



August 31, 2018

Mr. Joel Cehn  
PIKA International, Inc.  
12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477

Re: PIKA International, Inc  
Work Order: 457261

Dear Mr. Cehn:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 15, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4778.

Sincerely,

Hope Taylor  
Project Manager

Purchase Order: 1574129-004  
Enclosures

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# Case Narrative

**Receipt Narrative  
for  
PIKA  
SDG: 457261**

**August 31, 2018**

**Laboratory Identification:**

GEL Laboratories LLC  
2040 Savage Road  
Charleston, South Carolina 29407  
(843) 556-8171

**Summary:**

**Sample receipt:** The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on August 15, 2018 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

**Sample Identification:** The laboratory received the following samples:

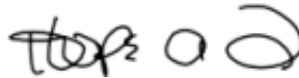
<b><u>Laboratory ID</u></b>	<b><u>Client ID</u></b>
457261001	3244-01
457261002	3244-02
457261003	3244-03
457261004	3244-04
457261005	3244-05
457261006	3244-06
457261007	3244-07
457261008	3244-08
457261009	3244-09
457261010	3244-10H
457261011	3244-11
457261012	3244-12
457261013	3244-13H
457261014	3244-14
457261015	3244-15S
457261016	3244-16
457261017	3244-17
457261018	3244-18
457261019	3244-19
457261020	3244-20
457261021	3244-21
457261022	3244-22
457261023	3244-23
457261024	3244-24
457261025	3244-25
457261026	3244-26
457261027	3244-27
457261028	3244-28
457261029	3244-29D

457261030	3244-30S
457261031	3244-31
457261032	3244-32

**Case Narrative:**

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.



Hope Taylor  
Project Manager

# **Chain of Custody and Supporting Documentation**

Page: 1 of 4  
 Project # 15-74-129  
 GEL Quote #: N/A  
 COC Number (Q): 3244-1  
 PO Number: 1574129-004  
 Client Name: PIXA International, Inc  
 Project/Site Name: Edgewood Bldg Surveys  
 Address: 12723 Capricorn Dr Suite 500 Stafford, TX 77477  
 Collected By: I Gonzales  
 Send Results To: isaac@genesissvs.com  
 Phone # 916 759 4592  
 Fax # \_\_\_\_\_

**GEL Laboratories LLC**  
 Chemistry | Radiochemistry | Radiobiology | Specialty Analytics  
 2040 Savage Road  
 Charleston, SC 29407  
 Phone: (843) 556-8171  
 Fax: (843) 766-1178

**Chain of Custody and Analytical Request**  
 GEL Work Order Number: 4572601 GEL Project Manager: HOPE TAYLOR

Sample Analysis Requested <sup>(5)</sup> (Fill in the number of containers for each test)

Sample ID	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code <sup>(2)</sup>	Field Filtered <sup>(3)</sup>	Sample Matrix <sup>(4)</sup>	Total number of containers	Should this sample be considered:		Preservative Type (6)	Comments
							(7) Known or Radiative isotopic info. Please supply	possible hazards		
3244-01	08-09-18	1320	N	N	P	1				Note: extra sample is required for sample specific QC
3244-02	08-09-18	1224	N	N	P	1				
3244-03	08-09-18	1327	N	N	P	1				
3244-04	08-09-18	1238	N	N	P	1				
3244-05	08-09-18	1306	N	N	P	1				
3244-06	08-09-18	1245	N	N	P	1				
3244-07	08-09-18	1329	N	N	P	1				
3244-08	08-09-18	1226	N	N	P	1				
3244-09	08-09-18	1317	N	N	P	1				
3244-104	08-09-18	1250	N	N	P	1				

Relinquished By (Signed) \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_  
 Received by (signed) A. Men Date 9/15/18 Time \_\_\_\_\_  
 1. Chain of Custody Number = Client Determined  
 2. \_\_\_\_\_  
 3. \_\_\_\_\_

Chain of Custody Signatures

TAT Requested: Normal: \_\_\_\_\_ Rush:  Specify: \_\_\_\_\_ (Subject to Surcharge)  
 Fax Results:  Yes  No  
 Select Deliverable:  C of A  QC Summary  Level 1  Level 2  Level 3  Level 4  
 Additional Remarks: \_\_\_\_\_  
 For Lab Receiving Use Only: Custody Seal Intact?  Yes  No Cooler Temp: \_\_\_\_\_ °C  
 Sample Collection Time Zone:  Eastern  Pacific  Central  Mountain  Other: \_\_\_\_\_

> For sample shipping and delivery details, see Sample Receipt & Review form (SRR.)

1.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite  
 2.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.  
 3.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, ML=Misc Liquid, SO=Soil, SD=Sediment, SL=Sludge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=Faecal, N=Nasal  
 4.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).  
 5.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = leave field blank  
 6.) Are there any known or possible hazards associated with these samples?  
 Characteristic Hazards: FL = Flammable/ignitable  
 CO = Corrosive  
 RE = Reactive  
 Listed Waste: LW = Listed Waste  
 (F, K, P and U-listed wastes.)  
 Waste code(s): \_\_\_\_\_  
 TSCA Regulated PCB = Polychlorinated biphenyls  
 RCRA Metals: As = Arsenic Hg = Mercury  
 Ba = Barium Se = Selenium  
 Cd = Cadmium Ag = Silver  
 Cr = Chromium MR = Miscellaneous  
 Pb = Lead RCRA metals  
 Other: OT = Other / Unknown  
 (i.e.: High/low pH, asbestos, beryllium, irritants, other misc. health hazards, etc.)  
 Description: \_\_\_\_\_  
 Please provide any additional details below regarding handling and/or disposal concerns. (i.e.: Origin of sample(s), type of site collected from, odd matrices, etc.)

Page: 2 of 4  
 Project # 15-74-129  
 GEL Quote #: N/A  
 COC Number (1): 3244-2  
 PO Number: 1574129-004  
 Client Name: PIVA International, Inc  
 Project/Site Name: Edgewood Building Surveys  
 Address: 12723 Capricorn Dr Suite 500 Stafford, TX 77477  
 Collected By: 1 Gonzalez  
 Phone # 916 759 6592  
 Fax #  
 Send Results To: 1sarc@genesisys.com

**GEL Laboratories LLC**  
 Chemistry | Radiochemistry | Radiobiology | Specialty Analytics  
 Chain of Custody and Analytical Request  
 GEL Work Order Number: HOE TAYLOR  
 GEL Laboratories, LLC  
 2040 Savage Road  
 Charleston, SC 29407  
 Phone: (843) 556-8171  
 Fax: (843) 766-1178

Sample ID	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (a)	Field Filtered (b)	Sample Matrix (c)	Should this sample be considered:	Total number of containers	Preservative Type (6)	Comments
3244-11	08-09-19	1313	N	N	P	Radioactive isotopic info: <u>CH3</u>	1		Note: extra sample is required for sample specific QC
3244-12	08-09-19	1233	N	N	P	Radioactive isotopic info: <u>CH3</u>	1		
3244-13A	08-09-19	1333	N	N	P	Radioactive isotopic info: <u>CH3</u>	1		
3244-14	08-09-19	1305	N	N	P	Radioactive isotopic info: <u>CH3</u>	1		
3244-15S	08-09-18	1335	N	N	P	Radioactive isotopic info: <u>CH3</u>	1		
3244-16	08-09-18	1235	N	N	P	Radioactive isotopic info: <u>CH3</u>	1		
3244-17	08-09-18	1308	N	N	P	Radioactive isotopic info: <u>CH3</u>	1		
3244-18	08-09-18	1231	N	N	P	Radioactive isotopic info: <u>CH3</u>	1		
3244-19	08-09-18	1322	N	N	P	Radioactive isotopic info: <u>CH3</u>	1		
3244-20	08-09-18	1228	N	N	P	Radioactive isotopic info: <u>CH3</u>	1		

Relinquished By (Signed) [Signature] Date 8/14/18 Time 11:13  
 Received by (signed) [Signature] Date 8/15/18 Time 9:15  
 Chain of Custody Signatures

TAT Requested: Normal:  Rush:  Specify: \_\_\_\_\_ (Subject to Surcharge)  
 Fax Results:  Yes  No  
 Select Deliverable:  C of A  QC Summary  Level 1  Level 2  Level 3  Level 4  
 Additional Remarks:  
 For Lab Receiving Use Only: Custody Seal Intact?  Yes  No Cooler Temp: \_\_\_\_\_ °C  
 Sample Collection Time Zone:  Eastern  Pacific  Central  Mountain  Other: \_\_\_\_\_

1) Chain of Custody Number = Client Determined  
 2) QC Codes: N = Normal Sample, TH = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite  
 3) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.  
 4) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, ML=Misc Liquid, SO=Soil, SD=Sediment, SL=Sludge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=fecal, N=Nasal  
 5) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).  
 6) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexamine, ST = Sodium Thiosulfate. If no preservative is added = leave field blank  
 7) Are there any known or possible hazards associated with these samples?  
 Characteristic Hazards:  FL = Flammable/Ignitable  
 CO = Corrosive  
 RE = Reactive  
 TSCA Regulated  
 PCB = Polychlorinated biphenyls  
 RCRA Metals:  As = Arsenic  Hg = Mercury  
 Ba = Barium  Se = Selenium  
 Cd = Cadmium  Ag = Silver  
 Cr = Chromium  MR = Miscellaneous  
 Pb = Lead  RCRA metals  
 Listed Waste:  LW = Listed Waste  
 Waste code(s):  
 Other:  OT = Other / Unknown  
 (i.e.: High/low pH, asbestos, beryllium, irritants, other misc. health hazards, etc.)  
 Description:  
 Please provide any additional details below regarding handling and/or disposal concerns. (i.e.: Origin of sample(s), type of site collected from, odd matrices, etc.)

Page: 3 of 4  
 Project # 15-74-129  
 GEL Quote #: N/A  
 COC Number (1): 3244-3  
 PO Number: 1574129-004  
 Client Name: PIKA INTERNATIONAL, INC  
 Project/Site Name: Edgewood Building Surveys  
 Address: 12723 Cypresscreek Dr Suite 500 Stafford, TX 77477  
 Collected By: i Gonzalez  
 Phone # 9167596542  
 Fax #  
 GEL Work Order Number: GEL Project Manager: HOPE TAYLOR  
 Chain of Custody and Analytical Request  
 GEL Laboratories, LLC  
 2040 Savage Road  
 Charleston, SC 29407  
 Phone: (843) 556-8171  
 Fax: (843) 766-1178

Sample ID	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (2)	Field Filtered (3)	Sample Matrix (4)	Should this sample be considered:	Total number of containers	Preservative Type (6)	Comments
3244-21	08-09-18	1316	N	N	P	Radioactive isotopic info. Please supply	1		Note: extra sample is required for sample specific QC
3244-22	08-09-18	1240	N	N	P		1		
3244-23	08-09-18	1305	N	N	P		1		
3244-24	08-09-18	1229	N	N	P		1		
3244-25	08-09-18	1319	N	N	P		1		
3244-26	08-09-18	1220	N	N	P		1		
3244-27	08-09-18	1324	N	N	P		1		
3244-28	08-09-18	1237	N	N	P		1		
3244-29D	08-09-18	1314	N	N	P		1		
3244-30S	08-09-18	1336	N	N	P		1		

Chain of Custody Signatures  
 Relinquished By (Signed) \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_  
 Received by (signed) \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_  
 1. A. Gonzalez 8/14/18 114  
 2. \_\_\_\_\_  
 3. \_\_\_\_\_  
 FAT Requested: Normal:  Yes  No Rush:  Specify: \_\_\_\_\_ (Subject to Surcharge)  
 Fax Results:  Yes  No  
 Select Deliverable:  C of A  QC Summary  Level 1  Level 2  Level 3  Level 4  
 Additional Remarks:  
 For Lab Receiving Use Only: Custody Seal Intact?  Yes  No Cooler Temp: \_\_\_\_\_ °C  
 Sample Collection Time Zone:  Eastern  Pacific  Central  Mountain  Other: \_\_\_\_\_  
 > For sample shipping and delivery details, see Sample Receipt & Review form (SRR)

1) Chain of Custody Number = Client Determined  
 2) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite  
 3) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.  
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 5) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).  
 6) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate. If no preservative is added = leave field blank  
 7) Are there any known or possible hazards associated with these samples?  
 Characteristic Hazards  
 FL = Flammable/Ignitable  
 CO = Corrosive  
 RE = Reactive  
 TSCA Regulated  
 PCB = Polychlorinated biphenyls  
 RCRA Metals  
 As = Arsenic Hg = Mercury  
 Ba = Barium Se = Selenium  
 Cd = Cadmium Ag = Silver  
 Cr = Chromium MR = Miscellaneous  
 Pb = Lead RCRA metals  
 Listed Waste  
 LW = Listed Waste  
 (F, K, P and U-listed wastes)  
 Waste code(s):  
 Other  
 OT = Other / Unknown  
 (i.e.: High/low pH, asbestos, beryllium, irritants, other misc. health hazards, etc.)  
 Description:  
 Please provide any additional details below regarding handling and/or disposal concerns. (i.e.: Origin of sample(s), type of site collected from, odd matrices, etc.)

GEL Laboratories, LLC  
 2040 Savage Road  
 Charleston, SC 29407  
 Phone: (843) 556-8171  
 Fax: (843) 766-1178

**GEL** Laboratories LLC  
 Chemistry | Radiochemistry | Radiobiology | Specialty Analytics  
**Chain of Custody and Analytical Request**  
 GEL Project Manager: HOPE TAYLOR

GEL Work Order Number: 1574129-004  
 Client Name: PIKA INTERNATIONAL, INC  
 Phone # 916 759 6592  
 Fax #  
 Project/Site Name: Edgewood Building Surveys  
 Address: 12723 Capricorn Dr Suite 500 Stafford, TX 77477  
 Collected By: I Gonzalez  
 Send Results To: ISAC@genesissr.com

Sample Analysis Requested (6) (Fill in the number of containers for each test)

Sample ID	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (6)	Field Filtered (6)	Sample Matrix (6)	Should this sample be considered:	Total number of containers	Preservative Type (6)	Comments
3244-31	08-09-18	1330	N	N	P	Radioactive Please supply isotopic info. CH	1		Note: extra sample is required for sample specific QC
3244-32	08-09-18	1222	N	N	P	CH FH	1		

Relinquished By (Signed) Date Time Received by (signed) Date Time

1. A. [Signature] 8/14/18 1115 1. A. [Signature] 8/15/18 9:15

2. [Signature] [Signature]

3. [Signature] [Signature]

TAT Requested: Normal:  Rush:  Specify: (Subject to Surecharge)

Fax Results:  Yes  No

Select Deliverable:  C of A  QC Summary  Level 1  Level 2  Level 3  Level 4

Additional Remarks:

For Lab Receiving Use Only: Custody Seal Intact?  Yes  No Cooler Temp: °C

Sample Collection Time Zone:  Eastern  Pacific  Central  Mountain  Other:

Chain of Custody Signatures

1. Chain of Custody Number = Client Determined

2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite

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5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).

6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = leave field blank

7.) Are there any known or possible hazards associated with these samples?

Characteristic Hazards  
 FL = Flammable/ignitable  
 CO = Corrosive  
 RE = Reactive

Listed Waste  
 LW = Listed Waste  
 (F, K, P and U-listed wastes.)

Other  
 OT = Other / Unknown  
 (i.e.: High/low pH, asbestos, beryllium, irritants, other misc. health hazards, etc.)

Description:

RCRA Metals  
 As = Arsenic Hg = Mercury  
 Ba = Barium Se = Selenium  
 Cd = Cadmium Ag = Silver  
 Cr = Chromium MR = Miscellaneous  
 Pb = Lead RCRA metals

Please provide any additional details below regarding handling and/or disposal concerns. (i.e.: Origin of sample(s), type of site collected from, odd matrices, etc.)

SAMPLE RECEIPT & REVIEW FORM

Client: <u>PIKA</u>	SDG/AR/COC/Work Order: <u>4572ca1</u>
Received By: <u>AA</u>	Date Received: <u>8/15/18</u>
Carrier and Tracking Number	Circle Applicable: <input checked="" type="checkbox"/> FedEx Express <input type="checkbox"/> FedEx Ground <input type="checkbox"/> UPS <input type="checkbox"/> Field Services <input type="checkbox"/> Courier <input type="checkbox"/> Other <u>7822 9998 0860</u>

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____
COC/Samples marked or classified as radioactive?		<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> CPM / mR/Hr Classified as: Rad 1 Rad 2 Rad 3
Is package, COC, and/or Samples marked HAZ?		<input checked="" type="checkbox"/>	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*		<input checked="" type="checkbox"/>		Preservation Method: Wet Ice Ice Packs Dry ice <input checked="" type="checkbox"/> None Other: *all temperatures are recorded in Celsius <b>TEMP: 25°</b>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: <u>IR2-18</u> Secondary Temperature Device Serial # (If Applicable):
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?		<input checked="" type="checkbox"/>		Sample ID's and Containers Affected: If Preservation added, Lot#:
7 Do any samples require Volatile Analysis?		<input checked="" type="checkbox"/>		If Yes, Are Encores or Soil Kits present? Yes ___ No ___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes ___ No ___ N/A (If unknown, select No) VOA vials free of headspace? Yes ___ No ___ N/A Sample ID's and containers affected:
8 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?		<input checked="" type="checkbox"/>		Sample ID's affected: <u>3100-025 has 10:55 on container</u>
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
12 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>			
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials TMC Date 8/16/18 Page 1 of 1

# **Laboratory Certifications**

**List of current GEL Certifications as of 31 August 2018**

<b>State</b>	<b>Certification</b>
Alaska	17-018
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA180011
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122018-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-18-13
Utah NELAP	SC000122018-26
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

# **Radiological Analysis**

# Case Narrative

**Radiochemistry  
Technical Case Narrative  
PIKA (PIKA)  
SDG #: 457261**

**Product:** Liquid Scint C14, Filter

**Analytical Method:** EPA EERF C-01 Modified

**Analytical Procedure:** GL-RAD-A-003 REV# 16

**Analytical Batch:** 1794252

The following samples were analyzed using the above methods and analytical procedure(s).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
457261001	3244-01
457261002	3244-02
457261003	3244-03
457261004	3244-04
457261005	3244-05
457261006	3244-06
457261007	3244-07
457261008	3244-08
457261009	3244-09
457261010	3244-10H
457261011	3244-11
457261012	3244-12
457261013	3244-13H
457261014	3244-14
457261015	3244-15S
457261016	3244-16
457261017	3244-17
457261018	3244-18
457261019	3244-19
457261020	3244-20
1204095737	Method Blank (MB)
1204095738	Laboratory Control Sample (LCS)
1204095739	Laboratory Control Sample Duplicate (LCSD)

The samples in this SDG were analyzed on an "as received" basis.

**Data Summary:**

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

**Product:** Liquid Scint C14, Filter

**Analytical Method:** EPA EERF C-01 Modified

**Analytical Procedure:** GL-RAD-A-003 REV# 16

**Analytical Batch:** 1794255

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
457261021	3244-21
457261022	3244-22
457261023	3244-23
457261024	3244-24
457261025	3244-25
457261026	3244-26
457261027	3244-27
457261028	3244-28
457261029	3244-29D
457261030	3244-30S
457261031	3244-31
457261032	3244-32
1204095740	Method Blank (MB)
1204095741	Laboratory Control Sample (LCS)
1204095742	Laboratory Control Sample Duplicate (LCSD)

The samples in this SDG were analyzed on an "as received" basis.

**Data Summary:**

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

**Product:** LSC, Direct Tritium, Filter

**Analytical Method:** GL-RAD-A-002

**Analytical Procedure:** GL-RAD-A-002 REV# 22

**Analytical Batch:** 1794273

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
457261001	3244-01
457261002	3244-02
457261003	3244-03
457261004	3244-04
457261005	3244-05
457261006	3244-06
457261007	3244-07
457261008	3244-08
457261009	3244-09
457261010	3244-10H
457261011	3244-11
457261012	3244-12
457261013	3244-13H
457261014	3244-14
457261015	3244-15S
457261016	3244-16
457261017	3244-17

457261018	3244-18
457261019	3244-19
457261020	3244-20
1204095791	Method Blank (MB)
1204095792	Laboratory Control Sample (LCS)
1204095793	Laboratory Control Sample Duplicate (LCSD)

The samples in this SDG were analyzed on an "as received" basis.

**Data Summary:**

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

**Product:** LSC, Direct Tritium, Filter

**Analytical Method:** GL-RAD-A-002

**Analytical Procedure:** GL-RAD-A-002 REV# 22

**Analytical Batch:** 1794274

The following samples were analyzed using the above methods and analytical procedure(s).

<b><u>GEL Sample ID#</u></b>	<b><u>Client Sample Identification</u></b>
457261021	3244-21
457261022	3244-22
457261023	3244-23
457261024	3244-24
457261025	3244-25
457261026	3244-26
457261027	3244-27
457261028	3244-28
457261029	3244-29D
457261030	3244-30S
457261031	3244-31
457261032	3244-32
1204095794	Method Blank (MB)
1204095797	Laboratory Control Sample (LCS)
1204095798	Laboratory Control Sample Duplicate (LCSD)

The samples in this SDG were analyzed on an "as received" basis.

