

**DEPARTMENT OF THE INTERIOR  
BUREAU OF OCEAN ENERGY MANAGEMENT, REGULATION AND  
ENFORCEMENT MANUAL**

**TRANSMITTAL SHEET**

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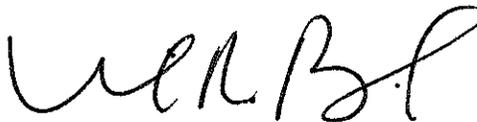
Release No. 337

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SUBJECT: Administrative  
Part 485: Safety and Occupational Health Program  
Chapter 11: Hearing Conservation

EXPLANATION OF MATERIAL TRANSMITTED:

This chapter specifies the minimum Safety and Occupational Health Program requirements for implementing the Bureau Hearing Conservation Program to prevent occupational hearing loss to employees in accordance with Occupational Safety and Health Administration regulations.



Director

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FILING INSTRUCTIONS:

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485       11       20       337

OPR: Chief of Staff, Administration and Budget

Date:       **MAY 17 2011**

**Department of the Interior**  
**Bureau of Ocean Energy Management, Regulation and Enforcement Manual**

**Effective Date:**

**Series:** Administrative

**Part 485:** Safety and Occupational Health Program

**Chapter 11:** Hearing Conservation

**Originating Office:** Chief of Staff, Office of Administration and Budget

**1. Purpose.** To establish methods and accountability for implementing the Bureau Hearing Conservation Program to prevent occupational hearing loss to employees in accordance with Occupational Safety and Health Administration (OSHA) regulations.

**2. Objective.** To minimize employee exposure to the hazards of high noise levels; prevent occupational related hearing loss; and comply with the OSHA noise standard.

**3. Authorities and References.**

- A. 29 CFR 1910.95 and 29 CFR 1926.52, Occupational Noise Exposure
- B. Occupational Safety and Health Act of 1970, Section 19, Federal Agency Safety Programs and Responsibilities
- C. Executive Order 12196, Occupational Safety and Health Programs for Federal Employees
- D. 29 CFR 1960, Basic Program Elements for Federal Employee Occupational Safety and Health Programs and related Matters, Subpart C, Standards
- E. 29 CFR 1910.132, Personal Protective Equipment, Subpart I
- F. 29 CFR 1904.10 Recording Criteria for Cases Involving Occupational Hearing Loss
- G. Department of the Interior (DOI) Occupational Medicine Program Handbook.
- H. 485 DM 17: Industrial Hygiene Program
- I. 485 DM 20: Personal Protective Equipment
- J. 29 CFR 1904.10 Recording Criteria for Cases Involving Occupational Hearing Loss

#### 4. Definitions

**A. Action level (AL)** - An 8-hour time-weighted average of 85 decibels measured on the A-scale, slow response, or equivalently, a dose of 50 percent. The AL is the point at which the employer must administer an effective Hearing Conservation Program.

**B. Administrative Control** - A process used to limit the daily exposure to noise in a high noise environment by controlling the employee's work schedule.

**C. Attenuation** - The amount of noise reduction afforded an employee by use of a hearing protector.

**D. Audiogram** - A chart, graph, or table produced from an audiometric test that shows hearing threshold levels as a function of frequency.

**E. Baseline audiogram** - The audiometric exam taken within 6 months of first exposure at or above the action level. The baseline audiogram is the audiogram against which future audiograms are compared.

**F. Decibel** - The unit used to measure the intensity of sound.

**G. Decibel A-weighted scale (dBA)** - Decibels with the sound pressure scale adjusted to conform to the frequency response of the human ear.

**H. Engineering Control** - Any mechanical device or physical barrier that reduces the sound level at the source or along the path.

**I. Hearing Conservation** - Measures taken to reduce the risk of noise-induced hearing loss.

**J. Hearing protection/protectors device (HPD)** – Devices worn in or on the ears to reduce the level of sound entering the ears. Types of HPDs include: **ear muffs** which enclose the entire outer ear and **ear plugs** which are inserted into the ear.

**K. Noise** - Disturbing, harmful, or unwanted sound.

**L. Noise Dosimetry** - The process or method of measuring a person's individual exposure to noise over a given period.

**M. Noise Reduction Rating (NRR)** - Measure of the estimated attenuation capacity of a hearing protector to represent the approximate noise reduction, in dBA.

