This document was too large to scan as a whole document, therefore it required breaking into smaller sections.

**Document number:** SD-WM-DP-054

**Section** 5 **of** 7

**Title:** Grout Product Test for Tank 241AP102, 5day & 90day Runs (Ansi Section)

**Date:** 1-14-94 **Revision:** A000

**Originator:** A.P. Hammitt, RA St. Denis T.L. Welsh
**Co:** WHC

**Recipient:**
**Co:**

**References:** EDT-140726

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# 5-DAY - BETA ANALYSES

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WESTINGHOUSE HANFORD COMPANY

222-S LABORATORY

Batch 1372

WHC-SD-WM-DP-054 REV 0

# ANALYTICAL BATCH

| | |
|---|---|
| Lab Segment Serial No. G-597-602 | Customer ID: 102 5 Day |
| Analysis: TC 99 | Sample Prep: Direct |

| | |
|---|---|
| Instrument: WB27818 / ~~WC-160853~~ 8-11-93 | Procedure/ Rev: LA 438-101 / D-1 |
| Technologist: Sandra R Hord Beatright | Date: 8-12-93 |
| Starting Time: 1700 | Temperature N-A |
| Ending Time: 2300 | Chemist: S. Catlow |

Comments:

| | Description | | Lab ID |
|---|---|---|---|
| 1 | STD | G | 595-5584 |
| 2 | BLK | G | 596-5684 |
| 3 | Sample | G | 597-5784 |
| 4 | Sample | G | 598-5784 |
| 5 | Sample | G | 599-5784 |
| 6 | Sample | G | 600-5784 |
| 7 | Sample | G | 601-5784 |
| 8 | Sample | G | 602-5784 |
| 9 | | | |
| 10 | | | |

| | Description | Lab ID |
|---|---|---|
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |

| Standard Type | Primary Book No. and Aliquot Vol. | Second Book No. and Aliquot Vol. | Third Book No. and Aliquot Vol. | Final Vol. of Standard |
|---|---|---|---|---|
| LMCS | 73B51 / .250ml | | | |
| Spike | 16B51 / .100ml | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | 580 | | |
| | | | | |

A-6000-881 (03/92)

QA

WHC-SD-WM-DP-054 REV O

ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA-438-101

DATE START: August 12, 1993

PREPARED BY: JL Slippern

DATE COMPLETE: August 17, 1993

| | UNITS: | uCi/mL | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SPL NAME | SPL ID | ANALYTE | RESULT #1 | RESULT #2 | AVERAGE | RPD% | %REC | DET LIM | % CT ER |
| 73B51 | G595 | Tc-99 | 3.73 | | | | 95.4 | | 2 |
| BLANK | G596 | Tc-99 | <1.58E-5 | | | | 35.8 | | 5.7 |
| A-0 | G597 | Tc-99 | <1.47E-5 | | | | 38.3 | <1.58E-5 | 5.9 |
| A-1 | G598 | Tc-99 | <1.45E-5 | | | | 38.9 | <1.58E-5 | 5.9 |
| A-2 | G599 | Tc-99 | <1.45E-5 | | | | 38.9 | <1.58E-5 | 5.7 |
| A-3 | G600 | Tc-99 | <1.45E-5 | | | | 38.9 | <1.58E-5 | 5.9 |
| A-4 | G601 | Tc-99 | <1.46E-5 | | | | 38.6 | <1.58E-5 | 5.8 |
| A-5 | G602 | Tc-99 | <1.53E-5 | | | | 36.9 | <1.58E-5 | 6.1 |

NARRATIVE: [X] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

The results for the standard are in uCi/L.

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

1-2

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 595.-5584 | 102 5 DAY | 7-22-93 | 14:26 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | % RECOVERY | D44B3 | 0 |

Sample Size .250m | gH 8-20-93 | Customer ID: STD

2 250ml + .100ml spike 16B51

Remarks, Calculations, Results

EDP S363 TC99 m gH 8-20-93

STD# 73B51 RESULT 3.73

STD VAL 3.912 %REC 95.35%

$$\frac{490.9901\,(2.115265)}{.250\,(2220)(2153.419-490.9901)} = 3.7332$$

SL Hood Beatright

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | D.A. Wilcox | A. Shamer | | |
| Hrs | Hrs | Hrs 8-13-93 2300 | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 2300 | J. Sliepcevich |

54-6800-061 (R-10-83)

WHC-SD-WM-DP-054 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | STANDARD |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G595-5584 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 0.25 |
| 1372 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 490.9901 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2153.419 |
| | Background cpm | (BKG cpm) | 55.7 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9479 |
| | Detection Limit | (Ld) | 8.35 |
| | Critical Level | (Lc) | 3.89 |
| | Tc-99 Concentration in µCi/L = | | 3.7332E+00 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 3.73E+00 |
| Tc-99 Concentration in µCi/mL | = | 3.73E-03 |
| Spike (Tracer) Recovery | = | 35.5% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | Jennifer L. Sliepcevich | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

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PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

3-4

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 596.-5684 | 102 5 DAY | 7-22-93 | 14:28 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1ml + 100ml spike 16B51 | BLK |

Remarks Calculations Results

REAGENT BLANK

COUNT AS uCI/L

<1.58 E-5 µCi/mL

S C Howard Boatright

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | D A Mulvaie | A D Lance | | |
| | Hrs | Hrs 8-13-93 2300 | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 2300 | J L Sleppin |

54-6800-06 (8-10-83)

WHC-SD-WM-DP-054 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | BLANK |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G596-5684 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1372 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 5.168687 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 1677.64 |
| | Background cpm | (BKG cpm) | 55.7 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.948 |
| | Detection Limit | (Ld) | 8.35 |
| | Critical Level | (Lc) | 3.89 |
| | Tc-99 Concentration in µCi/L = | < | 1.5771E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 1.58E-02 |
| Tc-99 Concentration in µCi/mL | = | < 1.58E-05 |
| Spike (Tracer) Recovery | = | 35.8% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | Jennifer L Sleppin | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

5-6

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 597.-5784 | 102 5 DAY | 7-22-93 | 14:29 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1ml + .100ml spike 16851 | A-0 |

Remarks Calculations Results

COUNT AS uCI/L

<1.47 E -5 µCi/mL

SL Hood Boatright

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | D.H. Malia | A. Glauser | | |
| | Hrs | Hrs 8-13-93 2300 | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 2300 | J. J. Blumenschein 8/18 |

54-6800-061 (R-10-83)

WHC-SD-WM-DP-054 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G597-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1372 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 1.898702 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 1790.905 |
| | Background cpm | (BKG cpm) | 55.7 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.943 |
| | Detection Limit | (Ld) | 8.35 |
| | Critical Level | (Lc) | 3.89 |
| | Tc-99 Concentration in µCi/L = | < | 1.4743E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000 mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000 mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3
**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 1.47E-02 |
| Tc-99 Concentration in µCi/mL | = | < 1.47E-05 |
| Spike (Tracer) Recovery | = | 38.3% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | Jennifer J. Blumenschein | Date: | 17-Aug-93 |

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PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

7-8

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 598.-5784 | 102 5 DAY | 7-22-93 | 14:30 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1ml + .100ml spike 16B51 | A-1 |

Remarks Calculations Results

COUNT AS uCI/L

<1.45 E-5 µCi/mL

SLHood Boatright

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | D.H. Millier | A. Johansen | | |
| | Hrs | Hrs 8-13-93 2300 | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 2300 | J. J. Slupperu |

8/18

54-6300-054 (R/10-83)

WHC-SD-WM-DP-054 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16B51 |
| G598-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1372 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 2.002926 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 1819.273 |
| | Background cpm | (BKG cpm) | 55.7 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9486 |
| | Detection Limit | (Ld) | 8.34 |
| | Critical Level | (Lc) | 3.89 |
| | Tc-99 Concentration in µCi/L = | < | 1.4505E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3
**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 1.45E-02 |
| Tc-99 Concentration in µCi/mL | = | < 1.45E-05 |
| Spike (Tracer) Recovery | = | 38.9% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | Jennifer J. Slupperu | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

Page 1 of 1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

9-10

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 599.-5784 | 102 5 DAY | 7-22-93 | 14:30 | 23 |

| Determination | Method Standard | *Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? /ml + .100 ml spike 16851 | A-2 |

Remarks Calculations Results

COUNT AS uCI/L

<1.45E-5 µCi/mL

SLHood Boatright

| Analyst - 1 | Analyst - 2 | Analys | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | D.H. Wilcox | A.G. Johnson | | |
| | Hrs | Hrs 8-13-93 2300 | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 2300 | J.J. Deppein |

54-6806-061 (R-10-83)

WHC-SD-WM-DP-061 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G599-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1372 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 5.590623 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 1826.281 |
| | Background cpm | (BKG cpm) | 55.7 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.948 |
| | Detection Limit | (Ld) | 8.35 |
| | Critical Level | (Lc) | 3.89 |
| | Tc-99 Concentration in µCi/L = | < | 1.4487E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 1.45E-02 |
| Tc-99 Concentration in µCi/mL | = | < 1.45E-05 |
| Spike (Tracer) Recovery | = | 38.9% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | Jennifer J. Deppein | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

11-12

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 600.-5784 | 102 5 DAY | 7-22-93 | 14:31 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1ml + .100 ml spike 16B57 | A-3 |

Remarks Calculations Results

COUNT AS uCI/L

<1.45E-5 µCi/mL

Sl Hood Boat right

| Analyst - 1 | Analyst - 2 | Analyst - | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | D H Melvin | A Johnson | | |
| | Hrs | Hrs 8-13-93 2300 | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 2300 | |

WHC-SD-WM-ER-054 REV 0

52-6840-561 (R-10-83)

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16B51 |
| G600-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1372 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 1.476512 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 1819.119 |
| | Background cpm | (BKG cpm) | 55.7 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9482 |
| | Detection Limit | (Ld) | 8.35 |
| | Critical Level | (Lc) | 3.89 |
| | Tc-99 Concentration in µCi/L = | < | 1.4508E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3
**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L = | < 1.45E-02 |
| Tc-99 Concentration in µCi/mL = | < 1.45E-05 |
| Spike (Tracer) Recovery = | 38.9% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

13-14

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 601.-5784 | 102 5 DAY | 7-22-93 | 14:31 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1ml + .100ml spike 16B51 69H 8-20-93 | A-4 |

Remarks Calculations Results

COUNT AS uCI/L

<1.46 E-5 µCi/mL

Sl Hood Boatright

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| Hrs | Hrs | 8-13-93 2300 Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 2300 | |

54-6820-061 (R-10-83)

WHC-SD-WM-ER-351 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16B51 |
| G601-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1372 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 3.16396 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 1809.726 |
| | Background cpm | (BKG cpm) | 55.7 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9482 |
| | Detection Limit | (Ld) | 8.35 |
| | Critical Level | (Lc) | 3.89 |
| | Tc-99 Concentration in µCi/L = | < | 1.4597E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3
**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 1.46E-02 |
| Tc-99 Concentration in µCi/mL | = | < 1.46E-05 |
| Spike (Tracer) Recovery | = | 38.6% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1 Page 1 of 1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

15-16

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 602.-5784 | 102 5 DAY | 7-22-93 | 14:32 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1 ml + .100 ml spike 16B51 | A-5 |

Remarks, Calculations, Results

COUNT AS uCI/L

<1.53 E-5 µCi/ml

Sl Hod Boatright

| Analyst - 1 | Analyst - 2 | Analyst - | - 4 | Analyst - 5 |
|---|---|---|---|---|
| | D H Milligan | A Bolance | | |
| | Hrs | Hrs 8-13-93 23:00 | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 2300 | |

WHC-SD-WM-TRP-054 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G602-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1372 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 0 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 1726.764 |
| | Background cpm | (BKG cpm) | 55.7 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9479 |
| | Detection Limit | (Ld) | 8.35 |
| | Critical Level | (Lc) | 3.89 |
| | Tc-99 Concentration in µCi/L = | < | 1.5276E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3
**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L = | < | 1.53E-02 |
| Tc-99 Concentration in µCi/mL = | < | 1.53E-05 |
| Spike (Tracer) Recovery = | | 36.9% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

A Johnson 8-13-93





USER: 5 ID:TC 99 PRESET TIME: 20.00 FRI 13 AUG 1993 16:34
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS232:N
H#: 1 ADC:Y DCF:N RCM:Y 2 PHASE MONITOR:N
RCM-TIME: 0.10 INT:999.95
CHANNEL 1-LL:150 UL: 800 2SIGMA: 0.10 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0

SINGLE LABEL DPM SET UP ON 20 DEC 1991 13:14

UNKNOWN ID:TC 99 UNKNOWN REPLICATES: 1
UNKNOWN NORM FACTOR ISO1:@ 1.00000
UNKNOWN UNITS ISO1:DPM
UNKNOWN HALF LIFE CORRECTION:N
INDIVIDUAL UNKNOWN NORM FACTORS:N BACKGROUND QUENCH CURVES:Y
STANDARD ID:131828-A 1-10 QUENCH LIMITS LOW:73.67 HIGH:207.7
HALF LIFE(DAYS) ISO1:N
STANDARD DPM ISO1:0.00000000

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | RCM% | ERR |
|---|---|---|---|---|---|---|---|---|---|
| B1 | **- 1 | 1 | 55.70 | 5.99 | 20.00 | 20.92 | 149.0 | 4.70 | |

BACKGROUND QUENCH CURVES: CONSTANT

**BEST AVAILABLE COPY**

CHANNEL 1
QUENCH CURVE COEFFICIENTS
A: 55.70000 B:0.00000000 C:0.00000000 D:0.00000000000

BACKGROUND QUENCH CURVE CORRELATION TABLE

| BKG | H# | MEASURED CPM. | CALCULATED CPM. | PERCENT DIFF. | FLAG |
|---|---|---|---|---|---|
| 1 | 149.0 | 55.70 | 55.70 | 0.00 | |

BACKGROUND QUENCH LIMITS LOW:0.000 HIGH:1000.
TOTAL QUENCH LIMITS LOW:73.67 HIGH:207.7

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | RCM% | ERR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | **- 3 | 1 | 521.10 | 1.96 | 20.00 | 42.12 | 117.0 | 0.86 | |
| | ISO1 %EFF CH1:94.79 | | | | | | | ISO1 DPM :490.9901 | |
| 2 | **- 4 | 1 | 2097.95 | 0.98 | 20.00 | 63.22 | 114.0 | 0.14 | |
| | ISO1 %EFF CH1:94.84 | | | | | | | ISO1 DPM :2153.419 | |
| 3 | **- 5 | 1 | 60.60 | 5.74 | 20.00 | 84.29 | 116.0 | 3.79 | |
| | ISO1 %EFF CH1:94.80 | | | | | | | ISO1 DPM :5.168687 | |
| 4 | **- 6 | 1 | 1649.55 | 1.10 | 20.00 | 105.38 | 109.0 | 0.20 | |
| | ISO1 %EFF CH1:95.01 | | | | | | | ISO1 DPM :1677.640 | |

| SAM | MUS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | M:SM% | Min |
|---|---|---|---|---|---|---|---|---|---|
| 5 | **- 7 | 1 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | |
| | ISO1 | %EFF | CH1:94.80 | | | | ISO1 | DPM | :1.898702 |
| 6 | **- 8 | 1 | 1754.15 | 1.07 | 20.00 | 147.55 | 114.0 | 0.21 | |
| | ISO1 | %EFF | CH1:94.84 | | | | ISO1 | DPM | :1790.905 |
| 7 | **- 9 | 1 | 57.60 | 5.89 | 20.00 | 168.62 | 113.0 | 6.44 | |
| | ISO1 | %EFF | CH1:94.86 | | | | ISO1 | DPM | :2.002926 |
| 8 | **-10 | 1 | 1780.40 | 1.06 | 20.00 | 189.68 | 116.0 | 0.17 | |
| | ISO1 | %EFF | CH1:94.80 | | | | ISO1 | DPM | :1819.273 |
| 9 | **-11 | 1 | 61.00 | 5.73 | 20.00 | 210.74 | 116.0 | 7.56 | |
| | ISO1 | %EFF | CH1:94.80 | | | | ISO1 | DPM | :3.140123 |
| 10 | **-12 | 1 | 1787.70 | 1.06 | 20.00 | 231.82 | 114.0 | 0.16 | |
| | ISO1 | %EFF | CH1:94.84 | | | | ISO1 | DPM | :1826.281 |
| 11 | **- 1 | 1 | 57.10 | 5.92 | 20.00 | 252.93 | 115.0 | 3.05 | |
| | ISO1 | %EFF | CH1:94.82 | | | | ISO1 | DPM | :1.476512 |
| 12 | **- 2 | 1 | 1780.55 | 1.06 | 20.00 | 274.00 | 115.0 | 0.20 | |
| | ISO1 | %EFF | CH1:94.82 | | | | ISO1 | DPM | :1819.119 |
| 13 | **- 3 | 1 | 58.70 | 5.84 | 20.00 | 295.06 | 115.0 | 4.94 | |
| | ISO1 | %EFF | CH1:94.82 | | | | ISO1 | DPM | :3.163960 |
| 14 | **- 4 | 1 | 1772.00 | 1.06 | 20.00 | 316.11 | 114.0 | 0.18 | |
| | ISO1 | %EFF | CH1:94.84 | | | | ISO1 | DPM | :1809.726 |
| 15 | **- 5 | 1 | 54.50 | 6.06 | 20.00 | 337.17 | 117.0 | 5.11 | |
| | ISO1 | %EFF | CH1:94.79 | | | | ISO1 | DPM | :0.000000 |
| 16 | **- 6 | 1 | 1692.70 | 1.09 | 20.00 | 358.22 | 116.0 | 0.16 | |
| | ISO1 | %EFF | CH1:94.80 | | | | ISO1 | DPM | :1726.764 |

BEST AVAILABLE COPY

102-5 DAY
Batch 1360

WESTINGHOUSE HANFORD COMPANY

222-S LABORATORY

HC-SD-WM-DP-054 REV O

# ANALYTICAL BATCH

102 5DAY

| | |
|---|---|
| Lab Segment Serial No. G-604, G-607, G-608, G-609, G-610 | Customer ID: A-6, A-7, B-0, B-1, B-2 |
| Analysis: TC 99 | Sample Prep: Direct |

| | |
|---|---|
| Instrument: WB-27818 | Procedure/ Rev: LA-738-101/D-1 |
| Technologist: RG Achen | Date: 8/13/93 |
| Starting Time: 08:45 | Temperature NA |
| Ending Time: 15:30 | Chemist: Jennifer Slippera |

Comments:

| | Description | Lab ID |
|---|---|---|
| 1 | STD | G-604-5784 |
| 2 | BLK | G-605-5784 |
| 3 | Sample | G-606-5784 |
| 4 | Sample | G-607-5784 |
| 5 | Sample | G-608-5784 |
| 6 | Sample | G-609-5784 |
| 7 | Sample | G-610-5784 |
| 8 | | |
| 9 | | |
| 10 | | |

| | Description | Lab ID |
|---|---|---|
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |

| Standard Type | Primary Book No. and Aliquot Vol. | Second Book No. and Aliquot Vol. | Third Book No. and Aliquot Vol. | Final Vol. of Standard |
|---|---|---|---|---|
| LMCS | 73B51 / .250ml | | | |
| Pro. Spike | 16B51 / .100ml | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |



A-6000-881 (03/92)

WHC-SD-WM-DP-054 REV 0

ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA-438-101

DATE START: August 13, 1993

PREPARED BY: JL Slippern

DATE COMPLETE: August 17, 1993

| | UNITS: | uCi/mL | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SPL NAME | SPL ID | ANALYTE | RESULT #1 | RESULT #2 | AVERAGE | RPD% | %REC | DET LIM | % CT ER |
| 73B51 | G604 | Tc-99 | 3.93 | | | | 101 | | 1.5 |
| BLANK | G605 | Tc-99 | <9.35E-6 | | | | 60.5 | | 5.8 |
| A-6 | G606 | Tc-99 | <9.26E-6 | | | | 61.5 | <9.35E-6 | 5.8 |
| A-7 | G607 | Tc-99 | <9.56E-6 | | | | 59.3 | <9.35E-6 | 5.9 |
| B-0 | G608 | Tc-99 | 2.23E-5 | | | | 61.8 | <9.35E-6 | 5.2 |
| B-1 | G609 | Tc-99 | 7.64E-5 | | | | 61.2 | <9.35E-6 | 4.1 |
| B-2 | G610 | Tc-99 | 4.16E-5 | | | | 60.7 | <9.35E-6 | 4.7 |

NARRATIVE: [X] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

The results for the standard are in uCi/L.

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

·182

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 604.-5584 | 102 5 DAY | 7-22-93 | 14:33 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | % RECOVERY | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .250 ml | STD |

Remarks Calculations Results

EDP S363 TC99

STD# 73B51 RESULT 3.93

STD VAL 3.912 %REC 100.46%

.100 ml spike #16B51

$$\frac{855.749(7.01523)}{.250(2220)(3608.466-855.749)} = 3.9295$$

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | | Em Bacer | | |
| | Hrs 8-13-93 1900 | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/13/93 | 15:30 | |

54-6800-561 (R 10 83)

WHC-SD-WM-DP-031 ARH 1.3

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | STANDARD |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G604-5584 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 0.25 |
| 1360 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 855.749 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3608.466 |
| | Background cpm | (BKG cpm) | 55.5 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/13/93 | Instrument Fractional Efficiency | (EFF) | 0.9388 |
| | Detection Limit | (Ld) | 8.41 |
| | Critical Level | (Lc) | 3.88 |
| | Tc-99 Concentration in µCi/L = | | 3.9295E+00 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000 mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000 mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 3.93E+00 |
| Tc-99 Concentration in µCi/mL | = | 3.93E-03 |
| Spike (Tracer) Recovery | = | 58.9% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 8/17/93 |

Form 1 Rev. 1.1

Page 1 of 1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

384

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 605.-5684 | 102 5 DAY | 7-22-93 | 14:33 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? /ml | BLK |

Remarks Calculations Results

REAGENT BLANK

COUNT AS uCI/L

1.00ml Spike #16B51 <9.35 E-6 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs 8-13-93 1900 | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/13/93 | 15:30 | |

54-6800-06 (R-10/93)

WHC-SD-WM-DP-065, REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | BLANK |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16B51 |
| G605-5684 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1360 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 5.195613 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2835.534 |
| | Background cpm | (BKG cpm) | 55.5 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/13/93 | Instrument Fractional Efficiency | (EFF) | 0.9431 |
| | Detection Limit | (Ld) | 8.38 |
| | Critical Level | (Lc) | 3.88 |
| | Tc-99 Concentration in µCi/L = | < | 9.3509E-03 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 9.35E-03 |
| Tc-99 Concentration in µCi/mL | = | < 9.35E-06 |
| Spike (Tracer) Recovery | = | 60.5% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | Jennifer H. Sheppard | Date: | 8/17/93 |

Form 1 Rev. 1.1

Page 1 of 1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

582

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 606.-5784 | 102 5 DAY | 7-22-93 | 14:34 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? /ml | A-6 |

Remarks Calculations Results

COUNT AS uCI/L

.100ml spike #16851 < 9.26E-6 uCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs 8-13-93 1900 | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/13/93 | 1530 | |

WHC-SD-WM-DP-054 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| Serial No. | | | SAMPLE |
|---|---|---|---|
| G606-5784 | Spike (Tracer) Book Number | | 16851 |
| | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1360 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 4.691064 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2879.13 |
| | Background cpm | (BKG cpm) | 55.5 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/13/93 | Instrument Fractional Efficiency | (EFF) | 0.938 |
| | Detection Limit | (Ld) | 8.42 |
| | Critical Level | (Lc) | 3.88 |
| | Tc-99 Concentration in µCi/L = | < | 9.2574E-03 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 9.26E-03 |
| Tc-99 Concentration in µCi/mL | = | < 9.26E-06 |
| Spike (Tracer) Recovery | = | 61.5% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 8/17/93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

7 x 8

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 607.-5784 | 102 5 DAY | 7-22-93 | 14:35 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? /ml | A-7 |

Remarks Calculations Results

COUNT AS uCI/L
.100ml spike #16851

<9.56E-6 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs 8-13-93 1900 | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/13/93 | 1530 | |

WHC-SD-WM-ER-054 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G607-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1360 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 2.763 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2776.589 |
| | Background cpm | (BKG cpm) | 55.5 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/13/93 | Instrument Fractional Efficiency | (EFF) | 0.941 |
| | Detection Limit | (Ld) | 8.39 |
| | Critical Level | (Lc) | 3.88 |
| | Tc-99 Concentration in µCi/L = | < | 9.5627E-03 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 9.56E-03 |
| Tc-99 Concentration in µCi/mL | = | < 9.56E-06 |
| Spike (Tracer) Recovery | = | 59.3% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 8/17/93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

9810

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 608.-5784 | 102 5 DAY | 7-22-93 | 14:35 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? / ml | B-0 |

Remarks, Calculations, Results

COUNT AS uCI/L

.100 ml spike #16B51

2.23E-5 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs 8-13-93 1900 | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/13/93 | 1530 | |

54-6800 (Rev. 10-83)