**Data Summary:**

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

**Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

## GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

### Qualifier Definition Report for

PIKA004 PIKA

Client SDG: 457261 GEL Work Order: 457261


**The Qualifiers in this report are defined as follows:**

- \* A quality control analyte recovery is outside of specified acceptance criteria
- \*\* Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

**Review/Validation**

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: 

Name: Theresa Austin

Date: 04 SEP 2018

Title: Group Leader

# **Sample Data Summary**

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-01	Project:	PIKA00004
Sample ID:	457261001	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:20		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-1.39	+/-4.28	7.97		pCi/Filter			TXJ1	08/31/18	1243	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	1.27	+/-1.76	2.99	10.0	pCi/Filter			TXJ1	09/01/18	0759	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-02	Project:	PIKA00004
Sample ID:	457261002	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 12:24		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-2.31	+/-3.65	6.97		pCi/Filter			TXJ1	08/31/18	1259	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-0.728	+/-1.73	3.14	10.0	pCi/Filter			TXJ1	09/01/18	0815	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-03	Project:	PIKA00004
Sample ID:	457261003	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:27		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-4.8	+/-4.60	9.12		pCi/Filter			TXJ1	08/31/18	1316	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	0.623	+/-1.65	2.85	10.0	pCi/Filter			TXJ1	09/01/18	0831	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-04	Project:	PIKA00004
Sample ID:	457261004	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 12:38		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-0.542	+/-4.68	8.57		pCi/Filter			TXJ1	08/31/18	1332	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	2.24	+/-1.78	2.93	10.0	pCi/Filter			TXJ1	09/01/18	0848	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-05	Project:	PIKA00004
Sample ID:	457261005	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:06		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-0.0527	+/-5.36	9.72		pCi/Filter			TXJ1	08/31/18	1348	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	1.10	+/-1.65	2.81	10.0	pCi/Filter			TXJ1	09/01/18	0904	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit



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Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-07	Project:	PIKA00004
Sample ID:	457261007	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:29		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-5.34	+/-4.66	9.31		pCi/Filter			TXJ1	08/31/18	1421	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	0.520	+/-1.64	2.86	10.0	pCi/Filter			TXJ1	09/01/18	0936	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
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Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-08	Project:	PIKA00004
Sample ID:	457261008	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 12:26		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-0.794	+/-4.37	8.05		pCi/Filter			TXJ1	08/31/18	1437	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-0.477	+/-1.66	3.00	10.0	pCi/Filter			TXJ1	09/01/18	0953	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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## Certificate of Analysis

Report Date: September 4, 2018

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Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-09	Project:	PIKA00004
Sample ID:	457261009	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:17		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-2.72	+/-5.82	11.0		pCi/Filter			TXJ1	08/31/18	1453	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	0.420	+/-1.60	2.80	10.0	pCi/Filter			TXJ1	09/01/18	1009	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst	Comments
1	GL-RAD-A-002		
2	EPA EERF C-01 Modified		

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID: 3244-10H Project: PIKA00004  
Sample ID: 457261010 Client ID: PIKA004  
Matrix: Filter  
Collect Date: 09-AUG-18 12:50  
Receive Date: 15-AUG-18  
Collector: Client

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-3.45	+/-3.93	7.67		pCi/Filter			TXJ1	08/31/18	1509	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-1.23	+/-1.62	3.01	10.0	pCi/Filter			TXJ1	09/01/18	1025	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst	Comments
1	GL-RAD-A-002		
2	EPA EERF C-01 Modified		

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-11	Project:	PIKA00004
Sample ID:	457261011	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:13		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	0.553	+/-6.78	12.2		pCi/Filter			TXJ1	08/31/18	1526	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	0.190	+/-1.54	2.71	10.0	pCi/Filter			TXJ1	09/01/18	1041	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-12	Project:	PIKA00004
Sample ID:	457261012	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 12:33		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-2.91	+/-4.06	7.82		pCi/Filter			TXJ1	08/31/18	1542	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	0.156	+/-1.72	3.02	10.0	pCi/Filter			TXJ1	09/01/18	1058	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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## Certificate of Analysis

Report Date: September 4, 2018

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Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-13H	Project:	PIKA00004
Sample ID:	457261013	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:33		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-3.0	+/-4.30	8.27		pCi/Filter			TXJ1	08/31/18	1558	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-0.0165	+/-1.64	2.90	10.0	pCi/Filter			TXJ1	09/01/18	1114	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit



# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-15S	Project:	PIKA00004
Sample ID:	457261015	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:35		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-4.43	+/-4.17	8.26		pCi/Filter			TXJ1	08/31/18	1631	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	0.278	+/-1.67	2.93	10.0	pCi/Filter			TXJ1	09/01/18	1146	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-16	Project:	PIKA00004
Sample ID:	457261016	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 12:35		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-1.79	+/-4.44	8.32		pCi/Filter			TXJ1	08/31/18	1647	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-0.0424	+/-1.67	2.96	10.0	pCi/Filter			TXJ1	09/01/18	1203	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-17	Project:	PIKA00004
Sample ID:	457261017	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:08		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-5.52	+/-4.15	8.42		pCi/Filter			TXJ1	08/31/18	1704	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-0.528	+/-1.60	2.89	10.0	pCi/Filter			TXJ1	09/01/18	1219	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-18	Project:	PIKA00004
Sample ID:	457261018	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 12:31		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-4.37	+/-4.70	9.22		pCi/Filter			TXJ1	08/31/18	1720	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-0.547	+/-1.58	2.86	10.0	pCi/Filter			TXJ1	09/01/18	1235	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-19	Project:	PIKA00004
Sample ID:	457261019	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:22		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-2.02	+/-4.50	8.47		pCi/Filter			TXJ1	08/31/18	1736	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	1.62	+/-1.74	2.91	10.0	pCi/Filter			TXJ1	09/01/18	1251	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-20	Project:	PIKA00004
Sample ID:	457261020	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 12:28		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-1.76	+/-4.16	7.81		pCi/Filter			TXJ1	08/31/18	1752	1794273	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	0.685	+/-1.71	2.96	10.0	pCi/Filter			TXJ1	09/01/18	1308	1794252	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit



# GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
 Address : 12723 Capricorn Drive  
 Ste 500  
 Stafford, Texas 77477  
 Contact: Mr. Joel Cehn  
 Project: PIKA International, Inc

Client Sample ID: 3244-22	Project: PIKA00004
Sample ID: 457261022	Client ID: PIKA004
Matrix: Filter	
Collect Date: 09-AUG-18 12:40	
Receive Date: 15-AUG-18	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
<b>Rad Liquid Scintillation Analysis</b>													
<b>LSC, Direct Tritium, Filter "As Received"</b>													
Tritium	U	-0.639	+/-5.71	10.6		pCi/Filter			BXM4	09/01/18	0045	1794274	1
<b>Liquid Scint C14, Filter "As Received"</b>													
Carbon-14	U	-1.46	+/-1.69	3.16	10.0	pCi/Filter			BXM4	09/01/18	1838	1794255	2

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	GL-RAD-A-002		
2	EPA EERF C-01 Modified		

**Notes:**

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-23	Project:	PIKA00004
Sample ID:	457261023	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:05		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-1.05	+/-4.24	7.98		pCi/Filter			BXM4	09/01/18	0101	1794274	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-1.19	+/-1.76	3.26	10.0	pCi/Filter			BXM4	09/01/18	1854	1794255	2

The following Analytical Methods were performed:

---

Method	Description	Analyst	Comments
1	GL-RAD-A-002		
2	EPA EERF C-01 Modified		

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-24	Project:	PIKA00004
Sample ID:	457261024	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 12:29		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-0.144	+/-4.14	7.64		pCi/Filter			BXM4	09/01/18	0117	1794274	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-1.1	+/-1.79	3.31	10.0	pCi/Filter			BXM4	09/01/18	1910	1794255	2

The following Analytical Methods were performed:

---

Method	Description	Analyst	Comments
1	GL-RAD-A-002		
2	EPA EERF C-01 Modified		

**Notes:**  
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-25	Project:	PIKA00004
Sample ID:	457261025	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:19		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	5.14	+/-5.55	9.29		pCi/Filter			BXM4	09/01/18	0134	1794274	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-1.75	+/-1.68	3.18	10.0	pCi/Filter			BXM4	09/01/18	1926	1794255	2

The following Analytical Methods were performed:

---

Method	Description	Analyst	Comments
1	GL-RAD-A-002		
2	EPA EERF C-01 Modified		

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit



# GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
 Address : 12723 Capricorn Drive  
 Ste 500  
 Stafford, Texas 77477  
 Contact: Mr. Joel Cehn  
 Project: PIKA International, Inc

Client Sample ID: 3244-27	Project: PIKA00004
Sample ID: 457261027	Client ID: PIKA004
Matrix: Filter	
Collect Date: 09-AUG-18 13:24	
Receive Date: 15-AUG-18	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-2.89	+/-4.60	9.02		pCi/Filter			BXM4	09/01/18	0206	1794274	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-1.24	+/-1.73	3.21	10.0	pCi/Filter			BXM4	09/01/18	1958	1794255	2

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	GL-RAD-A-002		
2	EPA EERF C-01 Modified		

**Notes:**  
 Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-28	Project:	PIKA00004
Sample ID:	457261028	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 12:37		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-0.521	+/-4.98	9.25		pCi/Filter			BXM4	09/01/18	0223	1794274	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-2.07	+/-1.67	3.20	10.0	pCi/Filter			BXM4	09/01/18	2014	1794255	2

The following Analytical Methods were performed:

---

Method	Description	Analyst	Comments
1	GL-RAD-A-002		
2	EPA EERF C-01 Modified		

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-29D	Project:	PIKA00004
Sample ID:	457261029	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:14		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-0.238	+/-6.19	11.4		pCi/Filter			BXM4	09/01/18	0239	1794274	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-0.17	+/-1.77	3.16	10.0	pCi/Filter			BXM4	09/01/18	2030	1794255	2

The following Analytical Methods were performed:

---

Method	Description	Analyst	Comments
1	GL-RAD-A-002		
2	EPA EERF C-01 Modified		

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-30S	Project:	PIKA00004
Sample ID:	457261030	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:38		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-0.802	+/-4.07	7.62		pCi/Filter			BXM4	09/01/18	0255	1794274	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-2.51	+/-1.69	3.30	10.0	pCi/Filter			BXM4	09/01/18	2047	1794255	2

The following Analytical Methods were performed:

---

Method	Description	Analyst	Comments
1	GL-RAD-A-002		
2	EPA EERF C-01 Modified		

**Notes:**  
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-31	Project:	PIKA00004
Sample ID:	457261031	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 13:30		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	0.850	+/-4.61	8.31		pCi/Filter			BXM4	09/01/18	0311	1794274	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-0.772	+/-1.78	3.25	10.0	pCi/Filter			BXM4	09/01/18	2103	1794255	2

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	
2	EPA EERF C-01 Modified	

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Report Date: September 4, 2018

Company : PIKA International, Inc.  
Address : 12723 Capricorn Drive  
Ste 500  
Stafford, Texas 77477  
Contact: Mr. Joel Cehn  
Project: PIKA International, Inc

---

Client Sample ID:	3244-32	Project:	PIKA00004
Sample ID:	457261032	Client ID:	PIKA004
Matrix:	Filter		
Collect Date:	09-AUG-18 12:22		
Receive Date:	15-AUG-18		
Collector:	Client		

---

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
LSC, Direct Tritium, Filter "As Received"													
Tritium	U	-1.25	+/-3.96	7.51		pCi/Filter			BXM4	09/01/18	0328	1794274	1
Liquid Scint C14, Filter "As Received"													
Carbon-14	U	-0.668	+/-1.83	3.33	10.0	pCi/Filter			BXM4	09/01/18	2119	1794255	2

The following Analytical Methods were performed:

---

Method	Description	Analyst	Comments
1	GL-RAD-A-002		
2	EPA EERF C-01 Modified		

### Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

# **Quality Control Summary**

# GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

## QC Summary

Report Date: September 4, 2018

Page 1 of 3

**PIKA International, Inc.**  
**12723 Capricorn Drive**  
**Ste 500**  
**Stafford, Texas**

**Contact: Mr. Joel Cehn**

**Workorder: 457261**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Rad Liquid Scintillation</b>											
Batch	1794252										
QC1204095738	LCS										
Carbon-14	75.1			72.0	pCi/Filter		96	(75%-125%)	TXJ1	09/01/18	13:40
	Uncertainty			+/-4.31							
QC1204095739	LCSD										
Carbon-14	75.1			75.8	pCi/Filter	5.14	101	(0%-20%)		09/01/18	13:56
	Uncertainty			+/-4.39							
QC1204095737	MB										
Carbon-14			U	-0.503	pCi/Filter					09/01/18	13:24
	Uncertainty			+/-1.76							
Batch	1794255										
QC1204095741	LCS										
Carbon-14	75.1			69.1	pCi/Filter		92	(75%-125%)	BXM4	09/01/18	21:51
	Uncertainty			+/-4.53							
QC1204095742	LCSD										
Carbon-14	75.1			69.6	pCi/Filter	0.703	92.7	(0%-20%)		09/01/18	22:07
	Uncertainty			+/-4.54							
QC1204095740	MB										
Carbon-14			U	-1.34	pCi/Filter					09/01/18	21:35
	Uncertainty			+/-1.86							
Batch	1794273										
QC1204095792	LCS										
Tritium	125			104	pCi/Filter		82.7	(75%-125%)	TXJ1	08/31/18	18:25
	Uncertainty			+/-9.09							
QC1204095793	LCSD										
Tritium	125			114	pCi/Filter	9.94	91.3	(0%-20%)		08/31/18	18:41
	Uncertainty			+/-9.38							
QC1204095791	MB										
Tritium			U	-3.3	pCi/Filter					08/31/18	18:09
	Uncertainty			+/-3.52							

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## QC Summary

Workorder: 457261

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Rad Liquid Scintillation</b>											
Batch	1794274										
QC1204095797	LCS										
Tritium	125			116	pCi/Filter		92.6	(75%-125%)	BXM4	09/01/18	04:00
	Uncertainty										
QC1204095798	LCSD										
Tritium	125			116	pCi/Filter	0.215	92.8	(0%-20%)		09/01/18	04:17
	Uncertainty										
QC1204095794	MB										
Tritium			U	1.74	pCi/Filter					09/01/18	03:44
	Uncertainty										

**Notes:**

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- \*\* Analyte is a Tracer compound
- < Result is less than value reported
- > Result is greater than value reported
- BD Results are either below the MDC or tracer recovery is low
- FA Failed analysis.
- H Analytical holding time was exceeded
- J Value is estimated
- K Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- M M if above MDC and less than LLD
- M REMP Result > MDC/CL and < RDL
- N/A RPD or %Recovery limits do not apply.
- NI See case narrative
- ND Analyte concentration is not detected above the detection limit
- NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Q One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
- R Sample results are rejected
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- UI Gamma Spectroscopy--Uncertain identification
- UJ Gamma Spectroscopy--Uncertain identification
- UL Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Other specific qualifiers were required to properly define the results. Consult case narrative.

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## QC Summary

Workorder: 457261

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.										
h	Preparation or preservation holding time was exceeded										

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

\* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

# Liquid Scintillation Raw Data

# Batch 1794273 Check-list

This check-list was completed on 04-SEP-18 by Lyndsey Pace

This batch was reviewed by Gregory Ramsay on 04-SEP-18 and Lyndsey Pace on 04-SEP-18.

**Batch ID:** 1794273

**Product:** LSC\_DH3F

**Description:** Tritium GL-RAD-A-002

#	Criteria	Yes	No	Comments
<b>Preparation Information</b>				
1	Were all of the samples homogenous?	Yes		
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
3	Are instrument source checks within limits?	Yes		
4	Have client special requirements have been reviewed and met?	Yes		
5	Has a hit notification been completed?		No	
6	Has an Aliquot Correction been completed for this batch?		No	
7	Have sample historical results been reviewed for this batch?	Yes		
<b>Technical Information</b>				
8	Were all the samples prepared/analyzed within the required holding time period?	Yes		
9	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
10	Was the method blank (MB) within the acceptance criteria?	Yes		
11	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
12	Were the relative percent differences and/or error (RPD/RER) between the LCS and the LCSD recoveries within the acceptance limits?	Yes		
13	Has the method required detection limit been met?	Yes		
<b>Miscellaneous Information</b>				
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

# Prep Logbook

## Direct Tritium Filters

**Batch ID:** 1794273

**Analyst:** Tiffany Jordan (TXJ1)

**Method:** GL-RAD-A-002

**Lab SOP:** GL-RAD-A-002 REV# 22

**Instrument:** No instrument-manual method

**Due Dates for Lab:** 02-SEP-2018

**Package:** 03-SEP-2018

**SDG:** 05-SEP-2018

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204095792	Tritium SPIKE	1753-D	.1	mL
LCSD	1204095793	Tritium SPIKE	1753-D	.1	mL

#	Sample ID	Prep Date	Min RDL ( )	Aliquot (Filter)
1	457261001	31-AUG-2018		1
2	457261002	31-AUG-2018		1
3	457261003	31-AUG-2018		1
4	457261004	31-AUG-2018		1
5	457261005	31-AUG-2018		1
6	457261006	31-AUG-2018		1
7	457261007	31-AUG-2018		1
8	457261008	31-AUG-2018		1
9	457261009	31-AUG-2018		1
10	457261010	31-AUG-2018		1
11	457261011	31-AUG-2018		1
12	457261012	31-AUG-2018		1
13	457261013	31-AUG-2018		1
14	457261014	31-AUG-2018		1
15	457261015	31-AUG-2018		1
16	457261016	31-AUG-2018		1
17	457261017	31-AUG-2018		1
18	457261018	31-AUG-2018		1
19	457261019	31-AUG-2018		1
20	457261020	31-AUG-2018		1
21	1204095791 MB	31-AUG-2018		1
22	1204095792 LCS	31-AUG-2018		1
23	1204095793 LCSD	31-AUG-2018		1

Reagent/Solvent Lot ID	Description	Amount	Comments:
REGNT 2605985	Quenching Agent	20 uL	Pipet Id: RAD-LSC-2970968
REGNT 2802196.4	Ecoscint Ultra Scintillation Solution	13 mL	Data Entry Date2: 31-AUG-2018 00:00

### Tritium Filter

Filename : H3DIR.XLS  
 File type : Excel  
 Version # : 1.2.12

**Batch :** 1794273  
**Analyst :** TIF02034  
**Prep Date :** 8/31/2018  
**Method Uncertainty :** 0

**Procedure Code :** LSC\_DH3F  
**Parmname :** Tritium  
**Required MDA :** 50 pCi/F  
**H-3 Abundance :** 1.00  
**Halflife of Tritium :** 12.32 years

**Geometry:**  
 10mL DW/13mL Ecoscint Ultra/Swipe

Sample Characteristics					Count raw Data									
Pos.	Sample ID	Sample Aliquot F	Sample Aliquot StDev. F	Sample Date/Time	Rack Position #	Counting Time (min.)	Quench#	Gross cpm	Bkg cpm	Bkg Count Time (min.)	Bkg Quench#	Corrected Bkg cpm	Count Start Date/Time	Sample Decay
1	457261001.1	1.0000	1.0000E-05	8/9/2018 13:20	**2	15	179.6	3.93	4.53	15	162.4	4.4034	8/31/2018 12:43	0.997
2	457261002.1	1.0000	1.0000E-05	8/9/2018 12:24	**3	15	164.3	3.6	4.53	15	162.4	4.5118	8/31/2018 12:59	0.997
3	457261003.1	1.0000	1.0000E-05	8/9/2018 13:27	**4	15	193.4	2.93	4.53	15	162.4	4.3546	8/31/2018 13:16	0.997
4	457261004.1	1.0000	1.0000E-05	8/9/2018 12:38	**5	15	187.2	4.2	4.53	15	162.4	4.3715	8/31/2018 13:32	0.997
5	457261005.1	1.0000	1.0000E-05	8/9/2018 13:06	**6	15	199.5	4.33	4.53	15	162.4	4.3447	8/31/2018 13:48	0.997
6	457261006.1	1.0000	1.0000E-05	8/9/2018 12:45	**7	15	180.8	3.13	4.53	15	162.4	4.3975	8/31/2018 14:04	0.997
7	457261007.1	1.0000	1.0000E-05	8/9/2018 13:29	**8	15	195.4	2.8	4.53	15	162.4	4.3506	8/31/2018 14:21	0.997
8	457261008.1	1.0000	1.0000E-05	8/9/2018 12:26	**9	15	180.6	4.13	4.53	15	162.4	4.3984	8/31/2018 14:37	0.997
9	457261009.1	1.0000	1.0000E-05	8/9/2018 13:17	**10	15	210.6	3.67	4.53	15	162.4	4.3407	8/31/2018 14:53	0.997
10	457261010.1	1.0000	1.0000E-05	8/9/2018 12:50	**11	15	175.4	3.2	4.53	15	162.4	4.4269	8/31/2018 15:09	0.997
11	457261011.1	1.0000	1.0000E-05	8/9/2018 13:13	**12	15	219.7	4.47	4.53	15	162.4	4.3475	8/31/2018 15:26	0.997
12	457261012.1	1.0000	1.0000E-05	8/9/2018 12:33	35-1	15	177.5	3.4	4.53	15	162.4	4.4146	8/31/2018 15:42	0.997
13	457261013.1	1.0000	1.0000E-05	8/9/2018 13:33	35-2	15	183.5	3.4	4.53	15	162.4	4.3854	8/31/2018 15:58	0.997
14	457261014.1	1.0000	1.0000E-05	8/9/2018 13:03	35-3	15	181.9	3.4	4.53	15	162.4	4.3924	8/31/2018 16:15	0.997
15	457261015.1	1.0000	1.0000E-05	8/9/2018 13:35	35-4	15	183.4	2.93	4.53	15	162.4	4.3858	8/31/2018 16:31	0.997
16	457261016.1	1.0000	1.0000E-05	8/9/2018 12:35	35-5	15	184.1	3.8	4.53	15	162.4	4.3830	8/31/2018 16:47	0.997
17	457261017.1	1.0000	1.0000E-05	8/9/2018 13:08	35-6	15	185.3	2.6	4.53	15	162.4	4.3783	8/31/2018 17:04	0.997
18	457261018.1	1.0000	1.0000E-05	8/9/2018 12:31	35-7	15	194.4	3.07	4.53	15	162.4	4.3525	8/31/2018 17:20	0.997
19	457261019.1	1.0000	1.0000E-05	8/9/2018 13:22	35-8	15	186	3.73	4.53	15	162.4	4.3757	8/31/2018 17:36	0.997
20	457261020.1	1.0000	1.0000E-05	8/9/2018 12:28	35-9	15	177.4	3.8	4.53	15	162.4	4.4151	8/31/2018 17:52	0.997
21	1204095791.1	1.0000	1.0000E-05	8/31/2018 0:00	35-10	15	163.6	3.2	4.53	15	162.4	4.5184	8/31/2018 18:09	1.000
22	1204095792.1	1.0000	1.0000E-05	8/31/2018 0:00	35-11	15	165.5	45.07	4.53	15	162.4	4.5009	8/31/2018 18:25	1.000
23	1204095793.1	1.0000	1.0000E-05	8/31/2018 0:00	35-12	15	163.6	50.13	4.53	15	162.4	4.5184	8/31/2018 18:41	1.000

**Pipet, 0.1 ml Stdev : +/-** 0.000200 ml  
**Pipet, 0.5 ml Stdev : +/-** 0.001000 ml  
**Pipet, 1.0 ml Stdev : +/-** 0.002000 ml  
**Pipet, 5.0 ml Stdev : +/-** 0.010000 ml