**N. Occupational Hearing Loss** - A permanent hearing loss sustained in the course of following an occupation or employment.

**O. OSHA Permissible Exposure Limit (PEL)** - The maximum allowable exposure, established by OSHA, for which a worker can be exposed over an 8-hour period. The PEL for noise exposure is 90 dBA.

**P. Sound Level Meter** - An electronic instrument for the measurement of sound levels.

**Q. Standard Threshold Shift (STS)** - A change in hearing threshold of an average of 10 dBA or more at 2000, 3000 and 4000 hertz (Hz) in either ear when compared to the baseline audiogram.

**R. Temporary Threshold Shift** - A temporary change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear.

**S. Time Weighted Average (TWA)** - Sound level, which if constant over an 8-hour exposure, would result in the same noise dose as is measured.

## **5. Requirements.**

Evidence is well established that worker exposure to noise of sufficient intensity and duration can result in permanent hearing loss. Noise induced hearing loss is gradual, hard to detect, and often permanent. To reduce the incidence of occupational hearing loss, the OSHA standard 29 CFR 1910.95, *Occupational Noise Exposure*, requires employers to develop and implement a Hearing Conservation Program whenever employee noise exposure levels equal or exceed an 8-hour time weighed average sound level (TWA) of 85 decibels (dBA). See Appendix A for permissible noise exposure durations at different sound levels. Program elements include the following.

**A. Noise Exposure Measurement and Evaluation.** In order to effectively control employee exposure to hazardous noise levels it is necessary that the noise be accurately measured according to standard procedures, and that the measurements be properly evaluated. Noise monitoring shall be conducted to accurately identify employees who are exposed to noise levels at or above the action level (AL) of 85 dBA, averaged over 8-working hours. Representative noise monitoring results may be used in different workplaces for similar operations. The sound measurement shall include all continuous, intermittent and impulsive sound levels from 80 dBA to 130 dBA. When high worker mobility or significant variations in sound level make area monitoring generally inappropriate, representative personal sampling (dosimetry) shall be conducted. Noise monitoring data that represent employee exposure shall be maintained on file at least 30 years in accordance with 1910.1020(d)(1)(ii).

1. **Area Monitoring.** In an area survey, measurements of noise levels are documented using a sound level meter to identify work areas where employees' exposures may be above hazardous levels requiring more thorough exposure monitoring. Area monitoring is conducted using a calibrated sound level meter set to the A scale, slow response.

2. **Personal Monitoring.** Determination of personal noise exposures shall be accomplished using calibrated noise dosimeters. Employees monitored will have dosimeters placed on them at the

beginning of their normal work shift with the microphone attached in the "hearing zone." The dosimeter will be worn for the full duration of the work shift while the employee performs a normal work routine. At the end of the work shift, the dosimeter will be removed and information analyzed as soon as possible. Background information will be collected from each employee detailing job description, unusual job activities, etc., for the sample period. Those employees whose noise exposures equal or exceed 85 dBA as an 8-hour TWA will be identified for inclusion in the Hearing Conservation Medical Surveillance Program.

**B. Noise Exposure Control.** Engineering and/or administrative controls will be utilized to reduce noise levels below the 90 dBA permissible exposure limit (PEL).

1. Engineering controls include the use of equipment design changes, enclosures, barriers, and absorption materials and should be used to the maximum extent possible.
2. Administrative controls such as job rotation, posting of noise signs, and employee training may be utilized if engineering controls are not feasible or do not provide sufficient protection.

**C. Audiometric testing.** Continuous exposure to loud sounds over an extended period of time may cause noise induced hearing loss. Audiometric testing monitors the sharpness of an employee's hearing over time.

1. Audiometric testing will be provided for all employees whose exposure to noise equal or exceed the 8-hour TWA of 85 dBA.
2. A baseline audiogram will be performed within 6 months of an employee's first exposure at or above 85 dBA TWA. The employee will avoid exposure to occupational and non-occupational noise for 14 hours prior to the appointment.
3. Annual audiometric testing will be conducted annually and compared to the baseline audiogram to determine if the audiogram is valid and if a standard threshold shift (STS) has occurred.
  - a. If the annual audiogram shows a STS, the employee will receive a retest within 30 days, and the results of the retest will be used as the annual audiogram.
  - b. If comparison of the baseline to the annual audiogram indicates a STS, the employee will be notified in writing within 21 days of the determination.
3. Employees who do experience a standard threshold shift will be:
  - a. Fitted or refitted with hearing protection.
  - b. Referred for a clinical or otological examination to determine if the medical pathology of the ear is caused or aggravated by the wearing of HPDs.

c. Informed of the need for an otological examination if a medical pathology of the ear that is unrelated to the use of hearing protectors is suspected.

