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<b>14. ABSTRACT</b> Permanent threshold shifts (PTS) are one of the key indicators used in hearing conservation to monitor program effectiveness. Across the Department of Defense, individual hearing test records are collected and maintained using the Defense Occupational and Environmental Health Readiness System-Data Repository (DOEHRS-DR). DOEHRS-DR reports are not widely used in the Air Force for program evaluation purposes, due in part to the understanding that not all base level records exported to the DOEHRS-DR are received. When this happens, it causes a discrepancy in the PTS rate local level compared to the DOEHRS-DR database level. Investigation revealed that this can be caused by interruptions during data export, incomplete or blank fields, or use of an incorrect reference audiogram. To mitigate these issues, it is recommended that public health technicians ensure all testing forms are filled out completely and correctly and that demographic information downloaded from DOEHRS-DR is still correct for the individual prior to testing. Since the capture of exported records continues to influence the PTS rates in the DR, ongoing confirmation that files exported to DOEHRS-DR are uploaded successfully is warranted.					
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**AFRL-SA-WP-HO-2012-0002**



**Data Discrepancies Between the Defense  
Occupational and Environmental Health  
Readiness System-Hearing Conservation  
and Defense Occupational and  
Environmental Health Readiness System-  
Data Repository**

**September 2012**

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Across the Department of Defense (DoD), individual tests for military and civilian members are recorded using the Defense Occupational and Environmental Health Readiness System-Hearing Conservation (DOEHRS-HC) software then exported to the Defense Occupational and Environmental Health Readiness System-Data Repository (DOEHRS-DR). DOEHRS-DR provides users with a report generating feature, based on a selection of items, such as a permanent threshold shift (PTS) report for their unit (see attachment for full list). DOEHRS-DR reports are not widely used in the U.S. Air Force (USAF) for program evaluation purposes due to perceptions within the public health community that not all base level records exported to DOEHRS-DR are received. For these reasons, USAF PTS rates may not be reflective of actual PTS rates and are thus usually calculated at each unit based on local recordkeeping methods, typically a Microsoft Excel<sup>®</sup> spreadsheet.

Data discrepancies between tests in the local DOEHRS-HC database and the tests visible in DOEHRS-DR and Oracle Discoverer application were investigated for four USAF locations. The bases were chosen from a list of USAF sites that reported PTS rates for a 6-month period to the Chief of Public Health Operations at the Air Force Medical Services Agency. Three bases were chosen because their reported PTS rates were notably lower than the PTS rates in DOEHRS-DR; the remaining base was chosen because the PTS rates were very similar. Additionally, the bases were requested to send copies of their local hearing conservation databases, containing between 12 months and 5 years worth of hearing tests, by compact disc to the U.S. Air Force School of Aerospace Medicine (USAFSAM) as the dataset for the independent calculation.

Investigation of receiving records into DOEHRS-DR identified three issues: (1) interrupted data export, (2) incomplete or blank fields in the hearing evaluation forms, and (3) incorrect reference audiogram issue.

### *Interrupted Data Export*

USAF standards require that hearing conservation program data be exported monthly. The number of records exported may range from 1 up to about 600, depending on the size of the base's hearing conservation program. When a user begins to export data, the DOEHRS-HC program will attempt to export any new or edited tests that have been completed since the time of the last export. If an interruption occurs (either by the user canceling the export or a timeout error), some files may not be received by DOEHRS-DR. However, all files involved in an interruption will be flagged in the local DOEHRS-HC program as exported; therefore, the local user is unaware that some files were not received by DOEHRS-DR. To re-export exams, the user must manually remove the flags from all the records, and export without interruption, or export the database to an external data storage device and upload the records manually on the DOEHRS-DR website. Specific instructions on unflagging records are not available in the DOEHRS-HC user manual, nor is it possible to ascertain which records did not upload to DOEHRS-DR without manually inquiring each Social Security number. When an export is unsuccessful, there is not an error message or user feedback in the DOEHRS-HC software to indicate that it was not successful. These processes are not user friendly and require database management knowledge that most public health technicians do not possess.

### *Incomplete or Blank Fields*

Before an initial hearing test is performed, the individual's information must be entered into DOEHRS-HC. If the individual never had a hearing test within the DoD and is new to DOEHRS, all the information is manually entered by the public health technician. If the individual has had previous hearing tests at any DoD location, the tests are likely available for import into the local database. In both circumstances, the demographics must be verified for accuracy and all fields completed appropriately. In fact, any missing information or information entered in an inappropriate format may cause DOEHRS-DR to reject the export of data.