**Analytical SOP:** GL-RAD-A-002  
**Instrument SOP:** GL-RAD-I-004

Calibration Data							
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Background Rack Position #	Background Count Start Date/Time
1	LSCGREEN	10/1/2017	9/30/2018	0.1543	0.00792	**1	8/31/2018 12:27
2	LSCGREEN	10/1/2017	9/30/2018	0.1786	0.00792	**1	8/31/2018 12:27
3	LSCGREEN	10/1/2017	9/30/2018	0.1341	0.00792	**1	8/31/2018 12:27
4	LSCGREEN	10/1/2017	9/30/2018	0.1429	0.00792	**1	8/31/2018 12:27
5	LSCGREEN	10/1/2017	9/30/2018	0.1257	0.00792	**1	8/31/2018 12:27
6	LSCGREEN	10/1/2017	9/30/2018	0.1524	0.00792	**1	8/31/2018 12:27
7	LSCGREEN	10/1/2017	9/30/2018	0.1313	0.00792	**1	8/31/2018 12:27
8	LSCGREEN	10/1/2017	9/30/2018	0.1527	0.00792	**1	8/31/2018 12:27
9	LSCGREEN	10/1/2017	9/30/2018	0.1113	0.00792	**1	8/31/2018 12:27
10	LSCGREEN	10/1/2017	9/30/2018	0.1607	0.00792	**1	8/31/2018 12:27
11	LSCGREEN	10/1/2017	9/30/2018	0.1002	0.00792	**1	8/31/2018 12:27
12	LSCGREEN	10/1/2017	9/30/2018	0.1575	0.00792	**1	8/31/2018 12:27
13	LSCGREEN	10/1/2017	9/30/2018	0.1484	0.00792	**1	8/31/2018 12:27
14	LSCGREEN	10/1/2017	9/30/2018	0.1508	0.00792	**1	8/31/2018 12:27
15	LSCGREEN	10/1/2017	9/30/2018	0.1485	0.00792	**1	8/31/2018 12:27
16	LSCGREEN	10/1/2017	9/30/2018	0.1475	0.00792	**1	8/31/2018 12:27
17	LSCGREEN	10/1/2017	9/30/2018	0.1457	0.00792	**1	8/31/2018 12:27
18	LSCGREEN	10/1/2017	9/30/2018	0.1327	0.00792	**1	8/31/2018 12:27
19	LSCGREEN	10/1/2017	9/30/2018	0.1447	0.00792	**1	8/31/2018 12:27
20	LSCGREEN	10/1/2017	9/30/2018	0.1576	0.00792	**1	8/31/2018 12:27
21	LSCGREEN	10/1/2017	9/30/2018	0.1797	0.00792	**1	8/31/2018 12:27
22	LSCGREEN	10/1/2017	9/30/2018	0.1766	0.00792	**1	8/31/2018 12:27
23	LSCGREEN	10/1/2017	9/30/2018	0.1797	0.00792	**1	8/31/2018 12:27

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

**Spike S/N :** N/A  
**Spike Exp Date :** N/A  
**Spike Activity (dpm/ml):** N/A  
**Spike Volume Added:** N/A  
  
**LCS S/N :** 1753-D  
**LCS Exp Date :** 12/12/2018  
**LCS Activity (dpm/ml):** 2779.02  
**LCS Volume Added:** 0.10

<b>Results</b>																	
Pos.	Decision	Critical	Required	Sample Act.		Net Count	Net Count	2 SIGMA		2 SIGMA		Sample QC	Sample Type	RPD	RER	Nominal pCi/F	Recovery
	Level pCi/F	Level pCi/F	MDA pCi/F	MDA pCi/F	Conc. pCi/F	Error %	Rate CPM	Rate Error CPM	Counting Uncertainty pCi/F	Total Prop. Uncertainty pCi/F							
1	5.2311	3.6932	50	7.9724	-1.3870	157.45%	-0.4734	0.7454	4.2805	4.2805			SAMPLE				
2	4.5746	3.2297	50	6.9657	-2.3081	80.65%	-0.9118	0.7354	3.6486	3.6486			SAMPLE				
3	5.9841	4.2249	50	9.1238	-4.8016	48.93%	-1.4246	0.6969	4.6038	4.6038			SAMPLE				
4	5.6245	3.9709	50	8.5742	-0.5424	440.69%	-0.1715	0.7559	4.6847	4.6847			SAMPLE				
5	6.3762	4.5017	50	9.7225	-0.0527	5188.93%	-0.0147	0.7605	5.3592	5.3592			SAMPLE				
6	5.2900	3.7348	50	8.0626	-3.7581	55.90%	-1.2675	0.7084	4.1168	4.1168			SAMPLE				
7	6.1084	4.3126	50	9.3135	-5.3374	44.53%	-1.5506	0.6904	4.6581	4.6581			SAMPLE				
8	5.2801	3.7278	50	8.0475	-0.7944	280.89%	-0.2684	0.7540	4.3734	4.3734			SAMPLE				
9	7.2011	5.0841	50	10.9806	-2.7248	108.96%	-0.6707	0.7308	5.8189	5.8189			SAMPLE				
10	5.0341	3.5541	50	7.6707	-3.4502	58.13%	-1.2269	0.7131	3.9304	3.9304			SAMPLE				
11	8.0030	5.6502	50	12.2026	0.5526	625.90%	0.1225	0.7667	6.7794	6.7794			SAMPLE				
12	5.1310	3.6225	50	7.8191	-2.9121	71.15%	-1.0146	0.7218	4.0606	4.0606			SAMPLE				
13	5.4268	3.8314	50	8.2720	-3.0015	73.11%	-0.9854	0.7204	4.3010	4.3010			SAMPLE				
14	5.3451	3.7737	50	8.1468	-2.9747	72.63%	-0.9924	0.7208	4.2347	4.2347			SAMPLE				
15	5.4217	3.8277	50	8.2641	-4.4299	47.98%	-1.4558	0.6984	4.1651	4.1651			SAMPLE				
16	5.4581	3.8535	50	8.3198	-1.7864	126.70%	-0.5830	0.7386	4.4361	4.4361			SAMPLE				
17	5.5215	3.8983	50	8.4168	-5.5155	38.36%	-1.7783	0.6821	4.1464	4.1464			SAMPLE				
18	6.0459	4.2685	50	9.2182	-4.3684	54.86%	-1.2825	0.7034	4.6963	4.6963			SAMPLE				
19	5.5591	3.9248	50	8.4743	-2.0170	113.85%	-0.6457	0.7351	4.5005	4.5005			SAMPLE				
20	5.1264	3.6192	50	7.8120	-1.7639	120.31%	-0.6151	0.7401	4.1594	4.1594			SAMPLE				
21	4.5335	3.2007	50	6.9027	-3.3049	54.42%	-1.3184	0.7173	3.5244	3.5244			MB				
22	4.6052	3.2513	50	7.0129	103.5073	4.55%	40.5691	1.8179	9.0907	9.2317			LCS			125.1811	82.7%
23	4.5335	3.2007	50	6.9028	114.3391	4.26%	45.6116	1.9087	9.3782	9.5447			LCSD	9.9%		125.1811	91.3%

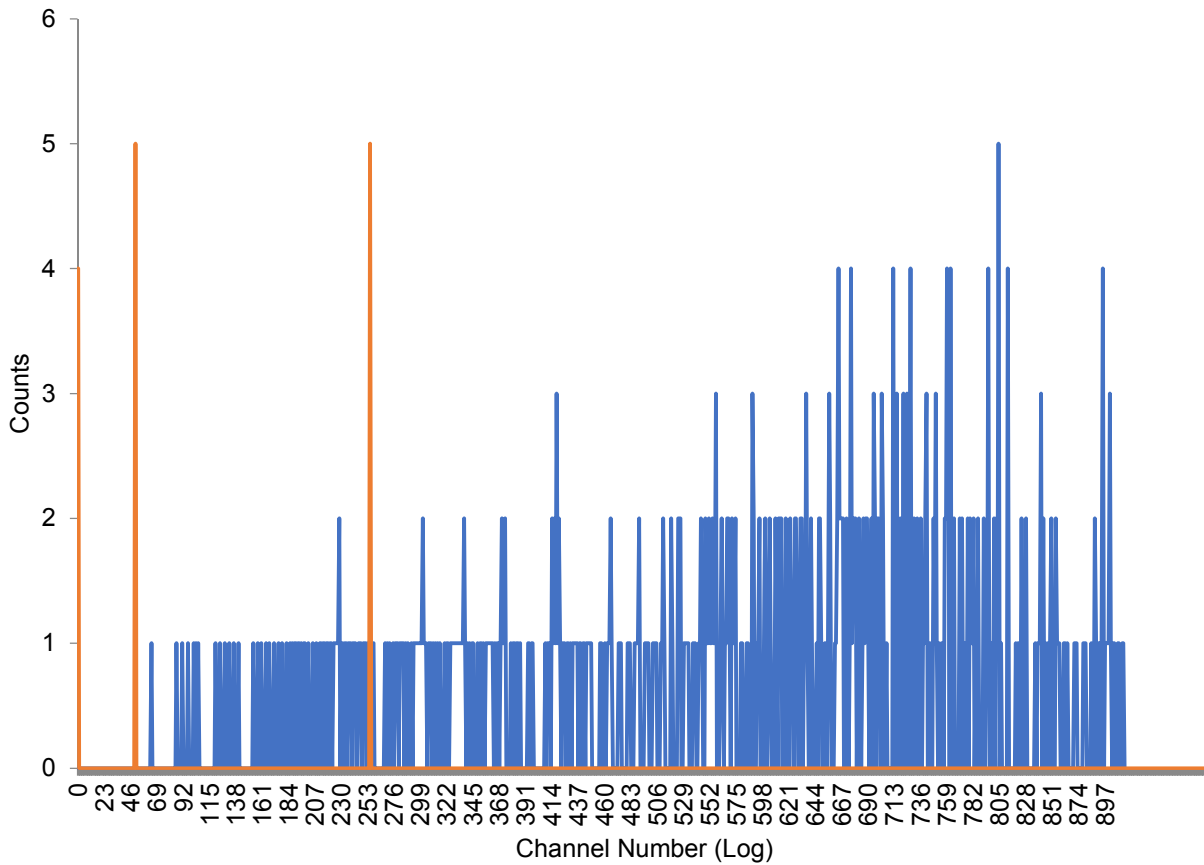
U040831---1A

SampleID	Rack	Time (min.)	H#	CPM Iso1	CPM Iso2	LumEx	Count Start Time	Count End Time	Machine
**_1	15	15	162.4	4.53	37.80	0.28	8/31/2018 12:27	8/31/2018 12:42	GREEN
**_2	15	15	179.6	3.93	36.13	1.04	8/31/2018 12:43	8/31/2018 12:58	GREEN
**_3	15	15	164.3	3.60	36.93	0.40	8/31/2018 12:59	8/31/2018 13:14	GREEN
**_4	15	15	193.4	2.93	34.40	0.37	8/31/2018 13:16	8/31/2018 13:31	GREEN
**_5	15	15	187.2	4.20	39.80	0.61	8/31/2018 13:32	8/31/2018 13:47	GREEN
**_6	15	15	199.5	4.33	36.00	0.68	8/31/2018 13:48	8/31/2018 14:03	GREEN
**_7	15	15	180.8	3.13	35.53	0.42	8/31/2018 14:04	8/31/2018 14:19	GREEN
**_8	15	15	195.4	2.80	33.33	0.48	8/31/2018 14:21	8/31/2018 14:36	GREEN
**_9	15	15	180.6	4.13	37.07	1.68	8/31/2018 14:37	8/31/2018 14:52	GREEN
**_10	15	15	210.6	3.67	33.07	0.54	8/31/2018 14:53	8/31/2018 15:08	GREEN
**_11	15	15	175.4	3.20	33.60	1.24	8/31/2018 15:09	8/31/2018 15:24	GREEN
**_12	15	15	219.7	4.47	34.60	3.37	8/31/2018 15:26	8/31/2018 15:41	GREEN
35-1	15	15	177.5	3.40	34.93	0.29	8/31/2018 15:42	8/31/2018 15:57	GREEN
35-2	15	15	183.5	3.40	35.53	0.38	8/31/2018 15:58	8/31/2018 16:13	GREEN
35-3	15	15	181.9	3.40	34.93	2.24	8/31/2018 16:15	8/31/2018 16:30	GREEN
35-4	15	15	183.4	2.93	34.47	0.60	8/31/2018 16:31	8/31/2018 16:46	GREEN
35-5	15	15	184.1	3.80	32.20	0.33	8/31/2018 16:47	8/31/2018 17:02	GREEN
35-6	15	15	185.3	2.60	34.53	0.57	8/31/2018 17:04	8/31/2018 17:19	GREEN
35-7	15	15	194.4	3.07	34.33	0.86	8/31/2018 17:20	8/31/2018 17:35	GREEN
35-8	15	15	186.0	3.73	39.80	0.94	8/31/2018 17:36	8/31/2018 17:51	GREEN
35-9	15	15	177.4	3.80	33.13	0.56	8/31/2018 17:52	8/31/2018 18:07	GREEN
35-10	15	15	163.6	3.20	37.33	0.12	8/31/2018 18:09	8/31/2018 18:24	GREEN
35-11	15	15	165.5	45.07	82.80	0.06	8/31/2018 18:25	8/31/2018 18:40	GREEN
35-12	15	15	163.6	50.13	83.47	0.06	8/31/2018 18:41	8/31/2018 18:56	GREEN

Sample Count Start Time:	31 Aug 2018 12:27:18		
Data Capture Date	31 Aug 2018 12:42:42		
User Filename	S040831---1A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	1	**_1	15.00
H#, Total Counts:	162.4	577	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

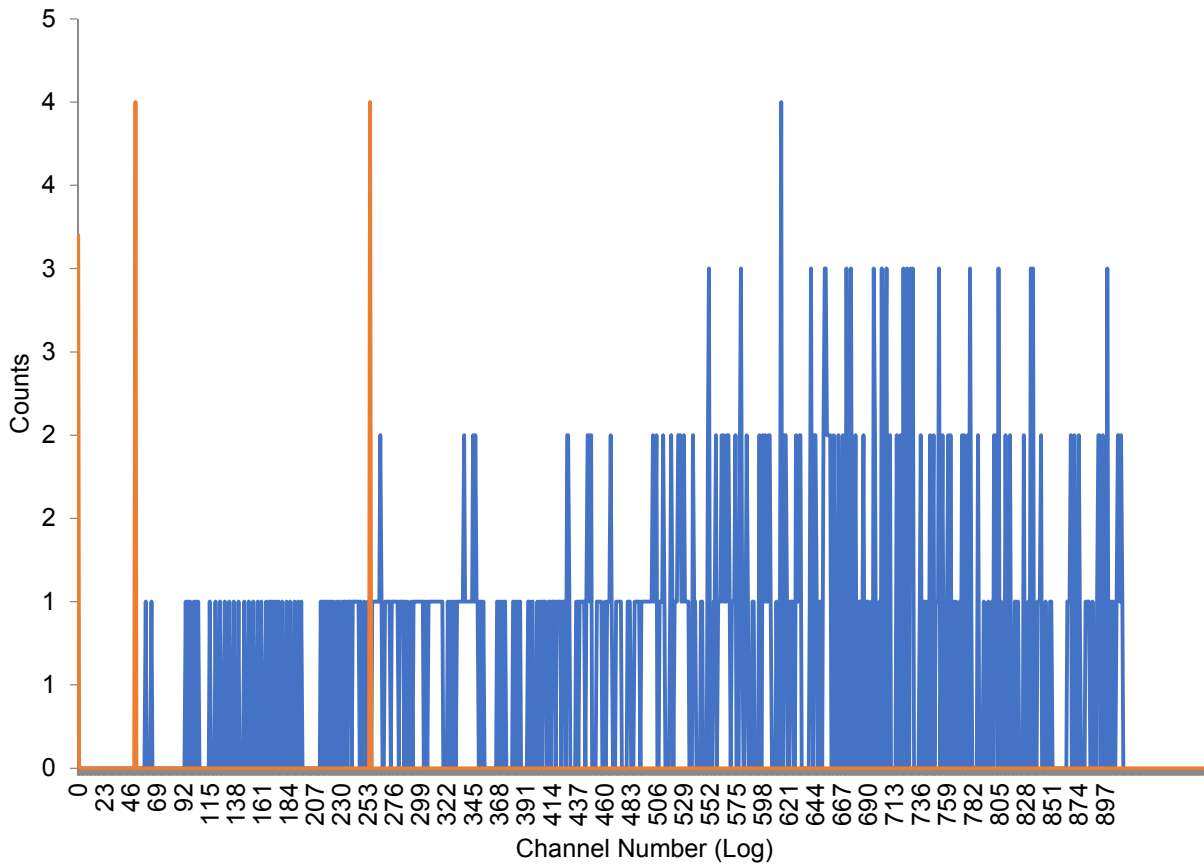
USER 04 - TRITIUM



Sample Count Start Time:	31 Aug 2018 12:43:34		
Data Capture Date	31 Aug 2018 12:58:57		
User Filename	S040831---2A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	2	** -2	15.00
H#, Total Counts:	179.6	553	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

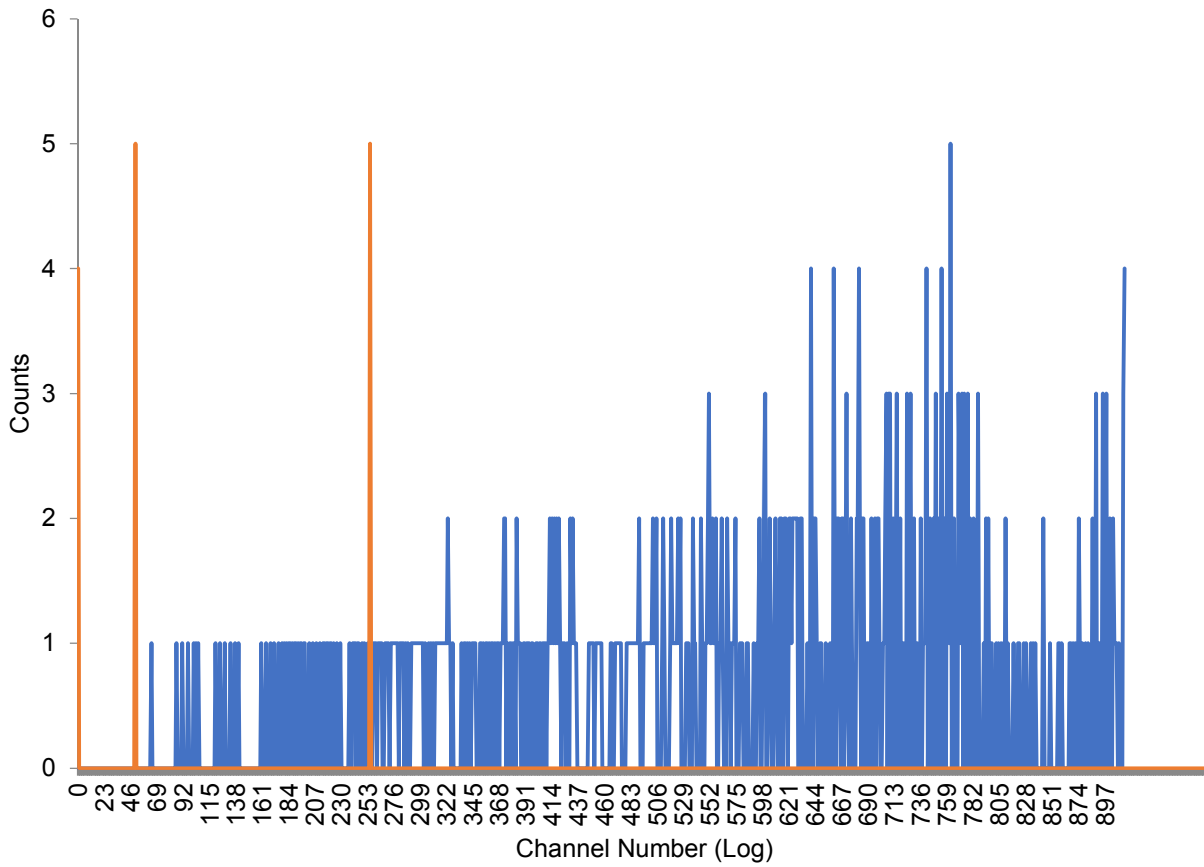
USER 04 - TRITIUM



Sample Count Start Time:	31 Aug 2018 12:59:49		
Data Capture Date	31 Aug 2018 13:15:12		
User Filename	S040831---3A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	3	** -3	15.00
H#, Total Counts:	164.3	569	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