**D. Hearing Protection Devices.** When engineering and/or administrative controls are not feasible or fail to reduce sound levels below the PEL, hearing protection will be provided and required to be used to reduce the sound levels to below the PEL.

1. Hearing Protection Devices (HPDs) will be made available to all employees exposed to the action level or greater at no cost to the employees.
2. Employees will be given the opportunity to select from a variety of ANSI S3.19-1974 devices (ear plugs and ear muffs).
3. HPDs will be worn by employees when exposed to 90 dBA TWA or above.
4. HPDs will be worn by employees when exposed to 85 dBA TWA or above when employee:
  - a. Has not had a baseline audiogram established; or
  - b. Has experienced a STS.
4. HPDs will have a minimum noise reduction rating (NRR) of 24 and must attenuate employee noise exposure to at least an 8-hour TWA of 90 dBA or to at least 85 dBA for employees who have suffered a STS.

**E. Employee Training**

1. Employees with an 8-hour TWA noise exposure of 85 dBA or above will be required to attend hearing conservation training annually. The training program will consist of a presentation that informs the employee of:
  - a. The effects of noise on hearing and hearing loss.
  - b. The purpose of hearing protectors.
  - c. The advantages, disadvantages, and attenuation of various types.
  - d. Instructions on selection, fitting, use, and care of hearing protectors.
  - e. The purpose of audiometric testing.
  - f. An explanation of the test procedures.
  - g. Locations where hearing protection is required.
  - f. Hearing conservation program requirements.

g. A copy of the Occupational Noise Exposure regulation (29 CFR 1910.95) will be available to affected employees and their representatives. A copy of the regulation will also be posted in the workplace.

2. Employees will be encouraged to use hearing protectors when exposed to hazardous noise during off-duty activities.

#### **F. Recordkeeping**

1. An accurate record of all employee exposure data will be retained for 2 years.

2. Training records will be retained for 2 years.

3. Audiometric test records will be retained for the duration of the affected employees' employment and will include:

a. Name and job classification of the employee.

b. Date of the audiogram.

c. The name of the examiner.

d. Date of the last acoustic or exhaustive calibration of the audiometer.

e. The employee's most recent noise exposure assessment.

4. Accurate records of the background sound pressure level measurements in audiometric test rooms will be retained for the duration of the affected worker's employment.

5. All records required by the noise standard will be provided upon request to:

a. Employees

b. Former employees

c. Representatives designated by the individual employee

d. The Occupational Safety and Health Administration

#### **G. Responsibilities.**

1. Head of Bureau/ Designated Agency Safety and Health Official

a. Approve the Hearing Conservation Program Policy.

- b. Ensure that the Bureau maintains an effective Hearing Conservation Program Policy.
- c. Ensure sufficient support and resources to implement the policy.

2. Associate and Regional Directors

- a. Support the implementation of the Hearing Conservation Program Policy.
- b. Provide sufficient support and resources to effectively implement a hearing conservation program in areas of responsibility.

3. Bureau Safety Manager

- a. Conduct periodic evaluations to determine the effectiveness of the administration and implementation of the Hearing Conservation Policy.
- b. Provide guidance to Safety Officers and Collateral Duty Safety Officers on implementation of the Hearing Conservation Policy and development of a Hearing Conservation Program to ensure compliance.
- c. Utilize DOI Safety Management Information System (SMIS) to assess level of hearing loss and identify areas in need of additional hearing loss prevention activities.

