Use of the CIRRUS CR:110AIS Personal Noise Dosimeter & Reader Unit and the QUEST 2200 Sound Level Meter

Tank Farm Operating Procedure

Industrial Hygiene

USQ # N/A-4

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<td>10/10/2017</td>
<td>Industrial Hygiene Request</td>
<td>Modified “Radiological and Contamination Control” section to current standard. Modified General Information section and steps from an editorial perspective within procedure.</td>
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<td>Inconsequential change from Records Management request.</td>
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<td>Due to software update the following general changes were implemented: Steps add/modified to address completion of field calibration. Added Note above Step 5.1.61 and modified 5.1.61. Corrected RC to PC Step 5.2.28. Modified Steps 5.2.20 through 5.2.22. Added new Steps 5.2.28 to 5.2.30.3 and Steps 5.2.31.1 and .2 for customized report. Modified Activity line above Step 5.2.32. Clarified Step 5.2.34. Added new Activity line above Step 5.2.35. Added new Activity and associated Steps 5.2.39 through 5.2.43. Modified Steps 5.3.33 and 5.3.34. Deleted Steps 5.3.35 to 5.3.40, 5.3.32. Added Note above Step 5.1.60. Changed 5.2.42.2 bullet list and table. Amended “8 Hour Dose” to ”Dose” to reflect SWIHD updates.</td>
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<td>In general: Changed to meet current writer’s standard. Added clarity and deleted ambiguity.</td>
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1.0 PURPOSE AND SCOPE

1.1 Purpose

The purpose of this procedure is to ensure the proper use of the CIRRUS CR:110AIS personal noise dosimeter (doseBadge), reader unit and the QUEST 2200 sound level meter in support of field monitoring performed in accordance with TF-OPS-IHT-007 “Using Direct Reading Instruments” and an industrial hygiene sampling plan.

1.2 Scope

The scope includes function checks for the doseBadge and QUEST 2200 sound level meter as well as downloading data from the CIRRUS CR:110AIS.

2.0 INFORMATION

2.1 Terms and Definitions

A-weighted sound level. Sound level measured on the A-frequency weighting scale of a standard sound level meter. This scale approximates the response of the human ear since it hears high noise frequencies better than lower frequencies.

Criterion level (CL). The constant sound level in dB that, if applied for 8 hours, would accumulate a “DOSE” of 100% the continuous equivalent A-weighted sound level that constitutes 100 percent of an allowable exposure. At Hanford, this is 85 dBA for an 8 hour exposure.

Dose. A percentage of the maximum allowable noise energy that a worker can be exposed to per day in reference to an occupational exposure limit (OEL). For example: a 100% value dose is equivalent to 85 dBA as an 8-hour time-weighted average; a worker exposed to 85 dBA for 4 hours has received 50% of the allowable dose, and a worker exposed to 88 dBA for 4 hours has received 100% of the allowable dose (see “exchange rate” below).

Exchange rate (ER). The number of decibels that a sound must change to either halve or double the rate of dose accumulation. 3, 4, 5, or 6 dB exchange rates are common. The exchange rate at Hanford is 3 dB.

Fast response (FAST). A measurement time constant, or averaging time, of 125 milliseconds. When “FAST” is used, the sound pressure level will closely track a fluctuating noise source, e.g. moving vehicles.
2.1 Terms and Definitions (Cont.)

Frequency. The frequency of sound describes the rate at which complete cycles of high and low pressure regions are produced by the sound source. The unit of frequency is in cycles per second (cps) which is also known as the Hertz (Hz). The frequency range of the human ear is highly dependent upon the individual and the sound level, but a normal ear will have a range of approximately 20 to 20,000 Hz at moderate sound levels, with maximum sensitivity at about 1000 Hz.

Hearing zone. OSHA defines the hearing zone as a sphere with a two foot diameter surrounding the head.

Maximum level (MAX). The highest sound pressure level, in decibels, that occurs during a given time period.

Minimum level (MIN). The lowest sound pressure level, in decibels, that occurs during a given time period.

Noise dosimeter. An instrument which records sound pressure levels over a period of time to define an individual’s exposure to noise.

Peak (absolute unweighted peak). The highest instantaneous sound pressure, in decibels, that occurs during a given time period.

Projected dose. A percentage computed by measuring dose for some time period and extrapolating it to a different time period. (Example: 50% Dose/4 hrs = 75% Projected Dose/6 hrs).

Slow response (SLOW). A measurement time constant, or averaging time of 1 second. When “SLOW” is used, the sound pressure level will not track a quickly fluctuating noise source, but will produce an average reading.

Sound pressure level (SPL). A quantity in decibels equal to 20 times the logarithm of the sound pressure divided by 20 uPa (0.00002 N/m2). The word "level" indicates that the sound pressure is a certain level above the reference level, i.e. the lowest sound pressure that can be heard by an adult with normal hearing.

Threshold level (TL). A preset level in decibels below which sound is not accumulated or averaged into the dose.