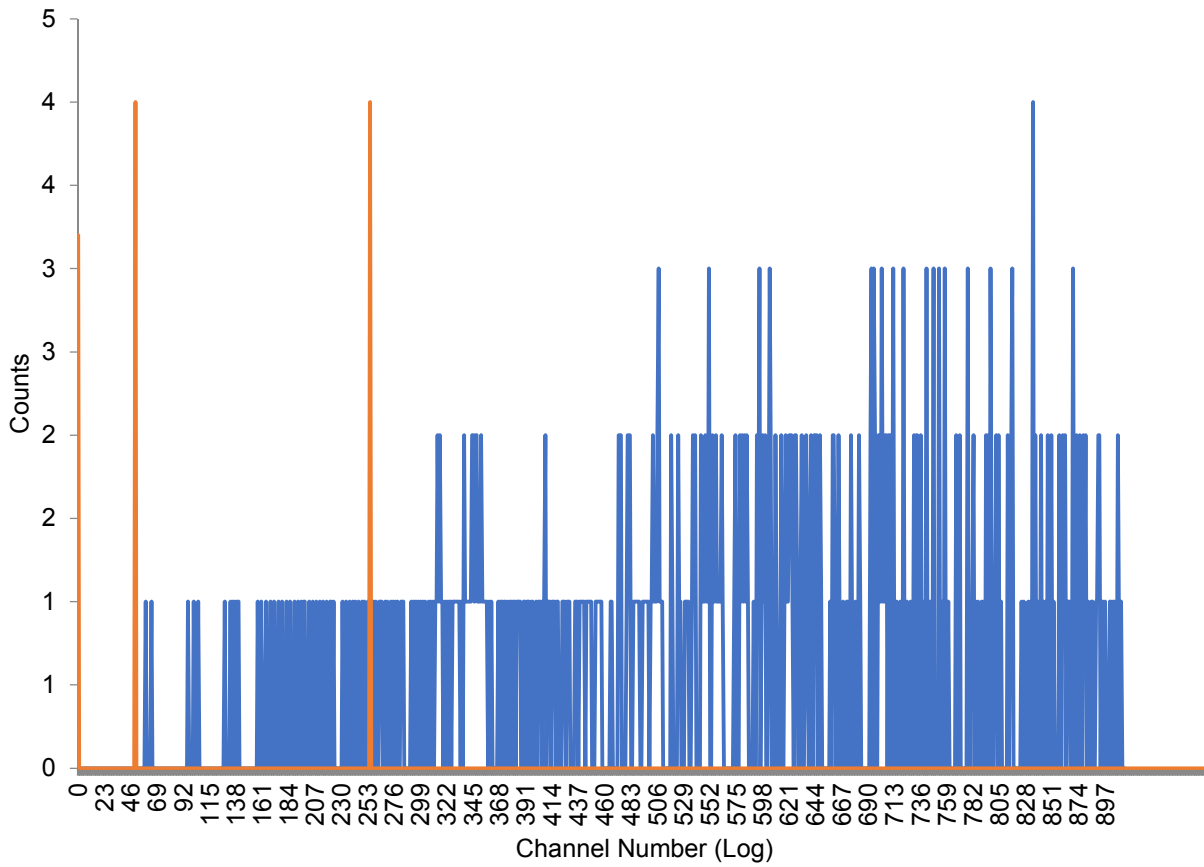
USER 04 - TRITIUM



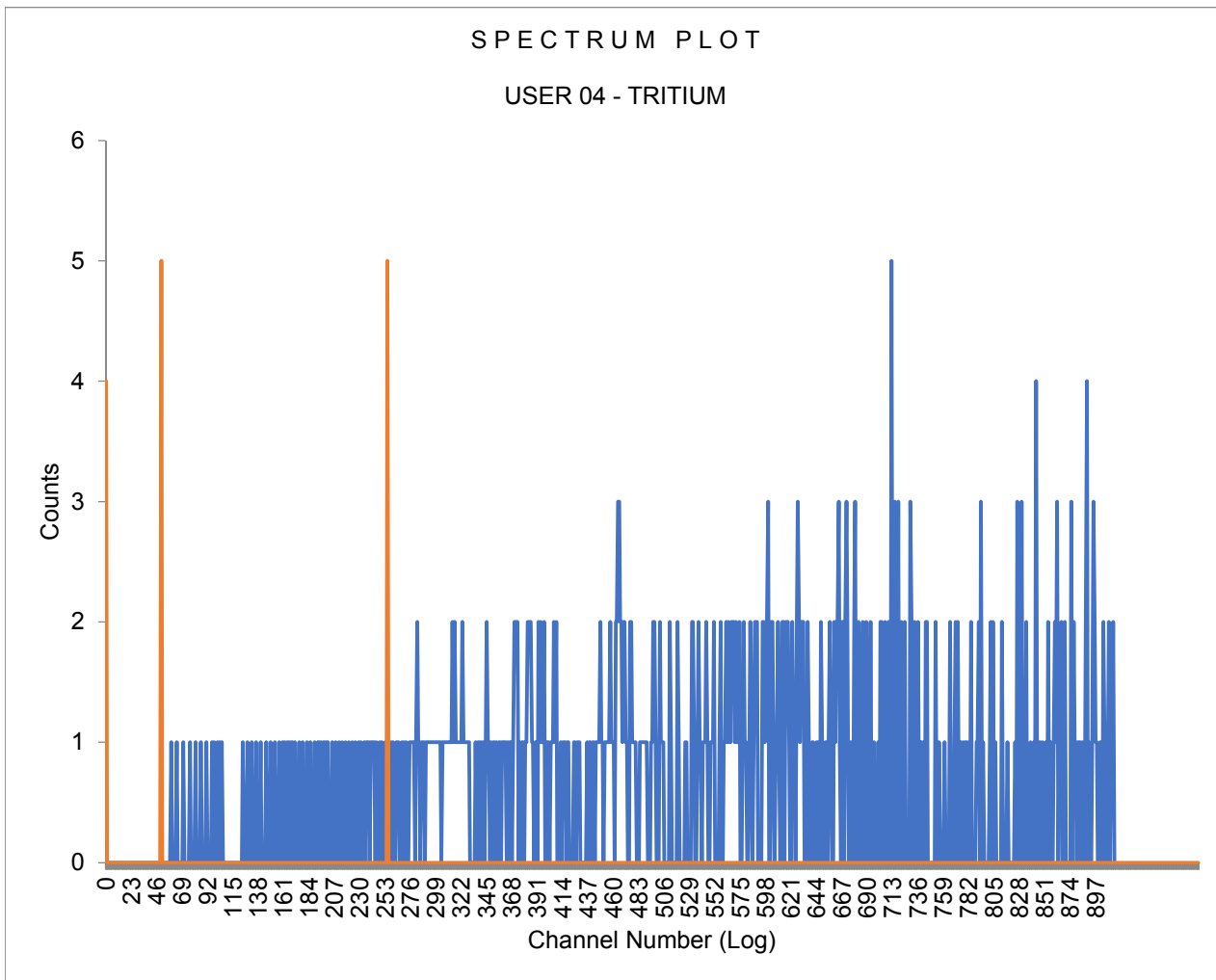
Sample Count Start Time: 31 Aug 2018 13:16:04  
 Data Capture Date: 31 Aug 2018 13:31:26  
 User Filename: S040831---4A.XLS  
 U040831---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 04  
 User Id: TRITIUM  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 4 \*\* -4 15.00  
 H#, Total Counts: 193.4 524  
 Win1: Tritium - Start, End: 50 255  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

USER 04 - TRITIUM



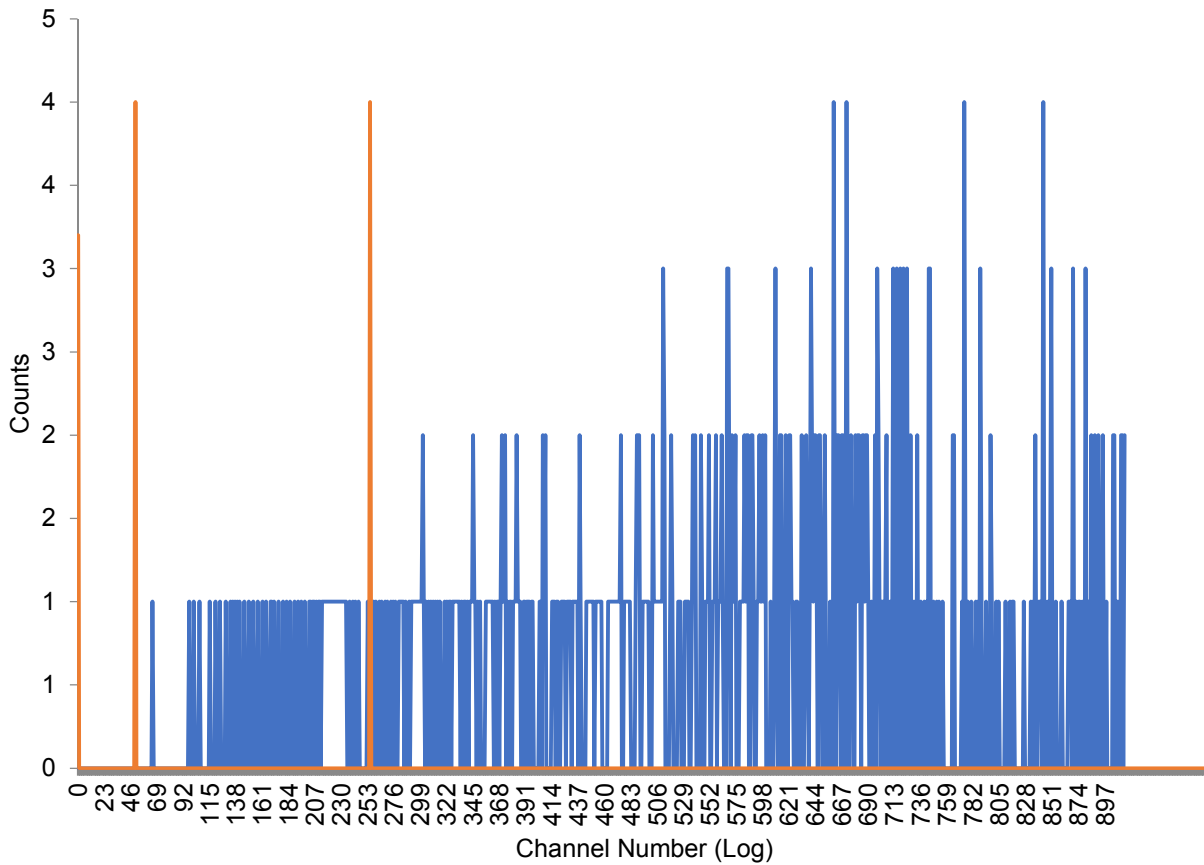
Sample Count Start Time:	31 Aug 2018 13:32:19		
Data Capture Date	31 Aug 2018 13:47:43		
User Filename	S040831---5A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	5	**-.5	15.00
H#, Total Counts:	187.2	608	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



Sample Count Start Time:	31 Aug 2018 13:48:36		
Data Capture Date	31 Aug 2018 14:03:58		
User Filename	S040831---6A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	6	** -6	15.00
H#, Total Counts:	199.5	552	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

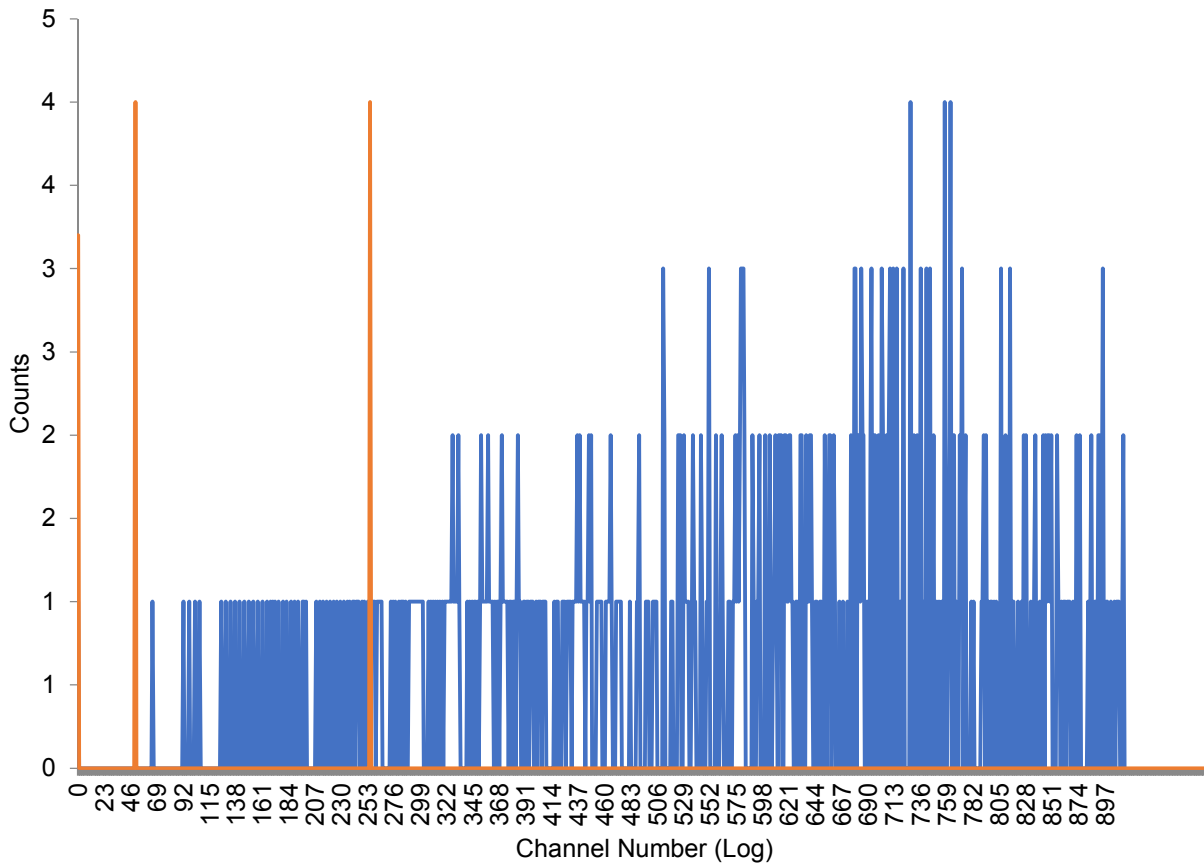
USER 04 - TRITIUM



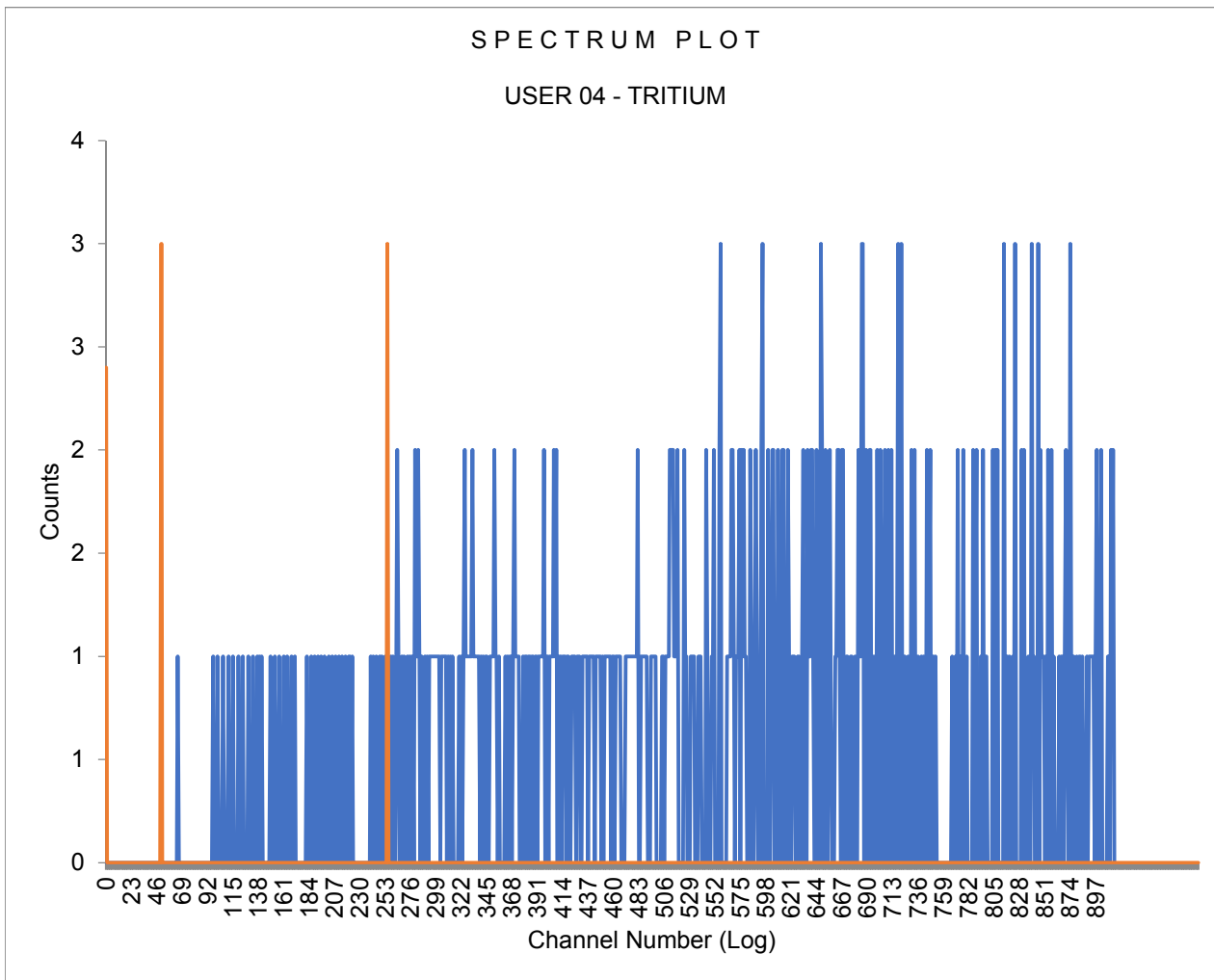
Sample Count Start Time:	31 Aug 2018 14:04:50		
Data Capture Date	31 Aug 2018 14:20:13		
User Filename	S040831---7A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	7	**-.7	15.00
H#, Total Counts:	180.8	541	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

USER 04 - TRITIUM



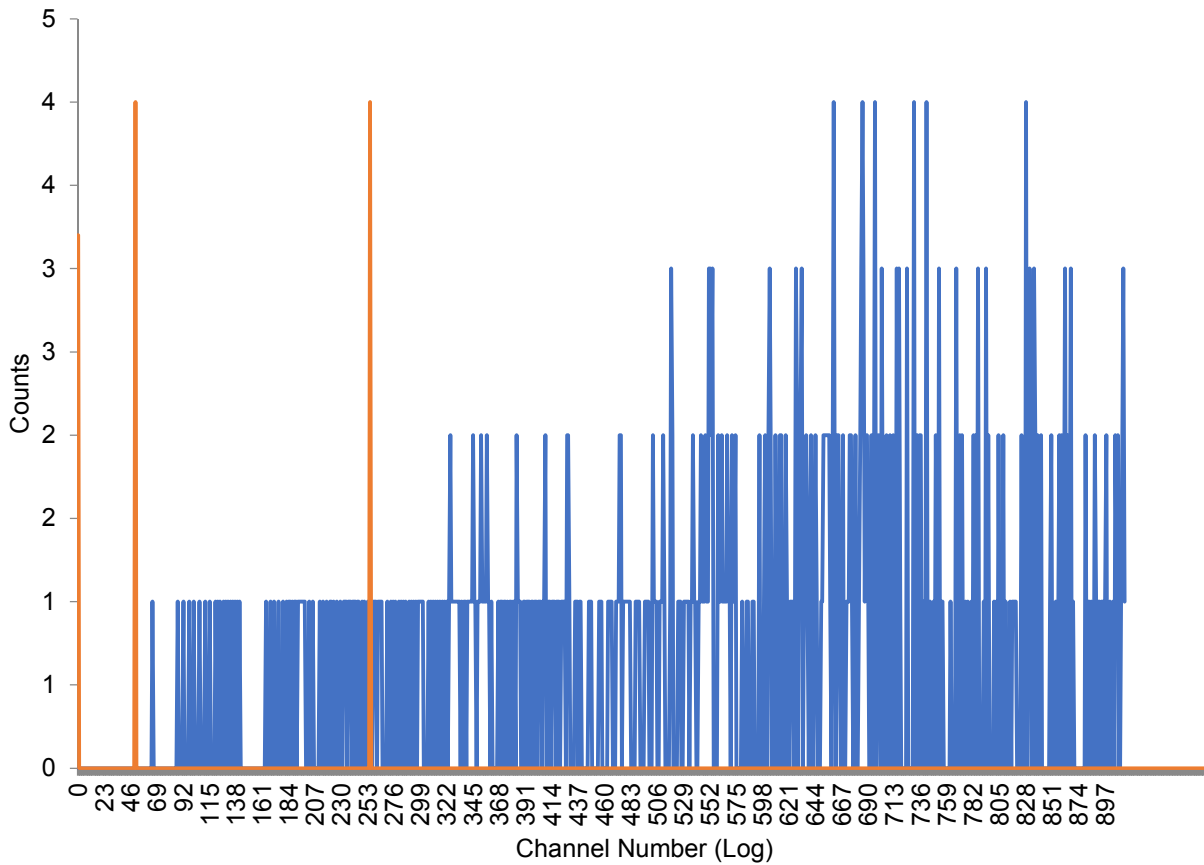
Sample Count Start Time:	31 Aug 2018 14:21:06		
Data Capture Date	31 Aug 2018 14:36:28		
User Filename	S040831---8A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	8	** -8	15.00
H#, Total Counts:	195.4	510	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



Sample Count Start Time:	31 Aug 2018 14:37:24		
Data Capture Date	31 Aug 2018 14:52:47		
User Filename	S040831---9A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	9	**-.9	15.00
H#, Total Counts:	180.6	570	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

