

DOCUMENT REVISION STATUS

REVISION LEVEL	DESCRIPTION OF CHANGE	DATE	ECO #
-	INITIAL RELEASE	7/18/07	N/A
A	Revised Sample Analysis section. Added Lower Limit of Detection section. Added Figure 1 and 2. See ECO.	5/1/09	15065
B	Revised Sample Preparation and Sample Analysis sections. Revised Figure 1 and 2. See ECO.	5/13/10	15264

APPROVALSAPPROVED: PROCESS ENGINEERING: DATE: 6/4/10APPROVED: ENGINEERING MANAGER: DATE: 6/2/10APPROVED: MANUFACTURING MANAGER: DATE: 6/2/10APPROVED: QUALITY ASSURANCE MANAGER: DATE: 6/4/10

1.0 PURPOSE:

- 1.1 This document details how to count wipe test samples for Tritium (H-3) contamination using the BetaScout Liquid Scintillation Counter.

2.0 PROCEDURE:**WARM-UP**

- 2.1 Turn on the BetaScout and allow 10 minutes of warm-up time.

BACKGROUND

- 2.2 Place vial marked "Background" into the BetaScout and close chamber. Wait a minimum of one minute before counting. Press the "Start" button to initiate counting. Record "Background" result after one-minute count is completed.

STANDARD

- 2.3 Place the vial marked "Standard" into the BetaScout and close chamber. Wait a minimum of one minute before counting. Press the "Start" button to initiate counting. Record "Standard" result after one-minute count is completed.

QUALITY CONTROL

- 2.4 Compare the "Background" result to the graph titled "Background QC". If "Background" result exceeds the "O.K." range, repeat the background count.
- 2.5 A result within the "O.K." range indicates an acceptable background.
- 2.6 Compare the "Standard" result to the graph titled "Standard QC". If "Standard" result exceeds the "O.K." range, repeat the "Standard" count.
- 2.7 A result within the "O.K." range indicates an acceptable standard count.
- 2.8 If both the first and the second count of a background or the standard count exceed the "O.K." ranges provided on the QC graphs (Figures 1 & 2) the unit may not be functioning properly. The unit may need servicing.

SAMPLE PREPARATION

- 2.9 The following instructions are to be used for all wipe tests:
- 2.9.1 Use plastic 20ml liquid scintillation vials (LSV).
- 2.9.2 Add Whatman #1 filter circles wipe sample for analyzed to the LSV.
- 2.9.3 Add between 10 and 15 ml of liquid scintillation fluid (LSF).
- 2.9.4 Cap the LSV tightly and clean off excess LSF on outside of vial.
- 2.9.5 Open BetaScout sample chamber and insert LSV for counting.

SAMPLE COUNTING

- 2.10 After obtaining a background and a standard counting result, insert the prepared sample for analysis into the BetaScout and close sample chamber.
- 2.11 Wait a minimum of one minute before initiating counting.
- 2.12 Press the "Start" button on the BetaScout to initiate the count.
- 2.13 The default count time is 60 seconds or 1 minute.
- 2.14 Record the "Sample" result for the one-minute count (CPM).

SAMPLE ANALYSIS

- 2.15 To determine the activity DPM (disintegrations per minute) on the sample perform the following calculations:
 - 2.15.1 *Subtract* the background count front the sample count to obtain the net counts in the sample (CPM).
$$(\text{Sample} - \text{Background}) = \text{Net counts per minute (CPM)}.$$
 - 2.15.2 Apply the BetaScout efficiency for Tritium (H-3).
BetaScout efficiency (EFF) = 63% (4/10).
 - 2.15.3 *Divide* the CPM value by the EFF to obtain the sample activity (DPM).

Example: For a background of 144 CPM
A sample count of 1,000 CPM

First calculate net counts on sample
 $(1,000 \text{ CPM} - 144 \text{ CPM}) = \underline{856 \text{ CPM}}$

Then divide the sample CPM by the EFF
 $(856 \text{ CPM} / 0.63 \text{ EFF}) = \underline{1,359 \text{ DPM}}$

Sample activity = 1,359 DPM or 0.0006 μCi

Note: Microcuries (μCi) can be obtained by dividing DPM by 2.22 E 6 DPM/ μCi .