WHC-SD-WM-ER-[illegible] REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16B51 |
| G608-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1360 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 20.38981 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2912.079 |
| | Background cpm | (BKG cpm) | 55.5 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/13/93 | Instrument Fractional Efficiency | (EFF) | 0.9416 |
| | Detection Limit | (Ld) | 8.39 |
| | Critical Level | (Lc) | 3.88 |
| | Tc-99 Concentration in µCi/L = | | 2.2282E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 2.23E-02 |
| Tc-99 Concentration in µCi/mL | = | 2.23E-05 |
| Spike (Tracer) Recovery | = | 61.8% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | Jennifer L. Leggett | Date: | 8/17/93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

11812

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 609.-5784 | 102 5 DAY | 7-22-93 | 14:35 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1ml | B-1 |

Remarks Calculations Results

COUNT AS uCI/L

.100ml spike #16851

7.64 E-5 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs 8-13-93 1900 | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/13/93 | 15:30 | |

54-6600-D R 3 (4/)

WHC-SD-WM-DP-004 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G609-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1360 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 69.23486 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2933 |
| | Background cpm | (BKG cpm) | 55.5 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/13/93 | Instrument Fractional Efficiency | (EFF) | 0.9396 |
| | Detection Limit | (Ld) | 8.41 |
| | Critical Level | (Lc) | 3.88 |
| | Tc-99 Concentration in µCi/L = | | 7.6397E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 7.64E-02 |
| Tc-99 Concentration in µCi/mL | = | 7.64E-05 |
| Spike (Tracer) Recovery | = | 61.2% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 8/17/93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

13514

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 610.-5784 | 102 5 DAY | 7-22-93 | 14:36 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? /ml | B-2 |

Remarks Calculations Results

COUNT AS uCI/L

.100 ml spike #16B51

4.16E-5 uCi/mL

| Analyst - 1 | Analyst - 2 | | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs 8-13-93 19:00 | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/3/93 | 15:00 | |

54-6300 (5-87) R-10-831

WHC-SD-WM-ER-054 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| Serial No. | | | SAMPLE |
|---|---|---|---|
| | Spike (Tracer) Book Number | | 16B51 |
| G610-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1360 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 37.35808 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2874.637 |
| | Background cpm | (BKG cpm) | 55.5 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/13/93 | Instrument Fractional Efficiency | (EFF) | 0.9396 |
| | Detection Limit | (Ld) | 8.41 |
| | Critical Level | (Lc) | 3.88 |
| | Tc-99 Concentration in µCi/L = | | 4.1607E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 4.16E-02 |
| Tc-99 Concentration in µCi/mL | = | 4.16E-05 |
| Spike (Tracer) Recovery | = | 60.7% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 8/17/93 |

Form 1 Rev. 1.1

600

Jim Lawrence
8-14-93

WHC-SD-WM-DP-054 REV 0



USER: 5 ID:TC 99 PRESET TIME: 20.00 FRI 13 AUG 1993 [illegible]
SAMPLE COUNTS: 1 CYCLE MEDIAN: 1 SCR:N [illegible]
[illegible]
RCM-TIME: 0.10 INT:999.95
CHANNEL 1-LL:150 UL: 800 2SIGMA: 0.10 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0

SINGLE LABEL DPM SET UP ON 20 DEC 1991 13:14

UNKNOWN ID:TC 99 UNKNOWN REPLICATES: 1
UNKNOWN NORM FACTOR ISO1:0 1.00000
UNKNOWN UNITS ISO1:DPM
UNKNOWN HALF LIFE CORRECTION:N
INDIVIDUAL UNKNOWN NORM FACTORS:N BACKGROUND QUENCH CURVES:Y
STANDARD ID:131028-A 1-10 QUENCH LIMITS LOW:73.67 HIGH:[illegible]
HALF LIFE(DAYS) ISO1:N
STANDARD DPM ISO1:0.0000000

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | RCM% | ERR |
|---|---|---|---|---|---|---|---|---|---|
| S1 | **- 1 | 1 | 55.50 | 6.00 | 20.00 | 20.93 | 152.0 | 3.77 | |

BACKGROUND QUENCH CURVES: CONSTANT

BEST AVAILABLE COPY

CHANNEL 1
QUENCH CURVE COEFFICIENTS
A: 55.50000 B:0.00000000 C:0.00000000 D:0.00000000000

BACKGROUND QUENCH CURVE CORRELATION TABLE

| BKG | H# | MEASURED CPM. | CALCULATED CPM. | PERCENT DIFF. | FLAG |
|---|---|---|---|---|---|
| 1 | 152.0 | 55.50 | 55.50 | 0.00 | |

BACKGROUND QUENCH LIMITS LOW:0.000 HIGH:1000.
TOTAL QUENCH LIMITS LOW:73.67 HIGH:207.7

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | RCM% | ERR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | **- 3 | 1 | 858.85 | 1.53 | 20.00 | 42.25 | 153.0 | 1.47 | |
| | ISO1 %EFF CH1:93.88 | | | | | | ISO1 DPM | :855.7490 | |
| 2 | **- 4 | 1 | 3453.40 | 0.76 | 20.00 | 63.44 | 149.0 | 0.30 | |
| | ISO1 %EFF CH1:94.16 | | | | | | ISO1 DPM | :3608.466 | |
| 3 | **- 5 | 1 | 60.40 | 5.75 | 20.00 | 84.58 | 146.0 | 15.80 | |
| | ISO1 %EFF CH1:94.31 | | | | | | ISO1 DPM | :5.195613 | |
| 4 | **- 6 | 1 | 2715.10 | 0.86 | 20.00 | 105.69 | 154.0 | 0.43 | |
| | ISO1 %EFF CH1:[illegible] | | | | | | ISO1 DPM | :2878.534 | |

601

| SAM | POS | CH | DPM | 2SIG% | TIME | EL TIME | AVG HH | RCM% | S-H |
|---|---|---|---|---|---|---|---|---|---|
| 5 | **- 7 | 1 | [illegible] | [illegible] | 20.00 | 125.82 | [illegible] | [illegible] | |
| | ISO1 | %EFF | CH1:93.80 | | | | | ISO1 DPM :4.691064 | |
| 6 | **- 8 | 1 | 2748.80 | 0.85 | 20.00 | 147.99 | 157.0 | 0.45 | |
| | ISO1 | %EFF | CH1:93.55 | | | | | ISO1 DPM :2879.130 | |
| 7 | **- 9 | 1 | 58.10 | 5.87 | 20.00 | 169.11 | 150.0 | 10.13 | |
| | ISO1 | %EFF | CH1:94.10 | | | | | ISO1 DPM :2.763000 | |
| 8 | **-10 | 1 | 2671.65 | 0.87 | 20.00 | 190.28 | 148.0 | 0.35 | |
| | ISO1 | %EFF | CH1:94.22 | | | | | ISO1 DPM :2776.589 | |
| 9 | **-11 | 1 | 74.70 | 5.17 | 20.00 | 211.42 | 149.0 | 10.94 | |
| | ISO1 | %EFF | CH1:94.16 | | | | | ISO1 DPM :[illegible] | |
| 10 | **-12 | 1 | 2797.65 | 0.85 | 20.00 | 232.58 | 149.0 | 0.57 | |
| | ISO1 | %EFF | CH1:94.16 | | | | | ISO1 DPM :2912.079 | |
| 11 | **- 1 | 1 | 120.55 | 4.07 | 20.00 | 253.78 | 152.0 | 17.83 | |
| | ISO1 | %EFF | CH1:93.96 | | | | | ISO1 DPM :69.23486 | |
| 12 | **- 2 | 1 | 2817.35 | 0.84 | 20.00 | 274.85 | 149.0 | 0.36 | |
| | ISO1 | %EFF | CH1:94.16 | | | | | ISO1 DPM :2933.000 | |
| 13 | **- 3 | 1 | 90.60 | 4.70 | 20.00 | 295.97 | 152.0 | 4.89 | |
| | ISO1 | %EFF | CH1:93.96 | | | | | ISO1 DPM :37.35808 | |
| 14 | **- 4 | 1 | 2760.55 | 0.85 | 20.00 | 317.07 | 150.0 | 0.41 | |
| | ISO1 | %EFF | CH1:94.10 | | | | | ISO1 DPM :2874.637 | |

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WESTINGHOUSE HANFORD COMPANY

222-S LABORATORY

WHC-SD-WM-DP-054 REV 0 **ANALYTICAL BATCH**

Batch 1365

1025DAY

| | |
|---|---|
| Lab Segment Serial No. G612 - G618 | Customer ID: |
| Analysis: TC 99 | Sample Prep: B3, B4, B5, B6, B7 UNDIGESTED Direct 8 3/17/93 |

| | |
|---|---|
| Instrument: WB27818 ~~WB16085~~ 3/17/93 | Procedure/ Rev: LA-438-101 D-1 |
| Technologist: Patrick J. McLown | Date: 8/12/93 |
| Starting Time: 0030 | Temperature NA |
| Ending Time: 0720 | Chemist: S. CATLOW |

Comments:

| | Description | Lab ID | | Description | Lab ID |
|---|---|---|---|---|---|
| 1 | LMCS | G612.-5584 | 11 | | |
| 2 | REAGENT BLANK | G613.-5684 | 12 | | |
| 3 | SAMPLE | G614.-5784 | 13 | | |
| 4 | SAMPLE | G615.-5784 | 14 | | |
| 5 | SAMPLE | G616.-5784 | 15 | | |
| 6 | SAMPLE | G617.-5784 | 16 | | |
| 7 | SAMPLE | G618.-5784 | 17 | | |
| 8 | | | 18 | | |
| 9 | | | 19 | | |
| 10 | | | 20 | | |

| Standard Type | Primary Book No. and Aliquot Vol. | Second Book No. and Aliquot Vol. | Third Book No. and Aliquot Vol. | Final Vol. of Standard |
|---|---|---|---|---|
| LMCS | 73851/.250mL | | | |
| SPIKE | 16851/.100mL | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |



A-6000-881 (03/92)

WHC-SD-WM-DP-054 REV 0

ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA-438-101

DATE START: August 12, 1993

PREPARED BY: JL Slippern

DATE COMPLETE: August 17, 1993

| | UNITS: | uCi/mL | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SPL NAME | SPL ID | ANALYTE | RESULT #1 | RESULT #2 | AVERAGE | RPD% | %REC | DET LIM | % CT ER |
| 73B51 | G612 | Tc-99 | 3.7 | | | | 94.6 | | 1.4 |
| BLANK | G613 | Tc-99 | 9.50E-6 | | | | 76.7 | | 5.7 |
| B-3 | G614 | Tc-99 | 4.70E-4 | | | | 75.5 | 9.50E-6 | 5.6 |
| B-4 | G615 | Tc-99 | 5.69E-4 | | | | 76.8 | 9.50E-6 | 5.5 |
| B-5 | G616 | Tc-99 | <3.00E-4 | | | | 75.2 | 9.50E-6 | 5.8 |
| B-6 | G617 | Tc-99 | 3.32E-4 | | | | 76.3 | 9.50E-6 | 5.8 |
| B-7 | G618 | Tc-99 | 3.60E-4 | | | | 77.1 | 9.50E-6 | 5.7 |

NARRATIVE: [X] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

The results for the standard are in uCi/L.

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

1-2 use le

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 612.-5584 | 102 5 DAY | 7-22-93 | 14:36 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | % RECOVERY | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .250 ML | STD |

Remarks Calculations Results

EDP S363 TC99

STD# 73851 RESULT 3.70

STD VAL %REC 94.58%

SPIKE # 16851

SPIKE VOL. .100 ML

$\frac{1026.386\ (7.0152E3)}{.250\ (2220)(4530.942-1026.386)} = 3.7019$

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | | | | |
| | Hrs | Hrs | Hrs | |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/12/93 | 0720 | |

WHC-SD-WM-DP-057 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | STANDARD |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G 612-5584 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 0.25 |
| 1365 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 1026.386 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 4530.942 |
| | Background cpm | (BKG cpm) | 51.8 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9371 |
| | Detection Limit | (Ld) | 8.15 |
| | Critical Level | (Lc) | 3.75 |
| | Tc-99 Concentration in µCi/L = | | 3.7019E+00 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 3.70E+00 |
| Tc-99 Concentration in µCi/mL | = | 3.70E-03 |
| Spike (Tracer) Recovery | = | 74.9% |

| | | | |
|---|---|---|---|
| Data Entry by: | Jennifer L. Sevacio | Date: | 17-Aug-93 |
| Approved by: | J. L. Sevacio | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

3-4

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 613.-5684 | 102 5 DAY | 7-22-93 | 14:37 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? / ML | BLK |

Remarks Calculations Results

REAGENT BLANK

COUNT AS uCI/L

SPIKE # 16B51 9.50E-6 µCi/mL

SPIKE VOL. .100mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | | | | |
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/12/93 | 0720 | |

WHC-SD-WM-DP-051 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | BLANK |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16B51 |
| G 613-5684 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1365 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 10.7873 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3598.727 |
| | Background cpm | (BKG cpm) | 51.8 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9363 |
| | Detection Limit | (Ld) | 8.16 |
| | Critical Level | (Lc) | 3.75 |
| | Tc-99 Concentration in µCi/L = | | 9.5007E-03 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 9.50E-03 |
| Tc-99 Concentration in µCi/mL | = | 9.50E-06 |
| Spike (Tracer) Recovery | = | 76.7% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 17-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

5-6

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 614.-5784 | 102 5 DAY | 7-22-93 | 14:38 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .250mL - 10mL - 1 mL | B-3 |

Remarks Calculations Results

COUNT AS uCI/L
SPIKE # 16851
SPIKE VOL. .100mL

4.70 E-4 µCi/mL

Patrick J. McCann

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | C.J. Opian | Tom Barao | | |
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/12/93 | 0720 | J.F. Schuppert |

54-6800 (R-10-93)

WHC-SD-WM-DP-[illegible] REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G 614-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1365 | Dilution Factor | (DF) | 41 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 12.80545 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3542.327 |
| 8 | Background cpm | (BKG cpm) | 51.8 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.941 |
| | Detection Limit | (Ld) | 8.11 |
| | Critical Level | (Lc) | 3.75 |
| | Tc-99 Concentration in µCi/L = | | 4.7006E-01 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 4.70E-01 |
| Tc-99 Concentration in µCi/mL | = | 4.70E-04 |
| Spike (Tracer) Recovery | = | 75.5% |

| | | | |
|---|---|---|---|
| Data Entry by: | Jennifer L. Schuppert | Date: | 17-Aug-93 |
| Approved by: | J.F. Schuppert | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

7-8

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 615.-5784 | 102 5 DAY | 7-22-93 | 14:40 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .250ML - 10ML - 1ML | B-4 |

Remarks Calculations Results

COUNT AS uCI/L
SPIKE # 16 B51
SPIKE VOL. .100mL

5.69 E-4 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/12/93 | 0420 | |

WHC-SD-WM-TP-[illegible], REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G 615-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1365 | Dilution Factor | (DF) | 41 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 15.79275 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3609.304 |
| | Background cpm | (BKG cpm) | 51.8 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9403 |
| | Detection Limit | (Ld) | 8.12 |
| | Critical Level | (Lc) | 3.75 |
| | Tc-99 Concentration in µCi/L = | | 5.6939E-01 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 5.69E-01 |
| Tc-99 Concentration in µCi/mL | = | 5.69E-04 |
| Spike (Tracer) Recovery | = | 76.8% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 17-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

9-10

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 616.-5784 | 102 5 DAY | 7-22-93 | 14:40 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .250ML - 10ML - 1ML | B-5 |

Remarks Calculations Results

COUNT AS uCI/L
SPIKE # 16851
SPIKE VOL. .100ML

<3.00E-4 µCi/mL

Patrick J. McLaren

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | C.J. Opsum | Em Beale | | |
| Hrs | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/12/93 | 0720 | J.J. Slupesen |

WHC-SD-WM-DP-051 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G 616-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1365 | Dilution Factor | (DF) | 41 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 7.889516 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3523.856 |
| | Background cpm | (BKG cpm) | 51.8 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.938 |
| | Detection Limit | (Ld) | 8.14 |
| | Critical Level | (Lc) | 3.75 |
| | Tc-99 Concentration in µCi/L = | < | 2.9996E-01 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3
**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 3.00E-01 |

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/mL | = | < 3.00E-04 |

| | | |
|---|---|---|
| Spike (Tracer) Recovery | = | 75.2% |

| | | | |
|---|---|---|---|
| Data Entry by: | Jennifer J. Slupesen | Date: | 17-Aug-93 |
| Approved by: | J.J. Slupesen | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

11-12

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 617.-5784 | 102 5 DAY | 7-22-93 | 14:41 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .250ML - 10ML - 1ML | B-6 |

Remarks Calculations Results

COUNT AS uCI/L
SPIKE # 16851
SPIKE VOL. - 100mL

3.32E-4 µCi/mL

Patrick J. McCown

| Analyst - 1 | Analyst - 2 | | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | G. Opsen | Em Barua | | |
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/12/93 | 0720 | |

54-6800-E1 1-10-93

WHC-SD-WM-BD-001 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G 617-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1365 | Dilution Factor | (DF) | 41 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 9.153266 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3577.821 |
| | Background cpm | (BKG cpm) | 51.8 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9396 |
| | Detection Limit | (Ld) | 8.13 |
| | Critical Level | (Lc) | 3.75 |
| | Tc-99 Concentration in µCi/L = | | 3.3231E-01 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 3.32E-01 |
| Tc-99 Concentration in µCi/mL | = | 3.32E-04 |
| Spike (Tracer) Recovery | = | 76.3% |

| | | | |
|---|---|---|---|
| Data Entry by: | Jennifer L. Sappington | Date: | 17-Aug-93 |
| Approved by: | J. L. Sappington | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

1374

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 618.-5784 | 102 5 DAY | 7-22-93 | 14:41 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

Sample Size: ? .250mL - 10mL - 1mL

Customer ID: B-7

Remarks Calculations Results

COUNT AS uCI/L
SPIKE # 16851
SPIKE VOL. .100mL

3.60E-4 µCi/mL

| Analyst - 1 | Analyst - 2 | | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/12/93 | 0720 | |

54-6800-5-1 (R/10-93)

WHC-SD-WM-ER-[illegible] REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| Serial No. | | | SAMPLE |
|---|---|---|---|
| G 618-5784 | Spike (Tracer) Book Number | | 16851 |
| | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1365 | Dilution Factor | (DF) | 41 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 10.02182 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3614.257 |
| | Background cpm | (BKG cpm) | 51.8 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.938 |
| | Detection Limit | (Ld) | 8.14 |
| | Critical Level | (Lc) | 3.75 |
| | Tc-99 Concentration in µCi/L = | | 3.6025E-01 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 3.60E-01 |
| Tc-99 Concentration in µCi/mL | = | 3.60E-04 |
| Spike (Tracer) Recovery | = | 77.1% |

| | | | |
|---|---|---|---|
| Data Entry by: | Jennifer L. Shipp | Date: | 17-Aug-93 |
| Approved by: | J. L. Shipp | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

Eric Dillman
9-12-93





USER: 6 ID:TC 99 PRESET TIME: 20.00 THU 12 AUG 1993 12:[illegible]
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RSD32:N
[illegible] PRINT: 2 PRINT CORRECTION:N
RCM-TIME: 0.10 INT:999.95
CHANNEL 1-LL:150 UL: 800 2SIGMA: 0.10 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0

SINGLE LABEL DPM SET UP ON 20 DEC 1991 13:14

UNKNOWN ID:TC 99 UNKNOWN REPLICATES: 1
UNKNOWN NORM FACTOR ISO1:0 1.00000
UNKNOWN UNITS ISO1:DPM
UNKNOWN HALF LIFE CORRECTION:N
INDIVIDUAL UNKNOWN NORM FACTORS:N BACKGROUND QUENCH CURVES:Y
STANDARD ID:131828-A 1-10 QUENCH LIMITS LOW:73.67 HIGH:207.7
HALF LIFE(DAYS) ISO1:N
STANDARD DPM ISO1:0.00000000

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | RCM% | ERR |
|---|---|---|---|---|---|---|---|---|---|
| B1 | **- 1 | 1 | 51.80 | 6.21 | 20.00 | 20.91 | 155.0 | 6.29 | |

BACKGROUND QUENCH CURVES: CONSTANT

BEST AVAILABLE COPY

CHANNEL 1
QUENCH CURVE COEFFICIENTS
A: 51.80000 B:0.00000000 C:0.00000000 D:0.00000000000

BACKGROUND QUENCH CURVE CORRELATION TABLE

| BKG | H# | MEASURED CPM. | CALCULATED CPM. | PERCENT DIFF. | FLAG |
|---|---|---|---|---|---|
| 1 | 155.0 | 51.80 | 51.80 | 0.00 | |

BACKGROUND QUENCH LIMITS LOW:0.000 HIGH:1000.
TOTAL QUENCH LIMITS LOW:73.67 HIGH:207.7

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | RCM% | ERR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | **- 3 | 1 | 1013.65 | 1.40 | 20.00 | 42.17 | 155.0 | 1.08 | |
| | ISO1 %EFF CH1:93.71 | | | | | | ISO1 DPM | :1026.386 | |
| 2 | **- 4 | 1 | 4297.85 | 0.68 | 20.00 | 63.35 | 155.0 | 0.24 | |
| | ISO1 %EFF CH1:93.71 | | | | | | ISO1 DPM | :4530.942 | |
| 3 | **- 5 | 1 | 61.90 | 5.68 | 20.00 | 84.50 | 156.0 | 36.19 | |
| | ISO1 %EFF CH1:93.63 | | | | | | ISO1 DPM | :10.78730 | |
| 4 | **- 6 | 1 | 3424.25 | 0.76 | 20.00 | 105.70 | 155.0 | 0.31 | |
| | [illegible] | | | | | | ISO1 DPM | :3509.707 | |

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | RCN% | BAR |
|---|---|---|---|---|---|---|---|---|---|
| [illegible] | [illegible] | 1 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | |
| | ISO1 | %EFF | CH1:94.10 | | | | ISO1 | DPM | :12.80545 |
| 6 | **- 8 | 1 | 3385.15 | 0.77 | 20.00 | 148.05 | 150.0 | 0.29 | |
| | ISO1 | %EFF | CH1:94.10 | | | | ISO1 | DPM | :3542.327 |
| 7 | **- 9 | 1 | 66.65 | 5.48 | 20.00 | 169.23 | 151.0 | 11.07 | |
| | ISO1 | %EFF | CH1:94.03 | | | | ISO1 | DPM | :15.79275 |
| 8 | **-10 | 1 | 3440.10 | 0.76 | 20.00 | 190.38 | 153.0 | 0.32 | |
| | ISO1 | %EFF | CH1:93.88 | | | | ISO1 | DPM | :3609.304 |
| 9 | **-11 | 1 | 59.20 | 5.81 | 20.00 | 211.55 | 154.0 | 19.80 | |
| | ISO1 | %EFF | CH1:93.80 | | | | ISO1 | DPM | :7.8695.6 |
| 10 | **-12 | 1 | 3365.30 | 0.77 | 20.00 | 232.71 | 151.0 | 0.27 | |
| | ISO1 | %EFF | CH1:94.03 | | | | ISO1 | DPM | :3523.856 |
| 11 | **- 1 | 1 | 60.40 | 5.75 | 20.00 | 253.90 | 152.0 | 7.54 | |
| | ISO1 | %EFF | CH1:93.96 | | | | ISO1 | DPM | :9.153266 |
| 12 | **- 2 | 1 | 3418.55 | 0.76 | 20.00 | 275.05 | 150.0 | 0.29 | |
| | ISO1 | %EFF | CH1:94.10 | | | | ISO1 | DPM | :3577.821 |
| 13 | **- 3 | 1 | 61.20 | 5.72 | 20.00 | 296.18 | 154.0 | 45.31 | |
| | ISO1 | %EFF | CH1:93.80 | | | | ISO1 | DPM | :10.02182 |
| 14 | **- 4 | 1 | 3444.75 | 0.76 | 20.00 | 317.32 | 153.0 | 0.31 | |
| | ISO1 | %EFF | CH1:93.88 | | | | ISO1 | DPM | :3614.257 |

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✓ OA 3

WESTINGHOUSE HANFORD COMPANY

222-S LABORATORY

# ANALYTICAL BATCH

Batch 1385

102-5DA4

| | |
|---|---|
| Lab Segment Serial No. G-622, G-623, G-624, G-625, G-626 | Customer ID: C0, C-1, C-2, C-3, C-4 |
| Analysis: $TC^{99}$ | Sample Prep: Direct |

| | |
|---|---|
| Instrument: WB-27818 | Procedure/ Rev: LA-438-101 / D-1 |
| Technologist: RG Achen | Date: 8/13/93 |
| Starting Time: 17:00 | Temperature NA |
| Ending Time: 21:30 | Chemist: Jennifer Slippen |

Comments:

| | Description | Lab ID | | Description | Lab ID |
|---|---|---|---|---|---|
| 1 | STD | G-620-5584 | 11 | | |
| 2 | BLK | G-621-5684 | 12 | | |
| 3 | Sample | G-622-5784 | 13 | | |
| 4 | Sample | G-623-5784 | 14 | | |
| 5 | Sample | G-624-5784 | 15 | | |
| 6 | Sample | G-625-5784 | 16 | | |
| 7 | Sample | G-626-5784 | 17 | | |
| 8 | | | 18 | | |
| 9 | | | 19 | | |
| 10 | | | 20 | | |

| Standard Type | Primary Book No. and Aliquot Vol. | Second Book No. and Aliquot Vol. | Third Book No. and Aliquot Vol. | Final Vol. of Standard |
|---|---|---|---|---|
| LMCS | 73BS1 / .250ml | | | |
| Pro. Spike | 16BS1 / .100ml | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |



A-6000-881 (03/92)

ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA-438-101

DATE START: August 13, 1993

PREPARED BY: JL Slippern

DATE COMPLETE: August 17, 1993

| | UNITS: | uCi/mL | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SPL NAME | SPL ID | ANALYTE | RESULT #1 | RESULT #2 | AVERAGE | RPD% | %REC | DET LIM | % CT ER |
| 73B51 | G620 | Tc-99 | 3.59 | | | | 91.8 | | 1.6 |
| BLANK | G621 | Tc-99 | 9.12E-6 | | | | 66.9 | | 5.7 |
| C-0 | G622 | Tc-99 | 3.20E-5 | | | | 62.1 | 9.12E-6 | 4.9 |
| C-1 | G623 | Tc-99 | 9.40E-5 | | | | 60.8 | 9.12E-6 | 3.9 |
| C-2 | G624 | Tc-99 | 5.27E-5 | | | | 60.4 | 9.12E-6 | 4.5 |
| C-3 | G625 | Tc-99 | 9.07E-5 | | | | 62.1 | 9.12E-6 | 3.9 |
| C-4 | G626 | Tc-99 | 8.55E-5 | | | | 60.7 | 9.12E-6 | 4 |

NARRATIVE: [X] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

The results for the standard are in uCi/L.

