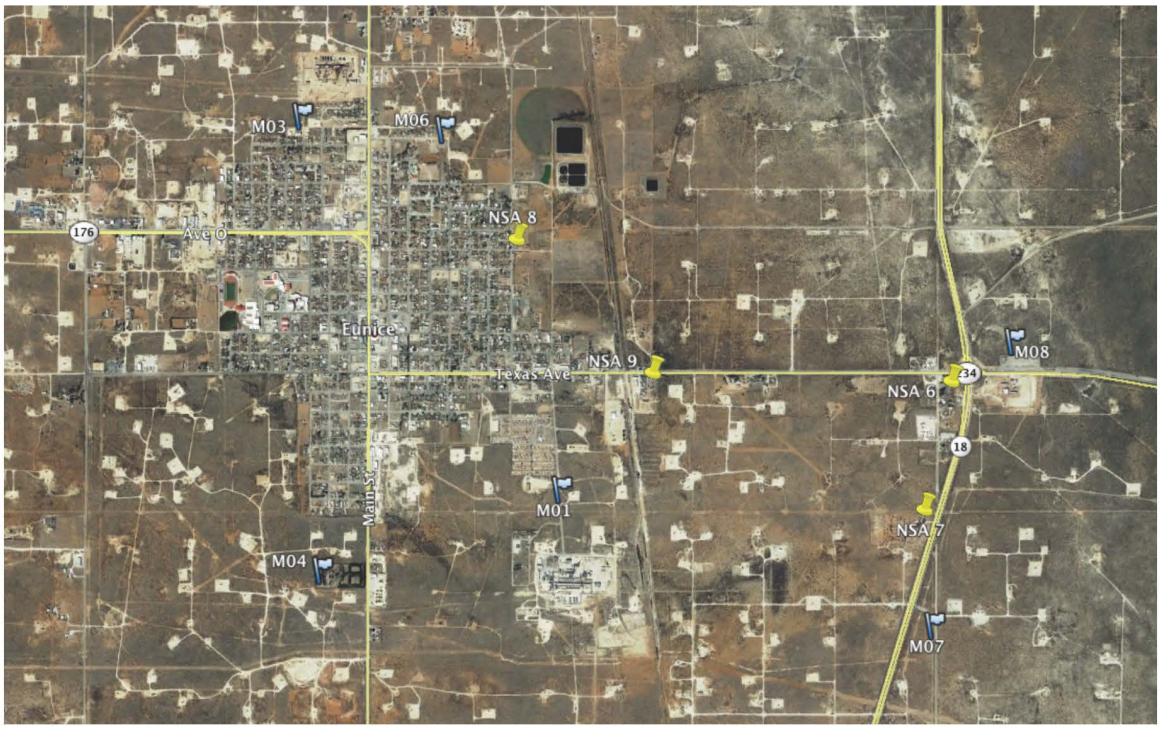

Figure 3: Overview of Study Area, North Up, around Eunice

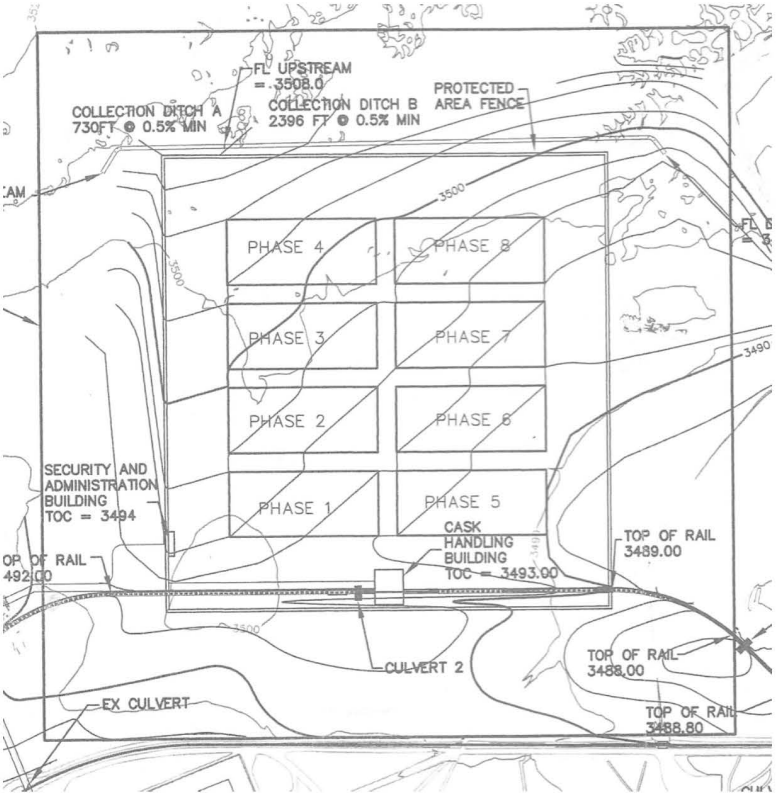

Figure 4: Site Layout, North approx. 30° counterclockwise from top of diagram

Table A-1: Prevailing Weather Conditions during Measurements (WCS)

Date	Range	Time [CDT]	Windspeed [kts]	Wind Direction	Temperature [ºF]	Rel. Humidity [%]	Barometric Pressure [in. Hg]
July 25 2019	Min Hourly	13:00	6.1	135	86.3	19.2	26.47
	Median Hourly		7.0	146	91.6	21.1	26.50
	Max Hourly	17:30	8.4	182	92.3	29.7	26.52
July 26 2019	Min Hourly	06:00	1.9	008	63.2	25.3	26.40
	Median Hourly		6.9	174	74.8	42.5	26.49
	Max Hourly	13:30	9.9	205	90.0	62.1	26.54

Table A-2: CJI Construction Equipment Count List

Phase	Action	Equipment	HP	Quantity per Hour
1	General Earthwork	Heavy Haul Truck	350	4
1	General Earthwork	Earthmover	500	2
1	Cask Building	Pump Truck	400	1
1	Cask Building	Ready-Mix Truck	400	1
1	Cask Building	Construction Eq	400	2
1	Cask Building	Earthmover	500	1
1	Security/Admin Bldg	Pump Truck	400	1
1	Security/Admin Bldg	Ready-Mix Truck	400	1
1	Security/Admin Bldg	Construction Eq	400	2
1	Security/Admin Bldg	Earthmover	500	1
1	SNF Pad	Pump Truck	400	1
1	SNF Pad	Ready-Mix Truck	400	1
1	SNF Pad	Earthmover	500	2
1	Protected Area	Heavy Haul Truck	350	1
1	Protected Area	Earthmover	500	2
2-8	SNF Pad	Pump Truck	400	1
2-8	SNF Pad	Ready-Mix Truck	400	1
2-8	SNF Pad	Earthmover	500	2
2-8	Protected Area	Heavy Haul Truck	350	1
2-8	Protected Area	Earthmover	500	2
Operations	Storage Module Construction	Ready-Mix Truck	400	1
Operations	Storage Module Transport	Transporter	350	1

Table A-3: Noise Source Classifications, Construction Phase 1

Classification	Extent	Presumed Acoustic Center	Equipment from CJI List	Additions
General Earthwork	Owner-Controlled and Protected Areas	Center of Protected Area	(4) Heavy Haul Trucks, (2) Earthmovers	(6) Back-up Alarms
Cask Building	Around the Building Site	Center of Cask Building	Concrete Pumper, Ready-Mix Truck, (2) Const. Equipment, Earthmover	(5) Back-up Alarms, (4) Welding, (4) Grinding, Air Compressor, Diesel Generator
Security/Admin Building	Around the Building Site	Center of Security/Admin Building	Concrete Pumper, Ready-Mix Truck, (2) Const. Equipment, Earthmover	(5) Back-up Alarms, (4) Welding, (4) Grinding, Air Compressor, Diesel Generator
SNF Pad	(1) Pad ea. of (8) Phases	Center of Phase 1 Pad	Concrete Pumper, Ready-Mix Truck, Earthmover	(4) Back-up Alarms
Protected Area	Protected Area	Center of Protected Area	Heavy Haul Truck, (2) Earthmovers	(3) Back-up Alarms

Table A-4: Noise Source Classifications, Operations

Classification	Extent	Presumed Acoustic Center	Equipment from CJI List	Additions
Storage Module Construction	Near Cask Handling Building	Center of Cask Handling Building	Ready-Mix Truck	(1) Back-up Alarms
Storage Module Transport	Between Cask Handling Building and SNF Pad	Between Cask Building and Phase 1 Pad	Transport	(1) Back-up Alarms
Cask Building Mechanical Equipment	Around Cask Building	Center of Cask Building	---	(8) unshrouded Ventilation Fans each long building side
Security/Admin Building Mechanical Equipment	Around Security/Admin Building	Center of Security/Admin Building	---	(3) 12T RTUs
Train	Siding Loop passing through CISF	Nearest point on North and South sides of Siding Loop	---	(1) Train per Day