The most common cause of incomplete fields in the USAF is the exclusion or mislabeling of the patient's unit or workplace identification code (UIC and WIC, respectively). To comply with USAF official standards, the DOEHRS-HC software was designed to accept UIC/WIC designations. However, this standard was rescinded as of January 2006. Although use of the WIC for identifying workplaces is no longer required by regulation, many USAF bioenvironmental engineering offices continue to use them as a way to organize the shops under their surveillance. The DOEHRS-HC system was constructed to allow use of the WIC in the UIC/WIC field (other services use the UIC). The use of too few characters or special characters increases the possibility that a test will not be accepted into the database; moreover, if the field is left blank, the test is rejected during export. When a test with the blank WIC field is rejected by DOEHRS-DR during export, the other hearing tests in that export are also rejected. However, all the tests in that export would subsequently be flagged as exported in the local database. Again, the local user is unaware that the export was unsuccessful. Adjustments to the current functions in DOEHRS-HC may allow for import of demographic data directly, which could essentially eliminate the need for manual entry in the UIC/WIC field in most cases and prevent blank WIC fields.

### *Incorrect Reference Audiogram*

In 2009, a business rule change, agreed on by each service collectively, regarding which baselines are used as references for annual tests created significant discrepancies in the PTS rates as reported in DOEHRS-DR reports. Historically, there are three types of baseline hearing tests (DD2215 Reference Audiogram) used in DOEHRS-HC:

- Reason 1: Prior to Initial Duty in Noise
- Reason 2: Following Exposure in Noise Duties
- Reason 3: Reestablished After Follow-Up Program

Before the business rule change, the system default employed the most recent baseline test, regardless of the Reason code. After the business rule change, the system began using only the most recent Reason 3 test, ignoring Reason 1 and Reason 2 baselines. If no Reason 3 baseline can be found for an individual, the system will select the first baseline on record. Typically, an examiner can import records for an individual from DOEHRS-DR into their local computer, where discrepancies in baseline selection can be noted and fixed. Legacy records from Hearing Evaluation Automated Response System cannot be inquired into the local computer but are mostly visible on the DOEHRS-DR website. Therefore, the baseline that is chosen in DOEHRS-HC is not necessarily the same baseline that is chosen by DOEHRS-DR.

Subsequently, the periodic test may reflect “no shift” in the local database using the available baselines tests. When the periodic test is exported, additional, older baselines that are not available at the local level may be employed for comparison and result in a “positive shift.” Therefore, the locally reported PTS rate can be different from that of the DOEHRS-DR report PTS rate for the same location, depending on which baseline is compared against the current hearing test.

Due to the discrepancy in positive shifts noted at the local level compared to the DOEHRS-DR database level, USAF PTS rates are hand calculated at base level. Unfortunately, hand calculation of PTS rates can result in entry errors; for example, what is considered a true PTS case can vary from base to base or ensuring all cases are documented can be almost impossible, especially for very large installations. For some installations, the DOEHRS-DR PTS rate reports do not reflect the actual significant threshold shift or PTS incidence, due to the inability of the annual test to be compared to the most recent baseline test, as described above.

Public health technicians should take great care in ensuring that testing forms are filled out completely and correctly and that demographic information downloaded from DOEHRS-DR is still correct for the individual prior to testing. To address the issue of incomplete or blank fields in hearing evaluation forms during export, it is highly recommended that bases confirm that files exported to DOEHRS-DR are uploaded successfully. One to 2 weeks after the export, a Hearing Conservation Program manager can log on to the DOEHRS-DR website and check the status of the upload in the “HC Upload History” report. It will label the export as a “success” or list a reason for a failed transfer. The DOEHRS-DR website can also provide the number of exported tests, which can be matched to the number of tests completed at the base during the same time period as reported in the DOEHRS-HC “Records Received” report.