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 620.-5584 | 102 5 DAY | 7-22-93 | 14:54 | 23 |

| Determination | Method-Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | % RECOVERY | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .250ml | STD |

Remarks Calculations Results

EDP S363 TC99

STD#73B51 RESULT 3.59

STD VAL 3.912 60% REC 91.77%

.100ml spike #16B51

$$\frac{817.4077(7015.253)}{.250(2220)(3692.224-817.4077)} = 3.594$$

| Analyst - 1 | Analyst - 2 | | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | | | | |
| | Hrs 8-13-93 22:15 | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/13/93 | 21:30 | |

WHC-SD-WM-DP-051 Rev. 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | STANDARD |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G620-5584 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 0.25 |
| 1385 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 817.4077 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3692.224 |
| | Background cpm | (BKG cpm) | 54.25 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/13/93 | Instrument Fractional Efficiency | (EFF) | 0.9396 |
| | Detection Limit | (Ld) | 8.31 |
| | Critical Level | (Lc) | 3.84 |
| | Tc-99 Concentration in µCi/L = | | 3.5940E+00 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L = | 3.59E+00 |
| Tc-99 Concentration in µCi/mL = | 3.59E-03 |
| Spike (Tracer) Recovery = | 61.5% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

354

| Serial No. | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 621.-5684 | 102 5 DAY | 7-22-93 | 14:56 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? /ml | BLK |

Remarks, Calculations, Results

REAGENT BLANK

COUNT AS uCI/L

.100ml spike #16851

9.12 E-6 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | | | | |
| | Hrs 8-13-93 22:15 | Hrs | Hrs | Hrs |
| Date 8/13/93 | Time Completed 21:30 21:30 | Lab Unit Mgr 8-20-93 | | |

54-6600 (R/C-831)

WHC-SD-WM-ER-[illegible] REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | BLANK |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G621-5684 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1385 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 9.021274 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3136.216 |
| | Background cpm | (BKG cpm) | 54.25 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/13/93 | Instrument Fractional Efficiency | (EFF) | 0.9422 |
| | Detection Limit | (Ld) | 8.29 |
| | Critical Level | (Lc) | 3.84 |
| | Tc-99 Concentration in µCi/L = | | 9.1159E-03 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 9.12E-03 |
| Tc-99 Concentration in µCi/mL | = | 9.12E-06 |
| Spike (Tracer) Recovery | = | 66.9% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

576

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 622.-5784 | 102 5 DAY | 7-22-93 | 14:58 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? / ml | C-0. |

Remarks, Calculations, Results

COUNT AS uCI/L

.100 ml spike #16B51

3.20 E -5 uCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs 8-13-93 2215 | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/13/93 | 21:30 | |

54-6600-061 (8-11-83)

WHC-SD-WM-DP-054 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16B51 |
| G622-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1385 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 29.43659 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2933.771 |
| | Background cpm | (BKG cpm) | 54.25 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/13/93 | Instrument Fractional Efficiency | (EFF) | 0.941 |
| | Detection Limit | (Ld) | 8.30 |
| | Critical Level | (Lc) | 3.84 |
| | Tc-99 Concentration in µCi/L = | | 3.2028E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000 mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000 mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 3.20E-02 |
| Tc-99 Concentration in µCi/mL | = | 3.20E-05 |
| Spike (Tracer) Recovery | = | 62.1% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

Page 1 of 1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

188

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 623.-5784 | 102 5 DAY | 7-22-93 | 15: 3 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? /ml | C-1 |

Remarks Calculations Results

COUNT AS uCI/L
.100ml spike #16B51

9.40 E-5 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | A Johnson | Eric Barnes | | |
| | Hrs 8-13-93 2215 | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/13/93 | 2120 | |

54-6200 (R 10-83)

WHC-SD-WM-DQO-002 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16B51 |
| G623-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1385 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 84.52566 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2925.832 |
| | Background cpm | (BKG cpm) | 54.25 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/13/93 | Instrument Fractional Efficiency | (EFF) | 0.9388 |
| | Detection Limit | (Ld) | 8.32 |
| | Critical Level | (Lc) | 3.84 |
| | Tc-99 Concentration in µCi/L = | | 9.4006E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 9.40E-02 |
| Tc-99 Concentration in µCi/mL | = | 9.40E-05 |
| Spike (Tracer) Recovery | = | 60.8% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | Jennifer L Shuppert | Date: | 8/17/93 |

Form 1 Rev. 1.1 Page 1 of 1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

9810

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 624.-5784 | 102 5 DAY | 7-22-93 | 15: 3 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1ml | C-2 |

Remarks Calculations Results

COUNT AS uCI/L

.100ml spike #16851

5.27E-5 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | 8-13-93 | | | |
| | Hrs 22:15 | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/12/93 | 21:30 | |

54-5AX (2-87) P (10-83)

WHC-SD-WM-TP-054 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| Serial No. | | | SAMPLE |
|---|---|---|---|
| G624-5784 | Spike (Tracer) Book Number | | 16851 |
| | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1385 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 47.16555 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2373.681 |
| | Background cpm | (BKG cpm) | 54.25 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/13/93 | Instrument Fractional Efficiency | (EFF) | 0.9403 |
| | Detection Limit | (Ld) | 8.31 |
| | Critical Level | (Lc) | 3.84 |
| | Tc-99 Concentration in µCi/L = | | 5.2730E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 5.27E-02 |
| Tc-99 Concentration in µCi/mL | = | 5.27E-05 |
| Spike (Tracer) Recovery | = | 60.4% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 8/17/93 |

Form 1 Rev. 1.1

Page 1 of 1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

11812

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 625.-5784 | 102 5 DAY | 7-22-93 | 15: 6 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1 ml | C-3 |

Remarks Calculations Results

COUNT AS uCI/L

.100ml spike #16851

9.07 E-5 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | 8-13-93 22:15 | | | |
| Hrs | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/13/93 | 21:30 | |

54 68 51 (R 10 83)

WHC-SD-WM-[illegible]-051 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G625-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1385 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 83.36459 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2988.664 |
| | Background cpm | (BKG cpm) | 54.25 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/13/93 | Instrument Fractional Efficiency | (EFF) | 0.9416 |
| | Detection Limit | (Ld) | 8.30 |
| | Critical Level | (Lc) | 3.84 |
| | Tc-99 Concentration in µCi/L = | | 9.0673E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 9.07E-02 |
| Tc-99 Concentration in µCi/mL | = | 9.07E-05 |
| Spike (Tracer) Recovery | = | 62.1% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 8/17/93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

13514

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 626.-5784 | 102 5 DAY | 7-22-93 | 15: 7 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? / ml | C-4 |

Remarks Calculations Results

COUNT AS uCI/L
.100 ml spike #16851

8.55E-5 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs 8-13-93 22:15 | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/13/83 | 21:30 | |

WHC-SD-[illegible]-OP-054 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G626-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1385 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 76.72642 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2913.301 |
| | Background cpm | (BKG cpm) | 54.25 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/13/93 | Instrument Fractional Efficiency | (EFF) | 0.941 |
| | Detection Limit | (Ld) | 8.30 |
| | Critical Level | (Lc) | 3.84 |
| | Tc-99 Concentration in µCi/L = | | 8.5475E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000 mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000 mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 8.55E-02 |
| Tc-99 Concentration in µCi/mL | = | 8.55E-05 |
| Spike (Tracer) Recovery | = | 60.7% |

| | | | |
|---|---|---|---|
| Data Entry by: | Jennifer L Slupesen | Date: | 16-Aug-93 |
| Approved by: | J L Slupesen | Date: | 17-Aug-93 |

Form 1 Rev. 1.1 Page 1 of 1

Em Dorlen
3-14-93





USER: S ID:TC 99 PRESET TIME: 20.00 SAT 14 AUG 1993 [illegible]
SAMPLE TIMEOUT: 1 CYCLE PROGRAM: 1 SUB:N RS232:N
LB: 1 [illegible] SAMPLE COUNTS 2 [illegible] RECOUNT:N
RCM-TIME: 0.10 INT:999.99
CHANNEL 1-LL:150 UL: 800 2SIGMA: 0.10 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0

SINGLE LABEL DPM SET UP ON 20 DEC 1991, 13:14

UNKNOWN ID:TC 99 UNKNOWN REPLICATES: 1
UNKNOWN NORM FACTOR ISO1:0 1.00000
UNKNOWN UNITS ISO1:DPM
UNKNOWN HALF LIFE CORRECTION:N
INDIVIDUAL UNKNOWN NORM FACTORS:N BACKGROUND QUENCH CURVES:Y
STANDARD ID:1SIB28-A 1-10 QUENCH LIMITS LOW:73.67 HIGH:207.7
HALF LIFE(DAYS) ISO1:N
STANDARD DPM: ISO1:0.00000000

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | RCM% | ERR |
|---|---|---|---|---|---|---|---|---|---|
| B1 | **- 1 | 1 | 54.25 | 6.07 | 20.00 | 20.92 | 160.0 | 4.77 | |

BACKGROUND QUENCH CURVES: CONSTANT

**BEST AVAILABLE COPY**

CHANNEL 1
QUENCH CURVE COEFFICIENTS
A: 54.25000 B:0.00000000 C:0.00000000 D:0.00000000000

BACKGROUND QUENCH CURVE CORRELATION TABLE

| BKG | H# | MEASURED CPM. | CALCULATED CPM. | PERCENT DIFF. | FLAG |
|---|---|---|---|---|---|
| 1 | 160.0 | 54.25 | 54.25 | 0.00 | |

BACKGROUND QUENCH LIMITS LOW:0.000 HIGH:1000.
TOTAL QUENCH LIMITS LOW:73.67 HIGH:207.7

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | RCM% | ERR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | **- 3 | 1 | 822.25 | 1.56 | 20.00 | 42.24 | 152.0 | 1.01 | |
| | ISO1 %EFF CH1:93.96 | | | | | | ISO1 DPM | :817.4077 | |
| 2 | **- 4 | 1 | 3523.30 | 0.75 | 20.00 | 63.41 | 152.0 | 0.36 | |
| | ISO1 %EFF CH1:93.96 | | | | | | ISO1 DPM | :3692.224 | |
| 3 | **- 5 | 1 | 62.75 | 5.65 | 20.00 | 84.53 | 148.0 | 7.81 | |
| | ISO1 %EFF CH1:94.22 | | | | | | ISO1 DPM | :9.021274 | |
| 4 | **- 6 | 1 | 3003.25 | 0.82 | 20.00 | 105.70 | 151.0 | 0.34 | |
| | ISO1 %EFF CH1:94.03 | | | | | | ISO1 DPM | :3136.216 | |

| SAM | POS | CH | CPM | 2SIGX | TIME | EL TIME | AVG H# | RUNS | DMP |
|---|---|---|---|---|---|---|---|---|---|
| [illegible] | **- [illegible] | 1 | [illegible] | 4.94 | [illegible] | [illegible] | [illegible] | [illegible] | |
| | ISOI | %EFF | CH1:94.10 | | | | ISOI | DPM | :29.43839 |
| 6 | **- 8 | 1 | 2818.50 | 0.84 | 20.00 | 147.98 | 148.0 | 0.32 | |
| | ISOI | %EFF | CH1:94.22 | | | | ISOI | DPM | :2933.771 |
| 7 | **- 9 | 1 | 133.60 | 3.87 | 20.00 | 169.13 | 153.0 | 7.26 | |
| | ISOI | %EFF | CH1:93.88 | | | | ISOI | DPM | :84.52566 |
| 8 | **-10 | 1 | 2809.35 | 0.84 | 20.00 | 190.26 | 149.0 | 0.33 | |
| | ISOI | %EFF | CH1:94.16 | | | | ISOI | DPM | :2925.832 |
| 9 | **-11 | 1 | 98.60 | 4.50 | 20.00 | 211.39 | 151.0 | 6.16 | |
| | ISOI | %EFF | CH1:94.03 | | | | ISOI | DPM | :47.16557 |
| 10 | **-12 | 1 | 2758.40 | 0.85 | 20.00 | 232.57 | 150.0 | 0.35 | |
| | ISOI | %EFF | CH1:94.10 | | | | ISOI | DPM | :2873.681 |
| 11 | **- 1 | 1 | 132.75 | 3.88 | 20.00 | 253.76 | 149.0 | 5.91 | |
| | ISOI | %EFF | CH1:94.16 | | | | ISOI | DPM | :83.36459 |
| 12 | **- 2 | 1 | 2866.60 | 0.84 | 20.00 | 274.91 | 150.0 | 0.32 | |
| | ISOI | %EFF | CH1:94.10 | | | | ISOI | DPM | :2988.664 |
| 13 | **- 3 | 1 | 126.45 | 3.98 | 20.00 | 296.02 | 150.0 | 6.29 | |
| | ISOI | %EFF | CH1:94.10 | | | | ISOI | DPM | :76.72642 |
| 14 | **- 4 | 1 | 2797.55 | 0.85 | 20.00 | 317.13 | 149.0 | 0.38 | |
| | ISOI | %EFF | CH1:94.16 | | | | ISOI | DPM | :2913.301 |

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OA 3

WESTINGHOUSE HANFORD COMPANY

Batch 1380

222-S LABORATORY

## ANALYTICAL BATCH

102-5-DA

| | |
|---|---|
| Lab Segment Serial No. G-630, G-631, G-632, G-633, ~~G-634~~ G-634 | Customer ID: C-5, C-6, C-7, D-0, D-1 |
| Analysis: TC 99 | Sample Prep: Direct |

| | |
|---|---|
| Instrument: WB27818 RSD 12-17-93 | Procedure/ Rev: LA-438-101 / D-1 |
| Technologist: RG Acton | Date: 8/15/93 |
| Starting Time: 05:30 | Temperature NA |
| Ending Time: 11:00 | Chemist: Jennifer Slippern |

Comments:

| | Description | Lab ID | | Description | Lab ID |
|---|---|---|---|---|---|
| 1 | STD | G628-5584 | 11 | | |
| 2 | BLK | G629-5684 | 12 | | |
| 3 | Sample | G-630-5784 | 13 | | |
| 4 | Sample | G-631-5784 | 14 | | |
| 5 | Sample | G-632-5784 | 15 | | |
| 6 | sample | G-633-5784 | 16 | | |
| 7 | sample | G-634-5784 | 17 | | |
| 8 | | | 18 | | |
| 9 | | | 19 | | |
| 10 | | | 20 | | |

| Standard Type | Primary Book No. and Aliquot Vol. | Second Book No. and Aliquot Vol. | Third Book No. and Aliquot Vol. | Final Vol. of Standard |
|---|---|---|---|---|
| LMCS | 23B51 / .250 ml | | | |
| Pro. Spike | 16B51 / .100 ml | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

OA

WHC-SD-WM-DP-054 REV O

ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA-438-101

DATE START: August 15, 1993

PREPARED BY: JL Slippern

DATE COMPLETE: August 17, 1993

| | UNITS: | uCi/mL | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SPL NAME | SPL ID | ANALYTE | RESULT #1 | RESULT #2 | AVERAGE | RPD% | %REC | DET LIM | % CT ER |
| 73B51 | G628 | Tc-99 | 4.39 | | | | 112 | | 1.6 |
| BLANK | G629 | Tc-99 | <1.17E-5 | | | | 48.6 | | 5.9 |
| C-5 | G630 | Tc-99 | 7.48E-5 | | | | 48.8 | <1.17E-5 | 4.4 |
| C-6 | G631 | Tc-99 | 7.22E-5 | | | | 51.8 | <1.17E-5 | 4.3 |
| C-7 | G632 | Tc-99 | 5.85E-5 | | | | 53.2 | <1.17E-5 | 4.5 |
| D-0 | G633 | Tc-99 | 3.40E-5 | | | | 56.4 | <1.17E-5 | 5 |
| D-1 | G634 | Tc-99 | 1.22E-4 | | | | 53.7 | <1.17E-5 | 3.7 |

NARRATIVE: [X] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

The results for the standard are in uCi/L.

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 628.-5584 | 102 5 DAY | 7-22-93 | 15: 8 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | % RECOVERY | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .250 ml | STD |

Remarks Calculations Results

EDP S363 TC99

STD#73B51 RESULT 4.39

STD VAL 3.912 %REC 112.22%

.100ml spike #16B51

$$\frac{802.5731(7.1552E3)}{.252(2220)(3111.032-802.5731)} = 4.3945$$

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs 8-15-93 | Hrs 8-15-93 23:50 | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/15/93 | 11:00 | |

54-6000-361 (Rev. 6 23)

WHC-SD-WM-DP-[illegible] REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | STANDARD |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G628-5584 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 0.25 |
| 1380 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 802.5731 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3111.032 |
| | Background cpm | (BKG cpm) | 54.35 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/15/93 | Instrument Fractional Efficiency | (EFF) | 0.9312 |
| | Detection Limit | (Ld) | 8.40 |
| | Critical Level | (Lc) | 3.84 |
| | Tc-99 Concentration in µCi/L = | | 4.3945E+00 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 4.39E+00 |
| Tc-99 Concentration in µCi/mL | = | 4.39E-03 |
| Spike (Tracer) Recovery | = | 49.4% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 8/17/93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

3-4

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 629.-5684 | 102 5 DAY | 7-22-93 | 15:10 | 23 |

| Determination | Method-Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? /ml | BLK |

Remarks Calculations Results

REAGENT BLANK

COUNT AS uCI/L

.100ml spike #16351

<1.17E-5 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst | 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs 8-15-93 | Hrs 8-15-93 2350 | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/15/93 | 15:00 | |

WHC-SD-W-CP-054 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | BLANK |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G629-5684 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1380 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 3.700113 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2276.111 |
| | Background cpm | (BKG cpm) | 54.35 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/15/93 | Instrument Fractional Efficiency | (EFF) | 0.9324 |
| | Detection Limit | (Ld) | 8.38 |
| | Critical Level | (Lc) | 3.84 |
| | Tc-99 Concentration in µCi/L = | < | 1.1660E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 1.17E-02 |
| Tc-99 Concentration in µCi/mL | = | < 1.17E-05 |
| Spike (Tracer) Recovery | = | 48.6% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 8/17/93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

5-6

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 630.-5784 | 102 5 DAY | 7-22-93 | 15:12 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? / ml | C-5 |

Remarks Calculations Results

COUNT AS uCI/L

.100 ml spike #16851

7.48E-5 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst | | Analyst - 5 |
|---|---|---|---|---|
| | Raymond | | | |
| | Hrs 8-15-93 | Hrs 8-15-93 2350 | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/15/93 | 11:00 | |

WHC-SD-WM-CSCH

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G630-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1380 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 54.01323 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2334.959 |
| | Background cpm | (BKG cpm) | 54.35 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/15/93 | Instrument Fractional Efficiency | (EFF) | 0.9331 |
| | Detection Limit | (Ld) | 8.38 |
| | Critical Level | (Lc) | 3.84 |
| | Tc-99 Concentration in µCi/L = | | 7.4829E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 7.48E-02 |
| Tc-99 Concentration in µCi/mL | = | 7.48E-05 |
| Spike (Tracer) Recovery | = | 48.8% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 8/17/93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

7.8

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 631.-5784 | 102 5 DAY | 7-22-93 | 15:12 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? / ml | C-6 |

Remarks Calculations Results

COUNT AS uCI/L

.100 ml spike #16B51

7.22 E-5 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs 8-15-93 | 8-15-93 2350 | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/15/93 | 11:00 | |

WHC-SP-0182-054 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16B51 |
| G631-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1380 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 55.35284 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2477.688 |
| | Background cpm | (BKG cpm) | 54.35 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/15/93 | Instrument Fractional Efficiency | (EFF) | 0.9331 |
| | Detection Limit | (Ld) | 8.38 |
| | Critical Level | (Lc) | 3.84 |
| | Tc-99 Concentration in µCi/L = | | 7.2209E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000 mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000 mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 7.22E-02 |
| Tc-99 Concentration in µCi/mL | = | 7.22E-05 |
| Spike (Tracer) Recovery | = | 51.8% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 8/17/93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

9-10

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 632.-5784 | 102 5 DAY | 7-22-93 | 15:13 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1 ml | C-7 |

Remarks Calculations Results

COUNT AS uCI/L

.100 ml spike #16851 5.85E-5 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - | | Analyst - 5 |
|---|---|---|---|---|
| | Hrs 8-15-93 | Hrs 8-15-93 2350 | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/15/93 | 11:00 | |

54-6800-861 (R/10 83)

WHC-SD-WM-TP-061 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G632-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1380 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 46.04573 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2534.747 |
| 1 | Background cpm | (BKG cpm) | 54.35 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/15/93 | Instrument Fractional Efficiency | (EFF) | 0.9339 |
| | Detection Limit | (Ld) | 8.37 |
| | Critical Level | (Lc) | 3.84 |
| | Tc-99 Concentration in µCi/L = | | 5.8466E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 5.85E-02 |
| Tc-99 Concentration in µCi/mL | = | 5.85E-05 |
| Spike (Tracer) Recovery | = | 53.2% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 8/17/93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

11-12

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 633-5784 | 102 5 DAY | 7-22-93 | 15:13 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? / ml | D-0 |

Remarks Calculations Results

COUNT AS uCI/L

.100ml spike #16B51

3.40E-5 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs 8-15-93 23:50 | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/15/93 | 11:00 | |

WHC-SD-WM-QCP-004 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16B51 |
| G633-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1380 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 28.38188 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2663.834 |
| | Background cpm | (BKG cpm) | 54.35 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/15/93 | Instrument Fractional Efficiency | (EFF) | 0.9355 |
| | Detection Limit | (Ld) | 8.36 |
| | Critical Level | (Lc) | 3.84 |
| | Tc-99 Concentration in µCi/L = | | 3.4031E-02 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Tc-99 µCi/L = (dm1 * (1000 mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000 mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 3.40E-02 |
| Tc-99 Concentration in µCi/mL | = | 3.40E-05 |
| Spike (Tracer) Recovery | = | 56.4% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 8/17/93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

13-14

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 634.-5784 | 102 5 DAY | 7-22-93 | 15:14 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1 ml | D-1 |

Remarks, Calculations, Results

COUNT AS uCI/L

.100 ml spike #16851

1.22 E-4 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs 8.15.93 | Hrs 8-15-93 2350 | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/15/93 | 11:00 | |

54-6800-C-R (C-83)

WHC-SD-W-[illegible]-031 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| Serial No. | | | SAMPLE |
|---|---|---|---|
| | Spike (Tracer) Book Number | | 16851 |
| G634-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1380 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 97.06495 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 2608.817 |
| | Background cpm | (BKG cpm) | 54.35 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/15/93 | Instrument Fractional Efficiency | (EFF) | 0.9355 |
| | Detection Limit | (Ld) | 8.36 |
| | Critical Level | (Lc) | 3.84 |
| | Tc-99 Concentration in µCi/L = | | 1.2212E-01 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 1.22E-01 |
| Tc-99 Concentration in µCi/mL | = | 1.22E-04 |
| Spike (Tracer) Recovery | = | 53.7% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 16-Aug-93 |
| Approved by: | | Date: | 8/17/93 |