4. Safety Officers/ Collateral Duty Safety Officers

- a. Assist local management in the development and implementation of local hearing conservation program.
- b. Conduct periodic evaluations to determine program effectiveness.
- c. Coordinate initial and annual training.
- d. Coordinate baseline, annual, and exit audiometric testing.
- e. Audit local audiometric test vendors to ensure that the rooms used for audiometric testing meet the requirements of 29 CFR 1910.95 Appendix D for background sound pressure levels.
- f. Maintain noise surveys, exposure monitoring and training records, and ensure that employee exposure records and audiograms are maintained in a secure location. This will include forwarding audiograms and medical records to the servicing personnel office where they will be maintained for the duration of the employee's employment.
- g. Assist Managers and Supervisors in evaluating HPDs to ensure proper noise attenuation.
- h. Coordinate noise surveys and monitoring with local management and Bureau Safety Manager.

i. Record work-related STS cases in the SMIS and on the OSHA Form 300.

## 5. Managers and Supervisors

a. Identify all affected employees who work in areas and occupations where noise exposure cannot be reduced below an 8-hour TWA of 85 dBA for inclusion in the Hearing Conservation Program.

b. Ensure that a written Hearing Conservation Program is developed and implemented at their respective location.

b. Mandate and ensure the use of required hearing protectors by personal example and direction.

c. Notify the Safety Office of processes, materials, or equipment changes that may alter noise exposures.

d. Coordinate with Safety Office to conduct noise surveys and/or exposure monitoring when potentially new noise hazards are suspected.

e. Ensure that multiple types of HPDs are available and that employees are provided with them when required.

f. Monitor and enforce the use of hearing protectors or noise reduction procedures in designated areas.

g. Ensure that noise-hazardous equipment/areas are properly labeled.

h. Ensure that potentially exposed employees are provided with a baseline audiometric hearing test prior to the initial work assignment and then annually thereafter.

i. Ensure that employees properly care for hearing protectors.

j. Ensure that new employees receive initial HCP training, and that annual refresher training is provided to all potentially exposed employees.

k. Ensure that employees receive audiometric testing annually and that testing is preceded by 14 hours without exposure to workplace noise.

l. Post a copy of occupational noise regulation in employee area.

## 6. Employees

a. Wear approved hearing protection equipment in designated areas, and follow all noise reduction procedures as required.

b. Store and maintain HPDs in a clean and sanitary manner.

- c. Report noise hazards, exposures, and unusual circumstances to their supervisor.
- d. Comply with audiometric test procedures (avoid high noise exposure for 14 hours prior to the exam) and report for testing when scheduled.
- e. Participate in annual training sessions as required.

7. Occupational Health Provider

- a. Provide baseline, annual, and post-employment audiometric testing.
- b. Perform audiometric evaluations.
- c. Report hearing deficiencies (STS) within 21 days to the supervisor, safety office, and the employee for follow-up testing, examinations, and/or recommendations as appropriate.
- d. Maintain audiometric test records.

## Appendix A

### Sample

(to be completed at the facility level)

## BOEMRE HEARING CONSERVATION PROGRAM

BOEMRE Site \_\_\_\_\_

Prepared by \_\_\_\_\_ Date \_\_\_\_\_

This Hearing Conservation Program was created to protect the hearing of employees by controlling and preventing employee exposure to occupational noise levels of 85 decibels or greater. \_\_\_\_\_ is concerned about the health and safety of its employees and has taken steps to ensure that all employees recognize and avoid exposure to loud noises without proper hearing protection. Table 1 of this program list the sound levels and the permitted noise duration at which an employee can be exposed without proper hearing protection. This program follows the requirements of Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.95 - Occupational Noise Exposure and BOEMRE Safety and Occupational Health Program Policy Part 485, Chapter 11: Hearing Conservation.

Management, supervisory, and employee commitment to hearing conservation and positive attitude are important aspects of the overall hearing conservation program. The key elements of this hearing conservation program are:

1. Noise monitoring and measurements
2. Noise exposure control
3. Audiometric testing and followup
5. Personal hearing protection
6. Employee education
7. Recordkeeping

\_\_\_\_\_ has been designated as the program administrator for the Hearing Conservation Program at \_\_\_\_\_.

### NOISE LEVEL MONITORING AND EVALUATION

The success of the BOEMRE's hearing conservation policy and program depends on an accurate knowledge of the existing noise environment. Accurate surveys define areas within acceptable guidelines for noise exposure and those areas where potentially harmful noise exposure exists. Effective noise exposure measurement prevents possible loss of hearing by detecting work areas where employees must wear hearing protection.

