Podium Session 119

Noise Exposure and Hearing Conservation

Tuesday, May 21, 2013, 10:30 AM – 12:30 PM

CS-119-01
Improving Hearing Conservation Performance in a Petrochemical Manufacturing Facility
A. Rovira, M. Karr, J. Tudor, Shell Oil Company, Deer Park, TX.

Situation/Problem: Hearing conservation is a complicated process which is only as strong as its weakest link. 1. Qualified personnel must be involved in the medical, industrial hygiene, plant engineering, and management must work together effectively. 2. Motivating and effective information and training is needed for exposed employees, with periodic reminders. 3. Area and personal sound surveys must be used for awareness, hearing protection selection, and noise abatement. 4. Noise reduction efforts must be active in existing noisy areas and for new equipment purchases. 5. Hearing protection selected must be effective and consistently used. 6. Audiometric monitoring must be done in a consistent manner under professional supervision.

Resolution, Results and Lessons Learned: This study will present the results of a benchmarking among petroleum refining and petrochemical manufacturing facilities, and an assessment of the correlation between performance in the six key areas and the effectiveness of the hearing conservation programs. A pilot test of new technology available for fit testing hearing protection will be presented, as well as the effect of innovative ways to motivate employees to protect their hearing.

SR-119-02
Noise Exposure Assessment on an Onshore Gas Platform: Identification of Noise Sources and Contribution to Workers’ Doses
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Objective: Workplace inventory and characterization of noise sources may be difficult tasks when workers are not working in a fixed setting. The objective of this work was to identify the most important noise sources contributing to doses received by production and maintenance workers on an onshore gas platform.

Methods: Noise exposures (Lex-8h) of production workers (operators, supervisors and distributed control system (DCS) technicians) and maintenance workers (mechanics, electricians, instrument-technicians) were monitored using a data logging dosimeter (Q-300 Noise-Pro DLX) from Quest Technologies. The dosimeters were set on ‘A’ frequency weighting, 3 decibels exchange rate, criterion level 85 dBA, slow response, and a threshold of 70. During measured shifts, the industrial hygienist completed an activity sheet reporting the timing of each of the various tasks performed, their use of hearing protection devices (HPDs), and various environmental factors. Times registered from dosimeters and times registered from work activities were matched to identify important sources of noise. A given factor was considered a noise source if Lex-8h exceeded 85 dBA.

Results: Lex-8h for operators, supervisors, mechanics and electricians exceeded 85dBA. For the operators, the most important apparatus linked to received doses were turbo-compressors and the aero-cooling process. However, for the mechanics, the highest exposed group among the maintenance group, the most important devices with respect to noise exposure turbo-compressors, the aero-cooling process, and the tools used in the tool crib.

Conclusions: Most workers on onshore gas platforms perform surveillance and maintenance tasks and are not confined to a fixed setting. Since engineering controls present important challenges in this environment, identification of noise sources may be a
key approach which could lead to exposure control using administrative actions.

CS-119-03
Noise Control Methods for Shipbuilding
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Situation/Problem: OSHA regulations for Occupational Exposure to Noise in 29CFR 1910.95 define specific requirements for shipyard employment, including surveillance, audiometric testing, training and use of approved PPE for exposures exceeding 85 dBA over a full shift. The goal of this project was to accurately measure and characterize representative noise levels generated by common shipyard manufacturing and maintenance processes, to define both representative exposure levels and to evaluate and describe the most effective control methods in place.
Resolution: Field work in this project included site visits to four participating shipyards to perform full-shift personal noise dosimetry and sound-level surveys during selected “high noise” shipyard processes. The testing represented a comprehensive cross-section of equipment and processes commonly used in shipbuilding.
Results: Full shift dosimeter testing was completed in accordance with three different measurement parameters corresponding to the criteria established for OSHA PEL compliance, OSHA Hearing Conservation Program thresholds and the ACGIH® Threshold Limit Values® for Noise. Of the 30 full shift dosimetry results recorded during the Field Work, 13 (43%) exceeded the OSHA PEL Criteria of 90 dBA, 22 (73%) exceeded the OSHA Hearing Conservation trigger level of 85 dBA, and 27 (90%) exceeded the ACGIH® TLV® criteria of 85 dBA.
Lessons Learned: High noise operations remain widespread in shipyard work. Each participating shipyard demonstrated some site-specific and innovative noise control strategies, which are presented with recommendations for future action.

SR-119-04
Improving the Likelihood of Detecting a Significant Hearing Threshold Shift during Annual Audiometric Hearing Assessments
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Objective: The objective of the research was to test the hypothesis that audiometric test repeatability could be improved, to reducing test and re-test errors, by replacing the supra-aural headphones normally utilised for an audiometric test, with ear inserts.
Methods: Comparative audiometric tests were conducted on a study population of 48. The tests comprised 3 audiometric tests using each device (headphones and inserts) using a randomized test sequence. Tests were conducted on the subjects' right ear only to reduce subject test fatigue. The threshold data was analyzed using paired t-tests, pairing the absolute values of the differences between first and second (T2-T1) and second and third (T3-T2) test data.
Results: The paired t-tests demonstrated no significant difference between test and retest data when data for each device was compared with subsequent data for the same device. A further paired t-test compared data between the two devices, this demonstrated a significant difference between the test data from each device. Further analysis was then undertaken using the threshold data, the mean, the standard deviation and threshold range were calculated. When the insert data was compared with the supra-aural headphone data, each of these calculated values was lower for the ear inserts.
Conclusions: The results indicate a significant difference between the performance of the two devices. Test, retest variability was lower for the ear inserts and the threshold of hearing that could be measured was lower when conducting the audiometric tests using the ear inserts. This suggests that the ability to detect hearing threshold and precision of repeated audiometric tests can be improved by replacing supra-aural headphones with ear inserts.