Form 1 Rev. 1.1

8-15-23





```
USER: 6 ID:TC 99          PRESET TIME: 20.00              SUN 15 AUG 1993 17:59
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N    RS232:N
H#: 1 AQC:Y QCF:N RCM:Y 2 PHASE MONITOR:N
RCM-TIME:  0.10 INT:999.95
CHANNEL 1-LL:150 UL: 800 2SIGMA: 0.10 BKG SUB:   0.00 BKG 2SIG:  0.00 LSR:   0

SINGLE LABEL DPM  SET UP ON  20 DEC 1991  13:14

UNKNOWN ID:TC 99                    UNKNOWN REPLICATES: 1
UNKNOWN NORM FACTOR  ISO1:0 1.00000
UNKNOWN UNITS        ISO1:DPM
UNKNOWN HALF LIFE CORRECTION:N
INDIVIDUAL UNKNOWN NORM FACTORS:N    BACKGROUND QUENCH CURVES:Y
STANDARD ID:131B28-A 1-10          QUENCH LIMITS   LOW:73.67    HIGH:207.7
HALF LIFE(DAYS)  ISO1:N
STANDARD DPM     ISO1:0.00000000


SAM  POS  CH     CPM    2SIG%  TIME   EL TIME AVG H#       RCM%            ERR

B1  **- 1  1      54.35  6.07  20.00    20.92 136.0         3.04


B  .GROUND QUENCH CURVES: CONSTANT
```

BEST AVAILABLE COPY

```
CHANNEL 1
QUENCH CURVE COEFFICIENTS
A:  54.35000      B:0.00000000      C:0.00000000      D:0.0000000000

                 BACKGROUND QUENCH CURVE CORRELATION TABLE

                          MEASURED      CALCULATED      PERCENT
  BKG          H#          CPM.           CPM.          DIFF.       FLAG
  ---        -----       --------      ----------      -------      ----
   1         136.0         54.35          54.35          0.00


BACKGROUND QUENCH LIMITS   LOW:0.000    HIGH:1000.
     TOTAL QUENCH LIMITS   LOW:73.67    HIGH:207.7


SAM  POS  CH     CPM    2SIG%  TIME   EL TIME AVG H#       RCM%            ERR

  1 **- 3  1     801.70  1.58  20.00    42.22 163.0         1.64
     ISO1 %EFF CH1:93.12                          ISO1 DPM  :802.5731

  2 **- 4  1    2959.60  0.82  20.00    63.39 159.0         0.38
     ISO1 %EFF CH1:93.39                          ISO1 DPM  :3111.032

  3 **- 5  1      57.80  5.88  20.00    84.53 161.0        13.27
     ISO1 %EFF CH1:93.24                          ISO1 DPM  :3.700113

  4 **- 6  1    2178.20  0.96  20.00   105.67 160.0         0.46
     ISO1 %EFF CH1:93.31                          ISO1 DPM  :2276.111
```

| SAM | POS | CH | CPM | 2SIGM | TIME | EL TIME | AVG MA | MDT. | MAC |
|---|---|---|---|---|---|---|---|---|---|
| 5 | [illegible] | 1 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | |
| | ISO1 | %EFF | CH1:93.31 | . | | | ISO1 | DPM | :54.01525 |
| 6 | **- 8 | 1 | 2236.70 | 0.95 | 20.00 | 147.90 | 158.0 | 0.42 | |
| | ISO1 | %EFF | CH1:93.46 | . | | | ISO1 | DPM | :2334.959 |
| 7 | **- 9 | 1 | 106.00 | 4.34 | 20.00 | 169.05 | 160.0 | 7.78 | |
| | ISO1 | %EFF | CH1:93.31 | | | | ISO1 | DPM | :55.35284 |
| 8 | **-10 | 1 | 2370.10 | 0.92 | 20.00 | 190.17 | 158.0 | 0.30 | |
| | ISO1 | %EFF | CH1:93.46 | | | | ISO1 | DPM | :2477.688 |
| 9 | **-11 | 1 | 97.35 | 4.53 | 20.00 | 211.26 | 159.0 | 6.47 | |
| | ISO1 | %EFF | CH1:93.39 | | | | ISO1 | DPM | :46.035 |
| 10 | **-12 | 1 | 2427.60 | 0.91 | 20.00 | 232.36 | 156.0 | 0.23 | |
| | ISO1 | %EFF | CH1:93.63 | | | | ISO1 | DPM | :2534.747 |
| 11 | **- 1 | 1 | 80.90 | 4.97 | 20.00 | 253.53 | 157.0 | 5.18 | |
| | ISO1 | %EFF | CH1:93.55 | | | | ISO1 | DPM | :28.38188 |
| 12 | **- 2 | 1 | 2546.25 | 0.89 | 20.00 | 274.65 | 157.0 | 0.35 | |
| | ISO1 | %EFF | CH1:93.55 | | | | ISO1 | DPM | :2663.834 |
| 13 | **- 3 | 1 | 145.15 | 3.71 | 20.00 | 295.80 | 157.0 | 5.58 | |
| | ISO1 | %EFF | CH1:93.55 | | | | ISO1 | DPM | :97.06495 |
| 14 | **- 4 | 1 | 2488.65 | 0.90 | 20.00 | 316.94 | 160.0 | 0.36 | |
| | ISO1 | %EFF | CH1:93.31 | | | | ISO1 | DPM | :2608.817 |

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WHC-SD-WM-DP-054 REV 0

WESTINGHOUSE HANFORD COMPANY

222-S LABORATORY

# ANALYTICAL BATCH

Batch 1375

102-5DAY

| | |
|---|---|
| Lab Segment Serial No. G635 - G642 | Customer ID: D-2, D-3, D-4, D-5, D-6, D-7 |
| Analysis: TC 99 | Sample Prep: DIRECT LIQUID |

| | |
|---|---|
| Instrument: WB27818, ~~WG11665~~ 8-3-17-93 | Procedure/ Rev: LA-438-101 / D-1 |
| Technologist: L. CONLIN Linda Conlin | Date: 8-12-93 |
| Starting Time: 0005 | Temperature N/A |
| Ending Time: 0715 | Chemist: S. CATLOW |

Comments:

| | Description | Lab ID | | Description | Lab ID |
|---|---|---|---|---|---|
| 1 | LMCS | G635-5584 | 11 | | |
| 2 | BLANK | G636-5684 | 12 | | |
| 3 | SAMPLE | G637-5784 | 13 | | |
| 4 | SAMPLE | G638-5784 | 14 | | |
| 5 | SAMPLE | G639-5784 | 15 | | |
| 6 | SAMPLE | G640-5784 | 16 | | |
| 7 | SAMPLE | G641-5784 | 17 | | |
| 8 | SAMPLE | G642-5784 | 18 | | |
| 9 | | | 19 | | |
| 10 | | | 20 | | |

| Standard Type | Primary Book No. and Aliquot Vol. | Second Book No. and Aliquot Vol. | Third Book No. and Aliquot Vol. | Final Vol. of Standard |
|---|---|---|---|---|
| TC 99 | 73351 / .250 ml | | | |
| TC 99 SPIKE | 16351 / .1 ml | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

636

A-6000-881 (03/92)

ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA-438-101

DATE START: August 13, 1993

PREPARED BY: JL Slippern

DATE COMPLETE: August 17, 1993

| | UNITS: | uCi/mL | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SPL NAME | SPL ID | ANALYTE | RESULT #1 | RESULT #2 | AVERAGE | RPD% | %REC | DET LIM | % CT ER |
| 73B51 | G635 | Tc-99 | 3.7 | | | | 94.6 | | 1.4 |
| BLANK | G636 | Tc-99 | <6.88E-6 | | | | 78.5 | | 6 |
| D-2 | G637 | Tc-99 | <2.80E-4 | | | | 79.3 | <6.88E-6 | 5.9 |
| D-3 | G638 | Tc-99 | 4.50E-4 | | | | 78.8 | <6.88E-6 | 5.7 |
| D-4 | G639 | Tc-99 | 3.31E-4 | | | | 78.5 | <6.88E-6 | 5.8 |
| D-5 | G640 | Tc-99 | <2.84E-4 | | | | 77.8 | <6.88E-6 | 6 |
| D-6 | G641 | Tc-99 | <2.79E-4 | | | | 79.3 | <6.88E-6 | 6.1 |
| D-7 | G642 | Tc-99 | <2.84E-4 | | | | 77.9 | <6.88E-6 | 6 |

JH 8-20-93

NARRATIVE: [X] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

The results for the standard are in uCi/L.

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

1-2 users 9

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 635.-5584 | 102 5 DAY | 7-22-93 | 15:16 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | % RECOVERY | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .250 ml + SPIKE # 16851/.1ml | STD |

Remarks Calculations Results

EDP S353 TC99

STD# 73851 RESULT 3.70

STD VAL %REC 94.58%

$$\frac{1070.498(7.015263)}{.250(2220)[4725.266-1070.498]} = 3.7023$$

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 0715 | |

54-6003-61 (9-10-92)

WHC-SD-WM-ER-[illegible] REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | STANDARD |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G 635-5584 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 0.25 |
| 1375 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 1070.498 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 4725.266 |
| | Background cpm | (BKG cpm) | 50.15 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9388 |
| | Detection Limit | (Ld) | 8.01 |
| | Critical Level | (Lc) | 3.69 |
| | Tc-99 Concentration in µCi/L = | | 3.7023E+00 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 3.70E+00 |
| Tc-99 Concentration in µCi/mL | = | 3.70E-03 |
| Spike (Tracer) Recovery | = | 78.1% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 17-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

3-4

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 636.-5684 | 102 5 DAY | 7-22-93 | 15:18 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1 ml $H_2O$ + spike #16851 / .1 ml | BLK |

Remarks Calculations Results

REAGENT BLANK

COUNT AS uCI/L

<6.88 E-6 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 0715 | |

WHC-SD-WM-DQS-004 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | BLANK |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G 636-5684 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1375 | Dilution Factor | (DF) | 1 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 5.317423 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3678.388 |
| | Background cpm | (BKG cpm) | 50.15 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9403 |
| | Detection Limit | (Ld) | 7.99 |
| | Critical Level | (Lc) | 3.69 |
| | Tc-99 Concentration in µCi/L = | < | 6.8759E-03 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000 mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000 mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3
**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 6.88E-03 |
| Tc-99 Concentration in µCi/mL | = | < 6.88E-06 |
| Spike (Tracer) Recovery | = | 78.5% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 17-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

5-6

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 637.-5784 | 102 5 DAY | 7-22-93 | 15:20 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?[.250ml - 10ml - 1 ml] + SPIKE # 16851/1ml | D-2 |

Remarks, Calculations, Results

COUNT AS uCi/L

<2.80E-4 µCi/mL

| Analyst - 1 | Analyst - 2 | | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 0715 | |

54-687-561 R/5-331

WHC-SD-WM-TI-614 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G 367-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1375 | Dilution Factor | (DF) | 41 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 7.609978 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3715.054 |
| | Background cpm | (BKG cpm) | 50.15 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9396 |
| | Detection Limit | (Ld) | 8.00 |
| | Critical Level | (Lc) | 3.69 |
| | Tc-99 Concentration in µCi/L = | < | 2.7951E-01 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3
**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 2.80E-01 |
| Tc-99 Concentration in µCi/mL | = | < 2.80E-04 |
| Spike (Tracer) Recovery | = | 79.3% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 17-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

7-8

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 638.-5784 | 102 5 DAY | 7-22-93 | 15:21 | 23 |

| Determination | Method: Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?[.250ml-10ml-1ml]+Spike #16851/.1ml | D-3 |

Remarks Calculations Results

COUNT AS uCI/L

4.50E-4 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| ~~8-15-93~~ | 0715 | |

ie 8-12-93

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G 638-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1375 | Dilution Factor | (DF) | 41 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 12.79673 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3699.249 |
| | Background cpm | (BKG cpm) | 50.15 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9416 |
| | Detection Limit | (Ld) | 7.98 |
| | Critical Level | (Lc) | 3.69 |
| | Tc-99 Concentration in µCi/L = | | 4.4974E-01 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 4.50E-01 |
| Tc-99 Concentration in µCi/mL | = | 4.50E-04 |
| Spike (Tracer) Recovery | = | 78.8% |

| | | | |
|---|---|---|---|
| Data Entry by: | Jennifer L Sluggett | Date: | 17-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

Page 1 of 1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

9-10

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 639.-5784 | 102 5 DAY | 7-22-93 | 15:22 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?[250ml-10ml-1ml] +spike#16851/.1ml | D-4 |

Remarks Calculations Results

COUNT AS uCI/L

3.31E-4 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 0715 | |

54-6606-061 (R-10 331)

WHC-SD-WM-[illegible] REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G 639-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1375 | Dilution Factor | (DF) | 41 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 9.366129 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3678.434 |
| | Background cpm | (BKG cpm) | 50.15 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9396 |
| | Detection Limit | (Ld) | 8.00 |
| | Critical Level | (Lc) | 3.69 |
| | Tc-99 Concentration in µCi/L = | | 3.3073E-01 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | 3.31E-01 |
| Tc-99 Concentration in µCi/mL | = | 3.31E-04 |
| Spike (Tracer) Recovery | = | 78.5% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 17-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

11-12

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 640.-5784 | 102 5 DAY | 7-22-93 | 15:24 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?[250ml-10ml-1ml] + SPIKE #16851/.1ml | D-5 |

Remarks Calculations Results

COUNT AS uCi/L

< 2.84 E -4 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 0715 | |

WHC-SD-WM-DP-PEN-100

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G 640-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1375 | Dilution Factor | (DF) | 41 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 6.801231 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3644.19 |
| | Background cpm | (BKG cpm) | 50.15 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.941 |
| | Detection Limit | (Ld) | 7.99 |
| | Critical Level | (Lc) | 3.69 |
| | Tc-99 Concentration in µCi/L = | < | 2.8447E-01 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3
**NOTE:** Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 2.84E-01 |
| Tc-99 Concentration in µCi/mL | = | < 2.84E-04 |
| Spike (Tracer) Recovery | = | 77.8% |

| | | | |
|---|---|---|---|
| Data Entry by: | | Date: | 17-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

13-14

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 641.-5784 | 102 5 DAY | 7-22-93 | 15:25 | 23 |

| Determination | Method-Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?[.25ml-10ml-1ml] + SPIKE #16851/.1ml | D-6 |

Remarks, Calculations, Results

COUNT AS uCI/L

<2.79 E-4 uCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 0715 | |

WHC-SD-WM-DP-074 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| Serial No. | | | SAMPLE |
|---|---|---|---|
| G 641-5784 | Spike (Tracer) Book Number | | 16851 |
| | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1375 | Dilution Factor | (DF) | 41 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 4.416979 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3712.412 |
| | Background cpm | (BKG cpm) | 50.15 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9396 |
| | Detection Limit | (Ld) | 8.00 |
| | Critical Level | (Lc) | 3.69 |
| | Tc-99 Concentration in µCi/L = | < | 2.7946E-01 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3
**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 2.79E-01 |
| Tc-99 Concentration in µCi/mL | = | < 2.79E-04 |
| Spike (Tracer) Recovery | = | 79.3% |

| | | | |
|---|---|---|---|
| Data Entry by: | Jennifer L. Shippen | Date: | 17-Aug-93 |
| Approved by: | | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

15-16

| Serial No. | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 642.-5784 | 102 5 DAY | 7-22-93 | 15:25 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| Tc99 | LA-438-101 | uCi/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?/250m/-10m/-1m/ + SPIKE#16B51/.1m/ | D-7 |

Remarks Calculations Results

COUNT AS uCI/L

< 2.84 E-4 µCi/mL

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-12-93 | 0715 | |

WHC-SD-WM-BD-030 REV 0

## Tc-99: LA-438-101 (D-1) LIQUIDS

| | | | SAMPLE |
|---|---|---|---|
| Serial No. | Spike (Tracer) Book Number | | 16851 |
| G 642-5784 | Activity for 100µl of Spike Added in dpm | (dm3) | 7015.2 |
| Batch ID | Volume of Sample in mL | (SS) | 1 |
| 1375 | Dilution Factor | (DF) | 41 |
| Rerun No. | Digest Dilution Factor | (DDF) | 1 |
| 0 | dpm of Sample from Liquid Scintillation Counter | (dm1) | 5.051552 |
| Analyst | dpm of Sample + Spike from Liquid Scintillation Counter | (dm2) | 3648.224 |
| | Background cpm | (BKG cpm) | 50.15 |
| Date | Background Time Counted in Minutes | (BKG time) | 20 |
| 08/12/93 | Instrument Fractional Efficiency | (EFF) | 0.9403 |
| | Detection Limit | (Ld) | 7.99 |
| | Critical Level | (Lc) | 3.69 |
| | Tc-99 Concentration in µCi/L = | < | 2.8423E-01 |

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / (2220000 * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3
**NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).**

| | | |
|---|---|---|
| Tc-99 Concentration in µCi/L | = | < 2.84E-01 |
| Tc-99 Concentration in µCi/mL | = | < 2.84E-04 |
| Spike (Tracer) Recovery | = | 77.9% |

| | | | |
|---|---|---|---|
| Data Entry by: | Jennifer L Bellizzi | Date: | 17-Aug-93 |
| Approved by: | J L Bellizzi | Date: | 17-Aug-93 |

Form 1 Rev. 1.1

8-1593





USER: 9 ID:TC 99 PRESET TIME: 20.00 THU 12 AUG 1993 10:17
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCA:N RESET:N
[illegible]
RUN TIME: 0.10 HH:MM.SS
CHANNEL 1-LL:150 UL: 800 2SIGMA: 0.10 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0

SINGLE LABEL DPM SET UP ON 20 DEC 1991 13:14

UNKNOWN ID:TC 99 UNKNOWN REPLICATES: 1
UNKNOWN NORM FACTOR ISO1:0 1.00000
UNKNOWN UNITS ISO1:DPM
UNKNOWN HALF LIFE CORRECTION:N
INDIVIDUAL UNKNOWN NORM FACTORS:N BACKGROUND QUENCH CURVES:Y
STANDARD ID:131B28-A 1-10 QUENCH LIMITS LOW:73.67 HIGH:207.7
HALF LIFE(DAYS) ISO1:N
STANDARD DPM ISO1:0.00000000

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | RCM% | ERR |
|---|---|---|---|---|---|---|---|---|---|
| B1 | **- 1 | 1 | 50.15 | 6.32 | 20.00 | 20.90 | 132.0 | 1.85 | |

BACKGROUND QUENCH CURVES: CONSTANT

BEST AVAILABLE COPY

CHANNEL 1
QUENCH CURVE COEFFICIENTS
A: 50.15000 B:0.00000000 C:0.00000000 D:0.00000000000

BACKGROUND QUENCH CURVE CORRELATION TABLE

| BKG | H# | MEASURED CPM. | CALCULATED CPM. | PERCENT DIFF. | FLAG |
|---|---|---|---|---|---|
| 1 | 132.0 | 50.15 | 50.15 | 0.00 | |

BACKGROUND QUENCH LIMITS LOW:0.000 HIGH:1000.
TOTAL QUENCH LIMITS LOW:73.67 HIGH:207.7

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | RCM% | ERR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | **- 3 | 1 | 1055.10 | 1.38 | 20.00 | 42.13 | 153.0 | 0.62 | |
| | ISO1 %EFF CH1:93.88 | | | | | | ISO1 DPM | :1070.498 | |
| 2 | **- 4 | 1 | 4489.80 | 0.67 | 20.00 | 63.26 | 152.0 | 0.16 | |
| | ISO1 %EFF CH1:93.96 | | | | | | ISO1 DPM | :4725.266 | |
| 3 | **- 5 | 1 | 55.15 | 6.02 | 20.00 | 84.37 | 151.0 | 8.19 | |
| | ISO1 %EFF CH1:94.03 | | | | | | ISO1 DPM | :5.317423 | |
| 4 | **- 6 | 1 | 3506.20 | 0.76 | 20.00 | 105.49 | 152.0 | 0.21 | |
| | ISO1 %EFF CH1:93.96 | | | | | | ISO1 DPM | :3678.388 | |

| SAM | POS | CH | CPM | 2S16% | TIME | EL TIME | AVG H# | RCM% | ERR |
|---|---|---|---|---|---|---|---|---|---|
| 5 | **- 7 | 1 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | |
| | ISO1 | %EFF | CH1:[illegible] | | | | ISO1 | DPM | [illegible] |
| 6 | **- 8 | 1 | 3540.65 | 0.75 | 20.00 | 147.73 | 152.0 | 0.17 | |
| | ISO1 | %EFF | CH1:93.96 | | | | ISO1 | DPM | :3715.054 |
| 7 | **- 9 | 1 | 62.20 | 5.67 | 20.00 | 168.82 | 149.0 | 10.32 | |
| | ISO1 | %EFF | CH1:94.16 | | | | ISO1 | DPM | :12.79673 |
| 8 | **-10 | 1 | 3525.80 | 0.75 | 20.00 | 189.95 | 152.0 | 0.18 | |
| | ISO1 | %EFF | CH1:93.96 | | | | ISO1 | DPM | :3699.249 |
| 9 | **-11 | 1 | 58.95 | 5.82 | 20.00 | 211.03 | 152.0 | 9.28 | |
| | ISO1 | %EFF | CH1:93.96 | | | | ISO1 | DPM | [illegible] |
| 10 | **-12 | 1 | 3509.00 | 0.75 | 20.00 | 232.17 | 151.0 | 0.19 | |
| | ISO1 | %EFF | CH1:94.03 | | | | ISO1 | DPM | :3678.434 |
| 11 | **- 1 | 1 | 56.55 | 5.95 | 20.00 | 253.32 | 150.0 | 7.60 | |
| | ISO1 | %EFF | CH1:94.10 | | | | ISO1 | DPM | :6.801231 |
| 12 | **- 2 | 1 | 3471.20 | 0.76 | 20.00 | 274.40 | 153.0 | 0.20 | |
| | ISO1 | %EFF | CH1:93.88 | | | | ISO1 | DPM | :3644.190 |
| 13 | **- 3 | 1 | 54.30 | 6.07 | 20.00 | 295.48 | 152.0 | 5.89 | |
| | ISO1 | %EFF | CH1:93.96 | | | | ISO1 | DPM | :4.416979 |
| 14 | **- 4 | 1 | 3540.95 | 0.75 | 20.00 | 316.59 | 151.0 | 0.15 | |
| | ISO1 | %EFF | CH1:94.03 | | | | ISO1 | DPM | :3712.412 |
| 15 | **- 5 | 1 | 54.90 | 6.04 | 20.00 | 337.67 | 151.0 | 11.94 | |
| | ISO1 | %EFF | CH1:94.03 | | | | ISO1 | DPM | :5.051552 |
| 16 | **- 6 | 1 | 3483.15 | 0.76 | 20.00 | 358.75 | 150.0 | 0.14 | |
| | ISO1 | %EFF | CH1:94.10 | | | | ISO1 | DPM | :3648.224 |

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# 5-DAY - OTHER ANALYSES

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BATCH # 1371 ✓ OA 2

WHC-SD-WM-DP-054 REV 0

WESTINGHOUSE HANFORD COMPANY

222-S LABORATORY

# ANALYTICAL BATCH

102-5DAY

| | |
|---|---|
| Lab Segment Serial No.<br>G-597 THRU G-602 | Customer ID:<br>A-0 THRU A-5 |
| Analysis:<br>TOTAL ORGANIC CARBON | Sample Prep:<br>DIRECT |

| | |
|---|---|
| Instrument: WC16130 | Procedure/ Rev: LA-344-105 B-2 |
| Technologist: E.H. COLVIN E.H. Colvin | Date: 08/11/93 |
| Starting Time: 0630 | Temperature 25C |
| Ending Time: 1500 | Chemist: J.S. LACHUT |

Comments:

| | Description | Lab ID | | Description | Lab ID |
|---|---|---|---|---|---|
| 1 | INITIAL LMCS CHECK STD | G-595-5526 | 11 | | |
| 2 | REAGENT BLANK | G-596-5626 | 12 | | |
| 3 | SAMPLE | G-597-5726 | 13 | | |
| 4 | SAMPLE | G-598-5726 | 14 | | |
| 5 | SAMPLE | G-599-5726 | 15 | | |
| 6 | SAMPLE | G-600-5726 | 16 | | |
| 7 | SAMPLE | G-601-5726 | 17 | | |
| 8 | SAMPLE | G-602-5726 | 18 | | |
| 9 | | | 19 | | |
| 10 | | | 20 | | |

| Standard Type | Primary Book No. and Aliquot Vol. | Second Book No. and Aliquot Vol. | Third Book No. and Aliquot Vol. | Final Vol. of Standard |
|---|---|---|---|---|
| LMCS | 10N12A .200ML | | | |
| | | | | |
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| | | | | |
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649

A-6000-881 (03/92)

## ANALYTICAL BATCH SUMMARY SHEET

| METHOD: LA 344-105 | DATE START: 8/11/93 |
|---|---|
| PREPARED BY: J. LACHUT | DATE COMPLETE: 8/12/93 |

| | UNITS: | mg/mL | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SPL NAME | SPL ID | ANALYT | RESULT #1 | RESULT #2 | AVERAGE | RPD% | %REC | DET LIM | % CT ER |
| | | TOC | | | | | | 5.50 mg/mL | |
| LMCS STD. | G-595 | | | | | | 101.0 | | |
| 10N12A | | | | | | | | | |
| BLANK | G-596 | | $3.50 \times 10^{1}$ µg/mL | | | | | | |
| A-0 | G-597 | | $4.07 \times 10^{1}$ µg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |
| A-1 | G-598 | | $6.33 \times 10^{1}$ µg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |
| A-2 | G-599 | | $2.81 \times 10^{1}$ µg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |
| A-3 | G-600 | | 5.50 mg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |
| A-4 | G-601 | | <5.50 mg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |
| A-5 | G-602 | | 5.50 mg/mL | | | | | | |
| 102 5 DAY | | ↓ | | | | | | | |