Time weighted average (TWA). The sound level in decibels that is accumulated for any time period with its average level computed over an 8 hour time period. TWA is usually measured using “A” weighting, slow response, and a 3 dB exchange rate.
2.2 General Information

The CIRRUS CR:110AIS personal noise dosimeter and QUEST 2200 sound level meter should be used in accordance with the following parameters:

- **Accuracy:** CIRRUS CR:110AIS (± 2 dB), QUEST 2200 (± 1 dB)
- **Operating temperature range:** CR:110AIS (14 to 104°F), QUEST 2200 (14 to 122°F)
- **Humidity range:** CR:110AIS (0 – 99% relative humidity (RH), non-condensing), QUEST 2200 (0 – 95% RH, non-condensing)
- **Operating range:** CR:110AIS (70 – 130 dBA, 120-140 peak dBC); QUEST 2200 (34-140 dBA, 43-143 dBC peak, 43-143 dBZ peak)
- **Warm-up time:** CR:110AIS and reader unit (< 5 sec.), QUEST 2200 (<15 sec)
- **Battery life:** CR:110AIS (20+ hrs.), QUEST 2200 (~25 hrs.) w/9V alkaline
- **Intrinsically Safe:** CR:110AIS: Ex CE II 1G, EEEx ia IIC T4 (-4 ≤ T ≤ 140°F), Ex ia IIC T4 (-4°F ≤ T ≤ 140°F); QUEST 2200: Class 1, Division 1, Groups C and D, Temperature Code T3C.
3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 The reader unit, and the charging unit do not carry intrinsically safe certification for use in hazardous atmospheres. Starting, stopping, reading, calibrating and charging the doseBadge inside of any areas designated as flammable/hazardous atmospheres is prohibited.

3.2 Radiation and Contamination Control

3.2.1 Planned work in radiological areas must be approved by Radiological Control personnel per the Radiological Risk Screening procedure TFC-ESHQ-RP-RWP-C-01.

3.2.1.1 When performed without a formal work package or approved procedure (i.e., Level 3 or 4 work), this procedure is limited to radiological areas and work activities permitted by a low risk Radiological Work Permit (RWP).

3.2.2 Before conducting sampling or monitoring, contact the responsible Radiological Control personnel for the facility or area to determine any specific survey or monitoring requirements.

- Pre, during, and post contamination survey requirements.
- Any applicable RSP’s for your specific equipment or task.
- Alternative survey or monitoring needs to support the radiological release survey process.

3.2.3 Comply with the requirements set forth by the RWP, HPT coverage, Release Survey Plan (RSP), and any other applicable procedures as determined above.

3.2.4 When exiting radiological areas where no HPT coverage was provided, inform the radiological control personnel of the use/history for the equipment being presented (e.g., only sampled air in the Contamination Area, No known history of contamination based on use, etc.) to aid them in properly evaluating the radiological release criteria needed.

3.2.5 Samples collected in a radiological area shall not be removed from the facility, transported by personnel, or submitted to an analytical laboratory until they have been evaluated by an HPT in accordance with approved procedures.
4.0 PREREQUISITES

4.1 Performance Documents

The following documents may be needed to perform this procedure:

- TFC-BSM-IRM_DC-C-02, “Records Management”
- TFC-ESHQ-S_IH-C-46, “Industrial Hygiene Reporting and Records Management”
- TFC-ESHQ-RP_RWP-C-03, “ALARA Program Planning”
- TF-OPS-IHT-007, “Using Direct Reading Instruments.”

4.2 Field Preparation

4.2.1 PERFORM a review of applicable industrial hygiene sampling plan prior to execution of this procedure.
5.0  PROCEDURE

5.1  Operating the CIRRUS CR:110AIS Personal Noise Dosimeter (doseBadge) and Reader Unit

CHECK Calibration Status

5.1.1  CONFIRM the maintenance calibration date on the sticker from Industrial Hygiene Equipment Services (IHES) is current on the doseBadge(s) and reader unit.

5.1.2  IF calibration is past due, RETURN the monitor to the equipment custodian with a completed green tag, i.e., “IH INSTRUMENT SERVICE TAG” (BT-6004-019) checking the box next to “Scheduled Maintenance Calibration.

Power On the Reader Unit

5.1.3  PRESS ON/OFF button at lower right corner.

5.1.3.1  IF the unit powers off after ~4 minutes because it is not in use, RE-PRESS ON/OFF button.

Check Battery Status of the Reader Unit

5.1.4  CHECK battery indicator icon at top right of reader screen.

5.1.5  IF battery icon appears empty, REPLACE the batteries as follows:

5.1.5.1  TURN OFF reader unit AND

REMOVE the back cover plate and the 2-AA alkaline batteries.

5.1.5.2  OBSERVE the battery orientation drawing in the battery chamber AND

INSTALL new batteries.

5.1.5.3  REPLACE the back cover plate.
5.1 Operating the CIRRUS CR:110AIS Personal Noise Dosimeter (doseBadge) and Reader Unit (Cont.)

NOTE - Charging cycle time is ~2.5 hours (from empty to full).