LOWER LIMIT OF DETECTION

- 2.16 The smallest amount of activity DPM (disintegrations per minute) that can be identified on any sample using this system:

$$\text{LLD} = 30 \text{ DPM}$$

- 2.17 All results calculated below this level should be reported as "Less than the LLD" or "< LLD".

FIGURE 1:

Standard QC Table

(Beckman H-3 Standard - Calculated 4/10)

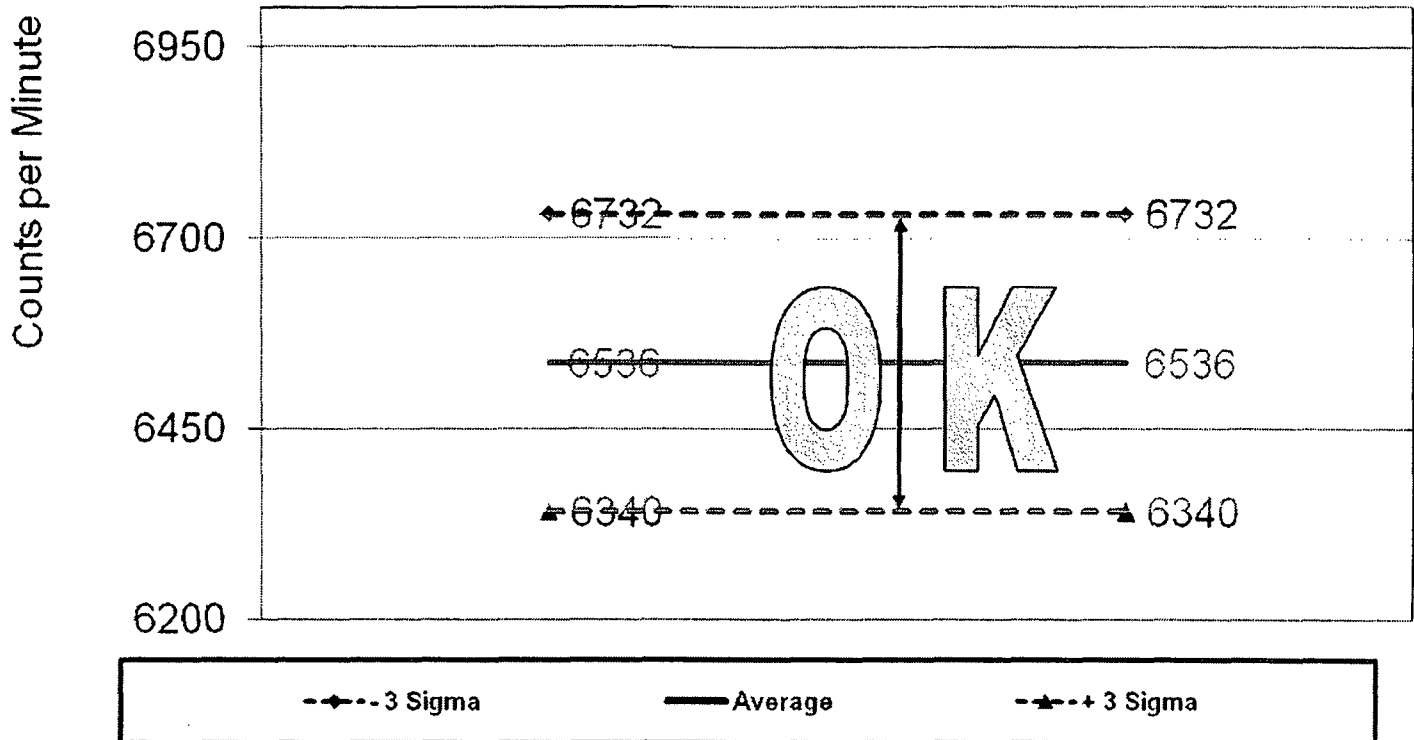


FIGURE 2:

Background QC Table
(Calculated 4/10)