USAF hearing conservation program subject matter experts are assigned to the USAFSAM Epidemiology Consult Services. The subject matter experts routinely monitor activity of the DOEHRS-DR Air Force-wide and serve as the main points of contact for a variety of hearing conservation issues. Because of the consultations and requests USAFSAM receives, as well as the recent report to Congress from the Government Accountability Office, Hearing Loss Prevention<sup>1</sup>, the need to verify the functionality of the DOEHRS-DR PTS rates became apparent. The Government Accountability Office report to Congress recommended DoD address the issues that have been identified within hearing conservation programs in regard to the mechanisms that are used to monitor and act on performance data. This includes quality assurance for data entry and accuracy, reporting capacity, and service-wide integration.<sup>1</sup> To our knowledge, the magnitude of error caused by these data discrepancies in significant threshold shift and PTS rates has not been systematically investigated and would be valuable in monitoring program effectiveness.

If you need any additional information, please contact Capt McKenna at [Elizabeth.Mckenna@wpafb.af.mil](mailto:Elizabeth.Mckenna@wpafb.af.mil) or Laurel Lloyd at [Laurel.Lloyd.ctr@wpafb.af.mil](mailto:Laurel.Lloyd.ctr@wpafb.af.mil).

#### Reference:

1. U.S. Government Accountability Office, Hearing Loss Prevention: Improvements to DOD Hearing Conservation Programs Could Lead to Better Outcomes, GAO-11-114, GAO, Washington, DC, Jan 2011, URL: <http://www.gao.gov/assets/320/315395.pdf>. Accessed 18 Apr 2012.

## ATTACHMENT

### DOEHRS-DR Report Names (Functional User Access Role)

#### REPORT NAME

#### AIR FORCE PROFILE

##### By Testing Installation

Air Force - Hearing Profile By DoD  
Air Force - Hearing Profile By DoD, Major Command  
Air Force - Hearing Profile By DoD, Region  
Air Force - Hearing Profile By Major Command, Zip/PAS/UIC  
Air Force - Hearing Profile By Region, Zip/PAS/UIC  
Air Force - Hearing Profile By Zip/PAS/UIC  
Air Force - Hearing Profile By Zip/PAS/UIC, Branch/Career Field/Activity  
Air Force - Hearing Profile By Zip/PAS/UIC, Hearing Protection Device  
Air Force - Hearing Profile By Zip/PAS/UIC, Pay Grade  
Air Force - Hearing Profile By Zip/PAS/UIC, SDOC  
Air Force - Hearing Profile By Zip/PAS/UIC, UIC/WIC

##### By Person

Air Force - Hearing Profile By DoD, Branch/Career Field/Activity  
Air Force - Hearing Profile By DoD, Hearing Protection Device  
Air Force - Hearing Profile By DoD, Major Command, Branch/Career Field/Activity  
Air Force - Hearing Profile By DoD, Major Command, Hearing Protection Device  
Air Force - Hearing Profile By DoD, Major Command, Pay Grade  
Air Force - Hearing Profile By DoD, Major Command, SDOC  
Air Force - Hearing Profile By DoD, Pay Grade  
Air Force - Hearing Profile By DoD, SDOC  
Air Force - Hearing Profile By Major Command, Zip/PAS/UIC, Branch/Career Field/Activity  
Air Force - Hearing Profile By Major Command, Zip/PAS/UIC, Hearing Protection Device  
Air Force - Hearing Profile By Major Command, Zip/PAS/UIC, Pay Grade  
Air Force - Hearing Profile By Major Command, Zip/PAS/UIC, SDOC  
Air Force - Hearing Profile By UIC/WIC, Hearing Protection Device  
Air Force - Hearing Profile By UIC/WIC, Pay Grade  
Air Force - Hearing Profile By UIC/WIC, SDOC

#### AIR FORCE SUMMARY TOTALS

##### By Testing Installation

Air Force - Summary Totals by DoD  
Air Force - Summary Totals by Major Command  
Air Force - Summary Totals by Major Command, Zip/PAS/UIC  
Air Force - Summary Totals by Region  
Air Force - Summary Totals by Region, Zip/PAS/UIC  
Air Force - Summary Totals by Zip/PAS/UIC

By Person

Air Force - Summary Totals by DoD  
Air Force - Summary Totals by Major Command  
Air Force - Summary Totals by Major Command, Zip/PAS/UIC  
Air Force - Summary Totals by UIC/WIC