Detailed noise measurements have been performed for the following areas or processes:

| Area / Process/Personal                      | Date         |
|--|--------------|
| Ocean Baroness Semi-submersible              | June 4, 2007 |
| Exxon ST 54G Production Platform             | June 5, 2007 |
| PL 13-7                                      | June 6, 2007 |
| PL-10-B Production Platform                  | June 6, 2007 |
| Rowan Alaska Jackup Drill Rig (pulling pipe) | June 7, 2007 |
| Apache Eugene 346 Production Platform        | June 7, 2007 |
| Helicopter – Augusta A109                    | June 2007    |
| Helicopter – A-Star 350 (187EH w/o AC)       | June 2007    |
| Helicopter – A-Star 350 (118TA with AC)      | June 2007    |
| Helicopter – Augusta A119 (N715RT)           | June 2007    |

Area monitoring was conducted using a Type 1 Quest Sound Level Meter (Model 1800). Results of area monitoring are included in Table 2. Personal noise monitoring was conducted using Quest Q-300 Noise Dosimeters worn by employees performing different activities throughout the day. The dosimeters were worn for the duration of the work shift or at least long enough to establish an average noise exposure. All affected employees were notified of the results. Results of personal noise monitoring are included in Table 3. A rule of thumb for those areas where a sound survey has not been performed is “When you feel the need to shout in order to be heard three feet away, the noise levels are probably 85 dBA or more,” and requirements of the Hearing Conservation Program should be initiated.

The full report of the survey is maintained by \_\_\_\_\_. Additional monitoring will be conducted whenever changes in work practices or methods change noise exposures.

Based on the results of the noise exposure measurements, many areas/jobs have been designated as work areas where employees’ noise exposure may exceed the action level of 85 dBA. Tables 2 – 4 list areas, processes, and activities where noise monitoring has demonstrated exposure above the Action Level or Permissible Exposure Limit.

## **NOISE CONTROLS**

\_\_\_\_\_ recognizes the desirability of controlling existing noise levels by engineering and/or administrative controls, and will use these controls to reduce employees’ exposure to high noise levels when feasible. Both engineering and administrative controls will continue to be considered and implemented on a continuing basis.

## **AUDIOMETRIC TESTING**

The objective of this hearing conservation program is the preservation of the hearing of employees. In order to achieve this goal, an effective audiometric testing program has been implemented. Audiometric testing provides an “early warning” of hearing disability. Factors

such as noisy hobbies, ear infections, diseases of the ear as well as general illness may also cause hearing loss.

Audiograms and evaluations are conducted by \_\_\_\_\_, who follow current OSHA and industry standards and uses accepted procedures and equipment to conduct the tests. Yearly comparisons to the baseline audiograms are also conducted by \_\_\_\_\_.

This program includes:

1. Audiograms at time of hire for all employees working in high noise areas or jobs.
2. Baseline audiograms for existing employees working in high noise areas or jobs.
3. Annual audiograms for all employees working in high noise areas or jobs.

The comparison of the annual audiogram to the baseline audiogram helps to determine the effectiveness of the hearing conservation program and ensures the protection of employees' hearing. \_\_\_\_\_ is responsible for reviewing the recommendations of the audiologist or physician.

## **PERSONAL HEARING PROTECTION**

Due to the complexity of many operations and activities, some noise levels cannot be reduced to below acceptable limits. Until such time as engineering and/or administrative controls reduce the amount of noise exposure to or below the allowed limits, appropriate hearing protection devices (HPDs) are available and required to be used by employees working in loud noise exposure jobs or areas. Some areas that require the use of HPDs are listed in Table 1. This list is not all inclusive. It is strongly recommended that employees wear hearing protectors whenever exposed to noise levels greater than 85dBA and double hearing protection whenever exposed to noise greater than 104dBA, regardless of duration.

## **EMPLOYEE EDUCATION**

All employees working in loud noise exposure areas or jobs are trained before initial assignment and at least annually on the following topics:

1. The effects of noise on hearing and hearing loss.
2. The purpose of hearing protectors.
3. The advantages, disadvantages, and attenuation of various types of HPDs.
4. Instructions on selection, fitting, use, and care of HPDs.
5. The purpose of audiometric testing.

6. An explanation of the audiometric test procedures.
7. Locations where hearing protection is required.
8. The Bureau Hearing Conservation Policy and this Hearing Conservation Program.
9. The Occupational Noise Exposure regulation (29 CFR 1910.95).