Table A-5: Noise Source Classifications, Construction Phases 2 – 8

Classification	Extent	Presumed Acoustic Center	Equipment from CJI List	Additions
SNF Pad	(1) Pad ea. of (8) Phases	Center of Phase 2 Pad	Concrete Pumper, Ready-Mix Truck, Earthmover	(4) Back-up Alarms
Protected Area	Protected Area	Center of Protected Area	Heavy Haul Truck, (2) Earthmovers	(3) Back-up Alarms

Table A-6: Est'd Shift-Average Noise Levels during Construction and Operation

						Octave Band LwA,eq						
Equip. Type	Data Source	HP	LpA,max @ 50 ft	% Utilization	LwA,eq	63	125	250	500	1000	2000	4000
Earthmover	RCNM	500	82	40	110	94	85	76	68	63	55	45
Heavy Haul Truck	RCNM	350	84	40	112	96	87	78	70	65	57	47
Pump Truck	RCNM	400	82	20	107	91	82	73	65	60	52	42
Ready-Mix Truck	RCNM	400	85	40	113	97	88	79	71	66	58	48
Transporter	RCNM	350	85	31	109	93	85	75	67	62	54	44
Backup Alarm	Project Files		93	20	115					115		
Air Compressors	RCNM		80	40	108	92	83	74	66	61	53	43
Diesel Generator	RCNM		82	50	111	95	86	77	69	64	56	46
Welding	Database			40	105	85	92	91	93	96	93	91
Grinding	Database			20	105	82	89	88	90	93	90	88
Bldg. Vent Fans	Project Files		75	100	107	100	103	104	102	102	103	100
Rooftop A/C Units	Project Files		---	100	92	86	86	83	86	81	74	72
					SEL (A)	Octave Band SEL (A)						
Train	Measurement, at 825 ft.			1/shift	82	70	70	64	77	79	64	49

Table A-7: Est'd Shift-Average Noise Levels during Construction and Operation

						Octave Band LwA,max						
Equip. Type	Data Source	HP	LpA,max @ 50 ft	% Utilization	LwA,max	63	125	250	500	1000	2000	4000
Earthmover	RCNM	500	82	100	114	98	105	104	106	108	106	104
Heavy Haul Truck	RCNM	350	84	100	116	100	107	106	108	110	108	106
Pump Truck	RCNM	400	82	100	114	98	105	104	106	108	106	104
Ready-Mix Truck	RCNM	400	85	100	117	101	108	107	109	111	109	107
Transporter	RCNM	350	85	100	117	101	108	107	109	111	109	107
Backup Alarm	Project Files		93	100	125	109	116	115	117	120	117	115
Air Compressors	RCNM		80	100	112	96	103	102	104	106	104	102
Diesel Generator	RCNM		82	100	114	98	105	104	106	108	106	104
Welding	Database			100	105	89	96	95	97	100	97	95
Grinding	Database			100	105	89	96	95	97	100	97	95
Bldg. Vent Fans	Project Files		75	100	107	100	103	104	102	102	103	100
Rooftop A/C Units	Project Files		---	100	92	86	86	83	86	81	74	72
Train	Measurement			1/shift	131	108	112	119	132	133	115	101

Table A-8: Construction Sound Levels, NSA #1 (Urenco)

Receptor	N	E
NSA 1	-4725	-4050

PHASE 1			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
General Earthwork	1175	1175	103	110	109	111	121	111	109	107	114	113	115	118	115	113
Cask Building	100	1150	105	112	110	112	120	112	110	108	115	114	116	119	116	114
Security/Admin Bldg	375	0	105	112	110	112	120	112	110	108	115	114	116	119	116	114
SNF Pad	525	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	525	725												134		

Divergence	Distance						
General Earthwork	7881	-75	-81	-83	-87	-92	-103	-132
Cask Building	7094	-74	-80	-82	-85	-90	-100	-126
Security/Admin Bldg	6512	-73	-79	-81	-84	-88	-97	-121
SNF Pad	7097	-74	-80	-82	-85	-90	-100	-126
Protected Area	7881	-75	-81	-83	-87	-92	-103	-132
B/U Alarms Max	7097	-74	-80	-82	-85	-90	-100	-126

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
General Earthwork		28	29	26	25	28	8	-24	32	33	30	29	25	12	-20
Cask Building		30	32	28	27	30	13	-16	34	35	32	31	29	17	-12
Security/Admin Bldg		31	32	29	29	32	15	-11	35	36	33	32	31	19	-7
SNF Pad		27	28	24	23	29	9	-20	31	32	29	28	26	13	-15
Protected Area		25	26	22	21	25	4	-27	29	30	26	25	22	8	-23
B/U Alarms Max													44		
LPA EQ	42.5	36	37	33	33	37	18	-9	40	41	37	37	45	22	-5
LDN (NM. Summer)	43.2														
LPA MAX	48.0														

PHASES 2-8			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
SNF Pad (use #2)	975	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	975	725												131		

Divergence	Distance						
SNF Pad (use #2)	7436	-74	-76	-78	-82	-89	-99	-127
Protected Area	7881	-75	-81	-83	-87	-92	-103	-132
B/U Alarms Max	7436	-74	-76	-78	-82	-89	-99	-127

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
SNF Pad (use #2)		26	31	28	26	30	9	-21	31	36	33	31	26	13	-16
Protected Area		25	26	22	21	25	4	-27	29	30	26	25	22	8	-23
B/U Alarms Max													42		
LPA EQ	37.0	28	32	29	27	31	10	-20	33	37	33	32	42	15	-16
LDN (NM. Summer)	37.7														
LPA MAX	44.1														

Table A-9: Construction Sound Levels, NSA #2 (Sundance)

Receptor	N	E
NSA 2	-500	-4050

PHASE 1			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
General Earthwork	1175	1175	103	110	109	111	121	111	109	107	114	113	115	118	115	113
Cask Building	100	1150	105	112	110	112	120	112	110	108	115	114	116	119	116	114
Security/Admin Bldg	375	0	105	112	110	112	120	112	110	108	115	114	116	119	116	114
SNF Pad	525	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	525	725												134		

Divergence	Distance						
General Earthwork	5487	-72	-78	-79	-81	-85	-92	-112
Cask Building	5235	-71	-77	-79	-81	-84	-91	-110
Security/Admin Bldg	4143	-69	-75	-77	-78	-80	-85	-101
SNF Pad	4884	-71	-76	-78	-80	-82	-89	-107
Protected Area	5487	-72	-78	-79	-81	-85	-92	-112
B/U Alarms Max	4884	-71	-76	-78	-80	-82	-89	-107

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
General Earthwork		31	33	30	30	36	19	-4	35	37	34	34	33	23	0
Cask Building		33	34	31	32	36	22	0	37	38	35	36	35	25	4
Security/Admin Bldg		35	37	34	35	41	27	9	39	40	37	38	39	31	13
SNF Pad		30	31	28	29	36	19	-1	34	36	32	33	33	24	3
Protected Area		28	29	26	26	33	15	-7	32	33	30	30	29	19	-3
B/U Alarms Max													52		
LPA EQ	47.7	39	41	37	38	44	29	11	43	44	41	42	52	33	14
LDN (NM. Summer)	48.4														
LPA MAX	53.9														

PHASES 2-8			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
SNF Pad (use #2)	975	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	975	725												131		

Divergence	Distance						
SNF Pad (use #2)	4998	-71	-73	-74	-76	-81	-88	-107
Protected Area	5487	-72	-78	-79	-81	-85	-92	-112
B/U Alarms Max	4998	-71	-73	-74	-76	-81	-88	-107

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
SNF Pad (use #2)		30	35	32	32	38	20	0	34	39	37	36	34	25	4
Protected Area		28	29	26	26	33	15	-7	32	33	30	30	29	19	-3
B/U Alarms Max													50		
LPA EQ	42.3	32	36	33	33	39	22	0	36	40	38	37	50	26	5
LDN (NM. Summer)	43.0														
LPA MAX	50.9														

Table A-10: Construction Sound Levels, NSA #3 (Permian)

Receptor	N	E
NSA 3	925	-4050

PHASE 1			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
General Earthwork	1175	1175	103	110	109	111	121	111	109	107	114	113	115	118	115	113
Cask Building	100	1150	105	112	110	112	120	112	110	108	115	114	116	119	116	114
Security/Admin Bldg	375	0	105	112	110	112	120	112	110	108	115	114	116	119	116	114
SNF Pad	525	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	525	725												134		

Divergence	Distance							
General Earthwork	5231	-71	-77	-79	-81	-84	-91	-110
Cask Building	5265	-71	-77	-79	-81	-84	-91	-111
Security/Admin Bldg	4087	-69	-75	-76	-77	-79	-85	-100
SNF Pad	4792	-71	-76	-78	-79	-82	-89	-106
Protected Area	5231	-71	-77	-79	-81	-84	-91	-110
B/U Alarms Max	4792	-71	-76	-78	-79	-82	-89	-106

