

NOISE MEASUREMENT

What are *sound* and *noise*?

When an object vibrates it possesses energy, some of which transfers to the air, causing the air molecules to vibrate. The disturbance in the air travels to the eardrum, causing it to vibrate at the same frequency. The ear and brain translate the vibration of the eardrum to what we call *sound*. *Noise* is simply unwanted sound.

How is sound measured?

The human ear responds to sound pressures over an extremely wide range of values. The range of sounds people normally experience extends from low to high pressures by a factor of 1 million. Accordingly, scientists have devised a special scale to measure sound. The term decibel (abbreviated dB), borrowed from electrical engineering, is the unit commonly used.

Another common sound measurement is the A-weighted sound level, denoted as dBA. The A-weighting accounts for the fact that the human ear responds more effectively to some pitches than others. Higher pitches receive less weighting than lower ones. Most of the sound levels provided in this EIS are A-weighted; however, some are in decibels due to lack of information on the frequency spectrum of the sound. The scale to the right provides common references to sound on the A-weighted sound-level scale.

Source: Modified from DIRS 103233-DOE (1999, p. 3-39)

TYPICAL A-WEIGHTED SOUND LEVELS

DECIBELS	
50-horsepower siren (33 meters) ^a	140
Jet takeoff (66 meters)	130
Riveting machine ^b	120 Diesel motors
Cut-off saw	110
Pneumatic peen hammer ^b	100 Outdoor public address system loudspeakers
Rock drill (16 meters)	90 Ventilation fans
Textile weaving plant ^b	
Subway train (6.6 meters)	
Dump truck (16 meters)	
Pneumatic drill (16 meters)	80
Freight train (33 meters)	
Vacuum cleaner (3.3 meters)	70 Inside sports car (24 meters per second) ^c
Speech (0.33 meters)	
Passenger auto (16 meters)	60 Near freeway (auto traffic) Large store Accounting office
Large transformer (66 meters)	
Soft whisper (13 centimeters) ^d	50 Private business office Light traffic (33 meters) Average residence
	40
	30 Studio (speech)
	20 Quiet
Threshold of hearing (youths)	10
	0

- To convert meters to feet, multiply by 3.2808.
- Operator's position.
- 24 meters per second = about 50 miles per hour.
- 13 centimeters = about 5 inches.

3.1.10 AESTHETICS

Visual resources, with nighttime darkness as a component, include the natural and manmade physical features that give a particular landscape its character and value as an environmental factor. The physical features representing the region of influence for aesthetics are those found within the approximate boundary of the analyzed land withdrawal area. Sections 3.1.3 and 3.1.5 describe the geologic and biological settings, respectively, at Yucca Mountain.

The region surrounding Yucca Mountain consists of unpopulated to sparsely populated desert and rural lands. Because much of Yucca Mountain is on the Nevada Test Site and Nellis Air Force Range with restricted public access, public visibility is limited to portions of U.S. Highway 95 near Amargosa Valley.

Table 3-33. Benchmark ground vibration criteria for buildings and human annoyance.^a

Category	Frequent events (>70/day) VdB ^b	Infrequent events (<70/day)		Impact of concern
		PPV (in/sec) ^c	VdB	
<i>Annoyance or interference</i>				
1. High sensitive buildings ^d	65	NA ^e	65	Sensitive equipment
2. Residential ^f	72	NA	80	Human disturbance
3. Institutional ^g	75	NA	83	Human disturbance
<i>Structural damage</i>				
Fragile buildings	NA	0.20	~100 (Impulse) 92 (Rail)	Structural damage
Extremely fragile buildings	NA	0.12	~95 (Impulse) 88 (Rail)	Structural damage

a. Source: DIRS 155547-HMHH (1995, p. 8-3).

b. Root-mean-square velocity expressed in decibels - VdB - referenced to 10⁻⁶ inch per second.

c. Peak particle velocity in inches per second; to convert to millimeters per second, multiply by 25.4.

d. Buildings with vibration-sensitive equipment (for example, at research institutions and medical facilities).

e. NA = not applicable.

f. Homes or buildings where people sleep.

g. Schools, churches, and office buildings.