NARRATIVE: [✓] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

J. Lachut 8/12/93

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 595.-5526 | 102 5 DAY | 7-22-93 | 14:26 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | % RECOVERY | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .200mL - 2mL - .200mL | STD |

Remarks Calculations Results

S356 CO3TOC

STD# 10N12 A RESULT 3.03

STD VAL 3.00 %REC 101.0%

E.H. Cohen

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 7-11-93 | 1500 | J. S. Lachut 8/12/93 | Gary Hammitt |

54-6800-061 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 596.-5626 | 102 5 DAY | 7-22-93 | 14:28 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .200mL | BLK |

Remarks Calculations Results

REAGENT BLANK

$\frac{7.00\,\mu g}{0.200\,mL} = \boxed{3.50 \times 10^{1}\ \mu g/mL\ C}$

E.H. Cohen

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 7-11-93 | 1500 | J. S. Lachut 8/12/93 | Gary Hammitt |

54-6800-061 (R-10-83)

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# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 597.-5726 | 102 5 DAY | 7-22-93 | 14:29 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

Sample Size: ?/mL + 100mL 5m $H_2SO_4$ - 200 mL

Customer ID: A-0

Remarks, Calculations, Results

$4.07 \times 10^{-2}$ g/L C x $\frac{1,000,000\ \mu g/g}{1,000\ mL/L}$ = $4.07 \times 10^{1}$ µg/mL C

E.H. Cohen

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8-11-93 | 1500 | J. S. Lachut 8/12/93 | Gary Hammitt |

54-6800-061 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 598.-5726 | 102 5 DAY | 7-22-93 | 14:30 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

Sample Size: ?/mL + 100mL 5m $H_2SO_4$ - 200 mL

Customer ID: A-1

Remarks, Calculations, Results

$6.33 \times 10^{-2}$ g/L C x $\frac{1,000,000\ \mu g/g}{1,000\ mL/L}$ = $6.33 \times 10^{1}$ µg/mL C

E.H. Cohen

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8-11-93 | 1500 | J. S. Lachut 8/12/93 | Gary Hammitt |

54-6800-061 (R-10-83)

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# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 599.-5726 | 102 5 DAY | 7-22-93 | 14:30 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1mL + 100mL 5M $H_2SO_4$ - 200mL | A-2 |

Remarks, Calculations, Results

$2.81 \times 10^{-2}$ g/L C x $\frac{1,000,000 \mu g/g}{1,000 mL/L}$ = $2.81 \times 10^{1}$ µg/mL C

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| Hrs | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-11-93 | 1500 | J. S. Lachut 8/12/93 |

54-6800-061 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 600.-5726 | 102 5 DAY | 7-22-93 | 14:31 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1mL + 100mL 5M $H_2SO_4$ - 200mL | A-3 |

Remarks, Calculations, Results

$5.5 \times 10^{-3}$ g/L C x $\frac{1,000,000 \mu g/g}{1,000 mL/L}$ = 5.50 µg/mL C

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| Hrs | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-11-93 | 1500 | J. S. Lachut 8/12/93 |

54-6800-061 (R-10-83)

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# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 601.-5726 | 102 5 DAY | 7-22-93 | 14:31 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?/mL + 100 mL + 5 m $H_2SO_4$ - 200 mL | A-4 |

Remarks Calculations Results

$$< 5.50 \times 10^{-3}\ g/L\ C \times \frac{1{,}000{,}000\ \mu g/g}{1{,}000\ mL/L} = \boxed{< 5.50\ \mu g/mL\ C}$$

E. H. Cohen

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8-11-93 | 1500 | J. S. Lachut 8/12/93 | Gary Hammitt |

54-6800-061 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 602.-5726 | 102 5 DAY | 7-22-93 | 14:32 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?/mL + 100 mL + 5 m $H_2SO_4$ - 200 mL | A-5 |

Remarks Calculations Results

$$5.50 \times 10^{-3}\ g/L\ C \times \frac{1{,}000{,}000\ \mu g/g}{1{,}000\ mL/L} = \boxed{5.50\ \mu g/mL\ C}$$

E. H. Cohen

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8-11-93 | 1500 | J. S. Lachut 8/12/93 | Gary Hammitt |

54-6800-061 (R-10-83)

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TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-595 STD  Date: 08/11/93  Time: 09:29:53

Sample Size = 200 ul
Dil Factor = 11
Blank ID # = G-596 BLANK
Blank Value = .9993116 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 1.20 | 0.00 |
| 2 | 1.01 | 26.10 | 95.40 |
| 3 | 1.50 | 42.90 | 39.16 |
| 4 | 2.00 | 49.70 | 13.68 |
| 5 | 2.50 | 53.00 | 6.23 |
| 6 | 3.00 | 54.20 | 2.21 |
| 7 | 3.50 | 56.20 | 3.56 |
| 8 | 4.00 | 57.00 | 1.40 |
| 9 | 4.50 | 58.40 | 2.40 |
| 10 | 5.00 | 59.10 | 1.18 |
| 11 | 5.50 | 60.20 | 1.83 |
| 12 | 6.00 | 61.40 | 1.95 |
| 13 | 6.50 | 61.80 | 0.65 |
| 14 | 7.00 | 62.10 | 0.48 |

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BLANK VALUE = 7 micrograms carbon
BLANK FACTOR = 7 / 7.004822 = +1.0E+00 ug/min Carbon

SAMPLE RESULTS:
( 62.1 - 6.99817 )(11)/(200) = +3.03E+00 g/L Carbon
( 62.1 - 6.99817 )(11)/(200)(12) = +2.53E-01 Molar Carbon

Sample Run By: EH Colvin 8-11-93
EH COLVIN

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 655 TO 662.

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: G-596 BLANK  Date: 08/11/93  Time: 08:54:00

Sample Size = 200 uL
Dil Factor = 1
Blank ID # = G-596 BLANK
Blank Value = N/A

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.70 | 0.00 |
| 2 | 1.01 | 1.00 | 30.00 |
| 3 | 1.51 | 1.30 | 23.08 |
| 4 | 2.01 | 1.90 | 31.58 |
| 5 | 2.51 | 2.40 | 20.83 |
| 6 | 3.01 | 2.90 | 17.24 |
| 7 | 3.51 | 3.40 | 14.71 |
| 8 | 4.01 | 3.90 | 12.82 |
| 9 | 4.50 | 4.70 | 17.02 |
| 10 | 5.00 | 5.20 | 9.62 |
| 11 | 5.51 | 5.80 | 10.34 |
| 12 | 6.01 | 6.10 | 4.92 |
| 13 | 6.51 | 6.70 | 8.96 |
| 14 | 7.00 | 7.00 | 4.29 |

BEST AVAILABLE COPY

BLANK VALUE = 7 micrograms carbon
BLANK FACTOR = 7 / 7.004822 = +1.0E+00 ug/min Carbon

Sample Run By: .....
EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-597 Date: 08/11/93 Time: 09:54:24

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = G-596 BLANK
Blank Value = .9993116 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.80 | 0.00 |
| 2 | 1.01 | 2.50 | 68.00 |
| 3 | 1.51 | 4.40 | 43.18 |
| 4 | 2.01 | 5.20 | 15.38 |
| 5 | 2.51 | 6.80 | 23.53 |
| 6 | 3.01 | 7.40 | 8.11 |
| 7 | 3.51 | 8.60 | 13.95 |
| 8 | 4.01 | 9.70 | 11.34 |
| 9 | 4.51 | 10.20 | 4.90 |
| 10 | 5.01 | 11.30 | 9.73 |
| 11 | 5.51 | 12.00 | 5.83 |
| 12 | 6.01 | 12.70 | 5.51 |
| 13 | 6.51 | 13.40 | 5.22 |
| 14 | 7.00 | 14.40 | 6.94 |

BEST AVAILABLE COPY

BLANK VALUE = 7 micrograms carbon
BLANK FACTOR = 7 / 7.004822 = +1.0E+00 ug/min Carbon

SAMPLE RESULTS:
( 14.4 - 7 )(1.1)/(200) = +4.07E-02 g/L Carbon
( 14.4 - 7 )(1.1)/(200)(12) = +3.39E-03 Molar Carbon

Sample Run By: _____
EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-598 Date: 08/11/93 Time: 09:46:59

Sample Size = 200 ul.
Dil Factor = 1.1
Blank ID # = G-596 BLANK
Blank Value = .9993116 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 1.40 | 0.00 |
| 2 | 1.01 | 3.50 | 60.00 |
| 3 | 1.51 | 5.70 | 38.60 |
| 4 | 2.01 | 7.60 | 25.00 |
| 5 | 2.51 | 9.20 | 17.39 |
| 6 | 3.01 | 9.90 | 7.07 |
| 7 | 3.51 | 11.30 | 12.39 |
| 8 | 4.01 | 12.50 | 9.60 |
| 9 | 4.50 | 13.30 | 6.02 |
| 10 | 5.00 | 14.70 | 9.52 |
| 11 | 5.50 | 15.20 | 3.29 |
| 12 | 6.00 | 16.40 | 7.32 |
| 13 | 6.50 | 17.10 | 4.09 |
| 14 | 7.00 | 18.50 | 7.57 |

BEST AVAILABLE COPY

BLANK VALUE = 7 micrograms carbon
BLANK FACTOR = 7 / 7.004822 = +1.0E+00 ug/min Carbon

SAMPLE RESULTS:
( 18.5 - 6.99817 )(1.1)/(200) = +6.33E-02 g/L Carbon
( 18.5 - 6.99817 )(1.1)/(200)(12) = +5.27E-03 Molar Carbon

Sample Run By: _____
EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-599 Date: 08/11/93 Time: 10:02:11

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = G-596 BLANK
Blank Value = .9993116 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.20 | 0.00 |
| 2 | 1.01 | 1.80 | 88.89 |
| 3 | 1.51 | 3.40 | 47.06 |
| 4 | 2.01 | 4.30 | 20.93 |
| 5 | 2.51 | 5.60 | 23.21 |
| 6 | 3.01 | 6.40 | 12.50 |
| 7 | 3.51 | 7.00 | 8.57 |
| 8 | 4.01 | 8.00 | 12.50 |
| 9 | 4.50 | 8.70 | 8.05 |
| 10 | 5.00 | 9.60 | 9.38 |
| 11 | 5.50 | 10.10 | 4.95 |
| 12 | 6.00 | 10.70 | 5.61 |
| 13 | 6.50 | 11.80 | 9.32 |
| 14 | 7.00 | 12.10 | 2.48 |

BEST AVAILABLE COPY

BLANK VALUE = 7 micrograms carbon
BLANK FACTOR = 7 / 7.004822 = +1.0E+00 ug/min Carbon

SAMPLE RESULTS:
( 12.1 - 6.999146 )(1.1)/(200) = +2.81E-02 g/L Carbon
( 12.1 - 6.999146 )(1.1)/(200)(12) = +2.34E-03 Molar Carbon

Sample Run By: _____
EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-600 Date: 08/11/93 Time: 12:14:56

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = G-596 BLANK
Blank Value = .9993116 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.30 | 0.00 |
| 2 | 1.01 | 1.60 | 81.25 |
| 3 | 1.51 | 2.20 | 27.27 |
| 4 | 2.01 | 2.80 | 21.43 |
| 5 | 2.51 | 3.30 | 15.15 |
| 6 | 3.01 | 3.90 | 15.38 |
| 7 | 3.51 | 4.40 | 11.36 |
| 8 | 4.01 | 4.80 | 8.33 |
| 9 | 4.51 | 5.70 | 15.79 |
| 10 | 5.01 | 6.50 | 12.31 |
| 11 | 5.51 | 7.30 | 10.96 |
| 12 | 6.01 | 7.30 | 0.00 |
| 13 | 6.51 | 8.00 | 8.75 |
| 14 | 7.00 | 8.00 | 0.00 |

BEST AVAILABLE COPY

BLANK VALUE = 7 micrograms carbon
BLANK FACTOR = 7 / 7.004822 = +1.0E+00 ug/min Carbon

SAMPLE RESULTS:
( 8 - 7 )(1.1)/(200) = +5.5E-03 g/L Carbon
( 8 - 7 )(1.1)/(200)(12) = +4.6E-04 Molar Carbon

Sample Run By: EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-601 Date: 08/11/93 Time: 12:06:56

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = G-596 BLANK
Blank Value = .9993116 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.30 | 0.00 |
| 2 | 1.01 | 1.10 | 72.73 |
| 3 | 1.51 | 2.30 | 52.17 |
| 4 | 2.01 | 2.80 | 17.86 |
| 5 | 2.51 | 3.60 | 22.22 |
| 6 | 3.01 | 3.90 | 7.69 |
| 7 | 3.51 | 4.60 | 15.22 |
| 8 | 4.00 | 4.90 | 6.12 |
| 9 | 4.50 | 5.30 | 7.55 |
| 10 | 5.01 | 5.80 | 8.62 |
| 11 | 5.51 | 6.10 | 4.92 |
| 12 | 6.01 | 6.60 | 7.58 |
| 13 | 6.50 | 7.20 | 8.33 |
| 14 | 7.00 | 7.40 | 2.70 |

BEST AVAILABLE COPY

BLANK VALUE = 7 micrograms carbon
BLANK FACTOR = 7 / 7.004822 = +1.0E+00 ug/min Carbon

SAMPLE RESULTS:
( 7.4 - 7 )(1.1)/(200) = JL 8/12/93 < ~~5.00~~ 5.50 E-3 g/L Carbon
( 7.4 - 7 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-602 Date: 08/11/93 Time: 12:23:43

Sample Size = 200 ul
Dil Factor = 1.1
Blank ID # = G-596 BLANK
Blank Value = .9993116 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.40 | 0.00 |
| 2 | 1.01 | 1.60 | 75.00 |
| 3 | 1.51 | 2.40 | 33.33 |
| 4 | 2.01 | 3.10 | 22.58 |
| 5 | 2.51 | 3.40 | 8.82 |
| 6 | 3.01 | 4.10 | 17.07 |
| 7 | 3.51 | 4.60 | 10.87 |
| 8 | 4.01 | 5.00 | 8.00 |
| 9 | 4.50 | 5.30 | 5.66 |
| 10 | 5.00 | 5.70 | 7.02 |
| 11 | 5.50 | 6.20 | 8.06 |
| 12 | 6.00 | 6.60 | 6.06 |
| 13 | 6.50 | 7.40 | 10.81 |
| 14 | 7.00 | 8.00 | 7.50 |

BEST AVAILABLE COPY

BLANK VALUE = 7 micrograms carbon
BLANK FACTOR = 7 / 7.004822 = +1.0E+00 ug/min Carbon

SAMPLE RESULTS:
( 8 - 6.999024 )(1.1)/(200) = +5.5E-03 g/L Carbon
( 8 - 6.999024 )(1.1)/(200)(12) = +4.6E-04 Molar Carbon

Sample Run By: E.H. Colvin 8-11-93
EH COLVIN

WHC-SD-WM-DP-054 REV 0 BATCH # 1363 ✓ QA 2

WESTINGHOUSE HANFORD COMPANY

222-S LABORATORY

# ANALYTICAL BATCH

102 SOAY

| | |
|---|---|
| Lab Segment Serial No. G-606 THRU G-610 | Customer ID: A-6 A-7 B-0 B-1 B-2 |
| Analysis: TOTAL ORGANIC CARBON | Sample Prep: DIRECT |

| | |
|---|---|
| Instrument: WC16130 | Procedure/ Rev: LA-344-105 B-2 |
| Technologist E.H. COLVIN EH Colvin | Date: 08/10/93 |
| Starting Time: 0630 | Temperature 25C |
| Ending Time: 1500 | Chemist: J.S. LACHUT |

Comments:

| | Description | Lab ID | | Description | Lab ID |
|---|---|---|---|---|---|
| 1 | INITIAL LMCS CHECK STD | G-604-5526 | 11 | | |
| 2 | REAGENT BLANK | G-605-5626 | 12 | | |
| 3 | SAMPLE | G-606-5726 | 13 | | |
| 4 | SAMPLE | G-607-5726 | 14 | | |
| 5 | SAMPLE | G-608-5726 | 15 | | |
| 6 | SAMPLE | G-609-5726 | 16 | | |
| 7 | SAMPLE | G-610-5726 | 17 | | |
| 8 | | | 18 | | |
| 9 | | | 19 | | |
| 10 | | | 20 | | |

| Standard Type | Primary Book No. and Aliquot Vol. | Second Book No. and Aliquot Vol. | Third Book No. and Aliquot Vol. | Final Vol. of Standard |
|---|---|---|---|---|
| LMCS | 10N12A .200ML | | | |
| | | | | |
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663

ANALYTICAL BATCH SUMMARY SHEET WHC-SD-WM-DP-054 REV O

METHOD: LA 344-105 DATE START: 8/10/93

PREPARED BY: J. LACHUT DATE COMPLETE: 8/11/93

| | UNITS: | mg/L | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SPL NAME | SPL ID | ANALYT | RESULT #1 | RESULT #2 | AVERAGE | RPD% | %REC | DET LIM | % CT ER |
| | | TOC | | | | | | 5.50 mg/L | |
| LMCS STD. 10N12A | 6-604 | | | | | | 102.7% | | |
| BLANK | 6-605 | | 2.95x10⁻¹ mg/L | | | | | | |
| A-6 102 5 DAY | 6-606 | | 1.90x10¹ mg/L | | | | | | |
| A-7 102 5 DAY | 6-607 | | 1.40x10¹ mg/L | | | | | | |
| B-1 102 5 DAY | 6-609 | | 7.70 mg/L | | | | | | |
| B-2 102 5 DAY | 6-610 | | 7.70 mg/L | | | | | | |

NARRATIVE: [✓] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

J. Lachut

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 604.-5526 | 102 5 DAY | 7-22-93 | 14:33 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | % RECOVERY | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?.200mL - 2mL - .200mL | STD |

Remarks, Calculations, Results

S356 CO3TOC

STD# 10N12A RESULT 3.08 G/L

STD VAL 3.00 G/L %REC 102.7

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8-10-93 | 1500 | J. S. Lachut 8/11/93 | Gary Hammitt |

54-6800-061 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 605.-5626 | 102 5 DAY | 7-22-93 | 14:33 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?.200mL | BLK |

Remarks, Calculations, Results

REAGENT BLANK $\frac{5.90\,\mu g}{0.200\,mL} = 2.95 \times 10^{1}\,\mu g/mL\ C$

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8-10-93 | 1500 | J. S. Lachut 8/11/93 | Gary Hammitt |

54-6800-061 (R-10-83)

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# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 606.-5726 | 102 5 DAY | 7-22-93 | 14:34 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1mL + 100mL .5m $H_2SO_4$ - .200mL | A-6 |

Remarks Calculations Results

$1.9 \times 10^{-2}$ g/L C x $\frac{1,000,000 \text{ mg/g}}{1,000 \text{ mL/L}}$ = $1.90 \times 10^{1}$ mg/mL C

8/3/93 8-12-93

P.H. Cole

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8-10-93 | 1500 | J. S. Lachut 8/11/93 | Gary Hammond |

54-6800-061 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 607.-5726 | 102 5 DAY | 7-22-93 | 14:35 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1mL + 100mL .5m $H_2SO_4$ - .200mL | A-7 |

Remarks Calculations Results

$1.4 \times 10^{-2}$ g/L C x $\frac{1,000,000 \text{ mg/g}}{1,000 \text{ mL/L}}$ = $1.40 \times 10^{1}$ mg/mL C

P.H. Cole

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8-10-93 | 1500 | J. S. Lachut 8/11/93 | Gary Hammond |

54-6800-061 (R-10-83)

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# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 608.-5726 | 102 5 DAY | 7-22-93 | 14:35 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?/mL + 100 mL .5 m $H_2SO_4$ - .200 mL | B-0 |

Remarks Calculations Results

$1.2 \times 10^{-2}$ g/L C × $\frac{1{,}000{,}000\ \mu g/g}{1{,}000\ mL/L}$ = $1.20 \times 10^{1}$ µg/mL C

P.H. Cohn

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8-10-93 | 1500 | J. S. Lachut 8/11/93 | Gary Hammett |

54-6800-061 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 609.-5726 | 102 5 DAY | 7-22-93 | 14:35 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?/mL + 100 mL .5 m $H_2SO_4$ - .200 mL | B-1 |

Remarks Calculations Results

$7.7 \times 10^{-3}$ g/L C × $\frac{1{,}000{,}000\ \mu g/g}{1{,}000\ mL/L}$ = 7.70 µg/mL C

P.H. Cohn

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8-10-93 | 1500 | J. S. Lachut 8/11/93 | Gary Hammett |

54-6800-061 (R-10-83)

BEST AVAILABLE COPY

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 610.-5726 | 102 5 DAY | 7-22-93 | 14:36 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 1mL + 100mL 5m $H_2SO_4$ - 200mL | B-2 |

Remarks Calculations, Results

$7.7 \times 10^{-3}$ g/L C x $\frac{1{,}000{,}000 \text{ ug/g}}{1{,}000 \text{ mg/L}}$ = 7.70 ug/mL C

P.H. Colin

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8-10-93 | 1500 | J. S. Lachut 8/11/93 | Gary Hammitt |

54-6800-061 (R-10-83)

BEST AVAILABLE COPY

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-604 STD  Date: 08/10/93  Time: 09:57:41

Sample Size = 200 uL
Dil Factor = 11
Blank ID # = G-605 BLANK
Blank Value = .842277 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 4.60 | 0.00 |
| 2 | 1.01 | 34.50 | 86.67 |
| 3 | 1.51 | 45.70 | 24.51 |
| 4 | 2.00 | 50.20 | 8.96 |
| 5 | 2.50 | 53.40 | 5.99 |
| 6 | 3.01 | 55.00 | 2.91 |
| 7 | 3.51 | 56.10 | 1.96 |
| 8 | 4.01 | 57.40 | 2.26 |
| 9 | 4.50 | 58.20 | 1.37 |
| 10 | 5.00 | 59.10 | 1.52 |
| 11 | 5.50 | 59.80 | 1.17 |
| 12 | 6.00 | 60.50 | 1.16 |
| 13 | 6.50 | 61.20 | 1.14 |
| 14 | 7.00 | 61.90 | 1.13 |

BEST AVAILABLE COPY

BLANK VALUE = 5.9 micrograms carbon
BLANK FACTOR = 5.9 / 7.004822 = +8.4E-01 ug/min Carbon

SAMPLE RESULTS:
( 61.9 - 5.899332 )(11)/(200) = +3.08E+00 g/L Carbon
( 61.9 - 5.899332 )(11)/(200)(12) = +2.57E-01 Molar Carbon

Sample Run By: EH Colvin 8-10-93
EH COLVIN

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 669 TO 675.