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
		63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
General Earthwork		32	33	30	30	37	20	-1	36	37	34	34	34	24	3
Cask Building		33	34	31	32	36	21	0	37	38	35	35	35	25	3
Security/Admin Bldg		35	37	34	35	41	27	10	39	41	38	39	39	31	14
SNF Pad		30	31	28	29	36	20	0	34	36	33	33	33	24	4
Protected Area		28	30	26	27	34	17	-5	32	34	30	31	30	21	-1
B/U Alarms Max													52		
LPA EQ	47.9	39	41	38	38	44	30	11	43	45	42	42	53	34	15
LDN (NM. Summer)	48.6														
LPA MAX	54.2														

PHASES 2-8			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
SNF Pad (use #2)	975	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	975	725												131		

Divergence	Distance							
SNF Pad (use #2)	4775	-71	-72	-74	-76	-80	-87	-105
Protected Area	5231	-71	-77	-79	-81	-84	-91	-110
B/U Alarms Max	4775	-71	-72	-74	-76	-80	-87	-105

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
		63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
SNF Pad (use #2)		30	35	33	33	38	22	2	34	40	37	37	35	26	6
Protected Area		28	30	26	27	34	17	-5	32	34	30	31	30	21	-1
B/U Alarms Max													51		
LPA EQ	43.0	32	36	34	34	40	23	2	36	41	38	38	51	27	7
LDN (NM. Summer)	43.7														
LPA MAX	51.7														

Table A-11: Construction Sound Levels, NSA #4 (CISF SW Corner)

Receptor	N	E
NSA 4	0	0

PHASE 1			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
General Earthwork	1175	1175	103	110	109	111	121	111	109	107	114	113	115	118	115	113
Cask Building	100	1150	105	112	110	112	120	112	110	108	115	114	116	119	116	114
Security/Admin Bldg	375	0	105	112	110	112	120	112	110	108	115	114	116	119	116	114
SNF Pad	525	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	525	725												134		

Divergence	Distance							
General Earthwork	1662	-62	-66	-68	-68	-67	-69	-75
Cask Building	1154	-59	-62	-65	-64	-63	-65	-69
Security/Admin Bldg	375	-50	-52	-55	-54	-52	-52	-54
SNF Pad	895	-57	-60	-63	-62	-61	-62	-65
Protected Area	1662	-62	-66	-68	-68	-67	-69	-75
B/U Alarms Max	895	-57	-60	-63	-62	-61	-62	-65

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
		63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
General Earthwork		41	45	41	43	53	42	33	45	49	45	47	50	46	37
Cask Building		46	49	45	48	57	48	41	49	53	49	52	56	52	45
Security/Admin Bldg		54	60	56	59	68	60	56	58	64	59	63	67	64	60
SNF Pad		44	48	44	47	58	47	41	48	52	48	51	55	51	46
Protected Area		38	41	37	40	50	38	30	42	45	41	44	47	42	34
B/U Alarms Max													74		
LPA EQ	70.9	55	61	56	59	69	61	57	59	64	60	63	75	64	60
LDN (TX, Summer)	69.9														
LPA MAX	75.9														

PHASES 2-8			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
SNF Pad (use #2)	975	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	975	725												131		

Divergence	Distance							
SNF Pad (use #2)	1215	-59	-60	-61	-61	-62	-64	-68
Protected Area	1662	-62	-66	-68	-68	-67	-69	-75
B/U Alarms Max	1215	-59	-60	-61	-61	-62	-64	-68

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
		63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
SNF Pad (use #2)		41	47	45	47	56	45	38	46	52	50	51	53	49	42
Protected Area		38	41	37	40	50	38	30	42	45	41	44	47	42	34
B/U Alarms Max													67		
LPA EQ	58.8	43	48	46	48	57	45	38	47	52	50	52	67	50	43
LDN (TX, Summer)	57.8														
LPA MAX	67.5														

Table A-12: Construction Sound Levels, NSA #5 (LSA Pad NE Corner)

Receptor	N	E
NSA 5	-1150	1075

PHASE 1			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
General Earthwork	1175	1175	103	110	109	111	121	111	109	107	114	113	115	118	115	113
Cask Building	100	1150	105	112	110	112	120	112	110	108	115	114	116	119	116	114
Security/Admin Bldg	375	0	105	112	110	112	120	112	110	108	115	114	116	119	116	114
SNF Pad	525	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	525	725												134		

Divergence	Distance							
General Earthwork	2327	-65	-69	-71	-71	-71	-74	-83
Cask Building	1252	-60	-63	-66	-65	-64	-66	-70
Security/Admin Bldg	1866	-63	-67	-69	-69	-69	-71	-78
SNF Pad	1711	-62	-66	-68	-68	-68	-70	-76
Protected Area	2327	-65	-69	-71	-71	-71	-74	-83
B/U Alarms Max	1711	-62	-66	-68	-68	-68	-70	-76

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
General Earthwork		39	41	38	40	49	37	26	43	45	42	44	46	41	30
Cask Building		45	49	45	47	56	47	40	49	52	49	51	55	51	44
Security/Admin Bldg		42	45	41	44	52	41	32	46	48	45	47	50	45	36
SNF Pad		39	42	38	40	51	39	30	43	46	42	45	48	43	35
Protected Area		35	37	34	36	46	33	22	39	41	38	40	43	37	26
B/U Alarms Max													67		
LPA EQ	61.0	48	51	48	50	59	49	41	52	55	52	54	67	53	45
LDN (TX, Summer)	60.0														
LPA MAX	68.0														

PHASES 2-8			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
SNF Pad (use #2)	975	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	975	725												131		

Divergence	Distance							
SNF Pad (use #2)	2154	-64	-65	-66	-67	-69	-72	-80
Protected Area	2327	-65	-69	-71	-71	-71	-74	-83
B/U Alarms Max	2154	-64	-65	-66	-67	-69	-72	-80

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
SNF Pad (use #2)		37	42	40	42	50	37	27	41	47	45	46	47	41	31
Protected Area		35	37	34	36	46	33	22	39	41	38	40	43	37	26
B/U Alarms Max													62		
LPA EQ	53.2	39	43	41	43	51	38	28	43	48	46	47	62	43	32
LDN (TX, Summer)	52.2														
LPA MAX	62.8														

Table A-13: Construction Sound Levels, NSA #6 (Residential, near 176 & 18)

Receptor	N	E
NSA 6	-6225	-19675

PHASE 1			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
General Earthwork	1175	1175	103	110	109	111	121	111	109	107	114	113	115	118	115	113
Cask Building	100	1150	105	112	110	112	120	112	110	108	115	114	116	119	116	114
Security/Admin Bldg	375	0	105	112	110	112	120	112	110	108	115	114	116	119	116	114
SNF Pad	525	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	525	725												134		

Divergence	Distance							
General Earthwork	22124	-84	-91	-97	-108	-128	-159	-241
Cask Building	21764	-84	-91	-97	-108	-127	-158	-238
Security/Admin Bldg	20752	-84	-90	-96	-107	-125	-154	-231
SNF Pad	21488	-84	-91	-96	-107	-127	-157	-236
Protected Area	22124	-84	-91	-97	-108	-128	-159	-241
B/U Alarms Max	21488	-84	-91	-96	-107	-127	-157	-236

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
General Earthwork		19	19	12	3	-8	-48	-132	23	23	16	7	-10	-44	-128
Cask Building		20	21	14	5	-7	-45	-128	24	24	17	8	-9	-42	-125
Security/Admin Bldg		21	21	14	6	-5	-42	-121	25	25	18	10	-6	-38	-117
SNF Pad		17	17	10	1	-8	-48	-130	21	21	14	5	-11	-44	-126
Protected Area		15	16	8	-1	-11	-52	-136	19	20	12	3	-14	-48	-132
B/U Alarms Max													8		
LPA EQ	29.5	26	26	19	10	0	-39	-119	30	30	23	14	8	-35	-116
LDN (NM. Summer)	30.2														
LPA MAX	33.5														

PHASES 2-8			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
SNF Pad (use #2)	975	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	975	725												131		

Divergence	Distance							
SNF Pad (use #2)	21633	-84	-87	-92	-104	-125	-156	-236
Protected Area	22124	-84	-91	-97	-108	-128	-159	-241
B/U Alarms Max	21633	-84	-87	-92	-104	-125	-156	-236

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
SNF Pad (use #2)		17	21	14	4	-6	-47	-130	21	25	19	9	-10	-43	-125
Protected Area		15	16	8	-1	-11	-52	-136	19	20	12	3	-14	-48	-132
B/U Alarms Max													6		
LPA EQ	24.3	19	22	15	6	-5	-46	-129	23	26	20	10	6	-42	-124
LDN (NM. Summer)	25.0														
LPA MAX	28.6														

Table A-14: Construction Sound Levels, NSA #7 (Residential, south of 176 & 18)