Check Battery Status of Charging Unit for the doseBadge

5.1.6 CHECK for the following indications:

- The indicator light blinks green slowly when “charging”; holds solid green when “charged.”
- The indicator light blinks green quickly when an error occurs, i.e. doseBadge not charging correctly.
- If no indicator light, doseBadge is not connected.

Power on the doseBadge

5.1.7 UNSCREW the doseBadge counterclockwise from the charging unit.

Check the doseBadge Status

5.1.8 GENTLY SHAKE horizontally, i.e. side-to-side (“shake-to-wake”) AND CONFIRM doseBadge blue light flashes twice to indicate it’s awake.

5.1.9 AIM reader unit infrared window (at front right end) directly towards the doseBadge infrared window.

5.1.10 KEEP units within 20 inches from one another during communication.
Use of the CIRRUS CR:110AIS Personal Noise Dosimeter & Reader Unit and the QUEST 2200 Sound Level Meter

5.1 Operating the CIRRUS CR:110AIS Personal Noise Dosimeter (doseBadge) and Reader Unit (Cont.)

5.1.11 SELECT “Stop” AND

CONFIRM the following:
- the blue indicator light on the doseBadge flashes once if successful
- the reader unit displays “stopping…ok” or “stopping…error”.

5.1.11.1 IF “stopping…error” is displayed, the unit is asleep or the units are too far away from one another, PERFORM Ste 5.1.8.

5.1.11.2 IF unsuccessful working the doseBadge, MOVE the doseBadge and radar unit closed together AND

REPEAT Steps 5.1.9 through 5.1.11 one time to recheck the doseBadge status.

5.1.11.3 IF unsuccessful, CHECK the battery status of the doseBadge AND

CHARGE immediately.
5.1 Operating the CIRRUS CR:110AIS Personal Noise Dosimeter (doseBadge) and Reader Unit (Cont.)

Set Configuration of the Reader Unit Manually

5.1.12 SELECT “Menu” button.

5.1.13 USE up/down arrows to scroll through the parameters AND CONFIRM the display at the bottom of the screen indicates the current setting.

5.1.14 SELECT “OK” on parameter to change.

5.1.15 CHOOSE “Clear Memory” AND PRESS “OK”.

5.1.16 SCROLL down to “Clear Memory” AND PRESS “OK”.

5.1.16.1 CONFIRM “00 Measurements” is displayed at the bottom of the screen.

5.1.17 SELECT “Set Clock” AND PRESS “OK”.

5.1.18 USE the left or right arrow to choose the parameter to change AND USE the up or down arrow to change the parameter.

5.1.19 WHEN the time and date are correct, PRESS “OK”.
5.1 Operating the CIRRUS CR:110AIS Personal Noise Dosimeter (doseBadge) and Reader Unit (Cont.)

NOTE - The doseBadge is equipped with dual channels, allowing for data comparisons against multiple standards.
- Channel 1 configuration can be set for the ACGIH TLV parameters for noise.
- Channel 2 configuration is not adjustable and is set as follows:
  - criterion time – 8 hours
  - criterion level – 85 dB
  - threshold level – none
  - time weighting average – none
  - exchange rate (“Q = 3”) – 3 dB.

5.1.20 SET Channel 1 parameters to the following configuration:
- “Time History Control”: “Time History On”
- “Criterion Time”: “8 hours”
- “Criterion Level”: “85 dB”
- “Threshold Level”: “80 dB”
- “Time Weighting”: “Slow”
- “Exchange Rate”: ”3 dB (Q = 3)”
- “Dual Channel”: “Dual Channel On”
- “Dose Exceedance”: “Dose Exceedence On”.

OR

USE Step 5.2.10 to set up the configuration using the doseBadge software.

5.1.21 PRESS “Cancel”.

5.1.22 DOCUMENT the dosimeter configuration in accordance with TFC-ESHQ-S_IH-C-46 “Industrial Hygiene Reporting and Records Management.”

Reset the doseBadge

5.1.23 INSERT “wakened” doseBadge into the reader unit calibrator opening.

5.1.24 GENTLY TWIST & PUSH in the doseBadge into alignment AND LINE up infrared windows of doseBadge and reader unit.

5.1.25 SELECT “Reset”. 
5.1 Operating the CIRRUS CR:110AIS Personal Noise Dosimeter (doseBadge) and Reader Unit (Cont.)

5.1.26 SELECT “OK” to clear the doseBadge memory and upload the configuration AND

CONFIRM the following:
- The timing bar on the reader screen moves across screen and displays “resetting...ok”
- The blue indicator light flashes twice.

Pre-Function Check the doseBadge

5.1.27 SELECT “Cal” AND

CONFIRM the following:
- The timing bar on the reader unit moves across screen and displays “calibrating…ok”
- The bottom of the display reads “Calibrated to 114 dB”.

5.1.28 IF function check fails ENSURE doseBADGE is seated snugly into the reader unit, then RESET AND RETRY,

OR

RETURN the doseBadge to the equipment custodian with a completed green tag, i.e. IH INSTRUMENT SERVICE TAG (BT-6004-019) indicating the unit is showing “Calibration Failure”.