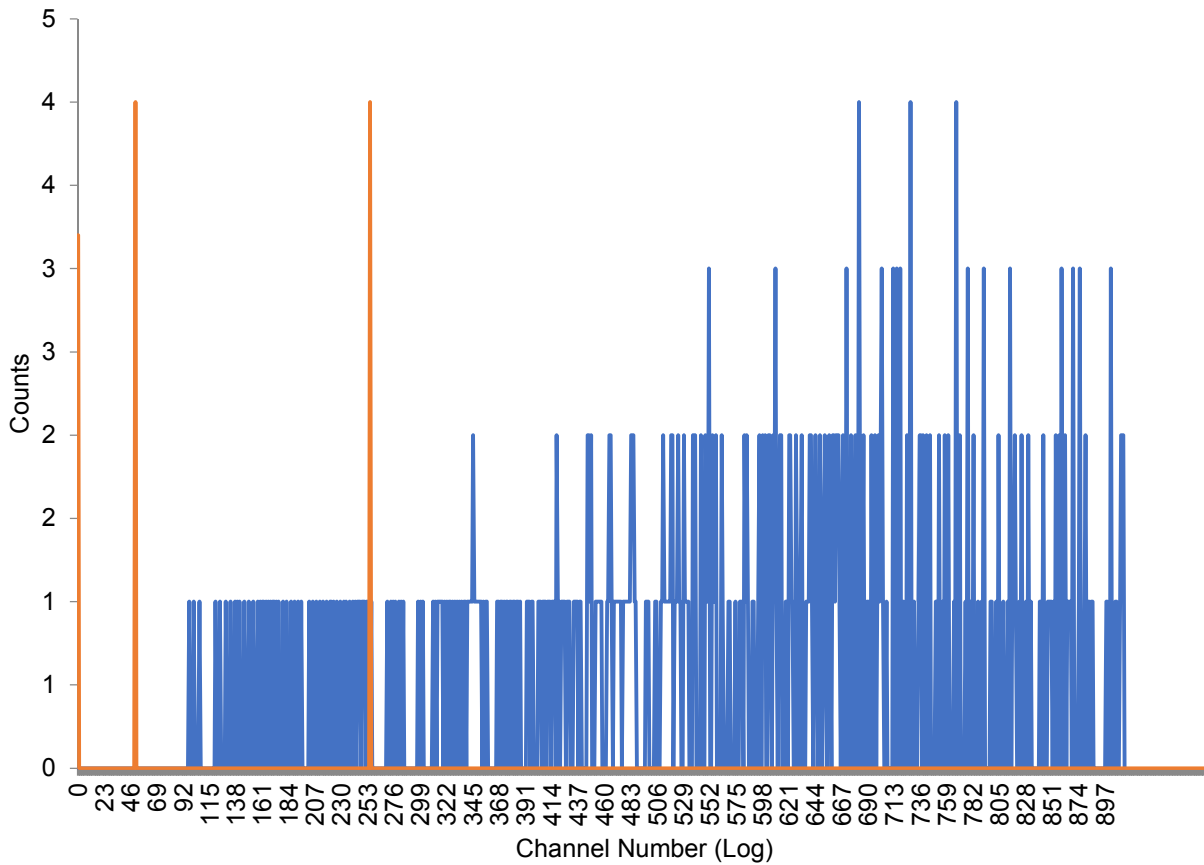
USER 04 - TRITIUM



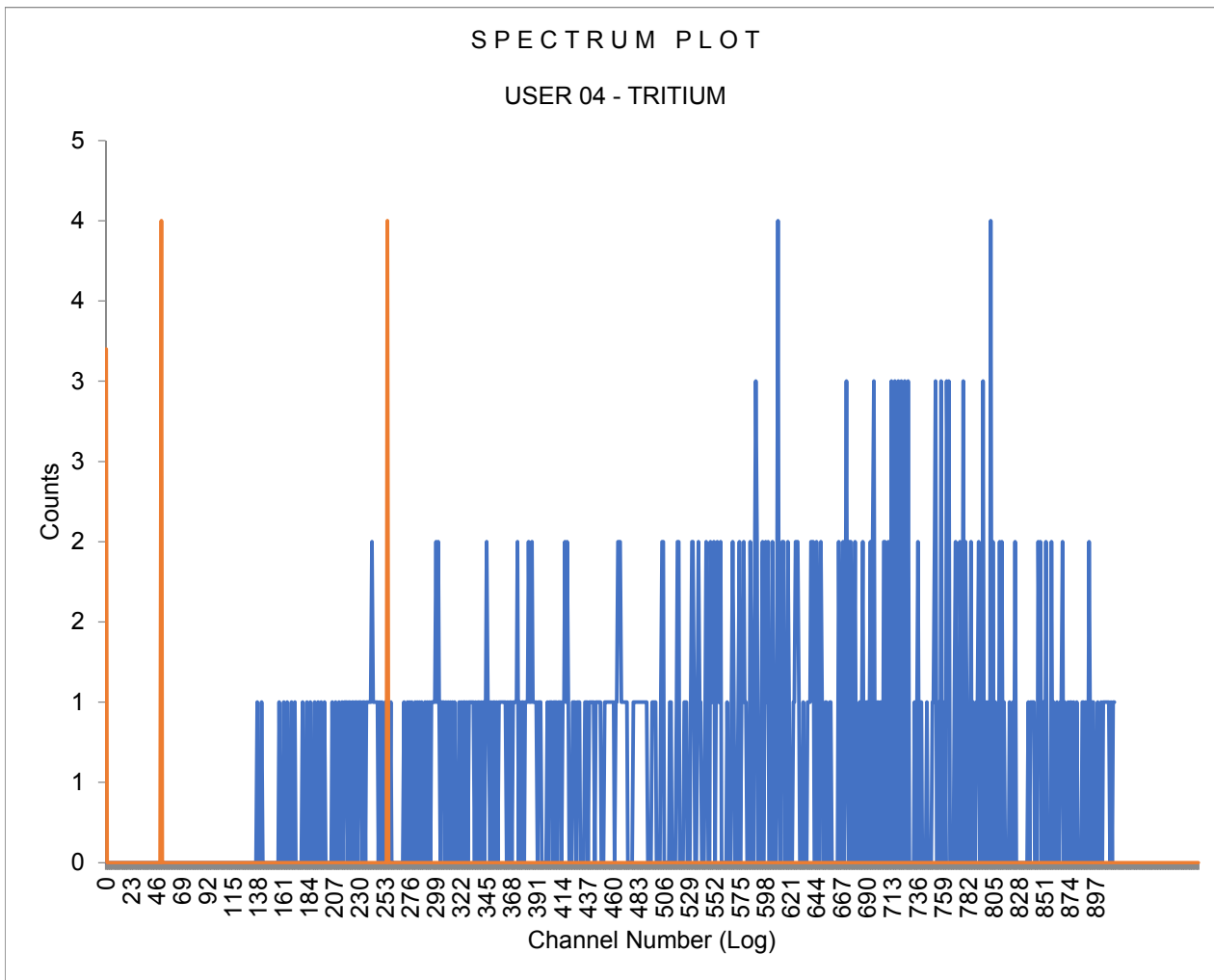
Sample Count Start Time: 31 Aug 2018 14:53:39  
 Data Capture Date: 31 Aug 2018 15:09:02  
 User Filename: S040831---10A.XLS  
 U040831---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 04  
 User Id: TRITIUM  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 10 \*\* -10 15.00  
 H#, Total Counts: 210.6 508  
 Win1: Tritium - Start, End: 50 255  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

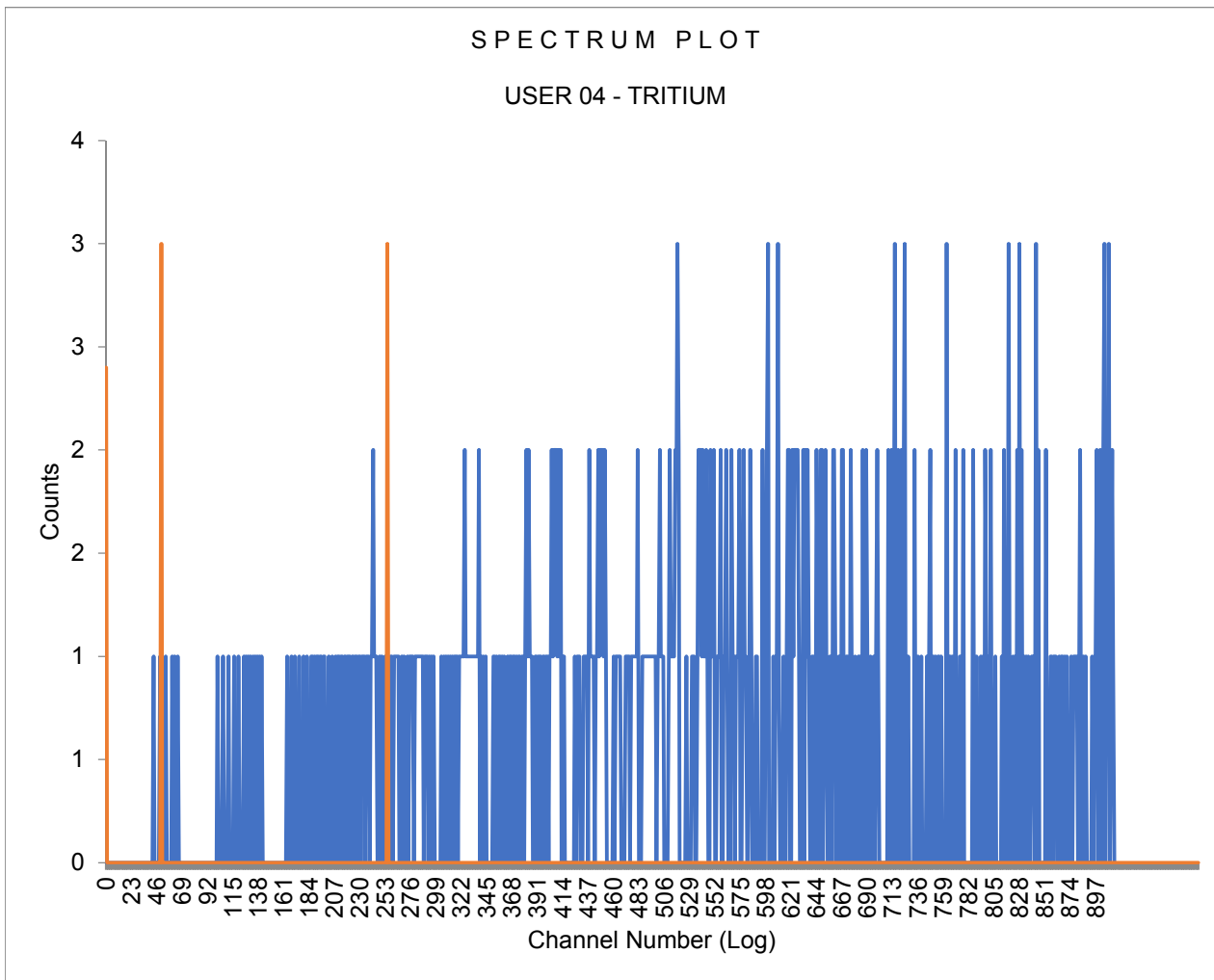
USER 04 - TRITIUM



Sample Count Start Time: 31 Aug 2018 15:09:56  
 Data Capture Date: 31 Aug 2018 15:25:18  
 User Filename: S040831---11A.XLS  
 U040831---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 04  
 User Id: TRITIUM  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 11 \*\* -11 15.00  
 H#, Total Counts: 175.4 514  
 Win1: Tritium - Start, End: 50 255  
 Win2: - Start, End: 0 990



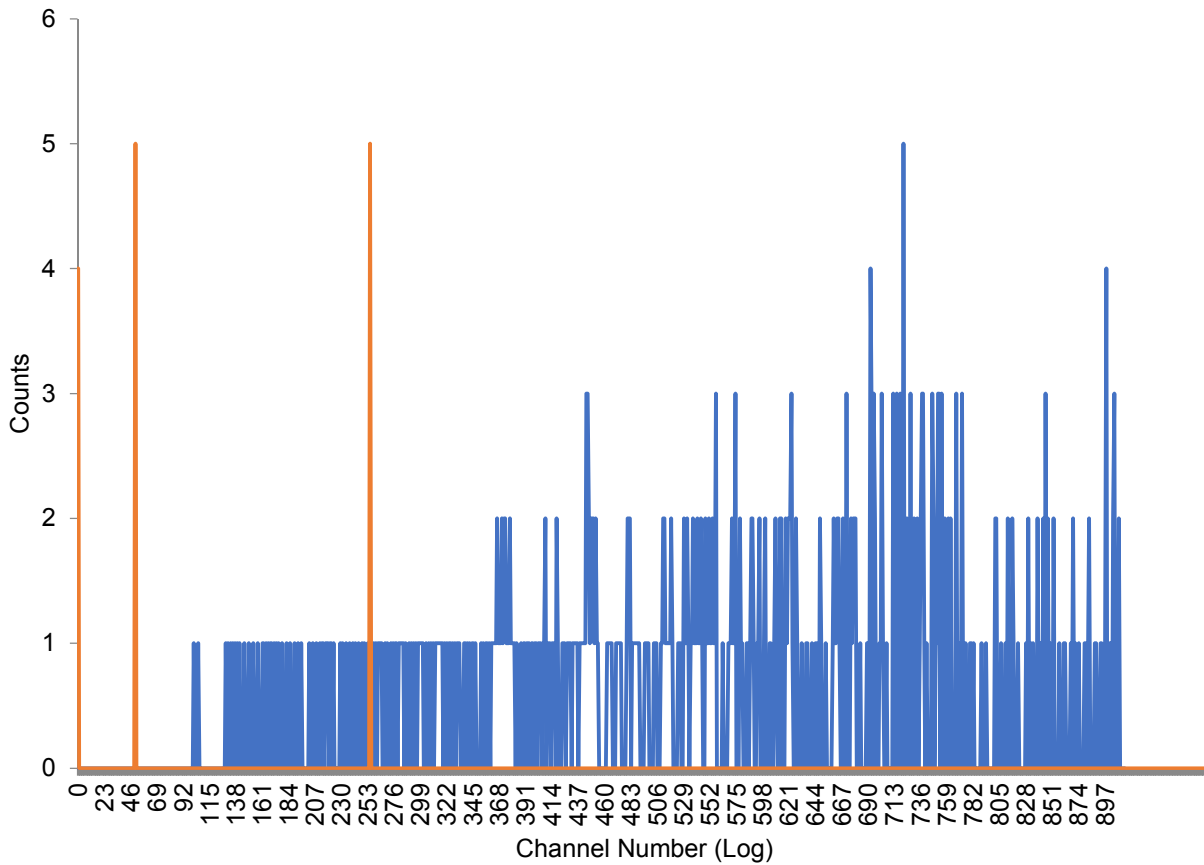
Sample Count Start Time:	31 Aug 2018 15:26:23		
Data Capture Date	31 Aug 2018 15:41:46		
User Filename	S040831---12A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	12	** -12	15.00
H#, Total Counts:	219.7	535	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



Sample Count Start Time:	31 Aug 2018 15:42:43		
Data Capture Date	31 Aug 2018 15:58:06		
User Filename	S04083135-1A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	13	35-1	15.00
H#, Total Counts:	177.5	534	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

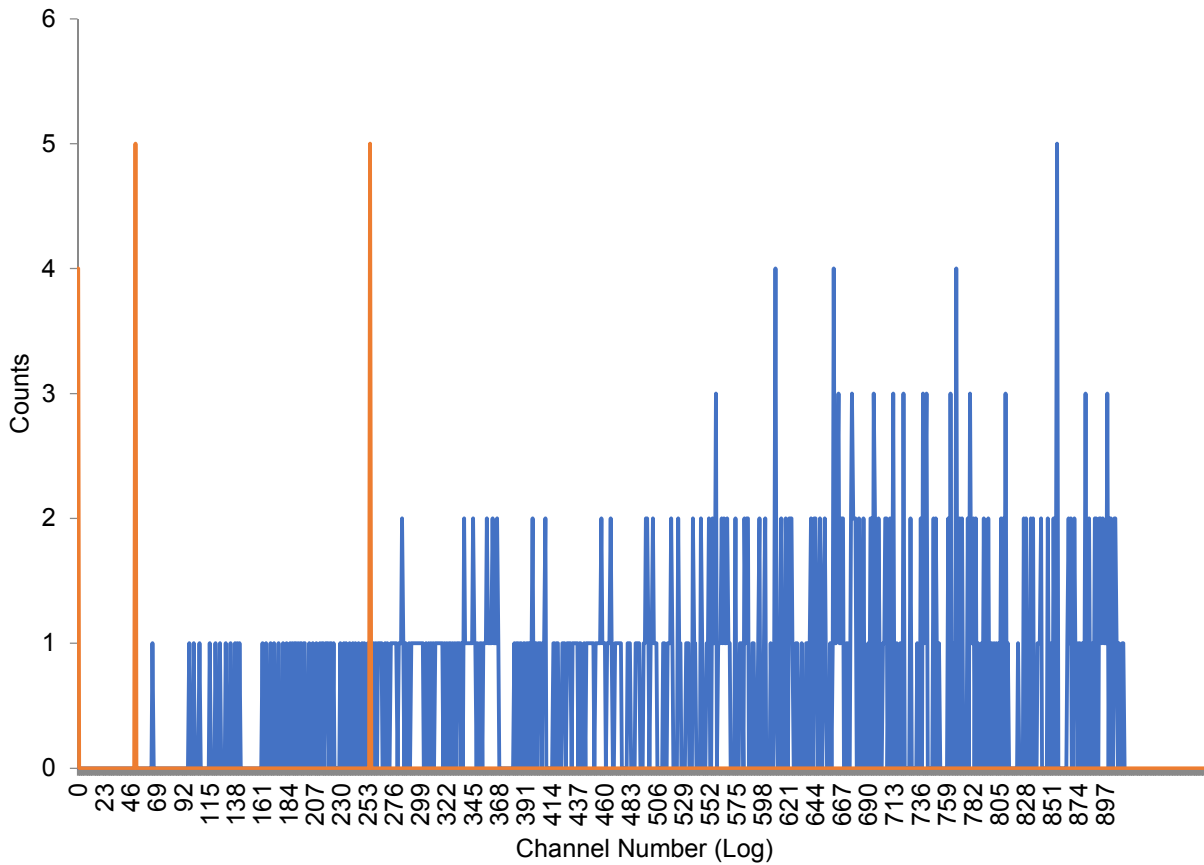
USER 04 - TRITIUM



Sample Count Start Time:	31 Aug 2018 15:58:58		
Data Capture Date	31 Aug 2018 16:14:22		
User Filename	S04083135-2A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	14	35-2	15.00
H#, Total Counts:	183.5	545	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

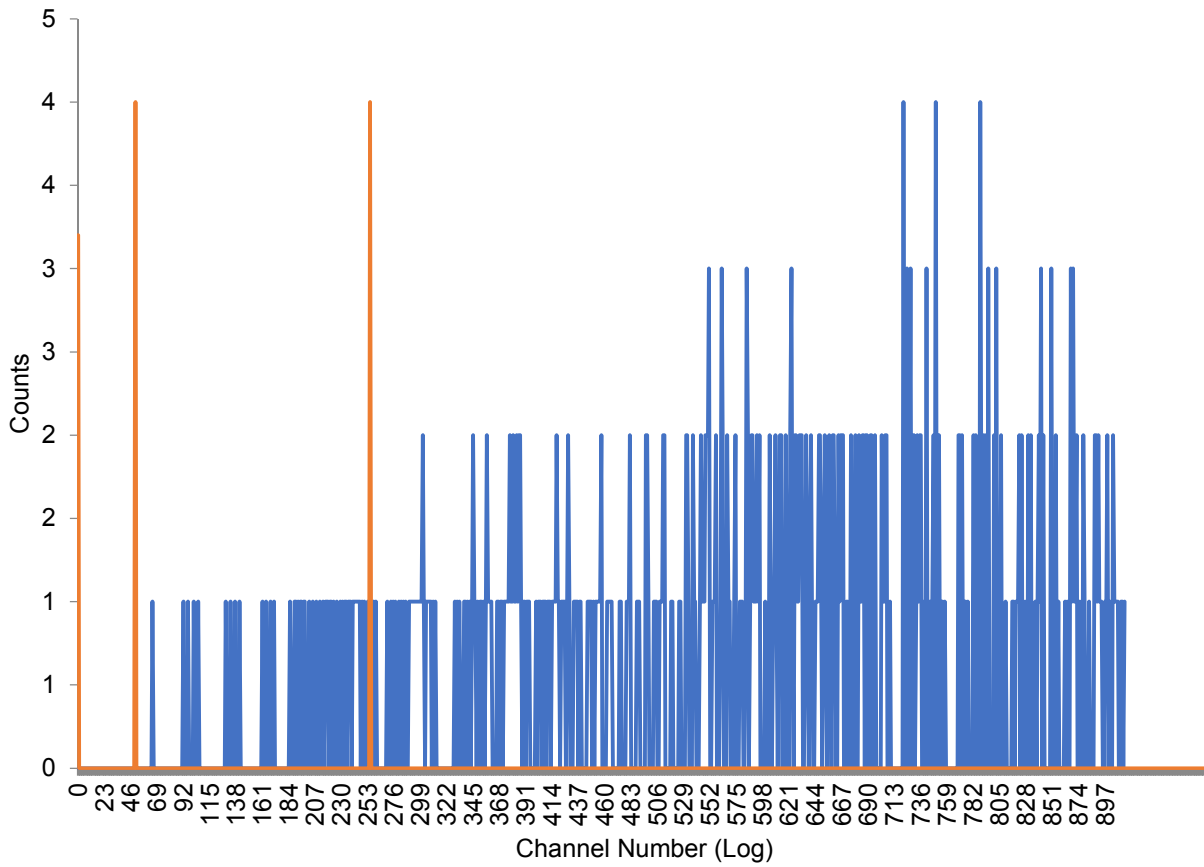
USER 04 - TRITIUM



Sample Count Start Time:	31 Aug 2018 16:15:18		
Data Capture Date	31 Aug 2018 16:30:40		
User Filename	S04083135-3A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	15	35-3	15.00
H#, Total Counts:	181.9	534	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

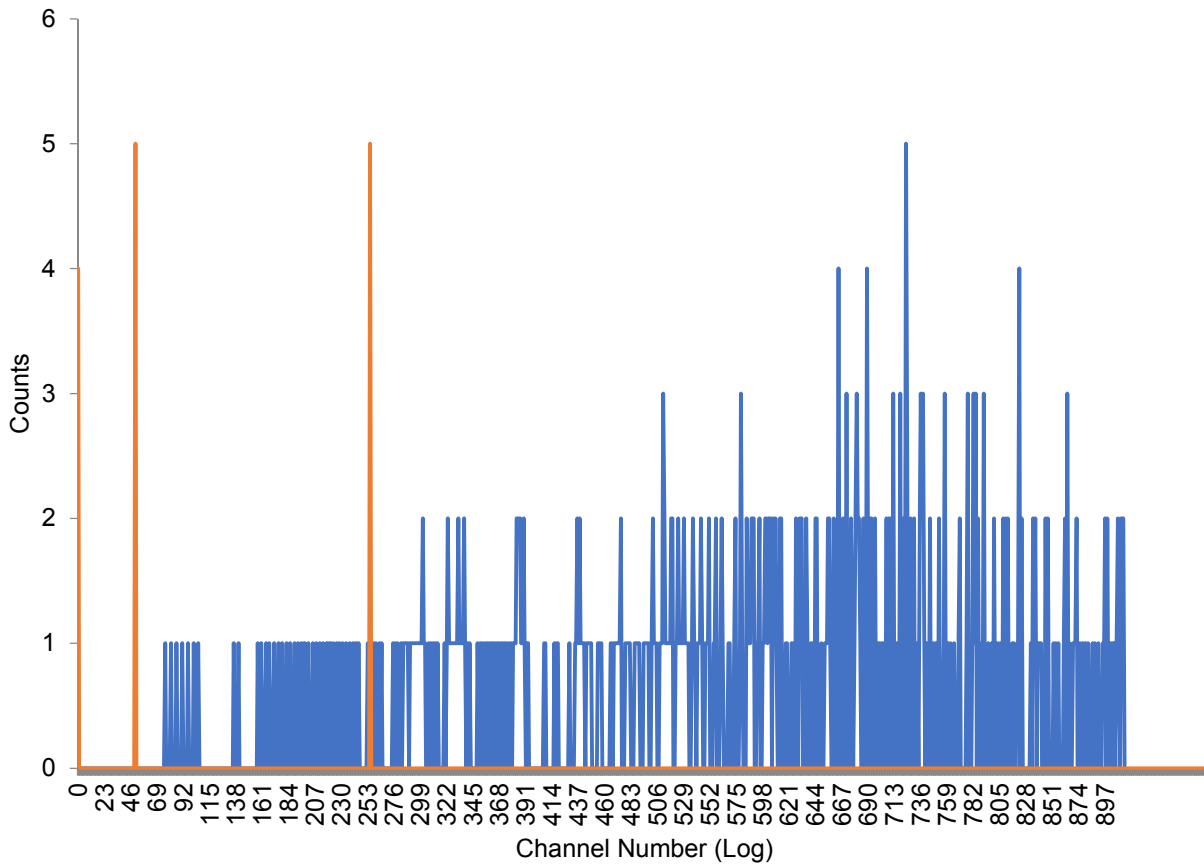
USER 04 - TRITIUM



Sample Count Start Time:	31 Aug 2018 16:31:33		
Data Capture Date	31 Aug 2018 16:46:56		
User Filename	S04083135-4A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	16	35-4	15.00
H#, Total Counts:	183.4	531	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