Receptor	N	E
NSA 7	-8625	-20175

PHASE 1			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
General Earthwork	1175	1175	103	110	109	111	121	111	109	107	114	113	115	118	115	113
Cask Building	100	1150	105	112	110	112	120	112	110	108	115	114	116	119	116	114
Security/Admin Bldg	375	0	105	112	110	112	120	112	110	108	115	114	116	119	116	114
SNF Pad	525	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	525	725												134		

Divergence	Distance						
General Earthwork	23492	-85	-92	-98	-110	-131	-164	-251
Cask Building	23041	-85	-92	-97	-109	-130	-163	-248
Security/Admin Bldg	22091	-84	-91	-97	-108	-128	-159	-241
SNF Pad	22815	-85	-91	-97	-109	-130	-162	-246
Protected Area	23492	-85	-92	-98	-110	-131	-164	-251
B/U Alarms Max	22815	-85	-91	-97	-109	-130	-162	-246

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
		63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
General Earthwork		18	19	11	1	-11	-53	-142	22	23	15	5	-14	-49	-138
Cask Building		20	20	13	3	-10	-50	-138	24	24	17	7	-11	-46	-134
Security/Admin Bldg		20	20	13	4	-8	-47	-131	24	24	17	8	-9	-43	-127
SNF Pad		16	16	9	-1	-11	-53	-140	20	21	13	4	-14	-49	-136
Protected Area		15	15	8	-3	-14	-57	-146	19	19	12	1	-17	-53	-142
B/U Alarms Max													5		
LPA EQ	**28.9**	**25**	**26**	**18**	**9**	**-3**	**-44**	**-129**	**29**	**29**	**22**	**12**	**5**	**-40**	**-125**
LDN (NM. Summer)	**29.6**														
LPA MAX	**32.8**														

PHASES 2-8			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
SNF Pad (use #2)	975	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	975	725												131		

Divergence	Distance						
SNF Pad (use #2)	22999	-85	-88	-93	-106	-128	-161	-246
Protected Area	23492	-85	-92	-98	-110	-131	-164	-251
B/U Alarms Max	22999	-85	-88	-93	-106	-128	-161	-246

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
		63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
SNF Pad (use #2)		16	20	13	3	-10	-52	-140	20	24	18	7	-13	-48	-135
Protected Area		15	15	8	-3	-14	-57	-146	19	19	12	1	-17	-53	-142
B/U Alarms Max													3		
LPA EQ	**23.6**	**18**	**21**	**14**	**4**	**-8**	**-51**	**-139**	**23**	**25**	**19**	**8**	**3**	**-47**	**-134**
LDN (NM. Summer)	**24.3**														
LPA MAX	**27.9**														

Table A-15: Construction Sound Levels, NSA #8 (Residential, NE corner of Eunice)

Receptor	N	E
NSA 8	-3525	-27700

PHASE 1			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
General Earthwork	1175	1175	103	110	109	111	121	111	109	107	114	113	115	118	115	113
Cask Building	100	1150	105	112	110	112	120	112	110	108	115	114	116	119	116	114
Security/Admin Bldg	375	0	105	112	110	112	120	112	110	108	115	114	116	119	116	114
SNF Pad	525	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	525	725												134		

Divergence	Distance						
General Earthwork	29255	-87	-94	-102	-117	-144	-185	-294
Cask Building	29077	-87	-94	-101	-117	-144	-185	-292
Security/Admin Bldg	27973	-87	-94	-101	-116	-141	-181	-284
SNF Pad	28712	-87	-94	-101	-116	-143	-183	-290
Protected Area	29255	-87	-94	-102	-117	-144	-185	-294
B/U Alarms Max	28712	-87	-94	-101	-116	-143	-183	-290

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
		63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
General Earthwork		16	16	7	-6	-24	-74	-185	20	20	11	-2	-26	-70	-181
Cask Building		18	17	9	-5	-23	-72	-182	21	21	13	-1	-25	-68	-178
Security/Admin Bldg		18	18	10	-3	-21	-68	-174	22	22	13	1	-22	-64	-170
SNF Pad		14	14	5	-8	-24	-75	-183	18	18	10	-4	-27	-70	-179
Protected Area		13	12	4	-10	-27	-78	-188	17	16	8	-6	-30	-74	-184
B/U Alarms Max													-9		
LPA EQ	**26.4**	**23**	**23**	**14**	**1**	**-16**	**-65**	**-173**	**27**	**27**	**18**	**5**	**-8**	**-61**	**-169**
LDN (NM. Summer)	**27.1**														
LPA MAX	**30.3**														

PHASES 2-8			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
SNF Pad (use #2)	975	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	975	725												131		

Divergence	Distance						
SNF Pad (use #2)	28779	-87	-90	-97	-113	-141	-182	-288
Protected Area	29255	-87	-94	-102	-117	-144	-185	-294
B/U Alarms Max	28779	-87	-90	-97	-113	-141	-182	-288

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
		63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
SNF Pad (use #2)		14	18	10	-4	-22	-73	-182	18	22	14	0	-26	-69	-178
Protected Area		13	12	4	-10	-27	-78	-188	17	16	8	-6	-30	-74	-184
B/U Alarms Max													-10		
LPA EQ	**21.1**	**16**	**19**	**11**	**-3**	**-21**	**-72**	**-181**	**21**	**23**	**15**	**1**	**-10**	**-68**	**-177**
LDN (NM. Summer)	**21.8**														
LPA MAX	**25.4**														

Table A-16: Construction Sound Levels, NSA #9 (Residential, 176 @ TXNM RR)

Receptor	N	E
NSA 9	-6075	-25160

PHASE 1			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
General Earthwork	1175	1175	103	110	109	111	121	111	109	107	114	113	115	118	115	113
Cask Building	100	1150	105	112	110	112	120	112	110	108	115	114	116	119	116	114
Security/Admin Bldg	375	0	105	112	110	112	120	112	110	108	115	114	116	119	116	114
SNF Pad	525	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	525	725												134		

Divergence	Distance						
General Earthwork	27315	-86	-93	-100	-115	-140	-178	-279
Cask Building	27025	-86	-93	-100	-114	-139	-177	-277
Security/Admin Bldg	25974	-86	-93	-99	-113	-137	-173	-270
SNF Pad	26713	-86	-93	-100	-114	-138	-176	-275
Protected Area	27315	-86	-93	-100	-115	-140	-178	-279
B/U Alarms Max	26713	-86	-93	-100	-114	-138	-176	-275

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
General Earthwork		17	17	9	-4	-19	-67	-171	21	21	13	0	-22	-63	-167
Cask Building		18	18	10	-2	-19	-65	-167	22	22	14	2	-20	-61	-163
Security/Admin Bldg		19	19	11	-1	-17	-61	-159	23	23	15	3	-18	-57	-156
SNF Pad		15	14	6	-6	-20	-68	-169	19	19	11	-1	-23	-63	-164
Protected Area		13	13	5	-7	-22	-71	-174	17	17	9	-3	-26	-67	-170
B/U Alarms Max													-4		
LPA EQ	27.2	24	24	16	4	-12	-58	-158	28	28	20	8	-4	-54	-154
LDN (NM. Summer)	27.9														
LPA MAX	31.1														

PHASES 2-8			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
SNF Pad (use #2)	975	725	101	108	106	108	119	108	106	105	112	111	113	115	113	111
Protected Area	1175	1175	100	107	105	107	117	107	105	104	111	109	111	114	111	109
B/U Alarms Max	975	725												131		

Divergence	Distance						
SNF Pad (use #2)	26828	-86	-89	-95	-111	-137	-175	-274
Protected Area	27315	-86	-93	-100	-115	-140	-178	-279
B/U Alarms Max	26828	-86	-89	-95	-111	-137	-175	-274

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
SNF Pad (use #2)		14	18	11	-2	-18	-66	-168	19	23	15	2	-21	-62	-163
Protected Area		13	13	5	-7	-22	-71	-174	17	17	9	-3	-26	-67	-170
B/U Alarms Max													-6		
LPA EQ	21.9	17	19	12	-1	-17	-65	-167	21	24	16	3	-6	-61	-163
LDN (NM. Summer)	22.6														
LPA MAX	26.2														

Table A-17: Operational Sound Levels, NSA #1 (Urenco)

Receptor	N	E	ft
NSA 1	-4725	-4050	

PHASE 1			Continuous Sound Power Level							Max Sound Power Level						
LWA	N	E	63	125	250	500	1000	2000	4000	63	125	250	500	1000	2000	4000
Storage Model Const	100	1150	97	104	103	105	107	105	103	101	108	107	109	111	109	107
Storage Model Transp	310	935	96	103	102	104	106	104	102	101	108	107	109	111	109	107
B/U Alarms Max	310	935					115							128		
Cask Building	100	1150	86	94	102	108	112	110	102	86	94	102	108	112	110	102
Security Bldg	375	0	64	69	82	83	79	78	75	64	69	82	83	79	78	75
Train Out at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Train In at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101