\_\_\_\_\_ is responsible for scheduling initial and annual hearing conservation training. \_\_\_\_\_ is responsible for conducting the training and maintaining documentation.

### **RECORDKEEPING**

\_\_\_\_\_ is responsible for maintaining exposure measurement records.  
\_\_\_\_\_ is responsible for maintaining audiometric test results for all employees working in high noise jobs or areas. These records will be maintained for the duration of the employment of the affected employee. All records related to this program will be provided upon request to employees, former employees, or representatives designated by the individual employee.

**Table 1**

**Table of Permissible Noise Exposure Limits**

| <b>Sound Level (dBA)</b> | <b>Permitted Duration per Workday (hours)</b> | <b>Sound Level (dBA)</b> | <b>Permitted Duration per Workday (hours)</b> |
|--------------------------|---|--------------------------|---|
| 90                       | 8   | 103                      | 1.32  |
| 91                       | 6.96  | 104                      | 1.15  |
| 92                       | 6.06  | 105                      | 1   |
| 93                       | 5.28  | 106                      | 0.86  |
| 94                       | 4.6   | 107                      | 0.76  |
| 95                       | 4   | 108                      | 0.66  |
| 96                       | 3.48  | 109                      | 0.56  |
| 97                       | 3.03  | 110                      | 0.5   |
| 98                       | 2.63  | 111                      | 0.43  |
| 99                       | 2.3   | 112                      | 0.38  |
| 100                      | 2   | 113                      | 0.33  |
| 101                      | 1.73  | 114                      | 0.28  |
| 102                      | 1.52  | 115                      | 0.25  |
|                          |   | Greater than 115         | Never   |

*This table describes the sound level and the permitted time duration that an employee can work without the use of hearing protection.*

**Table 2**

Noise Exposure Survey - June 2007  
Gulf of Mexico Region

Sound Level Meter Readings (Area/Process)

| <b>*Ocean Baroness Semi-submersible - June 4, 2007</b> |            |
|--|------------|
| <b>Location</b>  | <b>dBA</b> |
| Flight deck  | 78         |
| In office space  | 75         |
| Transformer room (noise source is ventilation system)  | 89-94      |
| Engine room  | 100-110    |
| Speaker announcement                                   | 96         |
| Shaker house (vent on; shaker not operating)           | 90-92      |
| Mud pit room   | 93-94      |
| Sack room  | 82-85      |
| Mud Pump room (pumps not operating)                    | 86         |
| Welding area   | <80        |
| Mud gumbo-buster                                       | 84         |
| Rig floor (running cable down hole)                    | 85-88      |

*\*There was no active drilling during this visit*

| <b>Exxon ST 54G Production Platform - June 5, 2007</b> |            |
|--|------------|
| <b>Location</b>  | <b>dBA</b> |
| Muster area on deck                                    | 75         |
| Compressor building                                    | 98-99      |
| On production deck                                     | <80        |
| Bleed off of SSV exhaust on well bay deck              | 103        |
| Bleed off on header deck                               | 94-95      |
| Header deck  | 88-90      |
| Pipeline pump (1 of 2 pumps operating)                 | 94-95      |
| Flow valve area  | 98-99      |
| Production deck area                                   | 86-88      |
| High voltage room                                      | <70        |
| Generator room (one 250kw gen set running)             | 90-95      |
| Fire water pump  | 108-110    |
| On Crane when engine revving                           | 104        |
| On Crane idling  | 98         |
| On Crane outside of crane cab                          | 86-88      |

Noise Exposure Survey - June 2007  
Gulf of Mexico Region

Sound Level Meter Readings (Area/Process)

| PL 13-7 - June 6, 2007                        |         |
|---|---------|
| Location                                      | dBA     |
| Background noise level                        | 80      |
| SSV bleed down                                | 105     |
| Holding check                                 | 112     |
| Helicopter switching landing                  | 97      |
| Fog horn                                      | 117     |
| Generator room                                | 95-96   |
| Compressor control panel                      | 90-91   |
| Compressor platform                           | 94-95   |
| Low deck sand blasting                        | 104     |
| Pipeline pump (with sandblasting)             | 94-95   |
| Pipeline pump (without adjacent sandblasting) | 90      |
| 10 feet from alarm                            | 124     |
| Crane check (on crane platform)               | 104-105 |
| Air compressor                                | 86-87   |
| Chiller/cooler                                | 88-89   |
| Background noise on 37R                       | 87      |

| PL-10-B Production Platform- June 6, 2007 |        |
|---|--------|
| Location                                  | dBA    |
| Cellar deck                               | 90-96  |
| Pipeline pump                             | 90-96  |
| Control room                              | <83    |
| Generator room (one running)              | 99-103 |
| Fire water pump                           | 98-99  |
| Cellar deck background noise              | 94     |
| Compressor                                | 96-103 |