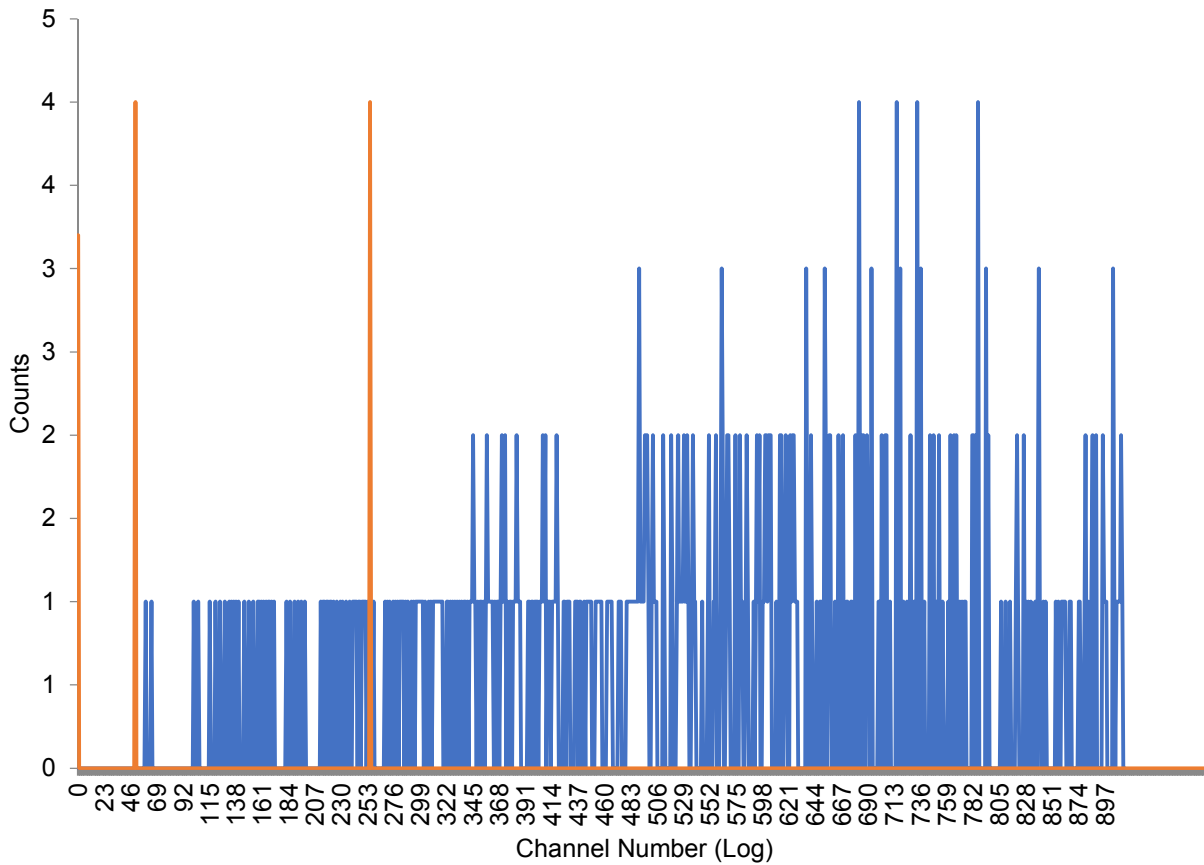
USER 04 - TRITIUM



Sample Count Start Time:	31 Aug 2018 16:47:48		
Data Capture Date	31 Aug 2018 17:03:10		
User Filename	S04083135-5A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	17	35-5	15.00
H#, Total Counts:	184.1	494	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

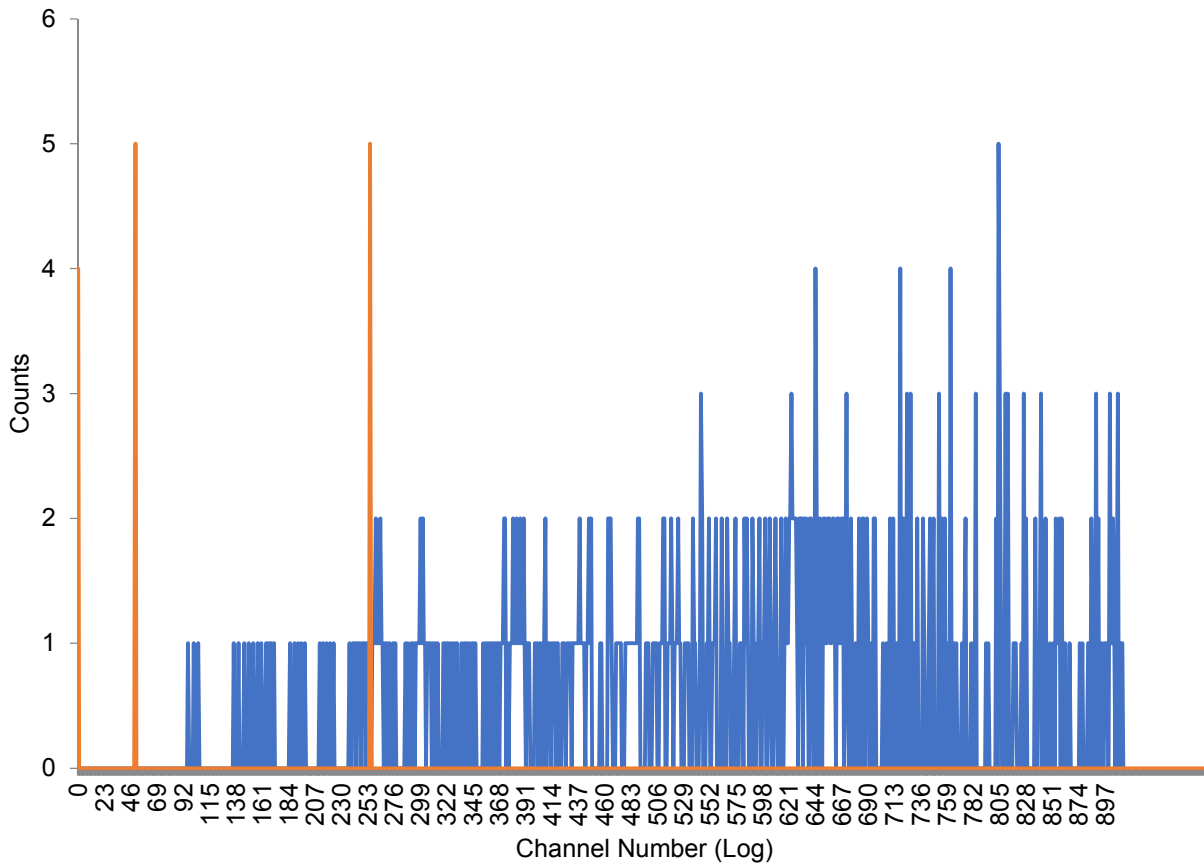
USER 04 - TRITIUM



Sample Count Start Time:	31 Aug 2018 17:04:03		
Data Capture Date	31 Aug 2018 17:19:26		
User Filename	S04083135-6A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	18	35-6	15.00
H#, Total Counts:	185.3	532	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

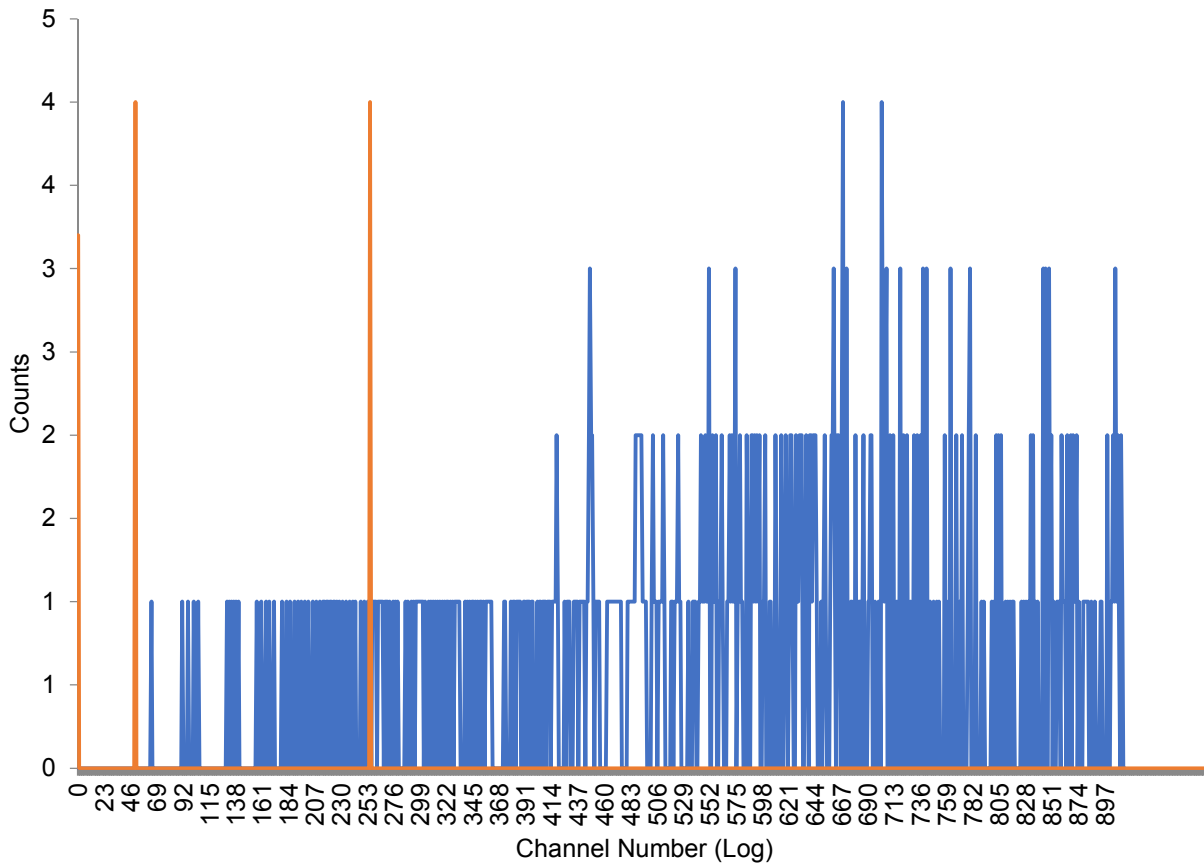
USER 04 - TRITIUM



Sample Count Start Time:	31 Aug 2018 17:20:27		
Data Capture Date	31 Aug 2018 17:35:50		
User Filename	S04083135-7A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	19	35-7	15.00
H#, Total Counts:	194.4	530	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

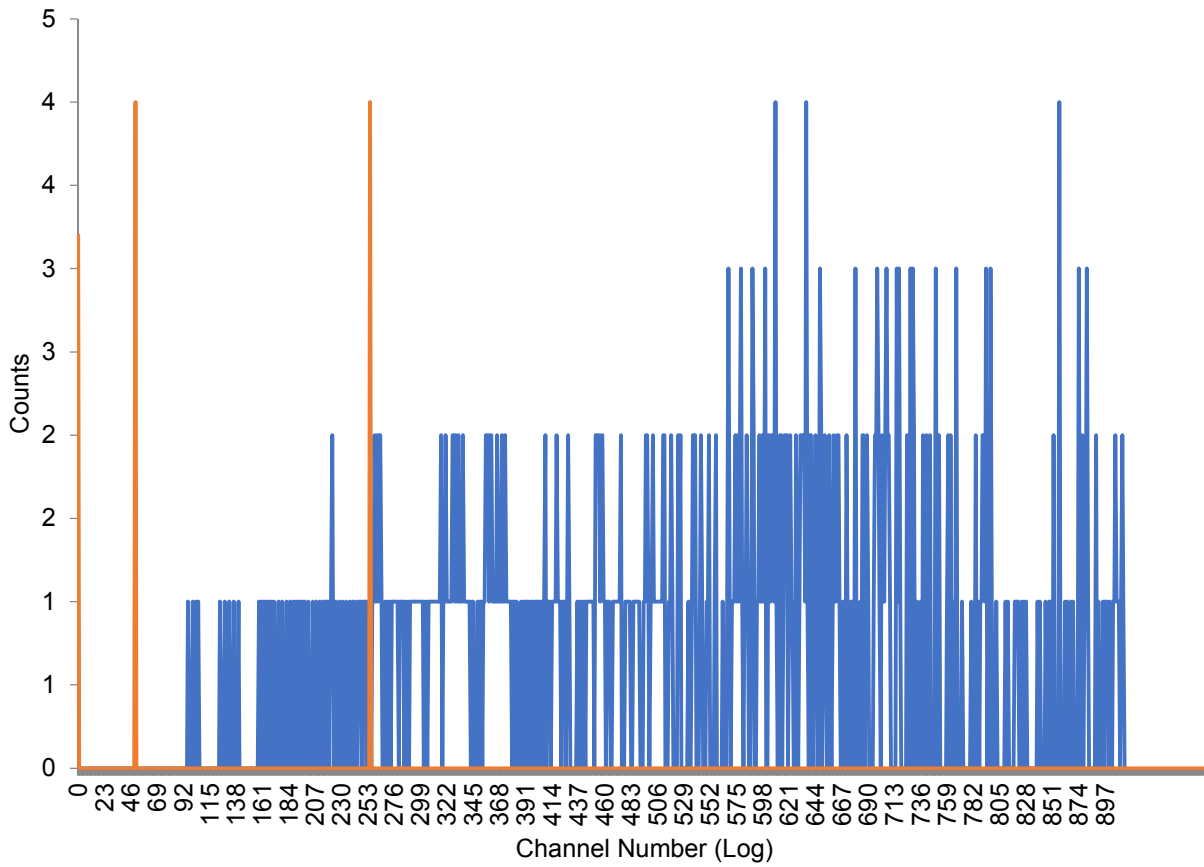
USER 04 - TRITIUM



Sample Count Start Time:	31 Aug 2018 17:36:43		
Data Capture Date	31 Aug 2018 17:52:06		
User Filename	S04083135-8A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	20	35-8	15.00
H#, Total Counts:	186.0	609	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

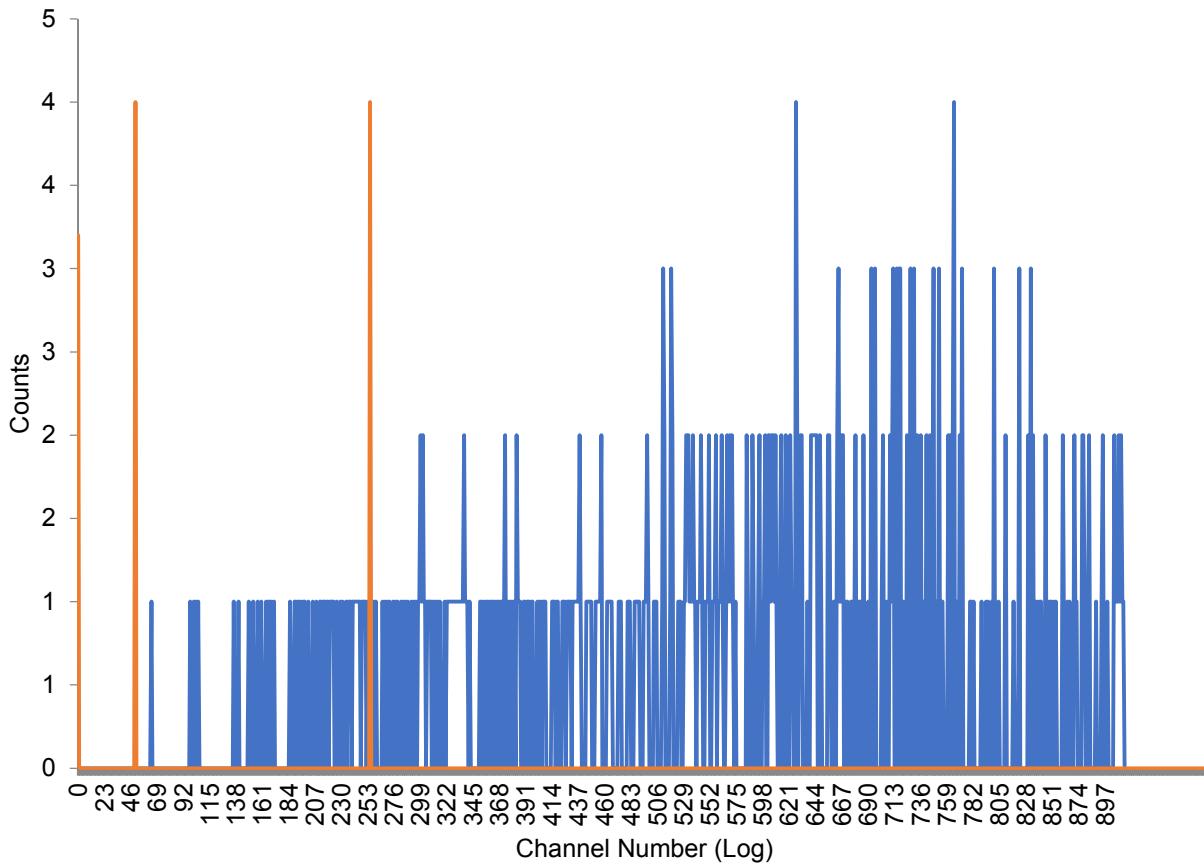
USER 04 - TRITIUM



Sample Count Start Time:	31 Aug 2018 17:52:58		
Data Capture Date	31 Aug 2018 18:08:21		
User Filename	S04083135-9A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	21	35-9	15.00
H#, Total Counts:	177.4	509	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

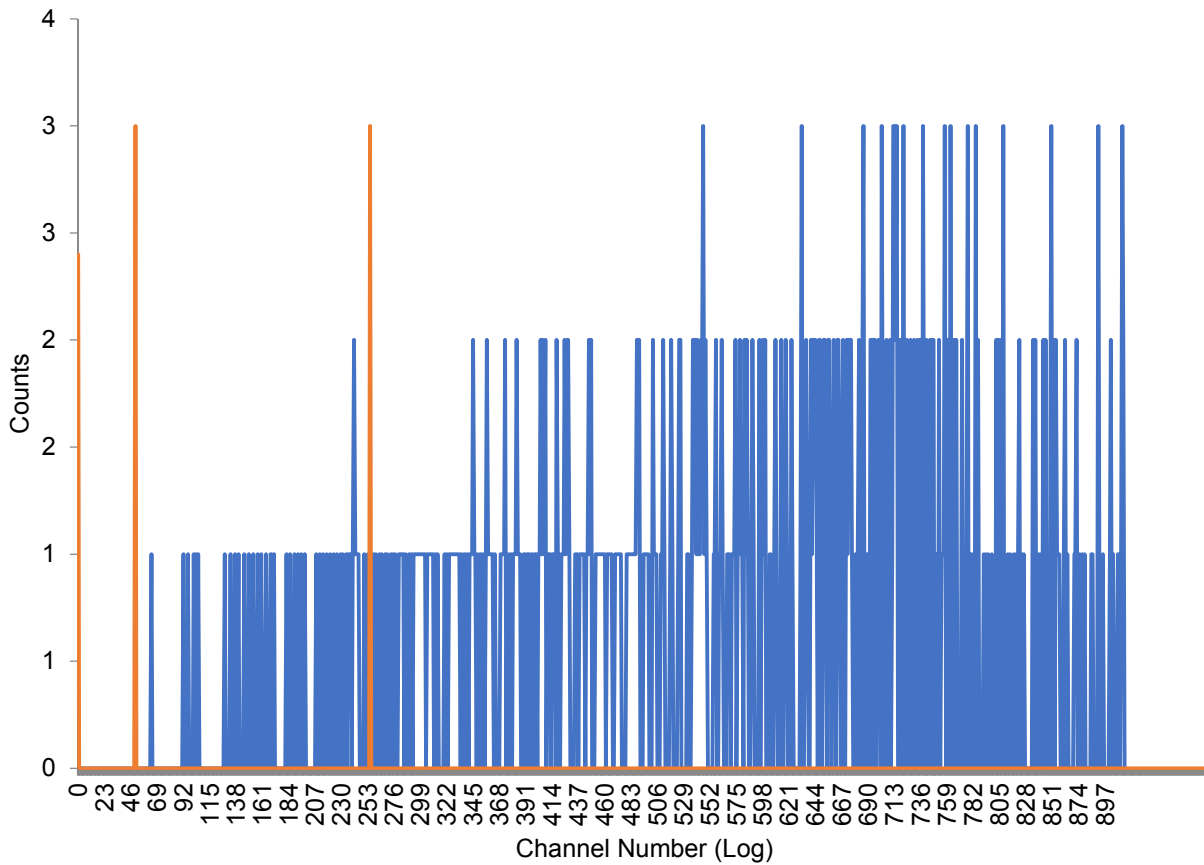
USER 04 - TRITIUM



Sample Count Start Time:	31 Aug 2018 18:09:12		
Data Capture Date	31 Aug 2018 18:24:35		
User Filename	S04083135-10A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	22	35-10	15.00
H#, Total Counts:	163.6	572	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