**DISTRIBUTION OF PERSONNEL BY SDOC**

Military >=H-3 Profiles - By Testing Installation

Air Force Distribution of Personnel by SDOC >=H-3 Hearing Profile  
Air Force Distribution of Personnel by SDOC >=H-3 Hearing Profile by Major Command  
Air Force Distribution of Personnel by SDOC >=H-3 Hearing Profile by Major Command, Zip/PAS/UIC  
Air Force Distribution of Personnel by SDOC >=H-3 Hearing Profile by Region  
Air Force Distribution of Personnel by SDOC >=H-3 Hearing Profile by Region, Zip/PAS/UIC  
Air Force Distribution of Personnel by SDOC >=H-3 Hearing Profile by Zip/PAS/UIC

Military >=H-3 Profiles - By Person

Air Force Distribution of Personnel by SDOC >=H-3 Hearing Profile  
Air Force Distribution of Personnel by SDOC >=H-3 Hearing Profile by Major Command  
Air Force Distribution of Personnel by SDOC >=H-3 Hearing Profile by Major Command, Zip/PAS/UIC  
Air Force Distribution of Personnel by SDOC >=H-3 Hearing Profile by UIC/WIC

Civilian Compensable Hearing Loss - By Testing Installation

Distribution of Personnel by SDOC Potential Hearing Loss Compensation by DoD  
Distribution of Personnel by SDOC Potential Hearing Loss Compensation by DoD, Major Command  
Distribution of Personnel by SDOC Potential Hearing Loss Compensation by DoD, Major Command, Zip/PAS/UIC  
Distribution of Personnel by SDOC Potential Hearing Loss Compensation by DoD, Region  
Distribution of Personnel by SDOC Potential Hearing Loss Compensation by DoD, Region, Zip/PAS/UIC  
Distribution of Personnel by SDOC Potential Hearing Loss Compensation by Zip/PAS/UIC

Civilian Compensable Hearing Loss - By Person

Distribution of Personnel by SDOC Potential Hearing Loss Compensation by DoD  
Distribution of Personnel by SDOC Potential Hearing Loss Compensation by DoD, Major Command  
Distribution of Personnel by SDOC Potential Hearing Loss Compensation by DoD, Major Command, Zip/PAS/UIC  
Distribution of Personnel by SDOC Potential Hearing Loss Compensation by UIC/WIC

**HC COMPLIANCE**

By Testing Installation

Hearing Conservation Compliance Report by DoD  
Hearing Conservation Compliance Report by DoD, Zip/PAS/UIC

Hearing Conservation Compliance Report by Major Command  
Hearing Conservation Compliance Report by Major Command, Zip/PAS/UIC  
Hearing Conservation Compliance Report by Region  
Hearing Conservation Compliance Report by Region, Zip/PAS/UIC  
Hearing Conservation Compliance Report by Zip/PAS/UIC

## **NEGATIVE STS**

### **By Testing Installation**

Negative Significant Threshold Shift by DoD  
Negative Significant Threshold Shift by Zip/PAS/UIC

### **By Person**

Negative Significant Threshold Shift by DoD  
Negative Significant Threshold Shift by DoD, UIC/WIC

## **POSITIVE STS**

### **By Testing Installation**

Positive Significant Threshold Shift by DoD  
Positive Significant Threshold Shift by Major Command  
Positive Significant Threshold Shift by Major Command, Zip/PAS/UIC  
Positive Significant Threshold Shift by Region  
Positive Significant Threshold Shift by Region, Zip/PAS/UIC  
Positive Significant Threshold Shift by Zip/PAS/UIC  
Positive Significant Threshold Shift by Zip/PAS/UIC, Branch/Career Field/Activity  
Positive Significant Threshold Shift by Zip/PAS/UIC, Hearing Protection Device  
Positive Significant Threshold Shift by Zip/PAS/UIC, Pay Grade  
Positive Significant Threshold Shift by Zip/PAS/UIC, Person UIC/WIC  
Positive Significant Threshold Shift by Zip/PAS/UIC, SDOC

### **By Person**

Positive Significant Threshold Shift by DoD  
Positive Significant Threshold Shift by DoD, Branch/Career Field/Activity  
Positive Significant Threshold Shift by DoD, Hearing Protection Device  
Positive Significant Threshold Shift by DoD, Pay Grade  
Positive Significant Threshold Shift by DoD, SDOC  
Positive Significant Threshold Shift by Major Command  
Positive Significant Threshold Shift by Major Command, Branch/Career Field/Activity  
Positive Significant Threshold Shift by Major Command, Hearing Protection Device  
Positive Significant Threshold Shift by Major Command, Pay Grade  
Positive Significant Threshold Shift by Major Command, SDOC  
Positive Significant Threshold Shift by Major Command, Zip/PAS/UIC, Branch/Career Field/Activity  
Positive Significant Threshold Shift by Major Command, Zip/PAS/UIC, Hearing Protection Device  
Positive Significant Threshold Shift by Major Command, Zip/PAS/UIC, Pay Grade  
Positive Significant Threshold Shift by Major Command, Zip/PAS/UIC, SDOC  
Positive Significant Threshold Shift by UIC/WIC