Noise Exposure Survey - June 2007  
Gulf of Mexico Region

Sound Level Meter Readings (Area/Process)

| Rowan Alaska Jackup Drill Rig (pulling pipe) - June 7, 2007 |         |
|---|---------|
| Location  | dBA     |
| Below crane   | 90-91   |
| Cement/chemical storage                                     | 88      |
| Mud pump room operating                                     | 89-96   |
| Cement room (not operating)                                 | 80      |
| Cement mixer  | 103-104 |
| SCR generator   | 94-99   |
| Generators (between 4 units in operation)                   | 105-110 |
| Mud pit room  | 91-92   |
| On deck adjacent to ventilation fans                        | 100-103 |
| Shell shaker  | 86-89   |
| Winch operating   | 103     |
| Winch brake   | 112-114 |
| Accumulator   | 88-93   |

| Apache Eugene 346 Production Platform - June 7, 2007         |         |
|--|---------|
| Location   | dBA     |
| Top deck   | 70-75   |
| Electric compressor  | 84-91   |
| Electric compressor from production deck                     | 70-80   |
| Switch panel for generator                                   | <70     |
| 2 <sup>nd</sup> level outside of turbine generator enclosure | 86-88   |
| Fire water pump  | 105-108 |
| Oil shipping pumps   | 88-90   |
| Water treatment  | 83      |
| Diesel fire pump start-up                                    | 113     |

**Table 3**

Noise Exposure Survey - June 2007  
Gulf of Mexico Region

Dosimetry (Personal) Sampling Data

| Date  | Office | Employee | Helicopter Type (tail numbers in parentheses) | Flight Time   | Total Sample Duration (hours & min) | 8-hr TWA dBA (% dose)<br>*AL Comparison | 8-hr TWA dBA (% dose) **PEL Comparison |
|-------|--------|----------|---|---|-------------------------------------|---|--|
| 4-Jun | Houma  | A        | A-Star 350 (187EH)                            | 120 min   | 7 hr 44 min                         | 94.8 (188%)                             | 94.5 (180%)                            |
| 4-Jun | Houma  | B        | Koala A-119 front seat (N715RT)               | 50 min + 330 min in office                            | 9 hr                                | 83.7 (41%)                              | 82.8 (37.4%)                           |
| 4-Jun | Houma  | C        | A-Star 350 (118TA)                            | 60 min  | 9 hr 14 min                         | 84 (50.7%)                              | 82.6 (41.5%)                           |
| 4-Jun | Houma  | D        | A-Star 350 (187EH)                            | 180 min   | 7 hr 40 min                         | 93.1 (147%)                             | 92.8 (141.2%)                          |
| 5-Jun | Houma  | E        | A-Star 350 (118TA)                            | 130 min flight 5 production platforms; 1 hr in office | 8 hr 36 min                         | 84.9 (51.6%)                            | 83.6 (43.2%)                           |
| 5-Jun | Houma  | F        | Koala 119 (N715RT)                            | 145 min flight; 2 rigs: semi and jack-up not drilling | 7 hr 24 min                         | 95.0 (186.2%)                           | 94.9 (183%)                            |
| 5-Jun | Houma  | G        | A-Star 350 (187EH)                            | 60 min flight; 3 production platforms                 | 7 hr 15 min                         | 88.4 (71.4%)                            | 87.5 (63.7%)                           |
| 5-Jun | Houma  | H        | A-Star 350 (187EH)                            | 60 min flight; 3 production platforms                 | 7 hr 10 min                         | 88.5 (71.5%)                            | 87.9 (65.6%)                           |
| 6-Jun | Houma  | E        | A-Star 350 (187EH)                            | 60 min flight; 3 production platforms; 45 min on boat | 9 hr 6 min                          | 83.2 (44%)                              | 81.7 (36.5%)                           |
| 6-Jun | Houma  | I        | A-Star 350 (118TA)                            | 75 min flight; 3 prod platforms                       | 6 hr 52 min                         | 85.0 (52.95%)                           | 86.5 (32.44%)                          |
| 6-Jun | Houma  | H        | A-Star 350 (118TA)<br>Koala A119 (N715RT)     | Accompanied --- but also tested Koala                 | 6 hr 51 min                         | 89.9 (83.6%)                            | 88.4 (68.0%)                           |
| 6-Jun | Houma  | F        | Koala A119 (N715RT)                           | 1.3 hrs flight; 2 hrs on rig; 2 hrs on rig            | 7 hr 11 min                         | 92.0 (118.5%)                           | 91.6 (112.6%)                          |