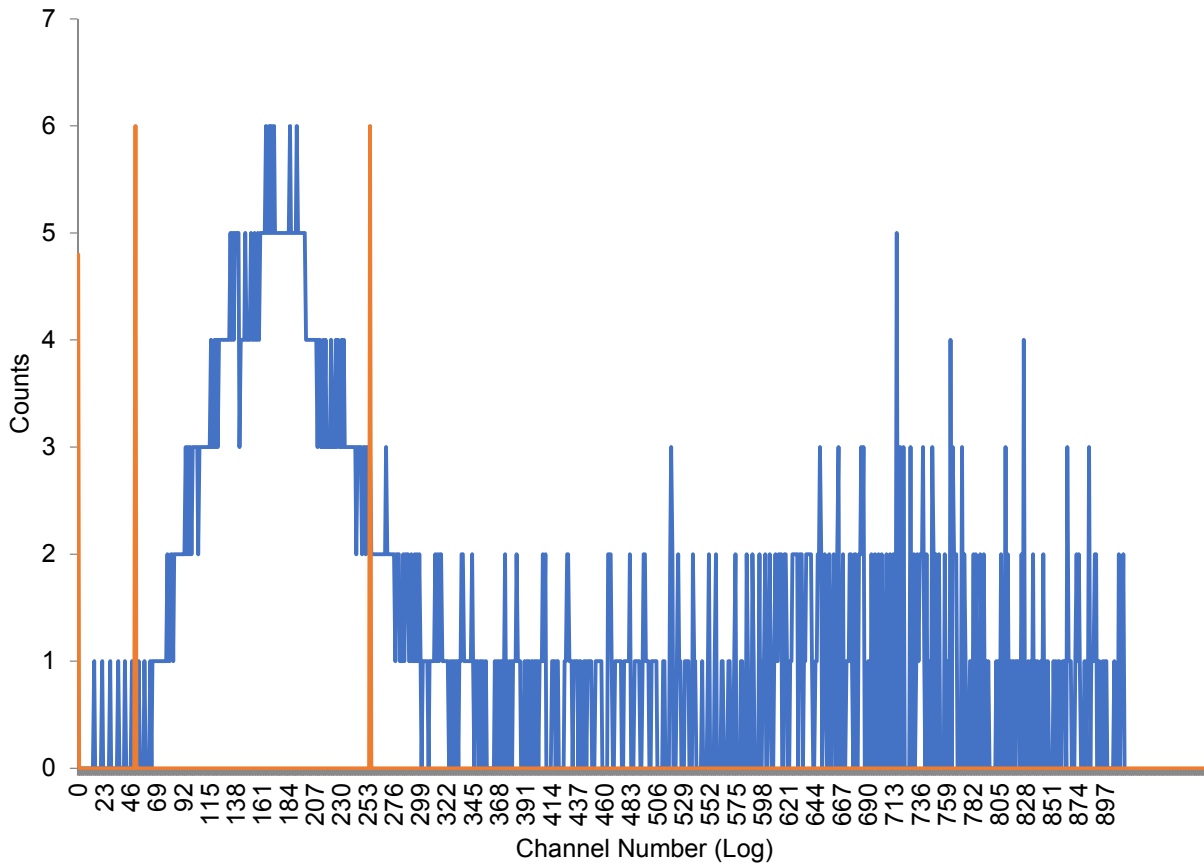
USER 04 - TRITIUM



Sample Count Start Time:	31 Aug 2018 18:25:25		
Data Capture Date	31 Aug 2018 18:40:48		
User Filename	S04083135-11A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	23	35-11	15.00
H#, Total Counts:	165.5	1249	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

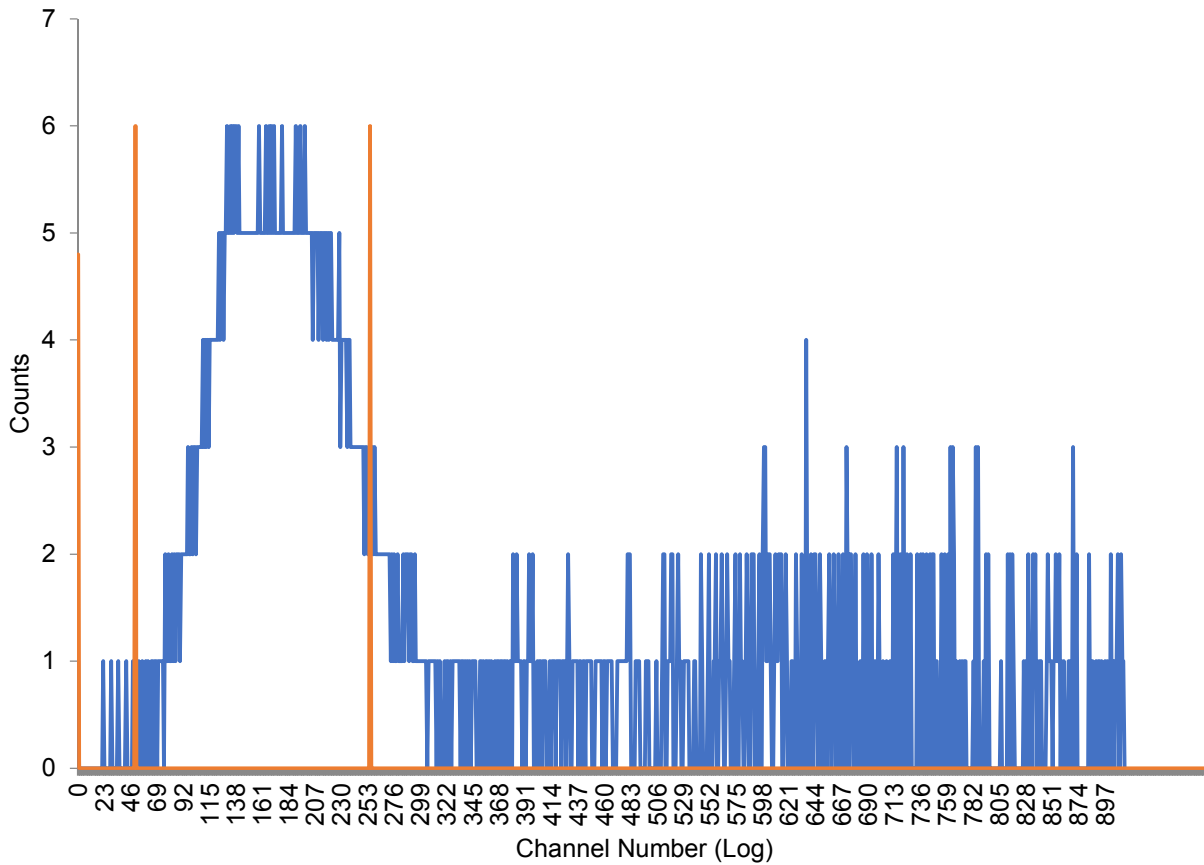
USER 04 - TRITIUM



Sample Count Start Time:	31 Aug 2018 18:41:39		
Data Capture Date	31 Aug 2018 18:57:02		
User Filename	S04083135-12A.XLS		
	U040831---1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	24	35-12	15.00
H#, Total Counts:	163.6	1263	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

USER 04 - TRITIUM



# Batch 1794252 Check-list

This check-list was completed on 04-SEP-18 by Lyndsey Pace

This batch was reviewed by Gregory Ramsay on 04-SEP-18 and Lyndsey Pace on 04-SEP-18.

**Batch ID:** 1794252

**Product:** LSC\_14CF

**Description:** Carbon-14 GL-RAD-A-003

#	Criteria	Yes	No	Comments
<b>Preparation Information</b>				
1	Were all of the samples homogenous?	Yes		
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
3	Are instrument source checks within limits?	Yes		
4	Have client special requirements have been reviewed and met?	Yes		
5	Has a hit notification been completed?		No	
6	Has an Aliquot Correction been completed for this batch?		No	
7	Have sample historical results been reviewed for this batch?	Yes		
<b>Technical Information</b>				
8	Were all the samples prepared/analyzed within the required holding time period?	Yes		
9	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
10	Was the method blank (MB) within the acceptance criteria?	Yes		
11	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
12	Were the relative percent differences and/or error (RPD/RER) between the LCS and the LCSD recoveries within the acceptance limits?	Yes		
13	Has the method required detection limit been met?	Yes		
<b>Miscellaneous Information</b>				
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

# Prep Logbook

## Carbon-14 in Filter

**Batch ID:** 1794252

**Analyst:** Tiffany Jordan (TXJ1)

**Method:** EPA EERF C-01 Modified

**Lab SOP:** GL-RAD-A-003 REV# 16

**Instrument:** Liquid Scintillation Counter  
No instrument-manual method

**Due Dates for Lab:** 02-SEP-2018

**Package:** 03-SEP-2018

**SDG:** 05-SEP-2018

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204095738	Carbon-14 SPIKE	1709-B	.1	mL
LCSD	1204095739	Carbon-14 SPIKE	1709-B	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/Filter)	Unadjusted Aliquot (g)	Aliquot (Filter)
1	457261001	31-AUG-2018	10	1	1
2	457261002	31-AUG-2018	10	1	1
3	457261003	31-AUG-2018	10	1	1
4	457261004	31-AUG-2018	10	1	1
5	457261005	31-AUG-2018	10	1	1
6	457261006	31-AUG-2018	10	1	1
7	457261007	31-AUG-2018	10	1	1
8	457261008	31-AUG-2018	10	1	1
9	457261009	31-AUG-2018	10	1	1
10	457261010	31-AUG-2018	10	1	1
11	457261011	31-AUG-2018	10	1	1
12	457261012	31-AUG-2018	10	1	1
13	457261013	31-AUG-2018	10	1	1
14	457261014	31-AUG-2018	10	1	1
15	457261015	31-AUG-2018	10	1	1
16	457261016	31-AUG-2018	10	1	1
17	457261017	31-AUG-2018	10	1	1
18	457261018	31-AUG-2018	10	1	1
19	457261019	31-AUG-2018	10	1	1
20	457261020	31-AUG-2018	10	1	1
21	1204095737 MB	31-AUG-2018	10	1	1
22	1204095738 LCS	31-AUG-2018	10	1	1
23	1204095739 LCSD	31-AUG-2018	10	1	1

Reagent/Solvent Lot ID	Description	Amount	Comments:
REGNT 2605985	Quenching Agent	30 uL	Spike Pipet ID: RAD-LSC-2970968 Data Entry Date2: 31-AUG-2018 00:00
REGNT 2631939.1	Ecoscint A Scintillation Solution	10 mL	
REGNT 2802942.1	Ethanolamine 99%	3 mL	
REGNT 2813676.2	Methanol 4L Plastic Bottle Reagent	9 mL	
REGNT 2815842	RL-0.4M Hydrochloric Acid	50 mL	
REGNT 2821312.4	99% For Analysis, 500g	5 g	
REGNT 2821417.11	HNO3	25 mL	
REGNT 2822318	RL-1M Silver Nitrate	2 mL	

### Carbon-14 Filter

Filename : C14.XLS  
 File type : Excel  
 Version # : 1.3.10

**Batch :** 1794252  
**Analyst :** TXJ1  
**Prep Date :** 8/31/2018  
**Method Uncertainty :** 0.0648

**Procedure Code :** LSC\_14CF  
**Parmname :** Carbon-14  
**Required MDA :** 10 pCi/F  
**C-14 Abundance :** 1.00  
**Halflife of Carbon-14 :** 5700.00 years

**Geometry:**  
 10mL DW/13mL Ecoscint Ultra/Swipe

Sample Characteristics					Count raw Data										
Pos.	Sample ID	Sample Aliquot F	Sample Aliquot StDev. F	Sample Date/Time	Rack Position #	Counting Time (min.)	Quench#	Gross cpm	Bkg cpm	Bkg Count Time (min.)	Bkg Quench#	Corrected Bkg cpm	Count Start Date/Time	C-14 Normalization Factor	Sample Decay
1	457261001.1	1.0000	2.0399E-05	8/9/2018 13:20	**2	15	179	10.47	8.87	15	163.3	8.8662	9/1/2018 7:59	1.00000	1.000
2	457261002.1	1.0000	2.0399E-05	8/9/2018 12:24	**3	15	165.2	8	8.87	15	163.3	8.8750	9/1/2018 8:15	1.00000	1.000
3	457261003.1	1.0000	2.0399E-05	8/9/2018 13:27	**4	15	193.6	9.6	8.87	15	163.3	8.7797	9/1/2018 8:31	1.00000	1.000
4	457261004.1	1.0000	2.0399E-05	8/9/2018 12:38	**5	15	184.8	11.73	8.87	15	163.3	8.8407	9/1/2018 8:48	1.00000	1.000
5	457261005.1	1.0000	2.0399E-05	8/9/2018 13:06	**6	15	199.3	10.2	8.87	15	163.3	8.7271	9/1/2018 9:04	1.00000	1.000
6	457261006.1	1.0000	2.0399E-05	8/9/2018 12:45	**7	15	181.6	8.8	8.87	15	163.3	8.8563	9/1/2018 9:20	1.00000	1.000
7	457261007.1	1.0000	2.0399E-05	8/9/2018 13:29	**8	15	192.8	9.47	8.87	15	163.3	8.7863	9/1/2018 9:36	1.00000	1.000
8	457261008.1	1.0000	2.0399E-05	8/9/2018 12:26	**9	15	177.7	8.27	8.87	15	163.3	8.8703	9/1/2018 9:53	1.00000	1.000
9	457261009.1	1.0000	2.0399E-05	8/9/2018 13:17	**10	15	201.1	9.27	8.87	15	163.3	8.7085	9/1/2018 10:09	1.00000	1.000
10	457261010.1	1.0000	2.0399E-05	8/9/2018 12:50	**11	15	177.1	7.33	8.87	15	163.3	8.8719	9/1/2018 10:25	1.00000	1.000
11	457261011.1	1.0000	2.0399E-05	8/9/2018 13:13	**12	15	219.5	8.73	8.87	15	163.3	8.4708	9/1/2018 10:41	1.00000	1.000
12	457261012.1	1.0000	2.0399E-05	8/9/2018 12:33	35-1	15	175.6	9.07	8.87	15	163.3	8.8754	9/1/2018 10:58	1.00000	1.000
13	457261013.1	1.0000	2.0399E-05	8/9/2018 13:33	35-2	15	188	8.8	8.87	15	163.3	8.8215	9/1/2018 11:14	1.00000	1.000
14	457261014.1	1.0000	2.0399E-05	8/9/2018 13:03	35-3	15	181.1	9	8.87	15	163.3	8.8584	9/1/2018 11:30	1.00000	1.000
15	457261015.1	1.0000	2.0399E-05	8/9/2018 13:35	35-4	15	184.4	9.2	8.87	15	163.3	8.8428	9/1/2018 11:46	1.00000	1.000
16	457261016.1	1.0000	2.0399E-05	8/9/2018 12:35	35-5	15	182.1	8.8	8.87	15	163.3	8.8541	9/1/2018 12:03	1.00000	1.000
17	457261017.1	1.0000	2.0399E-05	8/9/2018 13:08	35-6	15	188.7	8.13	8.87	15	163.3	8.8168	9/1/2018 12:19	1.00000	1.000
18	457261018.1	1.0000	2.0399E-05	8/9/2018 12:31	35-7	15	192.5	8.07	8.87	15	163.3	8.7887	9/1/2018 12:35	1.00000	1.000
19	457261019.1	1.0000	2.0399E-05	8/9/2018 13:22	35-8	15	187.1	10.93	8.87	15	163.3	8.8272	9/1/2018 12:51	1.00000	1.000
20	457261020.1	1.0000	2.0399E-05	8/9/2018 12:28	35-9	15	181.4	9.73	8.87	15	163.3	8.8571	9/1/2018 13:08	1.00000	1.000
21	1204095737.1	1.0000	2.0399E-05	8/31/2018 0:00	35-10	15	163.4	8.27	8.87	15	163.3	8.8703	9/1/2018 13:24	1.00000	1.000
22	1204095738.1	1.0000	2.0399E-05	8/31/2018 0:00	35-11	15	164.7	95.27	8.87	15	163.3	8.8738	9/1/2018 13:40	1.00000	1.000
23	1204095739.1	1.0000	2.0399E-05	8/31/2018 0:00	35-12	15	165.9	100.27	8.87	15	163.3	8.8764	9/1/2018 13:56	1.00000	1.000

Pipet, 0.1 ml Stdev : +/- 0.000200 ml  
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml

Analytical SOP: GL-RAD-A-003  
 Instrument SOP: GL-RAD-I-004

Calibration Data							
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Background Rack Position #	Background Count Start Date/Time
1	LSCGREEN	6/18/2018	6/30/2019	0.5695	0.00792	**1	9/1/2018 7:43
2	LSCGREEN	6/18/2018	6/30/2019	0.5413	0.00792	**1	9/1/2018 7:43
3	LSCGREEN	6/18/2018	6/30/2019	0.5934	0.00792	**1	9/1/2018 7:43
4	LSCGREEN	6/18/2018	6/30/2019	0.5798	0.00792	**1	9/1/2018 7:43
5	LSCGREEN	6/18/2018	6/30/2019	0.6007	0.00792	**1	9/1/2018 7:43
6	LSCGREEN	6/18/2018	6/30/2019	0.5743	0.00792	**1	9/1/2018 7:43
7	LSCGREEN	6/18/2018	6/30/2019	0.5923	0.00792	**1	9/1/2018 7:43
8	LSCGREEN	6/18/2018	6/30/2019	0.5671	0.00792	**1	9/1/2018 7:43
9	LSCGREEN	6/18/2018	6/30/2019	0.6028	0.00792	**1	9/1/2018 7:43
10	LSCGREEN	6/18/2018	6/30/2019	0.5659	0.00792	**1	9/1/2018 7:43
11	LSCGREEN	6/18/2018	6/30/2019	0.6152	0.00792	**1	9/1/2018 7:43
12	LSCGREEN	6/18/2018	6/30/2019	0.5630	0.00792	**1	9/1/2018 7:43
13	LSCGREEN	6/18/2018	6/30/2019	0.5851	0.00792	**1	9/1/2018 7:43
14	LSCGREEN	6/18/2018	6/30/2019	0.5734	0.00792	**1	9/1/2018 7:43
15	LSCGREEN	6/18/2018	6/30/2019	0.5792	0.00792	**1	9/1/2018 7:43
16	LSCGREEN	6/18/2018	6/30/2019	0.5751	0.00792	**1	9/1/2018 7:43
17	LSCGREEN	6/18/2018	6/30/2019	0.5862	0.00792	**1	9/1/2018 7:43
18	LSCGREEN	6/18/2018	6/30/2019	0.5919	0.00792	**1	9/1/2018 7:43
19	LSCGREEN	6/18/2018	6/30/2019	0.5836	0.00792	**1	9/1/2018 7:43
20	LSCGREEN	6/18/2018	6/30/2019	0.5739	0.00792	**1	9/1/2018 7:43
21	LSCGREEN	6/18/2018	6/30/2019	0.5373	0.00792	**1	9/1/2018 7:43
22	LSCGREEN	6/18/2018	6/30/2019	0.5402	0.00792	**1	9/1/2018 7:43
23	LSCGREEN	6/18/2018	6/30/2019	0.5429	0.00792	**1	9/1/2018 7:43

Notes:

- \* - Results are decay corrected to Sample Date/Time
- \* - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- \* - Spike Nominals are decay corrected to Sample Date/Time

**Spike S/N :** N/A  
**Spike Exp Date :** N/A  
**Spike Activity (dpm/ml):** N/A  
**Spike Volume Added:** N/A

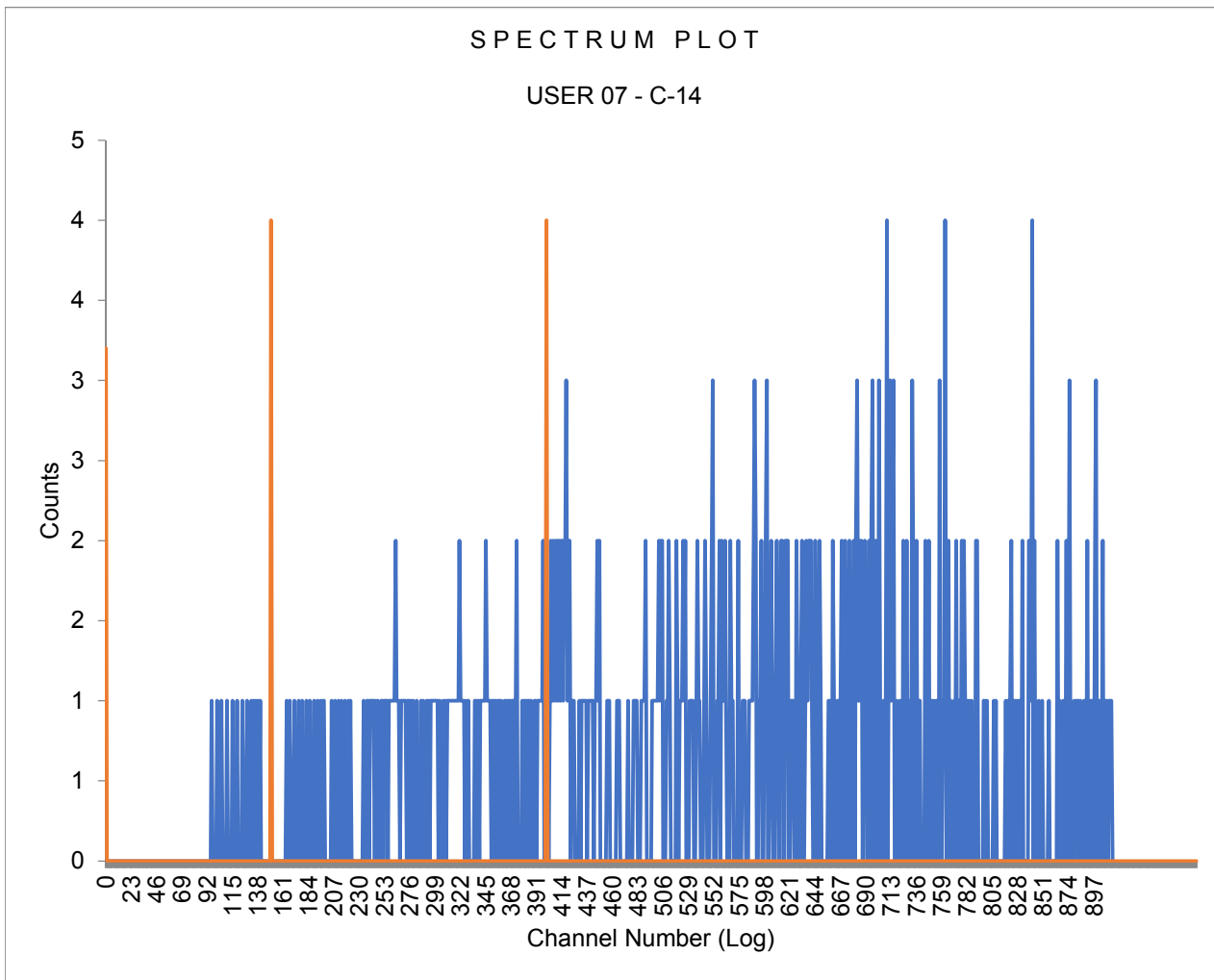
**LCS S/N :** 1709-B  
**LCS Exp Date :** 12/12/2018  
**LCS Activity (dpm/ml):** 1666.37  
**LCS Volume Added:** 0.10