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: G-605 BLANK  Date: 08/10/93  Time: 09:33:55

Sample Size = 200 uL
Dil Factor = 1
Blank ID # = G-605 BLANK
Blank Value = N/A

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.00 | 0.00 |
| 2 | 1.01 | 0.60 | 100.00 |
| 3 | 1.51 | 1.10 | 45.45 |
| 4 | 2.01 | 1.80 | 38.89 |
| 5 | 2.51 | 2.10 | 14.29 |
| 6 | 3.01 | 2.70 | 22.22 |
| 7 | 3.51 | 3.20 | 15.63 |
| 8 | 4.01 | 3.40 | 5.88 |
| 9 | 4.51 | 4.00 | 15.00 |
| 10 | 5.01 | 4.20 | 4.76 |
| 11 | 5.51 | 4.70 | 10.64 |
| 12 | 6.01 | 5.10 | 7.84 |
| 13 | 6.51 | 5.30 | 3.77 |
| 14 | 7.00 | 5.90 | 10.17 |

BEST AVAILABLE COPY

BLANK VALUE = 5.9 micrograms carbon
BLANK FACTOR = 5.9 / 7.004822 = +8.4E-01 ug/min Carbon

Sample Run By: _____
EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-606 Date: 08/10/93 Time: 10:06:46

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = G-605 BLANK
Blank Value = .842277 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.50 | 0.00 |
| 2 | 1.01 | 1.90 | 73.68 |
| 3 | 1.51 | 2.60 | 26.92 |
| 4 | 2.01 | 3.50 | 25.71 |
| 5 | 2.51 | 4.10 | 14.63 |
| 6 | 3.01 | 4.80 | 14.58 |
| 7 | 3.51 | 5.40 | 11.11 |
| 8 | 4.01 | 6.00 | 10.00 |
| 9 | 4.50 | 6.70 | 10.45 |
| 10 | 5.00 | 7.20 | 6.94 |
| 11 | 5.50 | 7.60 | 5.26 |
| 12 | 6.00 | 8.20 | 7.32 |
| 13 | 6.50 | 8.90 | 7.87 |
| 14 | 7.00 | 9.30 | 4.30 |

BEST AVAILABLE COPY

BLANK VALUE = 5.9 micrograms carbon
BLANK FACTOR = 5.9 / 7.004822 = +8.4E-01 ug/min Carbon

SAMPLE RESULTS:
( 9.3 - 5.899281 )(1.1)/(200) = +1.9E-02 g/L Carbon
( 9.3 - 5.899281 )(1.1)/(200)(12) = +1.6E-03 Molar Carbon

Sample Run By: _____
EH COLVIN

TOC-- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-607 Date: 08/10/93 Time: 10:15:06

Sample Size = 200 ul.
Dil Factor = 1.1
Blank ID # = G-605 BLANK
Blank Value = .842277 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.40 | 0.00 |
| 2 | 1.01 | 1.30 | 69.23 |
| 3 | 1.51 | 2.20 | 40.91 |
| 4 | 2.01 | 3.00 | 26.67 |
| 5 | 2.51 | 3.50 | 14.29 |
| 6 | 3.01 | 4.20 | 16.67 |
| 7 | 3.51 | 4.80 | 12.50 |
| 8 | 4.01 | 5.50 | 12.73 |
| 9 | 4.50 | 5.80 | 5.17 |
| 10 | 5.00 | 6.40 | 9.37 |
| 11 | 5.50 | 6.90 | 7.25 |
| 12 | 6.00 | 7.40 | 6.76 |
| 13 | 6.50 | 8.00 | 7.50 |
| 14 | 7.00 | 8.40 | 4.76 |

BEST AVAILABLE COPY

BLANK VALUE = 5.9 micrograms carbon
BLANK FACTOR = 5.9 / 7.004822 = +8.4E-01 ug/min Carbon

SAMPLE RESULTS:
( 8.4 - 5.899281 )(1.1)/(200) = +1.4E-02 g/L Carbon
( 8.4 - 5.899281 )(1.1)/(200)(12) = +1.1E-03 Molar Carbon

Sample Run By: _____
EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-608 Date: 08/10/93 Time: 12:03:49

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = G-605 BLANK
Blank Value = .84227/ ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.30 | 0.00 |
| 2 | 1.01 | 1.40 | 78.57 |
| 3 | 1.50 | 2.10 | 33.33 |
| 4 | 2.00 | 2.80 | 25.00 |
| 5 | 2.50 | 3.60 | 22.22 |
| 6 | 3.00 | 4.00 | 10.00 |
| 7 | 3.50 | 4.70 | 14.89 |
| 8 | 4.00 | 5.30 | 11.32 |
| 9 | 4.50 | 5.70 | 7.02 |
| 10 | 5.00 | 6.30 | 9.52 |
| 11 | 5.50 | 6.80 | 7.35 |
| 12 | 6.00 | 7.20 | 5.56 |
| 13 | 6.50 | 7.70 | 6.49 |
| 14 | 7.00 | 8.10 | 4.94 |

BEST AVAILABLE COPY

BLANK VALUE = 5.9 micrograms carbon
BLANK FACTOR = 5.9 / 7.004822 = +8.4E-01 ug/min Carbon

SAMPLE RESULTS:
( 8.1 - 5.898458 )(1.1)/(200) = +1.2E-02 g/L Carbon
( 8.1 - 5.898458 )(1.1)/(200)(12) = +1.0E-03 Molar Carbon

Sample Run By: _____
EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-609 Date: 08/10/93 Time: 12:12:25

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = G-605 BLANK
Blank Value = .842277 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.40 | 0.00 |
| 2 | 1.01 | 1.40 | 71.43 |
| 3 | 1.51 | 2.30 | 39.13 |
| 4 | 2.00 | 2.80 | 17.86 |
| 5 | 2.50 | 3.30 | 15.15 |
| 6 | 3.00 | 3.90 | 15.38 |
| 7 | 3.50 | 4.40 | 11.36 |
| 8 | 4.01 | 4.70 | 6.38 |
| 9 | 4.51 | 5.20 | 9.62 |
| 10 | 5.00 | 5.60 | 7.14 |
| 11 | 5.50 | 6.00 | 6.67 |
| 12 | 6.00 | 6.40 | 6.25 |
| 13 | 6.50 | 6.90 | 7.25 |
| 14 | 7.00 | 7.30 | 5.48 |

BEST AVAILABLE COPY

BLANK VALUE = 5.9 micrograms carbon
BLANK FACTOR = 5.9 / 7.004822 = +8.4E-01 ug/min Carbon

SAMPLE RESULTS:
( 7.3 - 5.899281 )(1.1)/(200) = +7.7E-03 g/L Carbon
( 7.3 - 5.899281 )(1.1)/(200)(12) = +6.4E-04 Molar Carbon

Sample Run By: _____
EH COLVIN

# TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-610 Date: 08/10/93 Time: 12:20:57

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = G-605 BLANK
Blank Value = .842277 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.30 | 0.00 |
| 2 | 1.01 | 1.40 | 78.57 |
| 3 | 1.51 | 2.10 | 33.33 |
| 4 | 2.01 | 2.70 | 22.22 |
| 5 | 2.51 | 3.20 | 15.63 |
| 6 | 3.01 | 3.80 | 15.79 |
| 7 | 3.51 | 4.20 | 9.52 |
| 8 | 4.01 | 4.60 | 8.70 |
| 9 | 4.51 | 5.20 | 11.54 |
| 10 | 5.01 | 5.60 | 7.14 |
| 11 | 5.51 | 6.00 | 6.67 |
| 12 | 6.01 | 6.40 | 6.25 |
| 13 | 6.51 | 6.90 | 7.25 |
| 14 | 7.01 | 7.30 | 5.48 |

BEST AVAILABLE COPY

BLANK VALUE = 5.9 micrograms carbon
BLANK FACTOR = 5.9 / 7.004822 = +8.4E-01 ug/min Carbon

SAMPLE RESULTS:
( 7.3 - 5.90072 )(1.1)/(200) = +7.7E-03 g/L Carbon
( 7.3 - 5.90072 )(1.1)/(200)(12) = +6.4E-04 Molar Carbon

Sample Run By: E.H. Colvin 8-10-93
EH COLVIN

 BATCH # 1368 OA 2

WESTINGHOUSE HANFORD COMPANY

222-S LABORATORY

# ANALYTICAL BATCH

102-5DAY

| | |
|---|---|
| Lab Segment Serial No. G-614 THRU G-618 | Customer ID: B-3 THRU B-7 |
| Analysis: TOTAL ORGANIC CARBON | Sample Prep: DIRECT |

| | |
|---|---|
| Instrument: WC16130 | Procedure/ Rev: LA-344-105 B-2 |
| Technologist: E.H. COLVIN E.H. Colvin | Date: ~~08/12/93~~ 8-16-93 EC |
| Starting Time: 0630 | Temperature 25C |
| Ending Time: 1500 | Chemist: J.S. LACHUT |

Comments:

| | Description | Lab ID |
|---|---|---|
| 1 | INITIAL LMCS CHECK STD | G-612-5526 |
| 2 | REAGENT BLANK | G-613-5626 |
| 3 | SAMPLE | G-614-5726 |
| 4 | SAMPLE | G-615-5726 |
| 5 | SAMPLE | G-616-5726 |
| 6 | SAMPLE | G-617-5726 |
| 7 | SAMPLE | G-618-5726 |
| 8 | | |
| 9 | | |
| 10 | | |

| | Description | Lab ID |
|---|---|---|
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |

| Standard Type | Primary Book No. and Aliquot Vol. | Second Book No. and Aliquot Vol. | Third Book No. and Aliquot Vol. | Final Vol. of Standard |
|---|---|---|---|---|
| LMCS | 10N12A .200ML | | | |
| | | | | |
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ANALYTICAL BATCH SUMMARY SHEET WHC-SD-WM-DP-054 REV O

METHOD: LA 344-105 DATE START: 8/16/93

PREPARED BY: J. LACHUT DATE COMPLETE: 8/17/93

| | UNITS: | mg/mL | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SPL NAME | SPL ID | ANALYT | RESULT #1 | RESULT #2 | AVERAGE | RPD% | %REC | DET LIM | % CT ER |
| | | TOC | | | | | | 5.50 mg/mL | |
| LMCS STD. | 6-612 | | | | | | 98.7 % | | |
| IONIZA | | | | | | | | | |
| BLANK | 6-613 | | $3.10 \times 10^{1}$ mg/mL | | | | | | |
| B-3 | 6-614 | | <5.50 mg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |
| B-4 | 6-615 | | <5.50 mg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |
| B-5 | 6-616 | | <5.50 mg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |
| B-6 | 6-617 | | <5.50 mg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |
| B-7 | 6-618 | | <5.50 mg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |

NARRATIVE: [✓] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

J. S. Lachut 8/17/93

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 612.-5526 | 102 5 DAY | 7-22-93 | 14:36 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | % RECOVERY | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .200mL - 2mL - .200mL | STD |

Remarks Calculations Results

S356 CO3TOC

STD# 10N12 A RESULT 2.96

STD VAL 3.00 %REC 98.672

P.H. Cohen

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-16-93 | 1500 | J. S. Lachut 8/17/93 |

54-6800-06 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 613.-5626 | 102 5 DAY | 7-22-93 | 14:37 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .200mL | BLK |

Remarks Calculations Results

REAGENT BLANK

$\frac{6.20\,\mu g}{0.200\,mL} = 3.10 \times 10^{1}\ \mu g/mL\ C$

P.H. Cohen

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| Hrs | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-16-93 | 1500 | J. S. Lachut 8/17/93 |

54-6800-06 (R-10-83)

BEST AVAILABLE COPY

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 614.-5726 | 102 5 DAY | 7-22-93 | 14:38 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?1mL + .100mL .5m $H_2SO_4$ - .200mL | B-3 |

Remarks, Calculations, Results

$< 5.50 \times 10^{-3}$ g/L C $\times \frac{1{,}000{,}000 \text{ mg/g}}{1{,}000 \text{ mL/L}} = \boxed{< 5.50 \text{ mg/mL C}}$

gH 8-23-93

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-16-93 | 1500 | J. S. Lachut 8/17/93 |

54-6800-561 (R-10-89)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 615.-5726 | 102 5 DAY | 7-22-93 | 14:40 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?1mL + .100mL .5m $H_2SO_4$ - .200mL | B-4 |

Remarks, Calculations, Results

$< 5.50 \times 10^{-3}$ g/L C $\times \frac{1{,}000{,}000 \text{ mg/g}}{1{,}000 \text{ mL}} = \boxed{< 5.50 \text{ mg/mL C}}$

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-16-93 | 1500 | J. S. Lachut 8/17/93 |

54-6800-561 (R-10-89)

BEST AVAILABLE COPY

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 616.-5726 | 102 5 DAY | 7-22-93 | 14:40 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?/mL + .100 mL .5 M $H_2SO_4$ - .200 mL | B-5 |

Remarks, Calculations, Results

$$<5.50 \times 10^{-3}\ g/L\ C \times \frac{1{,}000{,}000\ \mu g/g}{1{,}000\ mL} = \boxed{<5.50\ \mu g/mL\ C}$$

B.H. Cole

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| Hrs | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8-16-93 | 1500 | J. S. Lachut 8/17/93 | 8/17 |

54-6800-061 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 617.-5726 | 102 5 DAY | 7-22-93 | 14:41 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ?/mL + .100 mL .5 M $H_2SO_4$ - .200 mL | B-6 |

Remarks, Calculations, Results

$$<5.50 \times 10^{-3}\ g/L\ C \times \frac{1{,}000{,}000\ \mu g/g}{1{,}000\ mL} = \boxed{<5.50\ \mu g/mL\ C}$$

B.H. Cole

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8-16-93 | 1500 | J. S. Lachut 8/17/93 | 8/17 |

54-6800-061 (R-10-83)

BEST AVAILABLE COPY

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 618.-5726 | 102 5 DAY | 7-22-93 | 14:41 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| .100 mL 8-17-93 EE<br>?/mL + .500 .5M $H_2SO_4$ - .200 mL | B-7 |

Remarks, Calculations, Results

$$<5.50 \times 10^{-3}\ g/L\ C \times \frac{1{,}000{,}000\ mg/g}{1{,}000\ mL/L} = \boxed{<5.50\ mg/mL\ C}$$

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| Hrs | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8-16-93 | 1500 | J. S. Lachut 8/17/93 | 8/17 |

54-6800-021 (R-10/93)

BEST AVAILABLE COPY

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-612 STD  Date: 08/16/93  Time: 09:07:37

Sample Size = 200 uL
Dil Factor = 11
Blank ID # = G-613 BLANK
Blank Value = .885228 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.60 | 0.00 |
| 2 | 1.01 | 7.50 | 92.00 |
| 3 | 1.51 | 42.80 | 82.48 |
| 4 | 2.00 | 51.60 | 17.05 |
| 5 | 2.50 | 54.60 | 5.49 |
| 6 | 3.00 | 56.10 | 2.67 |
| 7 | 3.50 | 56.60 | 0.88 |
| 8 | 4.00 | 57.20 | 1.05 |
| 9 | 4.50 | 58.00 | 1.38 |
| 10 | 5.00 | 58.30 | 0.51 |
| 11 | 5.50 | 58.70 | 0.68 |
| 12 | 6.00 | 59.00 | 0.51 |
| 13 | 6.50 | 59.60 | 1.01 |
| 14 | 7.00 | 60.00 | 0.67 |

BEST AVAILABLE COPY

BLANK VALUE = 6.2 micrograms carbon
BLANK FACTOR = 6.2 / 7.003845 = +8.9E-01 ug/min Carbon

SAMPLE RESULTS:
( 60 - 6.2 )(11)/(200) = +2.96E+00 g/L Carbon
( 60 - 6.2 )(11)/(200)(12) = +2.47E-01 Molar Carbon

Sample Run By: EH Colvin 8-16-93
EH COLVIN

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 682 TO 688.

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: G-613 BLANK  Date: 08/16/93  Time: 08:45:48

Sample Size = 200 uL
Dil Factor = 1
Blank ID # = G-613 BLANK
Blank Value = N/A

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.50 | 0.00 |
| 2 | 1.01 | 1.40 | 64.29 |
| 3 | 1.51 | 1.40 | 0.00 |
| 4 | 2.01 | 2.00 | 30.00 |
| 5 | 2.51 | 2.50 | 20.00 |
| 6 | 3.01 | 3.00 | 16.67 |
| 7 | 3.51 | 3.30 | 9.09 |
| 8 | 4.00 | 3.70 | 10.81 |
| 9 | 4.50 | 4.10 | 9.76 |
| 10 | 5.00 | 4.50 | 8.89 |
| 11 | 5.50 | 5.10 | 11.76 |
| 12 | 6.00 | 5.70 | 10.53 |
| 13 | 6.50 | 5.70 | 0.00 |
| 14 | 7.00 | 6.20 | 8.06 |

BEST AVAILABLE COPY

BLANK VALUE = 6.2 micrograms carbon
BLANK FACTOR = 6.2 / 7.003845 = +8.9E-01 ug/min Carbon

Sample Run By: _____
EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-614 Date: 08/16/93 Time: 09:16:15

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = G-613 BLANK
Blank Value = .885228 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.10 | 0.00 |
| 2 | 1.01 | 1.20 | 91.67 |
| 3 | 1.51 | 2.10 | 42.86 |
| 4 | 2.01 | 2.80 | 25.00 |
| 5 | 2.51 | 3.20 | 12.50 |
| 6 | 3.01 | 3.60 | 11.11 |
| 7 | 3.51 | 4.00 | 10.00 |
| 8 | 4.01 | 4.50 | 11.11 |
| 9 | 4.50 | 5.00 | 10.00 |
| 10 | 5.00 | 5.00 | 0.00 |
| 11 | 5.51 | 5.50 | 9.09 |
| 12 | 6.01 | 5.80 | 5.17 |
| 13 | 6.51 | 6.10 | 4.92 |
| 14 | 7.00 | 6.60 | 7.58 |

BEST AVAILABLE COPY

BLANK VALUE = 6.2 micrograms carbon
BLANK FACTOR = 6.2 / 7.003845 = +8.9E-01 ug/min Carbon

SAMPLE RESULTS:
( 6.6 - 6.200108 )(1.1)/(200) = JL 8/17/93 < ~~5.00~~ 5.50 E-3 g/L Carbon
( 6.6 - 6.200108 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-615 Date: 08/16/93 Time: 09:25:09

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = G-613 BLANK
Blank Value = .835223 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.40 | 0.00 |
| 2 | 1.01 | 1.00 | 60.00 |
| 3 | 1.51 | 2.50 | 60.00 |
| 4 | 2.00 | 3.00 | 16.67 |
| 5 | 2.50 | 3.20 | 6.25 |
| 6 | 3.00 | 3.50 | 8.57 |
| 7 | 3.51 | 4.00 | 12.50 |
| 8 | 4.01 | 4.30 | 6.98 |
| 9 | 4.50 | 4.70 | 8.51 |
| 10 | 5.00 | 4.90 | 4.08 |
| 11 | 5.50 | 5.30 | 7.55 |
| 12 | 6.00 | 5.60 | 5.36 |
| 13 | 6.50 | 6.10 | 8.20 |
| 14 | 7.00 | 6.30 | 3.17 |

BEST AVAILABLE COPY

BLANK VALUE = 6.2 micrograms carbon
BLANK FACTOR = 6.2 / 7.003845 = +8.9E-01 ug/min Carbon

SAMPLE RESULTS:
( 6.3 - 6.200162 )(1.1)/(200) = 8/17/93 < ~~4.00~~ 5.50 E-3 g/L Carbon
( 6.3 - 6.200162 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: _____
EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-616 Date: 08/16/93 Time: 09:33:42

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = G-613 BLANK
Blank Value = .885223 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.00 | 0.00 |
| 2 | 1.01 | 0.50 | 100.00 |
| 3 | 1.51 | 1.30 | 61.54 |
| 4 | 2.01 | 2.00 | 35.00 |
| 5 | 2.51 | 2.00 | 0.00 |
| 6 | 3.01 | 2.40 | 16.67 |
| 7 | 3.51 | 2.70 | 11.11 |
| 8 | 4.01 | 2.90 | 6.90 |
| 9 | 4.51 | 3.50 | 17.14 |
| 10 | 5.01 | 3.50 | 0.00 |
| 11 | 5.51 | 3.90 | 10.26 |
| 12 | 6.01 | 4.40 | 11.36 |
| 13 | 6.51 | 4.80 | 8.33 |
| 14 | 7.00 | 4.80 | 0.00 |

BEST AVAILABLE COPY

BLANK VALUE = 6.2 micrograms carbon
BLANK FACTOR = 6.2 / 7.003845 = +8.9E-01 ug/min Carbon

SAMPLE RESULTS:
( 4.8 - 6.200864 )(1.1)/(200) = JL 8/17/93 < ~~5.00~~ 5.50 E-3 g/L Carbon
( 4.8 - 6.200864 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-617 Date: 08/16/93 Time: 09:42:07

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = G-613 BLANK
Blank Value = .885228 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.10 | 0.00 |
| 2 | 1.01 | 0.80 | 87.50 |
| 3 | 1.51 | 2.40 | 66.67 |
| 4 | 2.01 | 2.50 | 4.00 |
| 5 | 2.51 | 3.00 | 16.67 |
| 6 | 3.01 | 3.30 | 9.09 |
| 7 | 3.50 | 3.90 | 15.38 |
| 8 | 4.00 | 4.40 | 11.36 |
| 9 | 4.50 | 4.40 | 0.00 |
| 10 | 5.00 | 4.70 | 6.38 |
| 11 | 5.50 | 5.00 | 6.00 |
| 12 | 6.00 | 5.40 | 7.41 |
| 13 | 6.50 | 5.70 | 5.26 |
| 14 | 7.00 | 5.90 | 3.39 |

BEST AVAILABLE COPY

BLANK VALUE = 6.2 micrograms carbon
BLANK FACTOR = 6.2 / 7.003845 = . +8.9E-01 ug/min Carbon

SAMPLE RESULTS:
( 5.9 - 6.199297 )(1.1)/(200) = 8/17/93 < ~~5.00~~ 5.50 E-3 g/L Carbon
( 5.9 - 6.199297 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: _____
EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-618 Date: 08/16/93 Time: 09:57:58

Sample Size = 200 ul
Dil Factor = 1.1
Blank ID # = G-613 BLANK
Blank Value = .885228 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.40 | 0.00 |
| 2 | 1.01 | 0.90 | 55.56 |
| 3 | 1.51 | 1.50 | 40.00 |
| 4 | 2.00 | 1.90 | 21.05 |
| 5 | 2.50 | 2.50 | 24.00 |
| 6 | 3.00 | 2.50 | 0.00 |
| 7 | 3.50 | 2.80 | 10.71 |
| 8 | 4.00 | 3.10 | 9.68 |
| 9 | 4.50 | 3.80 | 18.42 |
| 10 | 5.00 | 3.80 | 0.00 |
| 11 | 5.50 | 4.10 | 7.32 |
| 12 | 6.00 | 4.40 | 6.82 |
| 13 | 6.50 | 4.70 | 6.38 |
| 14 | 7.00 | 5.00 | 6.00 |

BEST AVAILABLE COPY

BLANK VALUE = 6.2 micrograms carbon
BLANK FACTOR = 6.2 / 7.003845 = +8.9E-01 ug/min Carbon

SAMPLE RESULTS:
( 5 - 6.199244 )(1.1)/(200) = JL 8/17/93 < ~~4.00~~ 5.50 E-3 g/L Carbon
( 5 - 6.199244 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: EH Colvin 8-16-93
EH COLVIN

WESTINGHOUSE HANFORD COMPANY Batch 1388

222-S LABORATORY

WHC-SD-WM-DP-054 REV 0 **ANALYTICAL BATCH** 102-5-DAY

| | |
|---|---|
| b Segment Serial No. 6622 - 6626 | Customer ID: C-0, C-1, C-2, C-3, C-4 |
| Analysis: TOC | Sample Prep: UNDIGESTED |

| | |
|---|---|
| Instrument: MODEL 5011 WC16130 | Procedure/ Rev: LA-344-105 ~~B-1~~ B-2 |
| Technologist: Patrick J. McCown PATRICK J. McCOWN | Date: 8/14/93 |
| Starting Time: 0630 | Temperature NA RSD 10-8-93 |
| Ending Time: 0745 | Chemist: J. S. LACHUT |

Comments:

| | Description | Lab ID |
|---|---|---|
| 1 | LMCS STD PSM 8/14/93 | G620 ~~6621~~ - 5626 |
| 2 | REAGENT BLANK PSM 8/14/93 | G621 ~~6620~~ - 5526 |
| 3 | SAMPLE | 6622. - 5726 |
| 4 | SAMPLE | 6623. - 5726 |
| 5 | SAMPLE | 6624. - 5726 |
| 6 | SAMPLE | 6625. - 5726 |
| 7 | SAMPLE | 6626. - 5726 |
| 8 | | |
| 9 | | |
| 10 | | |

| | Description | Lab ID |
|---|---|---|
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |

| Standard Type | Primary Book No. and Aliquot Vol. | Second Book No. and Aliquot Vol. | Third Book No. and Aliquot Vol. | Final Vol. of Standard |
|---|---|---|---|---|
| LMCS | 10N12A / .200 ML | | | |
| | | | | |
| | | | | |
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| | | | | |



A-6000-881 (03/92)

# ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA 344-105 DATE START: 8/14/93

PREPARED BY: J. Lachut DATE COMPLETE: 8/16/93

| SPL NAME | SPL ID | ANALYT | RESULT #1 | RESULT #2 | AVERAGE | RPD% | %REC | DET LIM | % CT ER |
|---|---|---|---|---|---|---|---|---|---|
| UNITS: | | TOC | | | | | | 5.50 mg/L | |
| LMCS STD. | G-620 | | | | | | 94.7 | | |
| 10N12A | | | | | | | | | |
| BLANK | G-621 | | $2.10 \times 10^{1}$ mg/L | | | | | | |
| C-0 | G-622 | | <5.50 mg/L | | | | | | |
| 102 5 DAY | | | | | | | | | |
| C-1 | G-623 | | <5.50 mg/L | | | | | | |
| 102 5 DAY | | | | | | | | | |
| C-2 | G-624 | | <5.50 mg/L | | | | | | |
| 102 5 DAY | | | | | | | | | |
| C-3 | G-625 | | <5.50 mg/L | | | | | | |
| 102 5 DAY | | | | | | | | | |
| C-4 | G-626 | | <5.50 mg/L | | | | | | |
| 102 5 DAY | | | | | | | | | |

NARRATIVE: [✓] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

J. Lachut 8/16/93

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 620.-5526 | 102 5 DAY | 7-22-93 | 14:54 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | % RECOVERY | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .200ML - 2ML - .200ML 1N $H_2SO_4$ | STD |

Remarks, Calculations, Results

S356 CO3TOC

STD# 10N12A RESULT 284

STD VAL 3.00 %REC 94.67%

Patrick J. McCann

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8/14/93 | 0637 | J. S. Lachut 8/16/93 | Glenn A. Hardins |