Noise Exposure Survey - June 2007  
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Dosimetry (Personal) Sampling Data

| Date  | Office    | Employee | Helicopter Type (tail numbers in parentheses) | Flight Time  | Total Sample Duration (hours & min) | 8-hr TWA dBA (% dose)<br>*AL Comparison | 8-hr TWA dBA (% dose) **PEL Comparison |
|-------|-----------|----------|---|--|-------------------------------------|---|--|
| 7-Jun | Lafayette | F        | Augusta A109                                  | 130 min flight; Jack rig and production platform; 2 hr weather delay in am | 5 hr 32 min                         | 94.5 (128%)                             | 94.2 (94.5%)                           |
| 7-Jun | Lafayette | J        | A-Star 350 (N186EH with a/c )                 | 114 min flight   | 8 hr 28 min                         | 93.8 (178.9%)                           | 93.6 (173.6%)                          |
| 7-Jun | Lafayette | K        | A-Star 350 (N405 A4 without a/c)              | 145 min flight; 2 rigs: semi and jack-up not drilling; production          | 8 hr 26 min                         | 96.4 (259.9%)                           | 96.3 (254.8%)                          |
| 7-Jun | Lafayette | L        | A-Star  | 125 min flight; Drill rig and prod platform                                | 7 hr 51 min                         | 88.0 (79.2%)                            | 87.7 (75.55%)                          |

*\*AL - Action level - An 8-hour time-weighted average of 85 decibels measured on the A-scale, slow response, or equivalently, a dose of 50 percent. The point at which the HCA requires implementation of a continuing, effective hearing conservation program.*

*\*\*PEL - Permissible Exposure Limit (PEL) – The maximum allowable exposure, established by OSHA, for which a worker can be exposed over an eight hour period. The PEL for noise exposure is 90 dBA.*

**Table 4**

Noise Exposure Survey - June 2007  
 Gulf of Mexico Region  
 Octave Band Analysis of Helicopters

|                                 | <b>Type of Helicopter</b>                  |                                      |                                |  |
|---------------------------------|--|--------------------------------------|--------------------------------|--|
|                                 | Augusta A109                               | A-Star 350<br>(187EH<br>without A/C) | A-Star 350 (118TA<br>with A/C) | Augusta A119<br>(N715RT)                   |
| Frequency (Hz)                  | dB linear                                  | dB linear                            | dB linear                      | dB linear                                  |
| 16K                             | 82   | 69.4                                 | 61.6                           | 72   |
| 8K                              | 91   | 74.2                                 | 66.8                           | 83   |
| 4K                              | 101  | 81                                   | 75.7                           | 94   |
| 2K                              | 101.4                                      | 86.5                                 | 81.1                           | 102.4                                      |
| 1K                              | 96.2                                       | 88                                   | 81.5                           | 98.1                                       |
| 500                             | 96.2                                       | 90                                   | 85.2                           | 99.8                                       |
| 250                             | 94   | 95                                   | 91.5                           | 92.9                                       |
| 125                             | 97   | 96.8                                 | 94.5                           | 92.1                                       |
| 63                              | 106  | 102.4                                | 101.3                          | 101.1                                      |
| 31.5                            | 114.4                                      | 109.5                                | 110.8                          | 110.5                                      |
| Calculated dBA                  | 106  | 94                                   | 88                             | 105  |
| Measured dBA<br>while in flight | 100-107 - rear<br>passenger<br>compartment | 96 - center of<br>cockpit            | 87-88 - center of<br>cockpit   | 101-103 - rear<br>passenger<br>compartment |
|                                 | 97-98 - front<br>seats                     |                                      |                                | 94-95 - front seats                        |