Positive Significant Threshold Shift by UIC/WIC, Hearing Protection Device

**POST-DEPLOYMENT POSITIVE STS**

**By Testing Installation**

Positive Significant Threshold Shift by DoD (Post Deployment)  
Positive Significant Threshold Shift by Major Command, Zip/PAS/UIC (Post Deployment)  
Positive Significant Threshold Shift by Region, Zip/PAS/UIC (Post Deployment)  
Positive Significant Threshold Shift by Zip/PAS/UIC (Post Deployment)

**By Person**

Positive Significant Threshold Shift by DoD (Post Deployment)  
Positive Significant Threshold Shift by Major Command, Zip/PAS/UIC (Post Deployment)  
Positive Significant Threshold Shift by Region, Zip/PAS/UIC (Post Deployment)  
Positive Significant Threshold Shift by Zip/PAS/UIC (Post Deployment)

**POTENTIAL COMP**

**By Testing Installation**

Potential Hearing Loss Compensation Report by DoD  
Potential Hearing Loss Compensation Report by DoD, Major Command  
Potential Hearing Loss Compensation Report by DoD, Region  
Potential Hearing Loss Compensation Report by Major Command, Zip/PAS/UIC  
Potential Hearing Loss Compensation Report by Region, Zip/PAS/UIC  
Potential Hearing Loss Compensation Report by Zip/PAS/UIC  
Potential Hearing Loss Compensation Report by Zip/PAS/UIC, Activity  
Potential Hearing Loss Compensation Report by Zip/PAS/UIC, Hearing Protection Device  
Potential Hearing Loss Compensation Report by Zip/PAS/UIC, IDN(SSN)  
Potential Hearing Loss Compensation Report by Zip/PAS/UIC, Location  
Potential Hearing Loss Compensation Report by Zip/PAS/UIC, Paygrade  
Potential Hearing Loss Compensation Report by Zip/PAS/UIC, SDOC  
Potential Hearing Loss Compensation Report by Zip/PAS/UIC, UIC/WIC

**By Person**

Potential Hearing Loss Compensation Report by DoD  
Potential Hearing Loss Compensation Report by DoD, Activity  
Potential Hearing Loss Compensation Report by DoD, Hearing Protection Device  
Potential Hearing Loss Compensation Report by DoD, Paygrade  
Potential Hearing Loss Compensation Report by DoD, SDOC  
Potential Hearing Loss Compensation Report by Major Command  
Potential Hearing Loss Compensation Report by Major Command, Activity  
Potential Hearing Loss Compensation Report by Major Command, Hearing Protection Device  
Potential Hearing Loss Compensation Report by Major Command, Paygrade  
Potential Hearing Loss Compensation Report by Major Command, SDOC  
Potential Hearing Loss Compensation Report by Major Command, Zip/PAS/UIC  
Potential Hearing Loss Compensation Report by Major Command, Zip/PAS/UIC, Activity  
Potential Hearing Loss Compensation Report by Major Command,

Zip/PAS/UIC, Hearing Protection Device  
Potential Hearing Loss Compensation Report by Major Command,  
Zip/PAS/UIC, Paygrade  
Potential Hearing Loss Compensation Report by Major Command,  
Zip/PAS/UIC, SDOC  
Potential Hearing Loss Compensation Report by UIC/WIC  
Potential Hearing Loss Compensation Report by UIC/WIC, Hearing Protection  
Device  
Potential Hearing Loss Compensation Report by UIC/WIC, IDN(SSN)  
Potential Hearing Loss Compensation Report by UIC/WIC, Paygrade  
Potential Hearing Loss Compensation Report by UIC/WIC, SDOC

## RECORDS RECEIVED

### By Testing Installation

Records Received Analysis  
Records Received by Major Command, Zip/PAS/UIC  
Records Received by Region, Zip/PAS/UIC  
Records Received by Zip/PAS/UIC

### By Person

Records Received by UIC/WIC  
Records Received by UIC/WIC, DoD