5.1.29 SELECT “OK” to return to the home screen.

5.1.30 GENTLY UNTWIST doseBadge from the calibration cavity.

5.1.31 REPEAT Steps 5.1.23 through 5.1.30 for each unit to be function check.

5.1.32 DOCUMENT the function check in accordance with TFC-ESHQ-S_IH-C-46.

Mount the doseBadge on the Employee

5.1.33 INSTALL the foam windscreen over the doseBadge microphone to minimize the effects of air movement across the microphone and physical contact with other objects.
5.1 Operating the CIRRUS CR:110AIS Personal Noise Dosimeter (doseBadge) and Reader Unit (Cont.)

5.1.34 PLACE bottom end of the doseBadge through the mounting clip to secure the doseBadge to it AND

PERFORM the following:

5.1.34.1 USE the supplied mounting plate with the 43 mm metal disc only; any other mounting methods may invalidate the intrinsic safety certificate. The mounting plate seals the charging port of the doseBadge.

5.1.34.2 SCREW it to the mounting plate.

5.1.35 ATTACH mounting clip on wearer AND

ENSURE the doseBadge is on the shoulder, away of the the neck but within 4 inches of the wearer’s ear and infrared window is facing frontwards or sideways.

5.1.36 ENSURE doseBadge microphone is not touching clothing, cords from radios, etc.

Review Use With the doseBadge Wearer

5.1.37 INSTRUCT the employee(s) being sampled of the following:

- not to remove the doseBadge unless absolutely necessary
- not to cover the microphone with a coat or outer garment
- avoid hitting or bumping the microphone.
- Inform the IHT right away if there are any problems while wearing it

5.1.38 INFORM the employee(s) of the following:

- when and where the doseBadge(s) will be removed
- if full-shift monitoring will be performed (preferred).
5.1 Operating the CIRRUS CR:110AIS Personal Noise Dosimeter (doseBadge) and Reader Unit (Cont.)

START the doseBadge

5.1.39 AIM the reader unit’s infrared window directly at the doseBadge’s infrared window.

5.1.40 SELECT “Run” AND

CONFIRM the following:
• doseBadge blue light turns on
• doseBadge blue light flashes repeatedly during the run period
• the reader screen will indicate “starting…ok” then return to the home screen.

NOTE - These readings will be used as a validation check on the doseBadge results.

5.1.41 TAKE occasional sound level meter readings (detailed later) during the different phases of work performed by the employee to identify noise sources and exposure levels.

5.1.42 RECORD the following in accordance with TFC-ESHQ-S_IH-C-46:
• observations of the employee’s work location
• movements around the work area
• information on work cycles
• pertinent process descriptions
• kinds of noise sources.

5.1.43 OBSERVE AND RECORD the type of hearing protection used.

5.1.44 IF not done previously, RECORD the manufacturer, model, and the Noise Reduction Rating (NRR).

5.1.45 OBSERVE AND DOCUMENT if hearing protection is worn correctly.
5.1 Operating the CIRRUS CR:110AIS Personal Noise Dosimeter (doseBadge) and Reader Unit (Cont.)

Stop the doseBadge

5.1.46 TURN the reader unit on.

5.1.46.1 WHEN “Dose Exceedence” is set to “ON” AND

WHEN the doseBadge blue light flashes twice/second the noise exposure has exceeded 100% dose.

5.1.47 AIM the reader unit’s infrared window directly at the doseBadge’s infrared window.

5.1.48 SELECT “Stop” AND

CONFIRM the following:
- The doseBadge’s blue light flashes solid for 1 second and turns off
- The reader screen indicates “stopping…ok”, then returns to the home screen.

5.1.49 REMOVE dosimeter from its mounting clip and windscreen.

Pre-Function Check the doseBadge

5.1.50 INSERT microphone end of doseBadge into the reader unit calibration cavity AND

TWIST & PUSH IN gently.

5.1.51 LINE UP the infrared windows of the doseBadge and reader unit.

5.1.52 SELECT “Cal” AND

CONFIRM the following:
- The timing bar on the reader screen moves across screen and displays “calibrating…ok”
- The reader screen indicates “Calibrated to 114 dB” when complete.
5.1 Operating the CIRRUS CR:110AIS Personal Noise Dosimeter (doseBadge) and Reader Unit (Cont.)

5.1.53 IF the post-function succeeds, GO TO Step 5.1.55.

5.1.54 IF post-function check is “not compatible…”, COMPLETE the following:

5.1.54.1 DOWNLOAD data.

5.1.54.2 SELECT “Read”.

5.1.54.3 RE-ATTEMPT the post-function check.

5.1.54.4 IF the re-attempt at the post-function check succeeds, GO TO Step 5.1.55.

5.1.54.5 IF the re-attempt at the post-function check fails, COMPLETE green tag, i.e. “IH INSTRUMENT SERVICE TAG” (BT-6004-019) indicating the unit’s “Calibration Failure”.