54-6800-061 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 621.-5626 | 102 5 DAY | 7-22-93 | 14:56 | 26 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .200ML | BLK |

Remarks, Calculations, Results

REAGENT BLANK

$\frac{4.20\,\mu g}{0.200\,mL} = 2.10 \times 10^{1}\ \mu g/mL\ C$

Patrick J. McCann

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8/14/93 | 0628 | J. S. Lachut 8/16/93 | 8/16 |

54-6800-061 (R-10-83)

BEST AVAILABLE COPY

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 622.-5726 | 102 5 DAY | 7-22-93 | 14:58 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 2mL - .200mL - .200mL IN $H_2SO_4$ | C-0 |

Remarks Calculations Results

$<5.50 \times 10^{-3}$ g/L C $\times \frac{1,000,000 \mu g/g}{1,000 mg/L} = \boxed{<5.50 \mu g/mL C}$

Patrick J. McCann

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8/14/93 | 0646 | J. S. Lachut 8/16/93 | 8/16 |

54-6800-661 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 623.-5726 | 102 5 DAY | 7-22-93 | 15: 3 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 2mL - .200mL - .200mL IN $H_2SO_4$ | C-1 |

Remarks Calculations Results

$<5.50 \times 10^{-3}$ g/L C $\times \frac{1,000,000 \mu g/g}{1,000 mg/L} = \boxed{<5.50 \mu g/mL C}$

Patrick J. McCann

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8/14/93 | 0654 | J. S. Lachut 8/16/93 | 8/16 |

54-6800-661 (R-10-83)

BEST AVAILABLE COPY

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 624.-5726 | 102 5 DAY | 7-22-93 | 15: 3 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 2ML - .200ML - .200ML 1N $H_2SO_4$ | C-2 |

Remarks, Calculations, Results

$< 5.50 \times 10^{-3}$ g/L C $\times \frac{1{,}000{,}000\ \mu g/g}{1{,}000\ mL/L} = \boxed{< 5.50\ \mu g/mL\ C}$

Patrick J. McCann

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/14/93 | 0702 | J. S. Lachut 8/16/93 |

54-6800-064 (R/10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 625.-5726 | 102 5 DAY | 7-22-93 | 15: 6 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 2ML - .200ML - .200ML 1N $H_2SO_4$ | C-3 |

Remarks, Calculations, Results

$< 5.50 \times 10^{-3}$ g/L C $\times \frac{1{,}000{,}000\ \mu g/g}{1{,}000\ mL/L} = \boxed{< 5.50\ \mu g/mL\ C}$

Patrick J. McCann

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8/14/93 | 0711 | J. S. Lachut 8/16/93 |

54-6800-064 (R/10-83)

BEST AVAILABLE COPY

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 626.-5726 | 102 5 DAY | 7-22-93 | 15: 7 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 2mL - .200mL - .200mL in $H_2SO_4$ | C-4 |

Remarks, Calculations, Results

$$<5.50 \times 10^{-3}\ g/L\ C \times \frac{1{,}000{,}000\ \mu g/g}{1{,}000\ mL} = \boxed{<5.50\ mg/L\ C}$$

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8/14/93 | 0719 | 8/16/93 J. S. Lachut | 8/16 |

S-6400-061 (R-10-83)

BEST AVAILABLE COPY

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G620 STD  Date: 08/14/93  Time: 06:37:19

Sample Size = 200 uL  Analyst : PJ MCCOWN
Dil Factor = 11  Min Readings = 14
Blank ID # = G671 BLANK  Max Readings = 14
Blank Value = .3569903 ug/minute C  % Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.40 | 0.00 |
| 2 | 1.01 | 15.80 | 97.47 |
| 3 | 1.50 | 37.70 | 58.09 |
| 4 | 2.00 | 45.20 | 16.59 |
| 5 | 2.50 | 49.00 | 7.76 |
| 6 | 3.00 | 51.00 | 3.92 |
| 7 | 3.50 | 52.30 | 2.49 |
| 8 | 4.00 | 53.20 | 1.69 |
| 9 | 4.50 | 53.90 | 1.30 |
| 10 | 5.00 | 54.40 | 0.92 |
| 11 | 5.50 | 54.80 | 0.73 |
| 12 | 6.00 | 55.20 | 0.72 |
| 13 | 6.50 | 55.60 | 0.72 |
| 14 | 7.00 | 55.80 | 0.36 |

BEST AVAILABLE COPY

BLANK VALUE = 2.5 micrograms carbon
BLANK FACTOR = 2.5 / 7.002991 = +3.6E-01 ug/min Carbon

SAMPLE RESULTS: RA 8/14/93
( 55.8 - ~~2.499651~~ 2.838 )(11)/(200) = ~~+1.77E+00~~ g/L Carbon
( 55.8 - 2.499651 )(11)/(200)(12) = +2.44E-01 Molar Carbon

RA 8/14/93

Sample Run By: Patrick L. McCown
PJ MCCOWN

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 695 TO 701.

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G621 BLANK  Date: 08/14/93  Time: 06:28:44

Sample Size = 200 uL  Analyst : PJ MCCOWN
Dil Factor = 1  Min Readings = 14
Blank ID # = G671 BLANK  Max Readings = 14
Blank Value = .3569903 ug/minute C  % Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.20 | 0.00 |
| 2 | 1.01 | 0.70 | 71.43 |
| 3 | 1.51 | 1.20 | 41.67 |
| 4 | 2.01 | 1.50 | 20.00 |
| 5 | 2.51 | 1.80 | 16.67 |
| 6 | 3.01 | 2.10 | 14.29 |
| 7 | 3.51 | 2.40 | 12.50 |
| 8 | 4.01 | 2.70 | 11.11 |
| 9 | 4.51 | 3.00 | 10.00 |
| 10 | 5.01 | 3.20 | 6.25 |
| 11 | 5.51 | 3.50 | 8.57 |
| 12 | 6.01 | 3.70 | 5.41 |
| 13 | 6.51 | 3.90 | 5.13 |
| 14 | 7.00 | 4.20 | 7.14 |

BEST AVAILABLE COPY

BLANK VALUE = 2.5 micrograms carbon
BLANK FACTOR = 2.5 / 7.002991 = +3.6E-01 ug/min Carbon

SAMPLE RESULTS:
( 4.2 - 2.500654 )(1)/(200) = +8.5E-03 g/L Carbon
( 4.2 - 2.500654 )(1)/(200)(12) = +7.1E-04 Molar Carbon

Sample Run By: Patrick J. McCown
PJ MCCOWN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G622 SAMPLE  Date: 08/14/93  Time: 06:46:06

Sample Size = 200 ul  Analyst : PJ MCCOWN
Dil Factor = 1.1  Min Readings = 14
Blank ID # = G671 BLANK  Max Readings = 14
Blank Value = .3569903 ug/minute C  % Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.10 | 0.00 |
| 2 | 1.01 | 0.60 | 83.33 |
| 3 | 1.51 | 0.90 | 33.33 |
| 4 | 2.01 | 1.20 | 25.00 |
| 5 | 2.51 | 1.50 | 20.00 |
| 6 | 3.01 | 1.80 | 16.67 |
| 7 | 3.51 | 1.90 | 5.26 |
| 8 | 4.01 | 2.20 | 13.64 |
| 9 | 4.50 | 2.40 | 8.33 |
| 10 | 5.00 | 2.70 | 11.11 |
| 11 | 5.51 | 2.90 | 6.90 |
| 12 | 6.01 | 3.10 | 6.45 |
| 13 | 6.51 | 3.30 | 6.06 |
| 14 | 7.00 | 3.50 | 5.71 |

BEST AVAILABLE COPY

BLANK VALUE = 2.5 micrograms carbon
BLANK FACTOR = 2.5 / 7.002991 = +3.6E-01 ug/min Carbon

SAMPLE RESULTS: 2.2 blnk
( 3.5 - ~~2.500654~~ 4.2 )(1.1)/(200) = <+5.5E-03 g/L Carbon
( 3.5 - 2.500654 )(1.1)/(200)(12) = +4.6E-04 Molar Carbon

Sample Run By: Patrick J. McCown
PJ MCCOWN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G623 SAMPLE  Date: 08/14/93  Time: 06:54:29

Sample Size = 200 ul
Dil Factor = 1.1
Blank ID # = G671 BLANK
Blank Value = .3569903 ug/minute C

Analyst : PJ MCCOWN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.00 | 0.00 |
| 2 | 1.01 | 0.50 | 100.00 |
| 3 | 1.51 | 1.10 | 54.55 |
| 4 | 2.01 | 1.40 | 21.43 |
| 5 | 2.51 | 1.60 | 12.50 |
| 6 | 3.01 | 1.90 | 15.79 |
| 7 | 3.51 | 2.10 | 9.52 |
| 8 | 4.01 | 2.30 | 8.70 |
| 9 | 4.51 | 2.50 | 8.00 |
| 10 | 5.00 | 2.70 | 7.41 |
| 11 | 5.50 | 2.90 | 6.90 |
| 12 | 6.00 | 3.10 | 6.45 |
| 13 | 6.50 | 3.30 | 6.06 |
| 14 | 7.00 | 3.50 | 5.71 |

BEST AVAILABLE COPY

BLANK VALUE = 2.5 micrograms carbon
BLANK FACTOR = 2.5 / 7.002991 = +3.6E-01 ug/min Carbon

SAMPLE RESULTS: DL 8/16/93
( 3.5 - ~~2.5~~ 4.2 )(1.1)/(200) = <+5.5E-03 g/L Carbon
( 3.5 - 2.5 )(1.1)/(200)(12) = +4.6E-04 Molar Carbon

Sample Run By: Patrick J. McCown
PJ MCCOWN

WHC-SD-WM-DP-054 REV 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G624 SAMPLE  Date: 08/14/93  Time: 07:02:51

Sample Size = 200 uL  Analyst : PJ MCCOWN
Dil Factor = 1.1  Min Readings = 14
Blank ID # = G671 BLANK  Max Readings = 14
Blank Value = .3569903 ug/minute C  % Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.10 | 0.00 |
| 2 | 1.01 | 0.50 | 80.00 |
| 3 | 1.51 | 0.90 | 44.44 |
| 4 | 2.01 | 1.10 | 18.18 |
| 5 | 2.51 | 1.40 | 21.43 |
| 6 | 3.01 | 1.60 | 12.50 |
| 7 | 3.51 | 1.80 | 11.11 |
| 8 | 4.01 | 2.00 | 10.00 |
| 9 | 4.51 | 2.20 | 9.09 |
| 10 | 5.01 | 2.40 | 8.33 |
| 11 | 5.51 | 2.50 | 4.00 |
| 12 | 6.01 | 2.80 | 10.71 |
| 13 | 6.50 | 3.00 | 6.67 |
| 14 | 7.00 | 3.10 | 3.23 |

BEST AVAILABLE COPY

BLANK VALUE = 2.5 micrograms carbon
BLANK FACTOR = 2.5 / 7.002991 = +3.6E-01 ug/min Carbon

SAMPLE RESULTS: JL 8/16/93
( 3.1 - ~~2.500654~~ 4.2 )(1.1)/(200) = ~~< 5.00~~ < 5.50 E-3 g/L Carbon
( 3.1 - 2.500654 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

JL 8/16/93

Sample Run By: Patrick J. McCown
PJ MCCOWN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G625 SAMPLE  Date: 08/14/93  Time: 07:11:22
Sample Size = 200 uL  Analyst : PJ MCCOWN
Dil Factor = 1.1  Min Readings = 14
Blank ID # = G671 BLANK  Max Readings = 14
Blank Value = .33a9903 ug/minute C  % Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.00 | 0.00 |
| 2 | 1.01 | 0.50 | 100.00 |
| 3 | 1.51 | 0.90 | 44.44 |
| 4 | 2.01 | 1.10 | 18.18 |
| 5 | 2.51 | 1.30 | 15.38 |
| 6 | 3.01 | 1.60 | 18.75 |
| 7 | 3.51 | 1.80 | 11.11 |
| 8 | 4.00 | 2.00 | 10.00 |
| 9 | 4.50 | 2.20 | 9.09 |
| 10 | 5.00 | 2.40 | 8.33 |
| 11 | 5.50 | 2.60 | 7.69 |
| 12 | 6.00 | 2.80 | 7.14 |
| 13 | 6.50 | 3.00 | 6.67 |
| 14 | 7.00 | 3.10 | 3.23 |

BEST AVAILABLE COPY

BLANK VALUE = 2.5 micrograms carbon
BLANK FACTOR = 2.5 / 7.002991 = +3.6E-01 ug/min Carbon

SAMPLE RESULTS: DL 8/16/93
( 3.1 - ~~2.50036~~ 1.2 )(1.1)/(200) = DL 8/16/93 < 5.50 ~~< 5.00~~ E-3 g/L Carbon
( 3.1 - 2.50036 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: Patrick J. McCown
PJ MCCOWN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G626 SAMPLE  Date: 08/14/93  Time: 07:19:53

Sample Size = 200 uL  Analyst : PJ MCCOWN
Dil Factor = 1.1  Min Readings = 14
Blank ID # = G671 BLANK  Max Readings = 14
Blank Value = .3569906 ug/minute C  % Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.00 | 0.00 |
| 2 | 1.01 | 0.50 | 100.00 |
| 3 | 1.51 | 0.90 | 44.44 |
| 4 | 2.01 | 1.20 | 25.00 |
| 5 | 2.51 | 1.50 | 20.00 |
| 6 | 3.01 | 1.70 | 11.76 |
| 7 | 3.51 | 1.90 | 10.53 |
| 8 | 4.01 | 2.10 | 9.52 |
| 9 | 4.50 | 2.30 | 8.70 |
| 10 | 5.00 | 2.50 | 8.00 |
| 11 | 5.50 | 2.60 | 3.85 |
| 12 | 6.00 | 2.80 | 7.14 |
| 13 | 6.51 | 3.10 | 9.68 |
| 14 | 7.01 | 3.20 | 3.13 |

BEST AVAILABLE COPY

BLANK VALUE = 2.5 micrograms carbon
BLANK FACTOR = 2.5 / 7.002991 = +3.6E-01 ug/min Carbon

SAMPLE RESULTS: JL 8/16/93
( 3.2 - ~~2.500959~~ 4.2 )(1.1)/(200) = JL 8/16/93 < 5.50 ~~< 5.00~~ E-3 g/L Carbon
( 3.2 - 2.500959 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: Patrick F. McCown
PJ MCCOWN

WHC-SD-WM-DP-054 REV 0

WESTINGHOUSE HANFORD COMPANY

222-S LABORATORY

# ANALYTICAL BATCH

Batch 1383

102-5DAY

| | |
|---|---|
| Lab Segment Serial No. G628 - G634 | Customer ID: C5 C6, C7, D-0, D-1 |
| Analysis: Tc | Sample Prep: |

| | |
|---|---|
| Instrument: MODEL 5011 WC16130 | Procedure/ Rev: LA-344-105 B-1 |
| Technologist: PATRICK J. McCOWN | Date: 8/10/93 B-2 |
| Starting Time: 1930 | Temperature NA RJD |
| Ending Time: 2200 | Chemist: J. S LACHUT 10-8-93 |

Comments:

| | Description | Lab ID | | Description | Lab ID |
|---|---|---|---|---|---|
| 1 | LMCS STD | G628.-5526 | 11 | | |
| 2 | REAGENT BLANK | G629.-5626 | 12 | | |
| 3 | SAMPLE | G630.-5726 | 13 | | |
| 4 | SAMPLE | G631.-5726 | 14 | | |
| 5 | SAMPLE | G632.-5726 | 15 | | |
| 6 | SAMPLE | G633.-5726 | 16 | | |
| 7 | SAMPLE | G634.-5726 | 17 | | |
| 8 | | | 18 | | |
| 9 | | | 19 | | |
| 10 | | | 20 | | |

| Standard Type | Primary Book No. and Aliquot Vol. | Second Book No. and Aliquot Vol. | Third Book No. and Aliquot Vol. | Final Vol. of Standard |
|---|---|---|---|---|
| LMCS | 10N12A / .200 mL | | | |
| | | | | |
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| | | | | |
| | | | | |

702

A-6000-881 (03/92)

WHC-SD-WM-DP-054 REV 0

ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA 344-105 DATE START: 8/10/93

PREPARED BY: J.S. LACHUT DATE COMPLETE: 8/11/93

| SPL NAME | SPL ID | ANALYT | RESULT #1 | RESULT #2 | AVERAGE | RPD% | %REC | DET LIM | % CT ER |
|---|---|---|---|---|---|---|---|---|---|
| | UNITS: | mg/mL | | | | | | | |
| | | TOC | | | | | | 5.50 mg/L | |
| LMCS STD. | G-628 | | | | | | 92.7% | | |
| 10N12A | | | | | | | | | |
| BLANK | G-629 | | $1.80 \times 10^{1}$ mg/mL | | | | | | |
| C-5 | G-630 | | $1.60 \times 10^{1}$ mg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |
| C-6 | G-631 | | 8.20 mg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |
| [illegible] | [illegible] | | 5.50 mg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |
| D-0 | G-633 | | 7.70 mg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |
| D-1 | G-634 | | 9.40 mg/mL | | | | | | |
| 102 5 DAY | | | | | | | | | |

NARRATIVE: [✓] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

J. S. Lachut 8/11/93

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 628.-5526 | 102 5 DAY | 7-22-93 | 15: 8 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | % RECOVERY | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .200mL - 2mL - .200mL in $H_2SO_4$ | STD |

Remarks Calculations Results

S356 CO3TOC

STD# 10N12 A RESULT 2.78

STD VAL 3.00 %REC 92.67%

Patrick J. McCown

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8/10/93 | 2010 | J. S. Lackut 8/11/93 | Gary Hammitt |

54-6800-061 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 629.-5626 | 102 5 DAY | 7-22-93 | 15:10 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? .200mL | BLK |

Remarks Calculations Results

REAGENT BLANK

$\frac{3.60\mu g}{0.200mL} = 1.80 \times 10^1 \mu g/mL C$

Patrick J. McCown

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8/10/93 | 1945 ~~2110~~ 8/10/93 | J. S. Lackut 8/11/93 | Gary Hammitt |

54-6800-061 (R-10-83)

BEST AVAILABLE COPY

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 630.-5726 | 102 5 DAY | 7-22-93 | 15:12 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 2ML-.200ML-.200ML in $H_2SO_4$ | C-5 |

Remarks, Calculations, Results

$1.6 \times 10^{-2}$ g/L C $\times \frac{1,000,000 \text{ ug/g}}{1,000 \text{ mL/L}}$ = $1.60 \times 10^{1}$ ug/mL C

Robert J. McCown

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8/10/93 | 2120 | J. S. Lachut 8/11/93 | Gary Hammitt |

54-6800-061 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 631.-5726 | 102 5 DAY | 7-22-93 | 15:12 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 2ML-.200ML-.200ML in $H_2SO_4$ | C-6 |

Remarks, Calculations, Results

$8.2 \times 10^{-7}$ g/L C $\times \frac{1,000,000 \text{ ug/g}}{1,000 \text{ mL/L}}$ = 8.20 ug/mL C

Robert J. McCown

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8/10/93 | 2130 | J. S. Lachut 8/11/93 | Gary Hammitt |

54-6800-061 (R-10-83)

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# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 632.-5726 | 102 5 DAY | 7-22-93 | 15:13 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 2ML - .200ML - .200ML in $H_2SO_4$ | C-7 |

Remarks Calculations Results

$5.5 \times 10^{-3}$ g/L C x $\frac{1,000,000 \mu g/g}{1,000 ML}$ = 5.50 µg/ml C

Patrick J. McCown

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8/10/93 | 2138 | J. S. Lachut 8/11/93 | Gary Hammitt |

54-6800-061 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 633.-5726 | 102 5 DAY | 7-22-93 | 15:13 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? 2ML - .200ML - .200ML in $H_2SO_4$ | D-0 |

Remarks Calculations Results

$7.7 \times 10^{-3}$ g/L C x $\frac{1,000,000 \mu g/g}{1,000 ML}$ = 7.70 µg/ml C

Patrick J. McCown

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8/10/93 | 2147 | J. S. Lachut 8/11/93 | Gary Hammitt |

54-6800-061 (R-10-83)

BEST AVAILABLE COPY

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 634.-5726 | 102 5 DAY | 7-22-93 | 15:14 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 0 |

| Sample Size | Customer ID |
|---|---|
| ? ~~2mL~~ 8/10/93 2mL - .200mL - .200mL in $H_2SO_4$ | D-1 |

Remarks Calculations Results

$9.4 \times 10^{-3}$ g/L C x $\frac{1,000,000 \text{ ug/g}}{1,000 \text{ mg/L}}$ = 9.40 ug/mL C

Patrick J. McCann

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr | |
|---|---|---|---|
| 8/10/93 | 21 55 | J. S. Lachut 8/11/93 | Jay Hammitt |

54-6800-061 (R-13-83)

BEST AVAILABLE COPY

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G623 STD  Date: 08/10/93  Time: 20:12:52

Sample Size = 200 uL
Dil Factor = 11
Blank ID # = BLANK
Blank Value = .5139362 ug/minute C

Analyst : PJ MCCOWN
Min Readings = 4
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 9.10 | 0.00 |
| 2 | 1.01 | 31.00 | 70.65 |
| 3 | 1.51 | 41.70 | 25.66 |
| 4 | 2.01 | 45.90 | 9.15 |
| 5 | 2.51 | 48.10 | 4.57 |
| 6 | 3.01 | 49.30 | 2.43 |
| 7 | 3.51 | 50.20 | 1.79 |
| 8 | 4.00 | 50.90 | 1.38 |
| 9 | 4.50 | 51.50 | 1.17 |
| 10 | 5.00 | 52.20 | 1.34 |
| 11 | 5.50 | 52.70 | 0.95 |
| 12 | 6.00 | 53.20 | 0.94 |
| 13 | 6.50 | 53.60 | 0.75 |
| 14 | 7.00 | 54.10 | 0.92 |

BEST AVAILABLE COPY

BLANK VALUE = 3.6 micrograms carbon
BLANK FACTOR = 3.6 / 7.004761 = +5.1E-01 ug/min Carbon

SAMPLE RESULTS:
( 54.1 - 3.599561 )(11)/(200) = +2.78E+00 g/L Carbon
( 54.1 - 3.599561 )(11)/(200)(12) = +2.31E-01 Molar Carbon

Sample Run By: Patrick L. McCown
PJ MCCOWN

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 708 TO 714.