Divergence	Distance						
Storage Model Const	7094	-74	-80	-82	-85	-90	-100	-126
Storage Model Transp	7085	-74	-80	-82	-85	-90	-100	-126
B/U Alarms Max	7085	-74	-80	-82	-85	-90	-100	-126
Cask Building	7094	-74	-80	-82	-85	-90	-100	-126
Security Bldg	6512	-73	-79	-81	-84	-88	-97	-121
Train Out, 8 hr avg	825	-56	-59	-62	-61	-60	-61	-64
Train In, 8 hr avg	825	-56	-59	-62	-61	-60	-61	-64

LPA		Continuous Sound Pressure Level							Max Sound Pressure Level						
Storage Model Const		23	24	21	20	18	5	-23	27	28	25	24	22	9	-19
Storage Model Transport		22	23	20	19	17	4	-24	27	28	25	24	22	9	-19
B/U Alarms Max						25							38		
Cask Building		12	14	20	23	22	10	-24	12	14	20	23	22	10	-24
Security Bldg		-9	-10	1	-1	-9	-19	-46	-9	-10	1	-1	-9	-19	-46
Train Out, 8 hr avg		25	25	19	32	34	19	4	52	53	57	71	73	54	37
Train In, 8 hr avg		25	25	19	32	34	19	4	52	53	57	71	73	54	37
LPA EQ	41.1	30	31	27	36	38	23	8	52	53	57	71	73	54	37
LDN (NM. Summer)	41.4														
LPA MAX	75.3														

Table A-18: Operational Sound Levels, NSA #2 (Sundance)

Receptor	N	E														
NSA 2	-500	-4050	ft													
PHASE 1			**Continuous Sound Power Level**							**Max Sound Power Level**						
LWA	**N**	**E**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**
Storage Model Const	100	1150	97	104	103	105	107	105	103	101	108	107	109	111	109	107
Storage Model Transp	310	935	96	103	102	104	106	104	102	101	108	107	109	111	109	107
B/U Alarms Max	310	935					115							128		
Cask Building	100	1150	86	94	102	108	112	110	102	86	94	102	108	112	110	102
Security Bldg	375	0	64	69	82	83	79	78	75	64	69	82	83	79	78	75
Train Out at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Train In at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Divergence	**Distance**															
Storage Model Const	5235		-71	-77	-79	-81	-84	-91	-110							
Storage Model Transp	5050		-71	-77	-79	-80	-83	-90	-109							
B/U Alarms Max	5050		-71	-77	-79	-80	-83	-90	-109							
Cask Building	5235		-71	-77	-79	-81	-84	-91	-110							
Security Bldg	4143		-69	-75	-77	-78	-80	-85	-101							
Train Out, 8 hr avg	1600		-62	-65	-68	-67	-67	-69	-75							
Train In, 8 hr avg	2600		-66	-70	-72	-72	-73	-76	-86							
LPA			**Continuous Sound Pressure Level**							**Max Sound Pressure Level**						
Storage Model Const			26	27	24	24	24	14	-8	30	31	28	28	28	18	-4
Storage Model Transport			25	26	23	24	23	14	-7	30	31	28	29	28	19	-2
B/U Alarms Max							32							45		
Cask Building			15	17	23	27	28	19	-8	15	17	23	27	28	19	-8
Security Bldg			-5	-6	5	5	-1	-7	-26	-5	-6	5	5	-1	-7	-26
Train Out, 8 hr avg			21	21	15	28	30	15	0	47	47	51	65	66	46	26
Train In, 8 hr avg			18	18	12	25	27	12	-3	43	42	47	60	60	39	15
LPA EQ	39.6		**30**	**31**	**28**	**33**	**36**	**23**	**5**	**47**	**47**	**51**	**65**	**66**	**46**	**26**
LDN (NM. Summer)	39.9															
LPA MAX	68.6															

Table A-19: Operational Sound Levels, NSA #3 (Permian)

Receptor	N	E														
NSA 3	925	-4050	ft													
PHASE 1			**Continuous Sound Power Level**							**Max Sound Power Level**						
LWA	**N**	**E**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**
Storage Model Const	100	1150	97	104	103	105	107	105	103	101	108	107	109	111	109	107
Storage Model Transp	310	935	96	103	102	104	106	104	102	101	108	107	109	111	109	107
B/U Alarms Max	310	935					115							128		
Cask Building	100	1150	86	94	102	108	112	110	102	86	94	102	108	112	110	102
Security Bldg	375	0	64	69	82	83	79	78	75	64	69	82	83	79	78	75
Train Out at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Train In at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Divergence	**Distance**															
Storage Model Const	5265		-71	-77	-79	-81	-84	-91	-111							
Storage Model Transp	5023		-71	-77	-79	-80	-83	-90	-108							
B/U Alarms Max	5023		-71	-77	-79	-80	-83	-90	-108							
Cask Building	5265		-71	-77	-79	-81	-84	-91	-111							
Security Bldg	4087		-69	-75	-76	-77	-79	-85	-100							
Train Out, 8 hr avg	2600		-66	-70	-72	-72	-73	-76	-86							
Train In, 8 hr avg	4050		-69	-75	-76	-77	-79	-85	-100							
LPA			**Continuous Sound Pressure Level**							**Max Sound Pressure Level**						
Storage Model Const			26	27	24	24	24	14	-8	30	31	28	28	28	18	-4
Storage Model Transport			25	26	23	24	23	14	-7	30	31	28	29	28	19	-2
B/U Alarms Max							32							45		
Cask Building			15	17	23	27	28	19	-8	15	17	23	27	28	19	-8
Security Bldg			-5	-6	6	5	0	-7	-25	-5	-6	6	5	0	-7	-25
Train Out, 8 hr avg			18	18	12	25	27	12	-3	43	42	47	60	60	39	15
Train In, 8 hr avg			15	15	9	22	24	9	-6	39	37	43	55	53	30	1
LPA EQ	38.8		**29**	**30**	**28**	**32**	**35**	**22**	**4**	**43**	**42**	**47**	**60**	**60**	**39**	**15**
LDN (NM. Summer)	39.1															
LPA MAX	63.1															

Table A-20: Operational Sound Levels, NSA #4 (CISF SW Corner)

Receptor	N	E														
NSA 4	0	0	ft													
PHASE 1			**Continuous Sound Power Level**							**Max Sound Power Level**						
LWA	**N**	**E**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**
Storage Model Const	100	1150	97	104	103	105	107	105	103	101	108	107	109	111	109	107
Storage Model Transp	310	935	96	103	102	104	106	104	102	101	108	107	109	111	109	107
B/U Alarms Max	310	935					115							128		
Cask Building	100	1150	86	94	102	108	112	110	102	86	94	102	108	112	110	102
Security Bldg	375	0	64	69	82	83	79	78	75	64	69	82	83	79	78	75
Train Out at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Train In at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Divergence	**Distance**															
Storage Model Const	1154		-59	-62	-65	-64	-63	-65	-69							
Storage Model Transp	985		-58	-61	-63	-63	-62	-63	-66							
B/U Alarms Max	985		-58	-61	-63	-63	-62	-63	-66							
Cask Building	1154		-59	-62	-65	-64	-63	-65	-69							
Security Bldg	375		-50	-52	-55	-54	-52	-52	-54							
Train Out, 8 hr avg	100		-38	-39	-40	-40	-39	-39	-39							
Train In, 8 hr avg	5700		-72	-78	-80	-82	-85	-93	-114							
LPA			**Continuous Sound Pressure Level**							**Max Sound Pressure Level**						
Storage Model Const			38	42	38	41	44	40	34	42	46	42	45	48	44	38
Storage Model Transport			38	42	38	41	45	41	35	43	47	43	46	50	46	40
B/U Alarms Max							53							66		
Cask Building			27	32	37	44	49	46	33	27	32	37	44	49	46	33
Security Bldg			14	17	27	29	27	26	21	14	17	27	29	27	26	21
Train Out, 8 hr avg			39	39	33	46	48	33	18	71	73	79	92	94	76	61
Train In, 8 hr avg			13	13	7	20	22	7	-8	36	34	39	50	47	22	-14
LPA EQ	58.1		**43**	**46**	**43**	**50**	**56**	**48**	**39**	**71**	**73**	**79**	**92**	**94**	**76**	**61**
LDN (NM. Summer)	58.4															
LPA MAX	96.3															

Table A-21: Operational Sound Levels, NSA #5 (LSA Pad NE Corner)