5.1.54.6 RETURN the doseBadge to the equipment custodian.

5.1.55 SELECT “OK” to return to home screen.

5.1.56 DOCUMENT the calibration in accordance with TFC-ESHQ-S_IH-C-46.

Download Data

5.1.57 SELECT “Read”, reader unit will display “reading...ok” when complete and return to home screen with measurements available for viewing.

5.1.58 CONFIRM downloaded data is assigned a three-digit number, visible in the upper left of the reader unit screen.

5.1.59 SELECT LEFT/RIGHT arrow keys to scroll between data measurement.

5.1.60 SELECT UP/DOWN arrow keys to review specific results for a measurement.

NOTE - The Drift (or “Lost Cal Offset”) cannot exceed ± 2 dB

5.1.61 CONFIRM calibration “Drift” or “Last Cal Offset” is within ± 2 dB.

5.1.62 RECORD data.
5.2 Using the CIRRUS dBLink 3.3 Software: Set up Reader Unit, Download Data, Generate Reports

5.2.1 INSTALL “dBLink 3.3” software onto the PC.

5.2.2 USE “dBLink 3.3” software AND

SET configuration of the reader unit.

5.2.3 CONNECT reader unit to the PC using the USB cord.

5.2.3.1 CONFIRM that the connection of the reader unit to the PC automatically opens the software,

OR

OPEN the “dBLink 3.3” software on the PC.

5.2.4 PRIOR to monitoring, SET UP the reader unit.

Setting Up the Reader Unit

5.2.5 SELECT “Start…” at “Before making measurements”.

5.2.5.1 CONFIRM a connection is indicated by a green checkmark next to the message “Reader is connected.” displayed by the PC.

5.2.5.2 SELECT “Next”.

Set the Reader Unit’s Clock

5.2.6 IF adjustments are needed, SELECT “Set Instrument Clock” command to set clock to PC time AND

CONFIRM a green checkmark appears next to the message “Instrument clock is set.”.

5.2.7 SELECT “Next”.

Use of the CIRRUS CR:110AIS Personal Noise Dosimeter & Reader Unit and the QUEST 2200 Sound Level Meter
5.2 Using the CIRRUS dBLink 3.3 Software: Set up Reader Unit, Download Data, Generate Reports (Cont.)

Clear the Reader Unit’s Memory

5.2.8 IF data is no longer needed, SELECT “Clear the Instrument Memory” command and “Yes” AND

CONFIRM “Memory has been cleared” is displayed.

5.2.9 SELECT “Next”.

Configure the Reader Unit’s Measurement Setup

5.2.10 MANUALLY choose one of the following AND

- “Criterion Time”
- “Criterion Level”
- “Threshold”
- “Time Weighting”
- “Exchange Rate (Q=)”

SELECT the drop down arrow.

5.2.10.1 ENTER the appropriate parameters following ACGIH guidelines,

OR

SELECT the “Quick Setups” drop down arrow AND

CHOOSE the appropriate parameter, usually “ACGIH,” or DOE at the guidance of the Project Industrial Hygienist.

5.2.11 SELECT “Send Setup to Instrument”.

5.2.12 SELECT “Next”.

Configure the Reader Unit’s Display Options and “Date Format”

5.2.13 CHECK boxes for data to display and date format choice.

5.2.14 SELECT “Send Display Options to Instrument”.

5.2.15 SELECT “Finish”.
5.2 Using the CIRRUS dBLink 3.3 Software: Set up Reader Unit, Download Data, Generate Reports (Cont.)

**Downloading Data from the Reader Unit after Making Measurements**

5.2.16 USE the USB cable AND

CONNECT the reader unit to the PC.

5.2.17 SELECT “Start…” at “After making measurements”.

5.2.18 CONFIRM data is present in the reader unit and a green checkmark on the PC will indicate “Reader is connected”.

5.2.19 SELECT “Next.”

**Select “Load Measurements from the Instrument or from Disk”**

5.2.20 SELECT “Download from Instrument” to retrieve recent data (a “Download Completed” window will pop up)

5.2.21 SELECT “OK” AND

CONFIRM the message bar under Open Data File button “ _____ measurement has been received.”

5.2.22 SELECT, “Open Data File…””, “Open dBLink folder”, or “Open data files,” to open archived data THEN

CHOOSE desired file to review AND

SELECT “Open”.

5.2.23 SELECT “View Measurement Data…” to see the data.

5.2.24 MINIMIZE the display AND

SELECT “Next”.

**Select “Create a Report Based on this Measurement Data”**

5.2.25 SELECT the “Compact Report” style.

5.2.26 SELECT “Include all Measurements in Reports”.

5.2.27 SELECT “Next”.
5.2 Using the CIRRUS dBLink 3.3 Software: Set up Reader Unit, Download Data, Generate Reports (Cont.)

At the menu “Customize the Report” and Insert Detailed Field Notes

NOTE - Report title should include SWIHD Survey ID and individual doseBadge ID (e.g., XA161, XA196).

5.2.28 ENTER desired data (e.g. field notes, comments, survey data) at “Customize the Report” screen AND

PROCEED to Step 5.2.41.