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: BLANK  Date: 08/10/93  Time: 19:46:23

Sample Size = 200 uL
Dil Factor = 1
Blank ID # = BLANK
Blank Value = N/A

Analyst : PJ MCCOWN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.20 | 0.00 |
| 2 | 1.01 | 0.30 | 33.33 |
| 3 | 1.51 | 0.60 | 50.00 |
| 4 | 2.01 | 0.90 | 33.33 |
| 5 | 2.51 | 1.10 | 18.18 |
| 6 | 3.01 | 1.50 | 26.67 |
| 7 | 3.51 | 1.80 | 16.67 |
| 8 | 4.01 | 2.00 | 10.00 |
| 9 | 4.51 | 2.30 | 13.04 |
| 10 | 5.01 | 2.60 | 11.54 |
| 11 | 5.51 | 2.80 | 7.14 |
| 12 | 6.01 | 3.10 | 9.68 |
| 13 | 6.51 | 3.30 | 6.06 |
| 14 | 7.00 | 3.60 | 8.33 |

BEST AVAILABLE COPY

BLANK VALUE = 3.6 micrograms carbon
BLANK FACTOR = 3.6 / 7.004761 = +5.1E-01 ug/min Carbon

Sample Run By: Patrick J. McCown
PJ MCCOWN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G30 SAMPLE  Date: 08/10/93  Time: 21:22:27

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLANK
Blank Value = .5139362 ug/minute C

Analyst : FJ MCCOWN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.00 | 0.00 |
| 2 | 1.01 | 0.90 | 100.00 |
| 3 | 1.51 | 2.20 | 59.09 |
| 4 | 2.01 | 2.90 | 24.14 |
| 5 | 2.51 | 3.60 | 19.44 |
| 6 | 3.01 | 4.00 | 10.00 |
| 7 | 3.51 | 4.30 | 6.98 |
| 8 | 4.01 | 4.70 | 8.51 |
| 9 | 4.51 | 5.10 | 7.84 |
| 10 | 5.01 | 5.30 | 3.77 |
| 11 | 5.51 | 5.70 | 7.02 |
| 12 | 6.01 | 6.00 | 5.00 |
| 13 | 6.51 | 6.20 | 3.23 |
| 14 | 7.00 | 6.50 | 4.62 |

BEST AVAILABLE COPY

BLANK VALUE = 3.6 micrograms carbon
BLANK FACTOR = 3.6 / 7.004761 = +5.1E-01 ug/min Carbon

SAMPLE RESULTS:
( 6.5 - 3.600063 )(1.1)/(200) = +1.6E-02 g/L Carbon
( 6.5 - 3.600063 )(1.1)/(200)(12) = +1.3E-03 Molar Carbon

Sample Run By: Patrick J. McCowan
FJ MCCOWN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: 0631 SAMPLE  Date: 08/10/93  Time: 21:30:43

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLANK
Blank Value = .5139362 ug/minute C

Analyst : PJ MCCOWN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.00 | 0.00 |
| 2 | 1.01 | 0.30 | 100.00 |
| 3 | 1.51 | 1.10 | 72.73 |
| 4 | 2.01 | 1.90 | 42.11 |
| 5 | 2.51 | 2.40 | 20.83 |
| 6 | 3.01 | 2.90 | 17.24 |
| 7 | 3.51 | 3.10 | 6.45 |
| 8 | 4.01 | 3.50 | 11.43 |
| 9 | 4.51 | 3.80 | 7.89 |
| 10 | 5.01 | 4.30 | 11.63 |
| 11 | 5.51 | 4.30 | 0.00 |
| 12 | 6.01 | 4.70 | 8.51 |
| 13 | 6.51 | 4.90 | 4.08 |
| 14 | 7.01 | 5.10 | 3.92 |

BEST AVAILABLE COPY

BLANK VALUE = 3.6 micrograms carbon
BLANK FACTOR = 3.6 / 7.004761 = +5.1E-01 ug/min Carbon

SAMPLE RESULTS:
( 5.1 - 3.600125 )(1.1)/(200) = +8.2E-03 g/L Carbon
( 5.1 - 3.600125 )(1.1)/(200)(12) = +6.9E-04 Molar Carbon

Sample Run By: Patrick J. McCown
PJ MCCOWN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G632 SAMPLE  Date: 08/10/93  Time: 21:38:51

Sample Size = 200 uL  Analyst : PJ MCCOWN
Dil Factor = 1.1  Min Readings = 14
Blank ID # = BLANK  Max Readings = 14
Blank Value = .5139362 ug/minute C  % Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.00 | 0.00 |
| 2 | 1.01 | 0.30 | 100.00 |
| 3 | 1.51 | 0.90 | 66.67 |
| 4 | 2.01 | 1.40 | 35.71 |
| 5 | 2.51 | 1.90 | 26.32 |
| 6 | 3.01 | 2.30 | 17.39 |
| 7 | 3.51 | 2.60 | 11.54 |
| 8 | 4.01 | 2.90 | 10.34 |
| 9 | 4.51 | 3.20 | 9.37 |
| 10 | 5.01 | 3.50 | 8.57 |
| 11 | 5.51 | 3.80 | 7.89 |
| 12 | 6.01 | 4.10 | 7.32 |
| 13 | 6.50 | 4.30 | 4.65 |
| 14 | 7.00 | 4.60 | 6.52 |

BEST AVAILABLE COPY

BLANK VALUE = 3.6 micrograms carbon
BLANK FACTOR = 3.6 / 7.004761 = +5.1E-01 ug/min Carbon

SAMPLE RESULTS:
( 4.6 - 3.6 )(1.1)/(200) = +5.5E-03 g/L Carbon
( 4.6 - 3.6 )(1.1)/(200)(12) = +4.6E-04 Molar Carbon

Sample Run By: Patrick J. McCown
PJ MCCOWN

WHC-SD-WM-DP-054 REV 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: 6633 SAMPLE  Date: 08/10/93  Time: 21:47:04

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLANK
Blank Value = .5139362 ug/minute C

Analyst : PJ MCCOWN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.00 | 0.00 |
| 2 | 1.01 | 0.60 | 100.00 |
| 3 | 1.51 | 1.20 | 50.00 |
| 4 | 2.01 | 1.80 | 33.33 |
| 5 | 2.51 | 2.10 | 14.29 |
| 6 | 3.01 | 2.60 | 19.23 |
| 7 | 3.51 | 2.90 | 10.34 |
| 8 | 4.01 | 3.20 | 9.37 |
| 9 | 4.51 | 3.50 | 8.57 |
| 10 | 5.00 | 3.90 | 10.26 |
| 11 | 5.50 | 4.20 | 7.14 |
| 12 | 6.00 | 4.50 | 6.67 |
| 13 | 6.50 | 4.80 | 6.25 |
| 14 | 7.00 | 5.00 | 4.00 |

BEST AVAILABLE COPY

BLANK VALUE = 3.6 micrograms carbon
BLANK FACTOR = 3.6 / 7.004761 = +5.1E-01 ug/min Carbon

SAMPLE RESULTS:
( 5 - 3.599561 )(1.1)/(200) = +7.7E-03 g/L Carbon
( 5 - 3.599561 )(1.1)/(200)(12) = +6.4E-04 Molar Carbon

Sample Run By: Patrick J. McCown
PJ MCCOWN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: 6634 SAMPLE  Date: 08/10/93  Time: 21:55:14

Sample Size = 200 ul.
Dil Factor = 1.1
Blank ID # = BLANK
Blank Value = .5139362 ug/minute C

Analyst : PJ MCCOWN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.00 | 0.00 |
| 2 | 1.01 | 0.50 | 100.00 |
| 3 | 1.51 | 1.30 | 61.54 |
| 4 | 2.01 | 1.80 | 27.78 |
| 5 | 2.51 | 2.30 | 21.74 |
| 6 | 3.01 | 2.80 | 17.86 |
| 7 | 3.51 | 3.10 | 9.68 |
| 8 | 4.00 | 3.40 | 8.82 |
| 9 | 4.50 | 3.70 | 8.11 |
| 10 | 5.00 | 4.10 | 9.76 |
| 11 | 5.51 | 4.40 | 6.82 |
| 12 | 6.01 | 4.60 | 4.35 |
| 13 | 6.50 | 5.00 | 8.00 |
| 14 | 7.00 | 5.30 | 5.66 |

BEST AVAILABLE COPY

BLANK VALUE = 3.6 micrograms carbon
BLANK FACTOR = 3.6 / 7.004761 = +5.1E-01 ug/min Carbon

SAMPLE RESULTS:
( 5.3 - 3.6 )(1.1)/(200) = +9.4E-03 g/L Carbon
( 5.3 - 3.6 )(1.1)/(200)(12) = +7.8E-04 Molar Carbon

Sample Run By: Patrick J. McCown
PJ MCCOWN

WHC-SD-WM-DP-054 REV 0 BATCH # 1664

WESTINGHOUSE HANFORD COMPANY

222-S LABORATORY

# ANALYTICAL BATCH

102-5-DAY

| | |
|---|---|
| Lab Segment Serial No. G-637 THRU G-642 | Customer ID: D-3 THRU D-7 |
| Analysis: TOTAL ORGANIC CARBON | Sample Prep: DIRECT |

| | |
|---|---|
| Instrument: WC16130 | Procedure/ Rev: LA-344-105 B-2 |
| Technologist: E.H. COLVIN E.H. Colvin | Date: 08/17/93 |
| Starting Time: 0630 | Temperature 25C |
| Ending Time: 1500 | Chemist: J.S. LACHUT |

Comments:

| | Description | Lab ID |
|---|---|---|
| 1 | INITIAL LMCS CHECK STD | G-635-5526 |
| 2 | REAGENT BLANK | G-636-5626 |
| 3 | SAMPLE | G-637-5726 |
| 4 | SAMPLE | G-638-5726 |
| 5 | SAMPLE | G-639-5726 |
| 6 | SAMPLE | G-640-5726 |
| 7 | SAMPLE | G-641-5726 |
| 8 | SAMPLE | G-642-5726 |
| 9 | | |
| 10 | | |

| | Description | Lab ID |
|---|---|---|
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |

| Standard Type | Primary Book No. and Aliquot Vol. | Second Book No. and Aliquot Vol. | Third Book No. and Aliquot Vol. | Final Vol. of Standard |
|---|---|---|---|---|
| LMCS | 10N12A .200ML | | | |
| | | | | |
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A-6000-881 (03/92)

# ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA 344-105 DATE START: 8/17/93

PREPARED BY: J. Lachut DATE COMPLETE: 8/18/93

| SPL NAME | SPL ID | ANALYT | RESULT #1 | RESULT #2 | AVERAGE | RPD% | %REC | DET LIM | % CT ER |
|---|---|---|---|---|---|---|---|---|---|
| UNITS: | | mg/L | | | | | | | |
| | | TOC | | | | | | 5.50 mg/L | |
| LMCS STD. | G-635 | | | | | | 99.3 | | |
| IONIZA | | | | | | | | | |
| BLANK | G-636 | | 1.75x10^-2 | | | | | | |
| D-2 | | | | | | | | | |
| 102 5 DAY | G-637 | | <5.50 mg/L | | | | | | |
| D-3 | | | | | | | | | |
| 102 5 DAY | G-638 | | <5.50 mg/L | | | | | | |
| D-4 | | | | | | | | | |
| 102 5 DAY | G-639 | | <5.50 mg/L | | | | | | |
| D-5 | | | | | | | | | |
| 102 5 DAY | G-640 | | <5.50 mg/L | | | | | | |
| D-6 | | | | | | | | | |
| 102 5 DAY | G-641 | | <5.50 mg/L | | | | | | |
| D-7 | | | | | | | | | |
| 102 5 DAY | G-642 | | <5.50 mg/L | | | | | | |

NARRATIVE: [✓] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

J. S. Lachut 8/18/93

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 635.-5526 | 102 5 DAY | 7-22-93 | 15:16 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | % RECOVERY | D44B3 | 1 |

| Sample Size | Customer ID |
|---|---|
| ?.200mL-2mL-.200mL | STD |

Remarks, Calculations, Results

S356 CO3TOC

**RERUN**

STD# 10N12A RESULT 2.98%

STD VAL 3.00% (%REC 99.3)

$\frac{2.98\%}{3.00\%} \times 100\% =$

99.3% RECOVERY

P.H. Colin

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-17-93 | 1500 | J. S. Lachut 8/18/93 |

54-6800-661 (R 10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 636.-5626 | 102 5 DAY | 7-22-93 | 15:18 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 1 |

| Sample Size | Customer ID |
|---|---|
| ?.200mL | BLK |

Remarks Calculations Results

REAGENT BLANK

**RERUN**

$\frac{3.50\,\mu g}{0.200\,mL} = (1.75 \times 10^{1}\ \mu g/mL\ C)$

P.H. Colin

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-17-93 | 1500 | J. S. Lachut 8/18/93 |

54-6800-661 (R 10-83)

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# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 637.-5726 | 102 5 DAY | 7-22-93 | 15:20 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 1 |

Sample Size: ? / mLt, 100mL, 5m $H_2SO_4$ - 200mL

Customer ID: D-2

**RERUN**

Remarks Calculations Results

$$<5.50 \times 10^{-3}\ g/L\ C \times \frac{1{,}000{,}000\ \mu g/g}{1{,}000\ mL/L} = \boxed{<5.50\ \mu g/mL\ C}$$

EH Cohen

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-17-93 | 1500 | J. S. Lachut 8/18/93 |

54-6800-061 (R/10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 638.-5726 | 102 5 DAY | 7-22-93 | 15:21 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 1 |

Sample Size: ? / mLt, 100mL, 5m $H_2SO_4$ - 200mL

Customer ID: D-3

**RERUN**

Remarks Calculations Results

$$<5.50 \times 10^{-3}\ g/L\ C \times \frac{1{,}000{,}000\ \mu g/g}{1{,}000\ mL/L} = \boxed{<5.50\ \mu g/mL\ C}$$

EH. Cohen

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-17-93 | 1500 | J. S. Lachut 8/18/93 |

54-6800-061 (R/10-83)

BEST AVAILABLE COPY

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 639.-5726 | 102 5 DAY | 7-22-93 | 15:22 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 1 |

| Sample Size | Customer ID |
|---|---|
| ?/mL+.100mL.5mH2SO4-.200mL | D-4 |

Remarks Calculations Results

RERUN

$<5.50 \times 10^{-3}$ %C $\times \frac{1,000,000 \mu g/g}{1,000 \mu g/L} = <5.50 \mu g/mL C$

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-17-93 | 1500 | J. S. Lachut 8/18/93 |

54-6800-061 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 640.-5726 | 102 5 DAY | 7-22-93 | 15:24 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44B3 | 1 |

| Sample Size | Customer ID |
|---|---|
| ?/mL+.100mL.5mH2SO4-.200mL | D-5 |

Remarks Calculations Results

RERUN

$<5.50 \times 10^{-3}$ %C $\times \frac{1,000,000 \mu g/g}{1,000 \mu g/L} = <5.50 \mu g/mL C$

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| Hrs | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-17-93 | 1500 | J. S. Lachut 8/18/93 |

54-6800-061 (R-10-83)

BEST AVAILABLE COPY

# TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 641.-5726 | 102 5 DAY | 7-22-93 | 15:25 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44E3 | 1 |

Sample Size: ?/mL + 100mL 5m $H_2SO_4$ - 200mL

Customer ID: D-6

Remarks Calculations Results

$<5.50 \times 10^{-3}$ g/L C $\times \frac{1,000,000 \mu g/g}{1,000 mg/L} = <5.50$ µg/mL C

RERUN

E.H. Cohen

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-17-93 | 1500 | J. S. Lachut 8/18/93 |

54-6800-061 (R-10-83)

| Serial No | Sample Point | Date | Time Issued | Priority |
|---|---|---|---|---|
| G 642.-5726 | 102 5 DAY | 7-22-93 | 15:25 | 23 |

| Determination | Method Standard | Result Units | Charge Code | Reruns |
|---|---|---|---|---|
| TOC | LA-344-105 | uG C/ML | D44E3 | 1 |

Sample Size: ?/mL + 100mL 5m $H_2SO_4$ - 200mL

Customer ID: D-7

Remarks Calculations Results

$<5.50 \times 10^{-3}$ g/L C $\times \frac{1,000,000 \mu g/g}{1,000 mg/L} = <5.50$ µg/mL C

RERUN

E.H. Cohen

| Analyst - 1 | Analyst - 2 | Analyst - 3 | Analyst - 4 | Analyst - 5 |
|---|---|---|---|---|
| | Hrs | Hrs | Hrs | Hrs |

| Date | Time Completed | Lab Unit Mgr |
|---|---|---|
| 8-17-93 | 1500 | J. S. Lachut 8/18/93 |

54-6800-061 (R-10-83)

BEST AVAILABLE COPY

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-635 STD  Date: 08/17/93  Time: 09:08:54

Sample Size = 200 ul.  Analyst = EH COLVIN
Dil Factor = 11  Min Readings = 14
Blank ID # = BLANK-A  Max Readings = 14
Blank Value = .4997255 ug/minute C  % Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.10 | 0.00 |
| 2 | 1.01 | 3.30 | 96.97 |
| 3 | 1.50 | 30.20 | 89.07 |
| 4 | 2.00 | 46.20 | 34.63 |
| 5 | 2.50 | 51.20 | 9.77 |
| 6 | 3.00 | 53.70 | 4.66 |
| 7 | 3.50 | 54.90 | 2.19 |
| 8 | 4.00 | 55.40 | 0.90 |
| 9 | 4.50 | 55.80 | 0.72 |
| 10 | 5.00 | 56.20 | 0.71 |
| 11 | 5.50 | 56.60 | 0.71 |
| 12 | 6.00 | 56.90 | 0.53 |
| 13 | 6.50 | 57.30 | 0.70 |
| 14 | 7.00 | 57.60 | 0.52 |

BEST AVAILABLE COPY

BLANK VALUE = 3.5 micrograms carbon
BLANK FACTOR = 3.5 / 7.003845 = +5.0E-01 ug/min Carbon

SAMPLE RESULTS:
( 57.6 - 3.499085 )(11)/(200) = +2.98E+00 g/L Carbon
( 57.6 - 3.499085 )(11)/(200)(12) = +2.48E-01 Molar Carbon

Sample Run By: E H. Colvin 8-17-93
EH COLVIN

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 721 TO 728.

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT

TICTOC REV 2.0

8-17-93 EC

<<< BLANK ANALYSIS >>>

6-636

Sample: BLANK-A  Date: 08/17/93  Time: 08:54:49

Sample Size = 200 uL
Dil Factor = 1
Blank ID # = BLANK-A
Blank Value = N/A

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.00 | 0.00 |
| 2 | 1.01 | 0.30 | 100.00 |
| 3 | 1.51 | 0.90 | 66.67 |
| 4 | 2.01 | 1.20 | 25.00 |
| 5 | 2.51 | 1.30 | 7.69 |
| 6 | 3.01 | 1.70 | 23.53 |
| 7 | 3.51 | 2.00 | 15.00 |
| 8 | 4.01 | 2.20 | 9.09 |
| 9 | 4.50 | 2.40 | 8.33 |
| 10 | 5.00 | 2.60 | 7.69 |
| 11 | 5.50 | 2.80 | 7.14 |
| 12 | 6.00 | 3.10 | 9.68 |
| 13 | 6.50 | 3.40 | 8.82 |
| 14 | 7.00 | 3.50 | 2.86 |

BEST AVAILABLE COPY

BLANK VALUE = 3.5 micrograms carbon
BLANK FACTOR = 3.5 / 7.003845 = +5.0E-01 ug/min Carbon

Sample Run By: _____
EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-637 Date: 08/17/93 Time: 09:21:43

Sample size = 200 ul
Dil Factor = 1.1
Blank ID # = BLANK-A
Blank Value = .4997255 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.10 | 0.00 |
| 2 | 1.01 | 0.60 | 83.33 |
| 3 | 1.50 | 1.00 | 40.00 |
| 4 | 2.00 | 1.60 | 37.50 |
| 5 | 2.50 | 1.90 | 15.79 |
| 6 | 3.00 | 2.10 | 9.52 |
| 7 | 3.50 | 2.30 | 8.70 |
| 8 | 4.00 | 2.60 | 11.54 |
| 9 | 4.50 | 2.80 | 7.14 |
| 10 | 5.00 | 3.00 | 6.67 |
| 11 | 5.50 | 3.30 | 9.09 |
| 12 | 6.00 | 3.50 | 5.71 |
| 13 | 6.50 | 3.70 | 5.41 |
| 14 | 7.00 | 4.10 | 9.76 |

BEST AVAILABLE COPY

BLANK VALUE = 3.5 micrograms carbon
BLANK FACTOR = 3.5 / 7.003845 = +5.0E-01 ug/min Carbon

SAMPLE RESULTS:
( 4.1 - 3.499573 )(1.1)/(200) = JL 8/18/93 < ~~5.170~~ 5.50 E-3 g/L Carbon
( 4.1 - 3.499573 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: _____
EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-638 Date: 08/17/93 Time: 09:30:49

Sample Size = 200 ml
Dil Factor = 1.1
Blank ID # = BLANK-A
Blank Value = .4997255 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.30 | 0.00 |
| 2 | 1.01 | 0.40 | 25.00 |
| 3 | 1.50 | 1.00 | 60.00 |
| 4 | 2.00 | 1.50 | 33.33 |
| 5 | 2.50 | 1.70 | 11.76 |
| 6 | 3.00 | 2.00 | 15.00 |
| 7 | 3.50 | 2.40 | 16.67 |
| 8 | 4.00 | 2.50 | 4.00 |
| 9 | 4.50 | 2.80 | 10.71 |
| 10 | 5.00 | 3.00 | 6.67 |
| 11 | 5.50 | 3.50 | 14.29 |
| 12 | 6.00 | 3.50 | 0.00 |
| 13 | 6.50 | 3.70 | 5.41 |
| 14 | 7.00 | 4.00 | 7.50 |

BEST AVAILABLE COPY

BLANK VALUE = 3.5 micrograms carbon
BLANK FACTOR = 3.5 / 7.003845 = +5.0E-01 ug/min Carbon

SAMPLE RESULTS:
( 4 - 3.499573 )(1.1)/(200) = ~~[illegible]~~ < 6.50 E-3 g/L Carbon
( 4 - 3.499573 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

JL 8/18/93

Sample Run By: _____
EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-639 Date: 08/17/93 Time: 09:39:35

Sample Size = 200 ul
Dil Factor = 1.1
Blank ID # = BLANK-A
Blank Value = .4997255 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.00 | 0.00 |
| 2 | 1.01 | 0.50 | 100.00 |
| 3 | 1.51 | 0.90 | 44.44 |
| 4 | 2.01 | 1.50 | 40.00 |
| 5 | 2.51 | 1.50 | 0.00 |
| 6 | 3.01 | 1.80 | 16.67 |
| 7 | 3.51 | 2.20 | 18.18 |
| 8 | 4.01 | 2.30 | 4.35 |
| 9 | 4.51 | 2.70 | 14.81 |
| 10 | 5.01 | 2.90 | 6.90 |
| 11 | 5.51 | 3.00 | 3.33 |
| 12 | 6.01 | 3.30 | 9.09 |
| 13 | 6.50 | 3.50 | 5.71 |
| 14 | 7.00 | 3.70 | 5.41 |

BEST AVAILABLE COPY

BLANK VALUE = 3.5 micrograms carbon
BLANK FACTOR = 3.5 / 7.003845 = +5.0E-01 ug/min Carbon

SAMPLE RESULTS:
( 3.7 - 3.500488 )(1.1)/(200) = ~~< 5.50~~ 8/18/93 < 5.50 E-3 g/L Carbon
( 3.7 - 3.500488 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: _____
EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-640 Date: 08/17/93 Time: 09:50:16

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLANK-A
Blank Value = .4997255 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.20 | 0.00 |
| 2 | 1.01 | 0.50 | 60.00 |
| 3 | 1.51 | 1.10 | 54.55 |
| 4 | 2.01 | 1.30 | 15.38 |
| 5 | 2.51 | 1.70 | 23.53 |
| 6 | 3.01 | 1.90 | 10.53 |
| 7 | 3.51 | 2.20 | 13.64 |
| 8 | 4.01 | 2.30 | 4.35 |
| 9 | 4.50 | 2.50 | 8.00 |
| 10 | 5.00 | 2.70 | 7.41 |
| 11 | 5.50 | 3.00 | 10.00 |
| 12 | 6.00 | 3.20 | 6.25 |
| 13 | 6.50 | 3.50 | 8.57 |
| 14 | 7.00 | 3.50 | 0.00 |

BEST AVAILABLE COPY

BLANK VALUE = 3.5 micrograms carbon
BLANK FACTOR = 3.5 / 7.003845 = +5.0E-01 ug/min Carbon

SAMPLE RESULTS:
( 3.5 - 3.5 )(1.1)/(200) = JL 8/18/93 < 5.50 ~~< 5.00~~ E-3 g/L Carbon
( 3.5 - 3.5 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-641 Date: 08/17/93 Time: 10:00:01

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLANK-A
Blank Value = .4997255 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.00 | 0.00 |
| 2 | 1.01 | 0.30 | 100.00 |
| 3 | 1.51 | 0.90 | 66.67 |
| 4 | 2.01 | 1.10 | 18.18 |
| 5 | 2.51 | 1.30 | 15.38 |
| 6 | 3.01 | 1.60 | 18.75 |
| 7 | 3.51 | 1.90 | 15.79 |
| 8 | 4.01 | 2.30 | 17.39 |
| 9 | 4.50 | 2.30 | 0.00 |
| 10 | 5.00 | 2.50 | 8.00 |
| 11 | 5.50 | 2.70 | 7.41 |
| 12 | 6.00 | 2.90 | 6.90 |
| 13 | 6.51 | 3.20 | 9.37 |
| 14 | 7.00 | 3.40 | 5.88 |

BEST AVAILABLE COPY

BLANK VALUE = 3.5 micrograms carbon
BLANK FACTOR = 3.5 / 7.003845 = +5.0E-01 ug/min Carbon

SAMPLE RESULTS:
( 3.4 - 3.500488 )(1.1)/(200) = ~~< 5.00~~ < 5.50 E-3 g/L Carbon
( 3.4 - 3.500488 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

JL 8/18/93

Sample Run By: EH COLVIN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G-642 Date: 08/17/93 Time: 10:08:48

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLANK-A
Blank Value = .4997255 ug/minute C

Analyst : EH COLVIN
Min Readings = 14
Max Readings = 14
% Difference = 10

| Reading | Analysis Time | Coulometer | % Difference |
|---|---|---|---|
| 1 | 0.51 | 0.50 | 0.00 |
| 2 | 1.01 | 0.50 | 0.00 |
| 3 | 1.51 | 0.80 | 37.50 |
| 4 | 2.01 | 1.30 | 38.46 |
| 5 | 2.51 | 1.50 | 13.33 |
| 6 | 3.01 | 1.70 | 11.76 |
| 7 | 3.51 | 1.90 | 10.53 |
| 8 | 4.01 | 2.20 | 13.64 |
| 9 | 4.51 | 2.50 | 12.00 |
| 10 | 5.01 | 2.50 | 0.00 |
| 11 | 5.51 | 2.90 | 13.79 |
| 12 | 6.01 | 3.00 | 3.33 |
| 13 | 6.51 | 3.20 | 6.25 |
| 14 | 7.00 | 3.40 | 5.88 |

BEST AVAILABLE COPY

BLANK VALUE = 3.5 micrograms carbon
BLANK FACTOR = 3.5 / 7.003845 = +5.0E-01 ug/min Carbon

SAMPLE RESULTS:
( 3.4 - 3.500519 )(1.1)/(200) = ~~< 0.00~~ < 5.50 E-3 g/L Carbon
( 3.4 - 3.500519 )(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

JL 8/18/93

Sample Run By: EH Colvin 8-17-93
EH COLVIN