Receptor	N	E														
NSA 5	-1150	1075	ft													
PHASE 1			**Continuous Sound Power Level**							**Max Sound Power Level**						
LWA	**N**	**E**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**
Storage Model Const	100	1150	97	104	103	105	107	105	103	101	108	107	109	111	109	107
Storage Model Transp	310	935	96	103	102	104	106	104	102	101	108	107	109	111	109	107
B/U Alarms Max	310	935					115							128		
Cask Building	100	1150	86	94	102	108	112	110	102	86	94	102	108	112	110	102
Security Bldg	375	0	64	69	82	83	79	78	75	64	69	82	83	79	78	75
Train Out at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Train In at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Divergence	**Distance**															
Storage Model Const	1252		-60	-63	-66	-65	-64	-66	-70							
Storage Model Transp	1467		-61	-64	-67	-66	-66	-68	-73							
B/U Alarms Max	1467		-61	-64	-67	-66	-66	-68	-73							
Cask Building	1252		-60	-63	-66	-65	-64	-66	-70							
Security Bldg	1866		-63	-67	-69	-69	-69	-71	-78							
Train Out, 8 hr avg	1000		-58	-61	-64	-63	-62	-63	-67							
Train In, 8 hr avg	4650		-70	-76	-78	-79	-82	-88	-105							
LPA			**Continuous Sound Pressure Level**							**Max Sound Pressure Level**						
Storage Model Const			37	41	37	40	43	39	32	41	45	41	44	47	43	36
Storage Model Transport			35	39	35	37	41	36	29	40	44	40	42	46	41	34
B/U Alarms Max							49							62		
Cask Building			26	31	37	43	48	45	32	26	31	37	43	48	45	32
Security Bldg			1	2	13	14	10	7	-3	1	2	13	14	10	7	-3
Train Out, 8 hr avg			24	24	18	31	33	18	3	51	51	55	69	71	52	34
Train In, 8 hr avg			14	14	8	21	23	8	-7	38	36	41	53	51	27	-4
LPA EQ	**54.8**		**40**	**43**	**41**	**46**	**52**	**46**	**36**	**51**	**51**	**55**	**69**	**71**	**52**	**39**
LDN (NM. Summer)	**55.1**															
LPA MAX	**73.4**															

Table A-22: Operational Sound Levels, NSA #6 (Residential, near 176 & 18)

Receptor	N	E														
NSA 6	-6225	-19675	ft													
PHASE 1			**Continuous Sound Power Level**							**Max Sound Power Level**						
LWA	**N**	**E**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**
Storage Model Const	100	1150	97	104	103	105	107	105	103	101	108	107	109	111	109	107
Storage Model Transp	310	935	96	103	102	104	106	104	102	101	108	107	109	111	109	107
B/U Alarms Max	310	935					115							128		
Cask Building	100	1150	86	94	102	108	112	110	102	86	94	102	108	112	110	102
Security Bldg	375	0	64	69	82	83	79	78	75	64	69	82	83	79	78	75
Train Out at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Train In at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Divergence	**Distance**															
Storage Model Const	21764		-84	-91	-97	-108	-127	-158	-238							
Storage Model Transp	21621		-84	-91	-96	-108	-127	-157	-237							
B/U Alarms Max	21621		-84	-91	-96	-108	-127	-157	-237							
Cask Building	21764		-84	-91	-97	-108	-127	-158	-238							
Security Bldg	20752		-84	-90	-96	-107	-125	-154	-231							
Train Out, 8 hr avg	2640		-66	-71	-72	-72	-73	-76	-86							
Train In, 8 hr avg	2640		-66	-71	-72	-72	-73	-76	-86							
LPA			**Continuous Sound Pressure Level**							**Max Sound Pressure Level**						
Storage Model Const			13	13	6	-3	-20	-53	-136	17	17	10	1	-16	-49	-132
Storage Model Transport			12	12	5	-4	-21	-54	-136	17	17	10	1	-16	-48	-131
B/U Alarms Max							-12							1		
Cask Building			2	3	5	0	-15	-48	-136	2	3	5	0	-15	-48	-136
Security Bldg			-19	-21	-14	-24	-46	-76	-156	-19	-21	-14	-24	-46	-76	-156
Train Out, 8 hr avg			18	18	12	25	27	12	-3	43	41	47	60	60	38	15
Train In, 8 hr avg			18	18	12	25	27	12	-3	43	41	47	60	60	38	15
LPA EQ	**33.0**		**22**	**22**	**16**	**28**	**30**	**15**	**3**	**43**	**41**	**47**	**60**	**60**	**38**	**15**
LDN (NM. Summer)	**33.3**															
LPA MAX	**62.9**															

Table A-23: Operational Sound Levels, NSA #7 (Residential, south of 176 & 18)

Receptor	N	E														
NSA 7	-8625	-20175	ft													
PHASE 1			**Continuous Sound Power Level**							**Max Sound Power Level**						
LWA	**N**	**E**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**
Storage Model Const	100	1150	97	104	103	105	107	105	103	101	108	107	109	111	109	107
Storage Model Transp	310	935	96	103	102	104	106	104	102	101	108	107	109	111	109	107
B/U Alarms Max	310	935					115							128		
Cask Building	100	1150	86	94	102	108	112	110	102	86	94	102	108	112	110	102
Security Bldg	375	0	64	69	82	83	79	78	75	64	69	82	83	79	78	75
Train Out at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Train In at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Divergence	**Distance**															
Storage Model Const	23041		-85	-92	-97	-109	-130	-163	-248							
Storage Model Transp	22923		-85	-91	-97	-109	-130	-162	-247							
B/U Alarms Max	22923		-85	-91	-97	-109	-130	-162	-247							
Cask Building	23041		-85	-92	-97	-109	-130	-163	-248							
Security Bldg	22091		-84	-91	-97	-108	-128	-159	-241							
Train Out, 8 hr avg	5575		-72	-78	-80	-82	-85	-93	-113							
Train In, 8 hr avg	5575		-72	-78	-80	-82	-85	-93	-113							
LPA			**Continuous Sound Pressure Level**							**Max Sound Pressure Level**						
Storage Model Const			12	13	5	-5	-23	-58	-145	16	17	9	-1	-19	-54	-141
Storage Model Transport			11	12	4	-6	-24	-58	-146	16	17	9	0	-18	-53	-140
B/U Alarms Max							-15							-2		
Cask Building			1	2	5	-1	-18	-53	-146	1	2	5	-1	-18	-53	-146
Security Bldg			-20	-22	-15	-25	-49	-81	-166	-20	-22	-15	-25	-49	-81	-166
Train Out, 8 hr avg			13	13	7	20	22	7	-8	36	34	39	51	48	22	-12
Train In, 8 hr avg			13	13	7	20	22	7	-8	36	34	39	51	48	22	-12
LPA EQ	**28.5**		**19**	**19**	**13**	**23**	**25**	**10**	**1**	**36**	**34**	**39**	**51**	**48**	**22**	**0**
LDN (NM. Summer)	**28.8**															
LPA MAX	**52.8**															

Table A-24: Operational Sound Levels, NSA #8 (Residential, NE corner of Eunice)

Receptor	N	E													
NSA 8	-3525	-27700	ft												
PHASE 1			**Continuous Sound Power Level**							**Max Sound Power Level**					
LWA	**N**	**E**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**
Storage Model Const	100	1150	97	104	103	105	107	105	103	101	108	107	109	111	109	107
Storage Model Transp	310	935	96	103	102	104	106	104	102	101	108	107	109	111	109	107
B/U Alarms Max	310	935					115							128		
Cask Building	100	1150	86	94	102	108	112	110	102	86	94	102	108	112	110	102
Security Bldg	375	0	64	69	82	83	79	78	75	64	69	82	83	79	78	75
Train Out at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Train In at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Divergence	**Distance**														
Storage Model Const	29077		-87	-94	-101	-117	-144	-185	-292							
Storage Model Transp	28891		-87	-94	-101	-117	-143	-184	-291							
B/U Alarms Max	28891		-87	-94	-101	-117	-143	-184	-291							
Cask Building	29077		-87	-94	-101	-117	-144	-185	-292							
Security Bldg	27973		-87	-94	-101	-116	-141	-181	-284							
Train Out, 8 hr avg	2150		-64	-68	-70	-70	-70	-73	-81							
Train In, 8 hr avg	2150		-64	-68	-70	-70	-70	-73	-81							
LPA			**Continuous Sound Pressure Level**							**Max Sound Pressure Level**					
Storage Model Const			10	10	1	-12	-36	-80	-190	14	14	5	-8	-32	-76	-186
Storage Model Transport			9	9	0	-13	-37	-80	-189	14	14	5	-8	-32	-75	-184
B/U Alarms Max							-28							-15		
Cask Building			-1	0	1	-9	-32	-75	-190	-1	0	1	-9	-32	-75	-190
Security Bldg			-22	-25	-19	-33	-62	-103	-209	-22	-25	-19	-33	-62	-103	-209
Train Out, 8 hr avg			19	19	13	26	28	13	-2	45	44	49	62	62	42	20
Train In, 8 hr avg			19	19	13	26	28	13	-2	45	44	49	62	62	42	20
LPA EQ	**34.2**		**23**	**23**	**17**	**29**	**31**	**16**	**4**	**45**	**44**	**49**	**62**	**62**	**42**	**20**
LDN (NM. Summer)	**34.5**															
LPA MAX	**65.3**															

Table A-25: Operational Sound Levels, NSA #9 (Residential, 176 @ TXNM RR)