5.2.29 SELECT “Choose Report Data Items” button.

5.2.30 SELECT the following bulleted items in “Available” table using Steps 5.2.30.1 and 5.2.30.2:

- doseBadge
- Meas.Date
- Meas.Time
- Run Duration
- Peak Level dB(C)
- Low Battery
- Lavg dB(A)
- TWA dB(A)
- Dose % (from TWA)
- Est. Dose (from TWA)
- Peak Exceeded?
- First Cal. Time
- Last Cal. Time
- Reader
- First Cal.Offset
- Last Cal.Offset

5.2.30.1 HIGHLIGHT item by clicking on your choice.

5.2.30.2 PRESS “>” in between “Available” and “Displayed” boxes.

5.2.30.3 SELECT “Next”

5.2.31 SELECT either the “Print Report…” or “Preview Report…” AND

SELECT “OK”.

5.2.31.1 IF “Print Report” was selected, SELECT “OK” at “Print” AND

GO TO Step 5.2.32.

5.2.31.2 IF “Preview Report” was selected, SELECT “Close” to return to previous screen AND

RE-PERFORM Step 5.2.31 to print report.
### 5.2 Using the CIRRUS dBLink 3.3 Software: Set up Reader Unit, Download Data, Generate Reports (Cont.)

**Export the Measurement Details Page**

5.2.32 SELECT “Export Format” drop down menu AND

SELECT “Adobe Acrobat Document”.

5.2.33 SELECT “Send Report”, provide unique “File name” consisting of the TFIH survey number.

5.2.34 SELECT “Save in” box AND

USING the drop down menu, SAVE pdf file to: \Hanford\Data\Sitedata\Hazard\Datalogging-Files\Noise.

**Export Data to Excel Spreadsheet**

5.2.35 ENSURE “Include all Measurements” is selected AND

SELECT “Send to Excel with Time History Data”.

5.2.36 PROVIDE unique “File name” consisting of the TFIH survey number. This file name will be identical to the previous .pdf file name.

5.2.37 SELECT “Save in” box AND

SAVE Excel file to: \Hanford\Data\Sitedata\Hazard\Datalogging-Files\Noise.

5.2.38 SELECT “Finish”.

**Record the Dosimeter Readout Data**

5.2.38.1 ATTACH copies of exposure chart or histograms produced by the doseBadge to the survey form.

5.2.38.2 FORWARD forms and supplemental pages within 2 working days to the Project Industrial Hygienist for review.

**SWIHD Data Entry**

5.2.39 SELECT and COMPLETE “Noise” and “Job” Info tabs.
5.2 Using the CIRRUS dBLink 3.3 Software: Set up Reader Unit, Download Data, Generate Reports (Cont.)

5.2.40 SELECT and COMPLETE “Instrument” tab.

NOTE - Dosimeters are listed by serial number.

5.2.40.1 SELECT dosimeter from “Select Instrument Number” drop down menu.

5.2.40.2 SELECT “Add Instrument” (Green Button)

NOTE - Cirrus Calibration is the same as a function test. These terms may be used interchangeably when using Cirrus doseBadge, dBLink software, and SWIH database.

5.2.40.3 ENTER Pre Use Function Test and Post Use Function Test data (Pre and Post-calibration).

NOTE - The “As Found” and “As Left” readings should both be within 2 dB.

5.2.40.4 IF Post-Calibration was unable to be performed after alternate method in Step 5.1.54, OR

IF “Drift” (“Last Cal Offset”) was greater than or less than +/-2 dB,

CONTACT Project IH for guidance.

5.2.40.5 ENSURE “Adjusted To” is N/A unless otherwise specified by Project IH.

5.2.41 SELECT and COMPLETE the following:

• “Meteorology” tab
• “Personal Info” tab
• “Comments” tab.
5.2 Using the CIRRUS dBLink 3.3 Software: Set up Reader Unit, Download Data, Generate Reports (Cont.)

5.2.42 SELECT “Dos Readings” tab.

5.2.42.1 USING the drop down menu, SELECT “Instrument Number.”

5.2.42.2 USING the table below (corresponds dBLink output to SWIHD data entry boxes), COMPLETE the following boxes:
- “Dose”
- “TWA”
- “Peak”
- “LEQ”.

<table>
<thead>
<tr>
<th>dBLink Output</th>
<th>Dose</th>
<th>TWA</th>
<th>Peak</th>
<th>LEQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excel Output Sheet; Dose % (from TWA)</td>
<td>Excel Output Sheet; TWA</td>
<td>Excel Output Sheet, Peak Level</td>
<td>Excel Output Sheet; Lavg (dBA)</td>
<td></td>
</tr>
<tr>
<td>Explanation</td>
<td>Record % Dose from dBLink software; make a note in comments when % Dose exceeds 100% and dosimetry time was less than 8 hours that hazardous noise levels (Leq/Lavg) will not continue through full 8 hour period.</td>
<td>Record from dBLink software output.</td>
<td>Typically in dBC. A lack of a value in the Peak Level box indicates exposure likely did not exceed over 120 dBA. If there is no value, see Column D on Excel Sheet and select the highest dBA reading. Note in the comments method applied for selection of Peak value.</td>
<td>The dosimeter settings are such that Leq will equal Lavg. This value is the average sound level pressure throughout the sampling duration.</td>
</tr>
</tbody>
</table>