The Bureau of Land Management uses four visual resource classes in the management of public lands (DIRS 101505-BLM 1986, all). Classes I and II are the most valued, Class III is moderately valued, and Class IV is of least value. Visual resources fall into one of these management classes based on a combination of three factors: (1) scenic quality, (2) visual sensitivity, and (3) distance from travel routes or observation points (DIRS 101505-BLM 1986, all). There are three scenic quality classes in the Bureau of Land Management Visual Resource Management system. Class A includes areas that combine the most outstanding characteristics of each physical feature category. Class B includes areas in which there is a combination of some outstanding and some fairly common characteristics. Class C includes areas in which the characteristics are fairly common to the region. A visual sensitivity rating for an area is based on the number and types of users, special areas (natural areas, wilderness areas), public interest in the area, and adjacent land uses. Though a scenic quality rating (A, B, or C) is used in conjunction with visual sensitivity and distance zones (foreground, middleground, background, and seldom seen) to produce Visual Resource Management Classes, the scenic quality rating is often used independently to emphasize a visual resource within a management class area. For example, a Wilderness Study Area might have a Class A scenic rating and be in a Class II or III management area.

The Bureau of Land Management has not assigned a Visual Resource Management class to Yucca Mountain because the Nevada Test Site is not under the Bureau's jurisdiction. However, using the Bureau's method of determining scenic quality, DOE has evaluated the visual resources of the Yucca Mountain region from two observation points—one at Amargosa Valley on U.S. 95 and the other on the Nevada Test Site at a location that provides a clear view of the proposed repository site (DIRS 105002-CRWMS M&O 1999, all).

The visual assessment at both these locations concluded that the scenic quality classification of Yucca Mountain is C.

Nighttime darkness in the Yucca Mountain region is a valued component of the solitude experience sought by many individuals, and greatly enhances astronomy and stargazing activities. It is also felt to be one of the important scenic resources of the Death Valley National Park. Existing or potential sources of nighttime light in this area include the Towns of Beatty and Amargosa Valley that lie between Death Valley National Park and the Yucca Mountain site; the community of Pahrump slightly east of the Park; and Las Vegas farther to the east. Las Vegas is the largest source of nighttime light in the extended region; the glow of its lights is evident in the night sky at much farther distances than other city features.

**BUREAU OF LAND MANAGEMENT VISUAL RESOURCE
MANAGEMENT CLASS OBJECTIVES
(used in the management of public lands)**

Class I	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV	The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Current lighting at the repository site is similar to or less than lighting at other work areas on the Nevada Test Site and represents a minor contribution to the area's sources of nighttime lighting.

3.1.11 UTILITIES, ENERGY, AND SITE SERVICES

DOE research into the current consumer demand for utilities and energy in the Yucca Mountain region has yielded information on water and power sources, use, and supply systems. The research included water treatment capabilities. The region of influence for potential impacts to utility and energy supplies consists of those public and private resources on which DOE would draw to support the Proposed Action, and which are in Clark, Lincoln, and Nye Counties in Nevada. Sections 3.1.11.1 and 3.1.11.2 contain information on current water and energy suppliers and consumer use. Unless otherwise noted, the *Yucca Mountain Site Characterization Project Environmental Baseline File for Utilities, Energy, and Site Services* (DIRS 104988-CRWMS M&O 1999, all) is the basis of the information in this section.

3.1.11.1 Utilities

Water and sewer utilities in the region could be affected by the Proposed Action as a result of project-related increases in population and the associated increases in water demand and sewage production. DOE anticipates that the predominant project-related increase in population would occur in Clark County, with a smaller increase in Nye County (see Section 3.1.7).

Water. The Southern Nevada Water Authority supplies water to five communities in Clark County: Boulder City, Henderson, Las Vegas (including parts of unincorporated Clark County), Nellis Air Force