Receptor	N	E													
NSA 9	-6075	-25160	ft												
PHASE 1			**Continuous Sound Power Level**							**Max Sound Power Level**					
LWA	**N**	**E**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**
Storage Model Const	100	1150	97	104	103	105	107	105	103	101	108	107	109	111	109	107
Storage Model Transp	310	935	96	103	102	104	106	104	102	101	108	107	109	111	109	107
B/U Alarms Max	310	935					115							128		
Cask Building	100	1150	86	94	102	108	112	110	102	86	94	102	108	112	110	102
Security Bldg	375	0	64	69	82	83	79	78	75	64	69	82	83	79	78	75
Train Out at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Train In at 825 ft, 8 hr avg			25	25	19	32	34	19	4	108	112	119	132	133	115	101
Divergence	**Distance**														
Storage Model Const	27025		-86	-93	-100	-114	-139	-177	-277							
Storage Model Transp	26865		-86	-93	-100	-114	-139	-177	-276							
B/U Alarms Max	26865		-86	-93	-100	-114	-139	-177	-276							
Cask Building	27025		-86	-93	-100	-114	-139	-177	-277							
Security Bldg	25974		-86	-93	-99	-113	-137	-173	-270							
Train Out, 8 hr avg	2640		-66	-71	-72	-72	-73	-76	-86							
Train In, 8 hr avg	2640		-66	-71	-72	-72	-73	-76	-86							
LPA			**Continuous Sound Pressure Level**							**Max Sound Pressure Level**					
Storage Model Const			11	11	3	-10	-32	-72	-175	15	15	7	-6	-28	-68	-171
Storage Model Transport			10	10	2	-10	-32	-73	-175	15	15	7	-5	-27	-68	-170
B/U Alarms Max							-24							-11		
Cask Building			0	1	2	-6	-27	-67	-175	0	1	2	-6	-27	-67	-175
Security Bldg			-22	-24	-17	-30	-58	-95	-195	-22	-24	-17	-30	-58	-95	-195
Train Out, 8 hr avg			18	18	12	25	27	12	-3	43	41	47	60	60	38	15
Train In, 8 hr avg			18	18	12	25	27	12	-3	43	41	47	60	60	38	15
LPA EQ	**32.9**		**22**	**22**	**16**	**28**	**30**	**15**	**3**	**43**	**41**	**47**	**60**	**60**	**38**	**15**
LDN (NM. Summer)	**33.2**															
LPA MAX	**62.9**															

Table A-26: Personnel TWA, General Earthwork, Phase 1 Construction

Task	Description	HP	Quantity per Hour	Item LwA,eq	Subtotal LwA,eq	Divergence	LpA,eq	LpA,eq w/ NC B/U Alarms
Earthwork	Heavy Haul Truck	350	4	118				
	Earthmover	500	2	113				
	Backup Alarms		6	123				
	General Earthwork Subtotal				**124**	**-43**	**81**	**76**
Adjacent Const.	Cask Building				124	-61	63	60
	Security/Admin Bldg				124	-56	68	65
	SNF Pad 1				122	-56	66	61
	Protected Area				121	-43	78	73
	General Earthwork Total						**83**	**78**

Table A-27: Personnel TWA, Cask Building, Phase 1 Construction

Task	Description	HP	Quantity per Hour	Item LwA,eq	Subtotal LwA,eq	Divergence	LpA,eq	LpA,eq w/ NC B/U Alarms
Earthwork	Earthmover	500	1	110				
	Backup Alarms		1	115				
Support	Air Compressor		1	108				
	Diesel Generator		1	111				
Concrete	Pump Truck	400	1	107				
	Ready-Mix Truck	400	1	113				
	Backup Alarms		2	118				
Construction	Construction Eq	400	2	117				
	Welding		4	107				
	Grinding		4	104				
	Backup Alarms		2	118				
	Cask Building Subtotal				**124**	**-32**	**92**	**89**
Adjacent Const.	Gen'l Earthwork				124	-61	63	59
	Security/Admin Bldg				124	-59	68	65
	SNF Pad 1				122	-53	66	61
	Protected Area				121	-61	78	73
	Cask Building Total						**92**	**89**

Table A-28: Personnel TWA, Security/Admin Building, Phase 1 Construction

Task	Description	HP	Quantity per Hour	Item LwA,eq	Subtotal LwA,eq	Divergence	LpA,eq	LpA,eq w/ NC B/U Alarms
Earthwork	Earthmover	500	1	110				
	Backup Alarms		1	115				
Support	Air Compressor		1	108				
	Diesel Generator		1	111				
Concrete	Pump Truck	400	1	107				
	Ready-Mix Truck	400	1	113				
	Backup Alarms		2	118				
Construction	Construction Eq	400	2	117				
	Welding		4	107				
	Grinding		4	104				
	Backup Alarms		2	118				
	Security/Admin Subtotal				**124**	**-30**	**94**	**91**
Adjacent Const.	Gen'l Earthwork				124	-56	63	59
	Cask Building				124	-59	68	65
	SNF Pad 1				122	-55	66	61
	Protected Area				121	-56	78	73
	Security/Admin Building Total						**94**	**91**

Table A-29: Personnel TWA, SNF Pad 1, Phase 1 Construction

Task	Description	HP	Quantity per Hour	Item LwA,eq	Subtotal LwA,eq	Divergence	LpA,eq	LpA,eq w/ NC B/U Alarms
Earthwork	Earthmover	500	2	113				
	Backup Alarms		2	118				
Concrete	Pump Truck	400	1	107				
	Ready-Mix Truck	400	1	113				
	Backup Alarms		2	118				
	SNF Pad 1 Subtotal				**122**	**-35**	**87**	**83**
Adjacent Const.	Gen'l Earthwork				124	-56	68	64
	Cask Building				124	-53	71	67
	Security/Admin Building				124	-55	69	66
	Protected Area				121	-56	65	60
	SNF Pad 1 Total						**88**	**83**

Table A-30: Personnel TWA, Protected Area, Phase 1 Construction

Task	Description	HP	Quantity per Hour	Item LwA,eq	Subtotal LwA,eq	Divergence	LpA,eq	LpA,eq w/ NC B/U Alarms
Earthwork	Heavy Haul Truck	350	1	112				
	Earthmover	500	2	113				
	Backup Alarms		3	120				
	Protected Area Subtotal				**121**	**-43**	**78**	**73**
Adjacent Const.	Gen'l Earthwork				124	-43	81	76
	Cask Building				124	-61	63	60
	Security/Admin Building				124	-56	68	65
	SNF Pad 1				122	-56	66	61
	Protected Area Total						**83**	**78**

Table A-31: Personnel TWA, Storage Module Construction

Task	Description	Location	Quantity per Hour	Item LwA,eq	Eff. Dist. [ft]	Divergence	LpA,eq	LpA,eq w/ NC B/U Alarms
Operations	Storage Module Construction	Working	1	113	25	-26	87	87
	Backup Alarm	Working	1	115	25	-26	89	79
	Storage Module Transport	Pad 1	1	112		-53	58	58
	Backup Alarm	Pad 1	1	115		-53	61	51
	Cask Building Vent Fans	Cask Bldg	8	116	50	-32	84	84
	Security Bldg RTUs	Sec/Admin	3	97		-59	37	37
	Train Inbound			82	200	-35	47	47
	Train Outbound			82	5250	-56	26	26
	Storage Module Construction Crew Total						**92**	**89**

Table A-32: Personnel TWA, Storage Module Transport

Task	Description	Location	Quantity per Hour	Item LwA,eq	Eff. Dist. [ft]	Divergence	LpA,eq	LpA,eq w/ NC B/U Alarms
Operations	Storage Module Construction	Cask Bldg	1	113		-53	59	59
	Backup Alarm	Cask Bldg	1	115		-53	61	51
	Storage Module Transport	Working	1	112	12	-22	89	89
	Backup Alarm	Working	0	0			0	0
	Cask Building Vent Fans	Cask Bldg	8	116		-53	62	62
	Security Bldg RTUs	Sec/Admin	3	97		-55	42	42
	Train Inbound			82	425	-39	43	43
	Train Outbound			82	5000	-55	27	27
	Storage Module Transport Operations						**89**	**89**

Table A-33: Personnel TWA, SNF Pads, Phase 2-8 Construction

Task	Description	HP	Quantity per Hour	Item LwA,eq	Subtotal LwA,eq	Divergence	LpA,eq	LpA,eq w/ NC B/U Alarms
Earthwork	Earthmover	500	2	113				
Concrete	Pump Truck	400	1	107				
	Ready-Mix Truck	400	1	113				
All	Backup Alarms		4	121				
	SNF Pad 2-8 Subtotal				**122**	**-35**	**87**	**81**
Adjacent Const.	Protected Area				121	-53	68	63
Operations	Storage Model Construction	400	1		113	-57	55	55
	Backup Alarm		1		115	-57	57	47
	Storage Module Transport	350	1		112	-53	59	59
	Backup Alarm		1		115	-53	61	51
	Cask Building Vent Fans		8		116	-57	58	58
	Security Bldg RTUs		3		97	-57	39	39
	Train Inbound, Pad 5				82	-39	43	43
	Train Outboud, Pad 5				82	-55	27	27
	SNF Pad 2-8 Total						**87**	**81**