5.2.43 SUBMIT supporting documents to Project Industrial Hygienist for recordkeeping.
5.3 Performing Noise Surveys Using the QUEST Model 2200 Sound Level Meter

Check Calibration Status

5.3.1 CONFIRM the maintenance calibration date on the sticker from IHES is current on the QUEST 2200 sound level meter.

5.3.2 IF calibration is past due, RETURN the monitor to the equipment custodian with a completed green tag, i.e., “IH INSTRUMENT SERVICE TAG” (BT-6004-019) checking the box next to “Scheduled Maintenance Calibration.”

Prepare for Survey

5.3.3 OBTAIN one of the following:
- blueprint
- building map
- diagram of the survey area
- sketch.

5.3.4 ILLUSTRATE the following on the selected document:
- area layout
- approximate locations of noise sources
- employee work areas.

5.3.5 IF present, REMOVE the plastic cap over the microphone.

5.3.6 MOVE the “RUN/PAUSE/OFF” slider switch to “PAUSE”.

Check Battery Status

5.3.7 CONFIRM “BAT” indicator is shown on the display indicating, the battery is sufficiently charged AND

IF “LOBAT” is displayed, REPLACE the battery as follows:

5.3.7.1 TURN OFF unit.

5.3.7.2 SLIDE battery compartment door at bottom open

5.3.7.3 OBSERVE the “battery orientation” inside AND

REPLACE with a fresh 9-volt alkaline battery.
5.3 Performing Noise Surveys Using the QUEST Model 2200 Sound Level Meter (Cont.)

5.3.8 IF the Project Industrial Hygienist directs which of the following setup parameters are to be used during the survey, **CHECK** the identified setup parameters, **OTHERWISE**

**CHECK** all the following setup parameters during the warm-up:
- **FIRMWARE:** “r2.1”
- **EXCHANGE RATE:** “Er3”
- **CALIBRATION LEVEL:** “114.0”.

**Configure the Sound Level Meter**

5.3.9 IF the Project Industrial Hygienist directs which of the following parameters are to be used, **RECONFIGURE** the identified parameters, **OTHERWISE**

**SET** all the following parameters.

5.3.9.1 **MOVE** “A/C/Z WEIGHTING” slider switch to “A” for parameter A-WEIGHTING.

5.3.9.2 **MOVE** “F/S/P/I RESPONSE” slider switch to “S” for parameter SLOW RESPONSE.

5.3.9.3 **MOVE** “SPL/LEQ/RT/MAX/MIN/%OL” slider switch to “SPL” for parameter Sound Pressure Level.

**Change the Exchange Rate or Calibration Level**

5.3.10 **TURN OFF** the unit **AND**

**TURN** back **ON**.

5.3.11 **CONFIRM** the self-check cycles through the firmware, exchange rate and calibration level.

5.3.11.1 **WHEN** the desired parameter appears on the display, **SIMULTANEOUSLY PRESS** the “RESET” and “CAL” buttons momentarily.

5.3.11.2 **PRESS** the “RESET” or “CAL” button **AND**

**ADJUST** to the desired value.

5.3.11.3 **SIMULTANEOUSLY PRESS** the “RESET” and “CAL” buttons momentarily to **SAVE** changes.
5.3 Performing Noise Surveys Using the QUEST Model 2200 Sound Level Meter (Cont.)

**Span and Function Check the Sound Level Meter**

5.3.12 **CHECK** the QUEST QC-10 acoustical calibrator to be used AND **CONFIRM** it has a current maintenance calibration date on the sticker from IHES.

5.3.13 **IF** calibration is past due, **RETURN** calibrator to equipment custodian with a completed green tag, i.e., “IH INSTRUMENT SERVICE TAG” (BT-6004-019) check the box next to “Scheduled Maintenance Calibration.”

**NOTE** For maximum accuracy, the function test is performed at the temperature of the environment to be measured.

5.3.14 **INSTALL** the right size adapter for the sound level meter over its microphone.

**Adjust the “RANGE (dB)” Slider Switch to “50-120”**

5.3.15 **TURN** on the calibrator by moving the switch on the bottom of the calibrator to the “ON” position.

5.3.16 **SET** unit to “SPL”, “PAUSE”, “SLOW” and “A” weighting.

5.3.17 **IF** the unit has data stored in memory, **PRESS AND HOLD** the “RESET” button until the three dashes appear, i.e. “---“.

5.3.18 **INSERT** the microphone into the calibration device.

5.3.19 **PRESS AND HOLD** the “CAL” button until “CAL” appears in the display AND **RELEASE** the button.

5.3.20 **CONFIRM** three dashes appear and then disappear one at a time as the unit calibrates.

5.3.20.1 **CONFIRM** a final message of “PAS” or “BAD” appears in the display.

5.3.20.2 **IF** “BAD”, **REPEAT** Steps 5.3.15 through 5.3.20.1.

5.3.21 **AFTER** spanning the sound level meter function, **CHECK** the“SPL” level.
5.3 Performing Noise Surveys Using the QUEST Model 2200 Sound Level Meter (Cont.)

5.3.22 IF the dB level is not within ± 0.5 of 114 dB, RETRY OR RETURN it to the equipment custodian with a completed green tag, i.e., “IH INSTRUMENT SERVICE TAG” (BT-6004-019) indicating “Calibration Failure.”

Prepare the Instrument

5.3.23 WHEN ready to perform the survey, PLACE the foam windscreen to cover the microphone AND KEEP in “PAUSE” mode.

5.3.24 IF noise levels are high, WEAR appropriate hearing protection while conducting noise surveys to maintain exposures below ACGIH limits AND/OR COMPLY with facility posting or procedures.

5.3.25 ENSURE surveys are performed when the work operations are expected to be at the maximum noise level.

5.3.26 IF an operator is available, ARRANGE to be accompanied by an operator who can operate equipment under actual work conditions.

5.3.27 DOCUMENT workers use of hearing protection on the survey form.

Sound Level Meter Microphone Positioning

5.3.28 HOLD the instrument away from the body as far as possible AND POSITION the sound level meter with respect to the noise source, so that the microphone is oriented correctly and body shielding effects are minimized.

5.3.28.1 AVOID collecting sound measurements in corners, near walls and other reflective areas that may affect the accuracy of sound levels.

5.3.28.2 POINT the microphone directly at the noise source.

5.3.28.3 WHILE readings are taken, POSITION the microphone at approximate hearing height or in the employee’s hearing zone.
Use of the CIRRUS CR:110AIS Personal Noise Dosimeter & Reader Unit and the QUEST 2200 Sound Level Meter

5.3 Performing Noise Surveys Using the QUEST Model 2200 Sound Level Meter (Cont.)

Range Determination

5.3.29 MOVE the “RANGE (dB)” slider switch to “70-140” to start at the highest dB range.

Determine the Sound Level

5.3.30 IF “ur” (under range) appears, MOVE the “RANGE (dB)” slider switch to the next lowest setting.

5.3.31 IF “+” appears, MOVE the “RANGE (dB)” slider switch to the next highest setting.

5.3.32 MEASURE the sound levels in accordance with Project Industrial Hygienist instructions and IH Sampling Plan.

5.3.33 IF noise levels fluctuate, RECORD the lowest, steady-state and highest.

Record the Noise Measurements in accordance with TFC-ESHQ-S_IH-C-46

5.3.34 ATTACH a building diagram, map, or area sketch to the form.

5.3.35 MARK the map with numbered positions, relating to numbered readings on the form, to show where the measurements were taken.

5.3.36 REPEAT this process throughout the work area and for each piece of noise-producing equipment.

5.3.37 IF multiple noise sources exist, TAKE measurements to characterize additive effects.

5.3.38 IN the space provided on the documentation, INDICATE the operational status of the equipment and distance from the noise source to the measurement point.

5.3.39 DESCRIBE process information that may be useful in characterizing the noise source and the noise exposure.
5.3 Performing Noise Surveys Using the QUEST Model 2200 Sound Level Meter (Cont.)

5.3.40 IF any hearing protection is in use, OBSERVE AND DOCUMENT the type AND INCLUDE the manufacturer, model, and the Noise Reduction Rating (NRR).

5.3.41 COLLECT AND ENTER the following on the documentation:
- personnel names
- employee ID numbers
- task information
- exposure duration
- any process information that helps to characterize the exposure.

Post Function Check the Sound Level Meter

5.3.42 PERFORM a post-function check of the sound level meter AND RECORD the results.

5.3.43 IF the meter fails the post function check (i.e. 2dB difference between pre and post-function), PERFORM the following:

5.3.43.1 DESCRIBE on the survey form.

5.3.43.2 REPORT information to the Project Industrial Hygienist and equipment custodian.

5.3.43.3 TAG the instrument out of service.

5.3.43.4 IF possible, REPEAT survey measurements with a properly functioning instrument.

5.3.44 FORWARD forms and supplemental pages to the Project Industrial Hygienist within 2 working days for review to ensure timely notification to affected personnel.
5.4 Records

5.4.1 **PERFORM** the following for records identified within this procedure.

5.4.1.1 **RECORD** the number of times the record was generated in applicable column

**OR**

5.4.1.2 **SUBMIT** the package to IH.

<table>
<thead>
<tr>
<th>Records Submittal Checklist</th>
<th>Number of times completed</th>
<th>N/A (✓)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FORMS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Hygiene surveys (including forms)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SEND** the completed records with Records Submittal Checklist attached to the Safety and Health Program for records retention.

__________________________ / _________________________ / ______________________

Signature                  Print (First and Last)           Date
IH

The record custodian identified in the Company Level Record Inventory and Disposition Schedule (RIDS), is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.