Table A-34: Personnel TWA, Protected Area, Phase 2-8 Construction

Task	Description	HP	Quantity per Hour	Item LwA,eq	Subtotal LwA,eq	Divergence	LpA,eq	LpA,eq w/ NC B/U Alarms
Earthwork	Heavy Haul Truck	350	1	112				
	Earthmover	500	2	113				
	Backup Alarms		3	120				
	Protected Area Subtotal				**121**	**-43**	**78**	**73**
Adjacent Const.	SNF Pad 2				122	-53	68	62
Operations	Storage Module Construction	400	1		113	-61	52	52
	Backup Alarm		1		115	-61	54	44
	Storage Module Transport	350	1		112	-56	55	55
	Backup Alarm		1		115	-56	58	48
	Cask Building Vent Fans		8		116	-61	55	55
	Security Bldg RTUs		3		97	-56	41	41
	Train Inbound, PA Center				82	-45	37	37
	Train Outbound, PA Center				82	-57	25	25
	Protected Area Total						**78**	**73**

Table A-35: Personnel $L_{pA,max}$, General Earthwork, Phase 2-8 Construction

Task	Description	HP	Quantity per Hour	Item LwA,max	Subtotal LwA,max	Divergence	LpA,max	LpA,max w/ NC B/U Alarms
Earthwork	Heavy Haul Truck	350	4	122				
	Earthmover	500	2	117				
	Backup Alarms		3	129				
	General Earthwork Subtotal				**130**	**-43**	**87**	**81**
Adjacent Const.	Cask Building				131	-61	70	64
	Security/Admin Bldg				131	-56	75	69
	SNF Pad 1				130	-56	74	67
	Protected Area				128	-43	85	78
	General Earthwork Total						**89**	**83**

Table A-36: Personnel $L_{pA,max}$, Cask Building, Phase 1 Construction

Task	Description	HP	Quantity per Hour	Item LwA,max	Subtotal LwA,max	Divergence	LpA,max	LpA,max w/ NC B/U Alarms
Earthwork	Earthmover	500	1	114				
Support	Air Compressor		1	112				
	Diesel Generator		1	114				
Concrete	Pump Truck	400	1	114				
	Ready-Mix Truck	400	1	117				
Construction	Construction Eq	400	2	120				
	Welding		4	111				
	Grinding		4	111				
All	Backup Alarms		3	129				
	Cask Building Subtotal				**131**	**-32**	**99**	**93**
Adjacent Const.	Gen'l Earthwork				130	-61	69	64
	Security/Admin Bldg				131	-59	75	69
	SNF Pad 1				130	-53	74	67
	Protected Area				128	-61	85	78
	Cask Building Total						**99**	**93**

Table A-37: Personnel $L_{pA,max}$, Security/Admin Building, Phase 1 Construction

Task	Description	HP	Quantity per Hour	Item LwA,max	Subtotal LwA,max	Divergence	LpA,max	LpA,max w/ NC B/U Alarms
Earthwork	Earthmover	500	1	114				
Support	Air Compressor		1	112				
	Diesel Generator		1	114				
Concrete	Pump Truck	400	1	114				
	Ready-Mix Truck	400	1	117				
Construction	Construction Eq	400	2	120				
	Welding		4	111				
	Grinding		4	111				
All	Backup Alarms		3	129				
	Security/Admin Subtotal				**131**	**-30**	**100**	**95**
Adjacent Const.	Gen'l Earthwork				130	-56	69	64
	Cask Building				131	-59	75	69
	SNF Pad 1				130	-55	74	67
	Protected Area				128	-56	85	78
	Security/Admin Building Total						**100**	**95**

Table A-38: Personnel $L_{pA,max}$, SNF Pad 1, Phase 1 Construction

Task	Description	HP	Quantity per Hour	Item LwA,max	Subtotal LwA,max	Divergence	LpA,max	LpA,max w/ NC B/U Alarms
Earthwork	Earthmover	500	2	117				
Concrete	Pump Truck	400	1	114				
	Ready-Mix Truck	400	1	117				
All	Backup Alarms		3	129				
	SNF Pad 1 Subtotal				**130**	**-35**	**95**	**89**
Adjacent Const.	Gen'l Earthwork				131	-56	74	69
	Cask Building				131	-53	77	72
	Security/Admin Building				131	-55	75	70
	Protected Area				128	-56	72	65
	SNF Pad 1 Total						**96**	**89**

Table A-39: Personnel $L_{pA,max}$, Protected Area, Phase 1 Construction

Task	Description	HP	Quantity per Hour	Item LwA,max	Subtotal LwA,max	Divergence	LpA,max	LpA,max w/ NC B/U Alarms
Earthwork	Heavy Haul Truck	350	1	116				
	Earthmover	500	2	117				
	Backup Alarms		2	128				
	Protected Area Subtotal				**128**	**-43**	**85**	**78**
Adjacent Const.	Gen'l Earthwork				130	-43	87	81
	Cask Building				131	-61	70	64
	Security/Admin Building				131	-56	75	69
	SNF Pad 1				130	-56	74	67
	Protected Area Total						**89**	**83**

Table A-40: Personnel $L_{pA,max}$, Storage Module Construction

Task	Description	Location	Quantity per Hour	Item LwA,max	Eff. Dist. [ft]	Divergence	LpA,max	LpA,max w/ NC B/U Alarms
Operations	Storage Module Construction	Working	1	117	20	-24	93	93
	Backup Alarm	Working	1	125	20	-24	101	91
	Storage Module Transport	Pad 1	1	117		-53	63	63
	Backup Alarm	Pad 1	1	125		-53	71	61
	Cask Building Vent Fans	Cask Bldg	8	116	50	-32	84	84
	Security Bldg RTUs	Sec/Admin	3	97		-59	37	37
	Train Inbound			131	200	-35	97	47
	Train Outbound			131	5250	-56	76	26
	Storage Module Construction Crew Total						**103**	**95**

Table A-41: Personnel $L_{pA,max}$, Storage Module Transport

Task	Description	Location	Quantity per Hour	Item LwA,max	Eff. Dist. [ft]	Divergence	LpA,max	LpA,max w/ NC B/U Alarms
Operations	Storage Module Construction	Cask Bldg	1	117		-53	63	63
	Backup Alarm	Cask Bldg	1	125		-53	71	61
	Storage Module Transport	Working	1	117	10	-21	96	96
	Backup Alarm	Working	0	0			0	0
	Cask Building Vent Fans	Cask Bldg	8	116		-53	62	62
	Security Bldg RTUs	Sec/Admin	3	97		-55	42	42
	Train Inbound			131	425	-39	92	43
	Train Outbound			131	5000	-55	76	27
	Storage Module Transport Operations						**97**	**96**

Table A-42: Personnel $L_{pA,max}$, SNF Pads, Phase 2-8 Construction

Task	Description	HP	Quantity per Hour	Item LwA,max	Subtotal LwA,max	Divergence	LpA,max	LpA,max w/ NC B/U Alarms
Earthwork	Earthmover	500	2	117				
Concrete	Pump Truck	400	1	114				
	Ready-Mix Truck	400	1	117				
All	Backup Alarms		3	129				
	SNF Pad 2-8 Subtotal				**130**	**-35**	**95**	**87**
Adjacent Const.	Protected Area				128	-53	75	69
Operations	Storage Model Construction	400	1		117	-57	59	59
	Backup Alarm		1		125	-57	67	57
	Storage Module Transport	350	1		117	-53	63	63
	Backup Alarm		1		125	-53	71	61
	Cask Building Vent Fans		8		116	-57	58	58
	Security Bldg RTUs		3		97	-57	39	39
	Train Inbound, Pad 5				131	-39	92	43
	Train Outboud, Pad 5				131	-55	76	27
	SNF Pad 2-8 Total						**97**	**88**

Table A-43: Personnel $L_{pA,max}$, Protected Area, Phase 2-8 Construction

Task	Description	HP	Quantity per Hour	Item LwA,max	Subtotal LwA,max	Divergence	LpA,max	LpA,max w/ NC B/U Alarms
Earthwork	Heavy Haul Truck	350	1	116				
	Earthmover	500	2	117				
	Backup Alarms		2	128				
	Protected Area Subtotal				**128**	**-43**	**85**	**78**
Adjacent Const.	SNF Pad 2				130	-53	77	69
Operations	Storage Module Construction	400	1		117	-61	56	56
	Backup Alarm		1		125	-61	64	54
	Storage Module Transport	350	1		117	-56	60	60
	Backup Alarm		1		125	-56	68	58
	Cask Building Vent Fans		8		116	-61	55	55
	Security Bldg RTUs		3		97	-56	41	41
	Train Inbound, PA Center				131	-45	86	37
	Train Outbound, PA Center				131	-57	75	25
	Protected Area Total						**89**	**79**