Results																
Pos.	Decision Level pCi/F	Critical Level pCi/F	Required MDA pCi/F	MDA pCi/F	Sample Act. Conc. pCi/F	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/F	2 SIGMA Total Prop. Uncertainty pCi/F	Sample QC	Sample Type	RPD	RER	Nominal pCi/F	Recovery
1	2.0038	1.4147	10	2.9876	<b>1.2685</b>	70.80%	1.6038	1.1354	1.7602	1.7676		SAMPLE				
2	2.1091	1.4891	10	3.1446	<b>-0.7281</b>	121.22%	-0.8750	1.0607	1.7299	1.7299		SAMPLE				
3	1.9136	1.3510	10	2.8539	<b>0.6227</b>	134.94%	0.8203	1.1069	1.6469	1.6488		SAMPLE				
4	1.9652	1.3875	10	2.9303	<b>2.2446</b>	40.54%	2.8893	1.1711	1.7831	1.8061		SAMPLE				
5	1.8847	1.3306	10	2.8112	<b>1.1045</b>	76.27%	1.4729	1.1233	1.6509	1.6570		SAMPLE				
6	1.9861	1.4022	10	2.9613	<b>-0.0442</b>	1927.45%	-0.0563	1.0849	1.6680	1.6680		SAMPLE				
7	1.9180	1.3541	10	2.8603	<b>0.5200</b>	161.35%	0.6837	1.1032	1.6445	1.6458		SAMPLE				
8	2.0129	1.4211	10	3.0011	<b>-0.4769</b>	178.08%	-0.6003	1.0690	1.6644	1.6644		SAMPLE				
9	1.8763	1.3247	10	2.7989	<b>0.4196</b>	194.98%	0.5615	1.0948	1.6036	1.6045		SAMPLE				
10	2.0172	1.4241	10	3.0075	<b>-1.2274</b>	67.41%	-1.5419	1.0393	1.6214	1.6215		SAMPLE				
11	1.8131	1.2801	10	2.7066	<b>0.1898</b>	413.06%	0.2592	1.0708	1.5368	1.5370		SAMPLE				
12	2.0280	1.4318	10	3.0236	<b>0.1557</b>	562.20%	0.1946	1.0938	1.7153	1.7154		SAMPLE				
13	1.9455	1.3735	10	2.9011	<b>-0.0165</b>	5048.11%	-0.0215	1.0839	1.6356	1.6356		SAMPLE				
14	1.9894	1.4046	10	2.9662	<b>0.1112</b>	770.55%	0.1416	1.0911	1.6802	1.6802		SAMPLE				
15	1.9678	1.3893	10	2.9341	<b>0.2778</b>	307.06%	0.3572	1.0967	1.6719	1.6723		SAMPLE				
16	1.9827	1.3998	10	2.9563	<b>-0.0424</b>	2005.69%	-0.0541	1.0849	1.6653	1.6654		SAMPLE				
17	1.9413	1.3706	10	2.8949	<b>-0.5278</b>	154.76%	-0.6868	1.0629	1.6009	1.6009		SAMPLE				
18	1.9196	1.3553	10	2.8627	<b>-0.5470</b>	147.51%	-0.7187	1.0601	1.5814	1.5814		SAMPLE				
19	1.9509	1.3774	10	2.9091	<b>1.6229</b>	54.58%	2.1028	1.1477	1.7361	1.7485		SAMPLE				
20	1.9874	1.4031	10	2.9632	<b>0.6851</b>	127.53%	0.8729	1.1132	1.7125	1.7147		SAMPLE				
21	2.1242	1.4997	10	3.1671	<b>-0.5032</b>	178.07%	-0.6003	1.0690	1.7564	1.7564		MB				
22	2.1133	1.4920	10	3.1508	<b>72.0397</b>	3.15%	86.3962	2.6349	4.3063	10.1740		LCS			75.0617	96.0%
23	2.1033	1.4850	10	3.1359	<b>75.8366</b>	3.06%	91.3936	2.6975	4.3871	10.6492		LCSD	5.1%		75.0617	101.0%

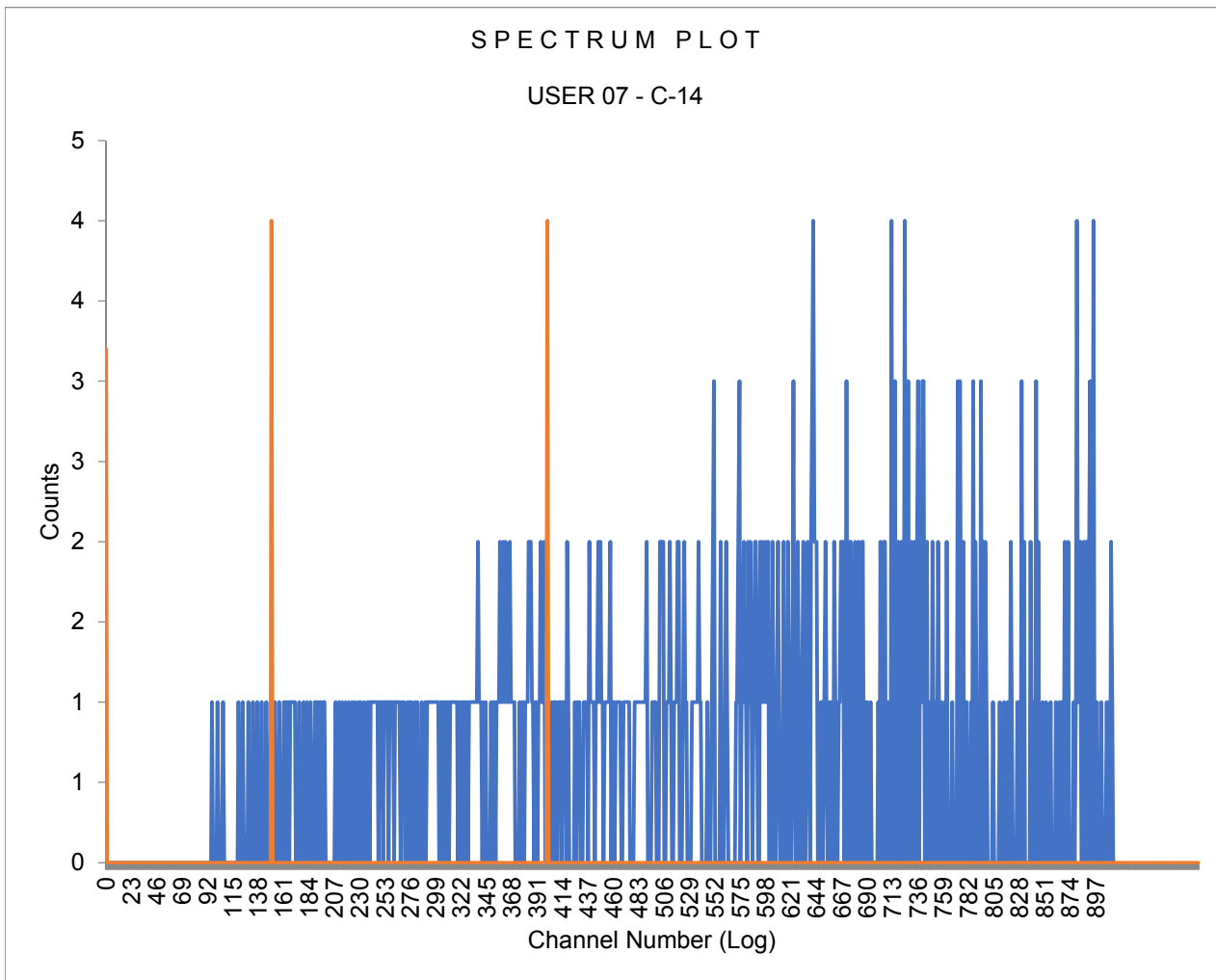
U070901---1A

SampleID	Rack	Time (min.)	H#	CPM Iso1	CPM Iso2	LumEx	Count Start Time	Count End Time	Machine
**_1		15	163.3	8.87	35.00	0.10	9/1/2018 7:43	9/1/2018 7:58	GREEN
**_2		15	179.0	10.47	37.33	0.21	9/1/2018 7:59	9/1/2018 8:14	GREEN
**_3		15	165.2	8.00	34.73	0.16	9/1/2018 8:15	9/1/2018 8:30	GREEN
**_4		15	193.6	9.60	35.47	0.15	9/1/2018 8:31	9/1/2018 8:46	GREEN
**_5		15	184.8	11.73	39.73	0.27	9/1/2018 8:48	9/1/2018 9:03	GREEN
**_6		15	199.3	10.20	40.33	0.30	9/1/2018 9:04	9/1/2018 9:19	GREEN
**_7		15	181.6	8.80	32.67	0.17	9/1/2018 9:20	9/1/2018 9:35	GREEN
**_8		15	192.8	9.47	35.40	0.20	9/1/2018 9:36	9/1/2018 9:51	GREEN
**_9		15	177.7	8.27	34.07	0.72	9/1/2018 9:53	9/1/2018 10:08	GREEN
**_10		15	201.1	9.27	33.27	0.20	9/1/2018 10:09	9/1/2018 10:24	GREEN
**_11		15	177.1	7.33	34.60	0.35	9/1/2018 10:25	9/1/2018 10:40	GREEN
**_12		15	219.5	8.73	35.80	0.85	9/1/2018 10:41	9/1/2018 10:56	GREEN
35-1		15	175.6	9.07	34.47	0.13	9/1/2018 10:58	9/1/2018 11:13	GREEN
35-2		15	188.0	8.80	35.47	0.17	9/1/2018 11:14	9/1/2018 11:29	GREEN
35-3		15	181.1	9.00	34.87	0.53	9/1/2018 11:30	9/1/2018 11:45	GREEN
35-4		15	184.4	9.20	35.00	0.30	9/1/2018 11:46	9/1/2018 12:01	GREEN
35-5		15	182.1	8.80	35.20	0.15	9/1/2018 12:03	9/1/2018 12:18	GREEN
35-6		15	188.7	8.13	33.53	0.30	9/1/2018 12:19	9/1/2018 12:34	GREEN
35-7		15	192.5	8.07	33.80	0.26	9/1/2018 12:35	9/1/2018 12:50	GREEN
35-8		15	187.1	10.93	37.20	0.28	9/1/2018 12:51	9/1/2018 13:06	GREEN
35-9		15	181.4	9.73	33.53	0.21	9/1/2018 13:08	9/1/2018 13:23	GREEN
35-10		15	163.4	8.27	32.60	0.09	9/1/2018 13:24	9/1/2018 13:39	GREEN
35-11		15	164.7	95.27	175.47	0.02	9/1/2018 13:40	9/1/2018 13:55	GREEN
35-12		15	165.9	100.27	179.00	0.02	9/1/2018 13:56	9/1/2018 14:11	GREEN

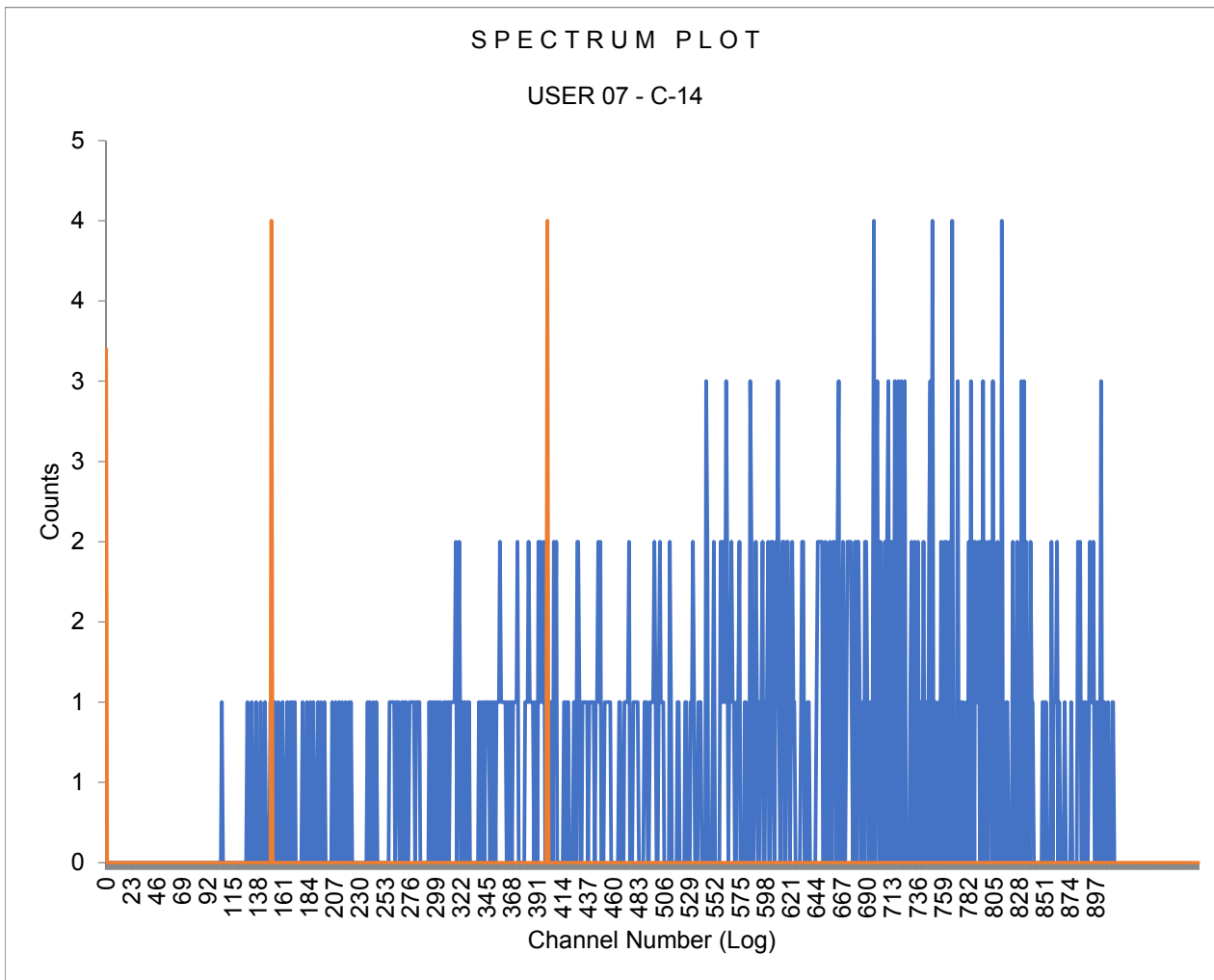
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 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 1 \*\*-.1 15.00  
 H#, Total Counts: 163.3 534  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



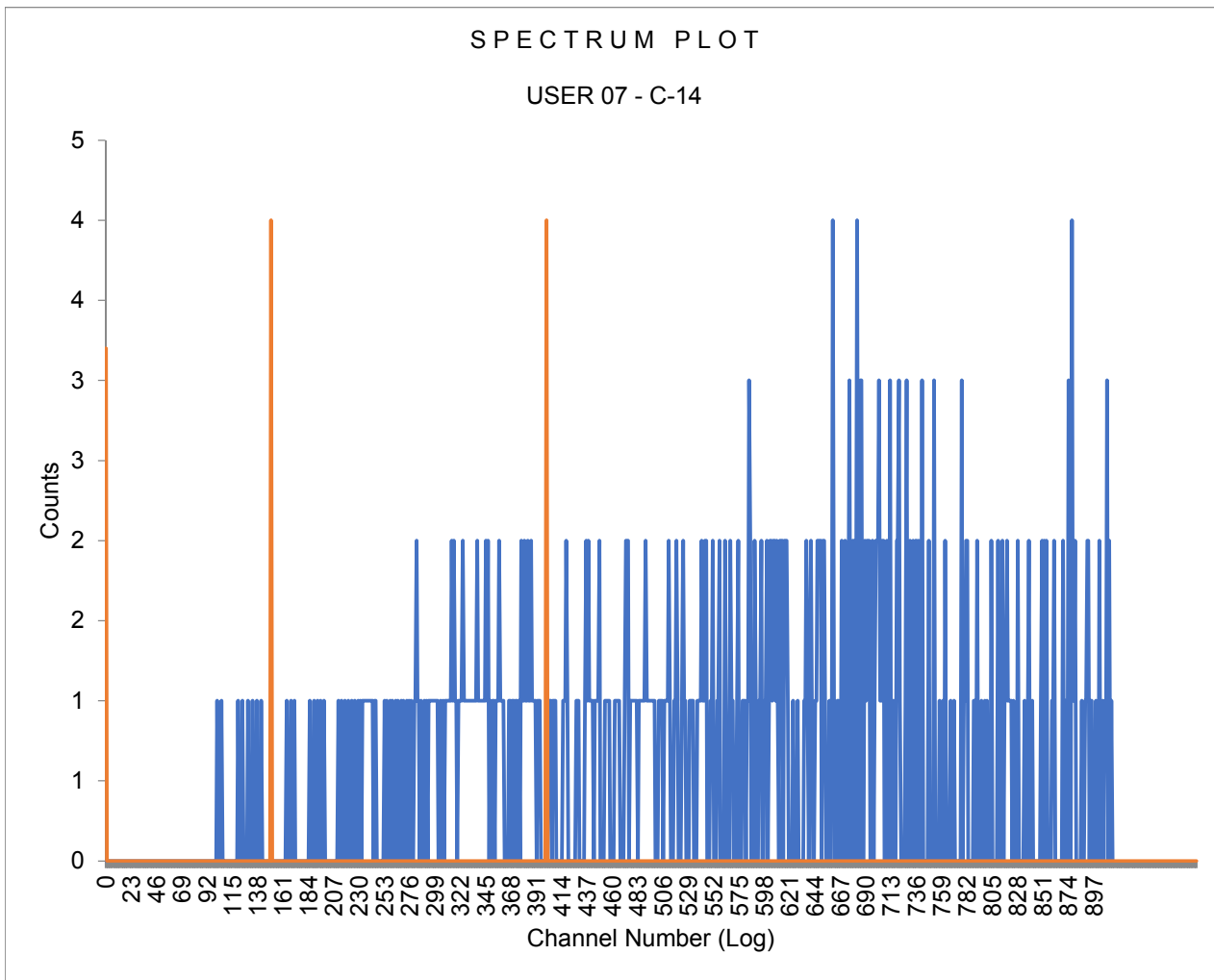
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 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 2 \*\* -2 15.00  
 H#, Total Counts: 179.0 566  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



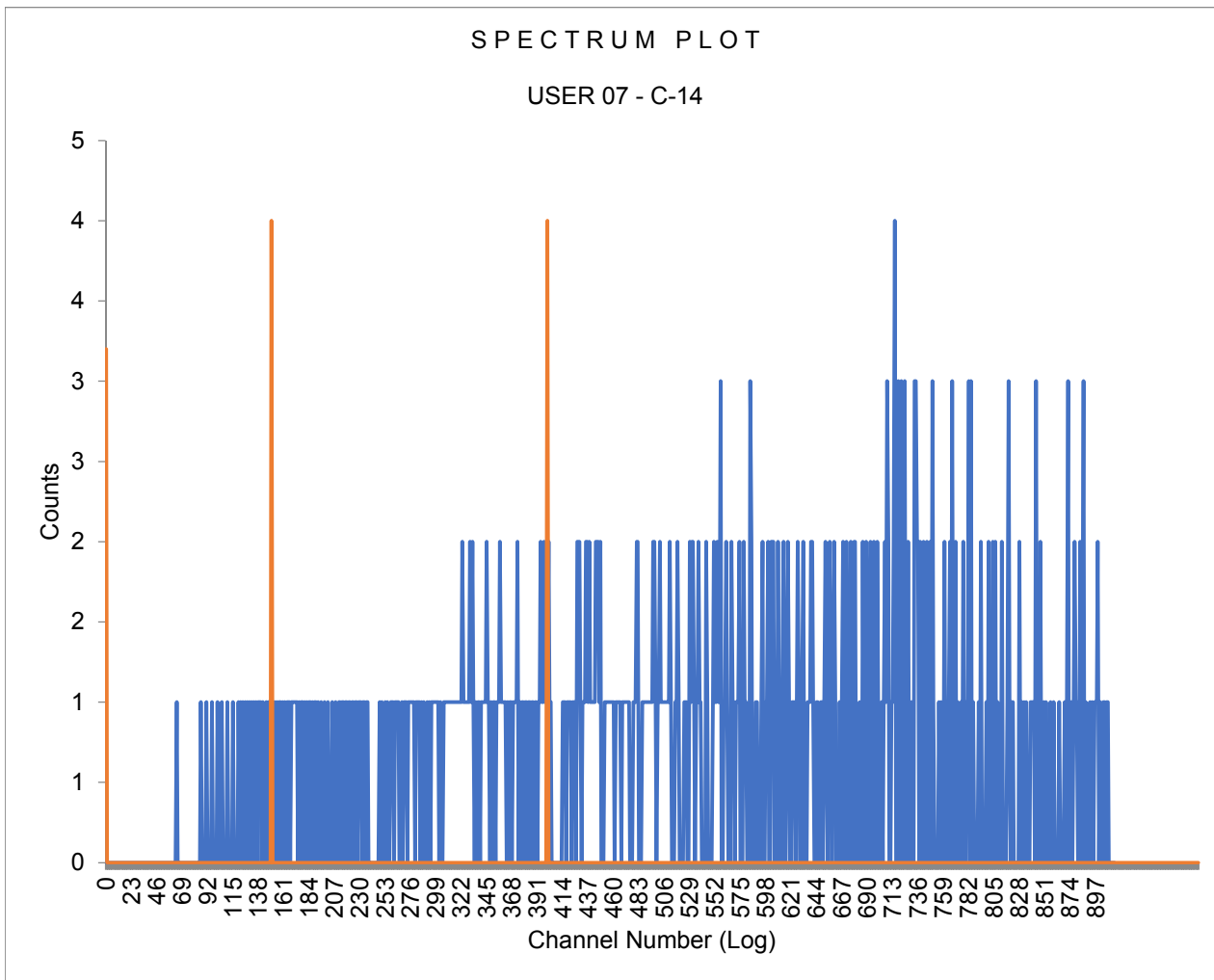
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 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 3 \*\* -3 15.00  
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 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



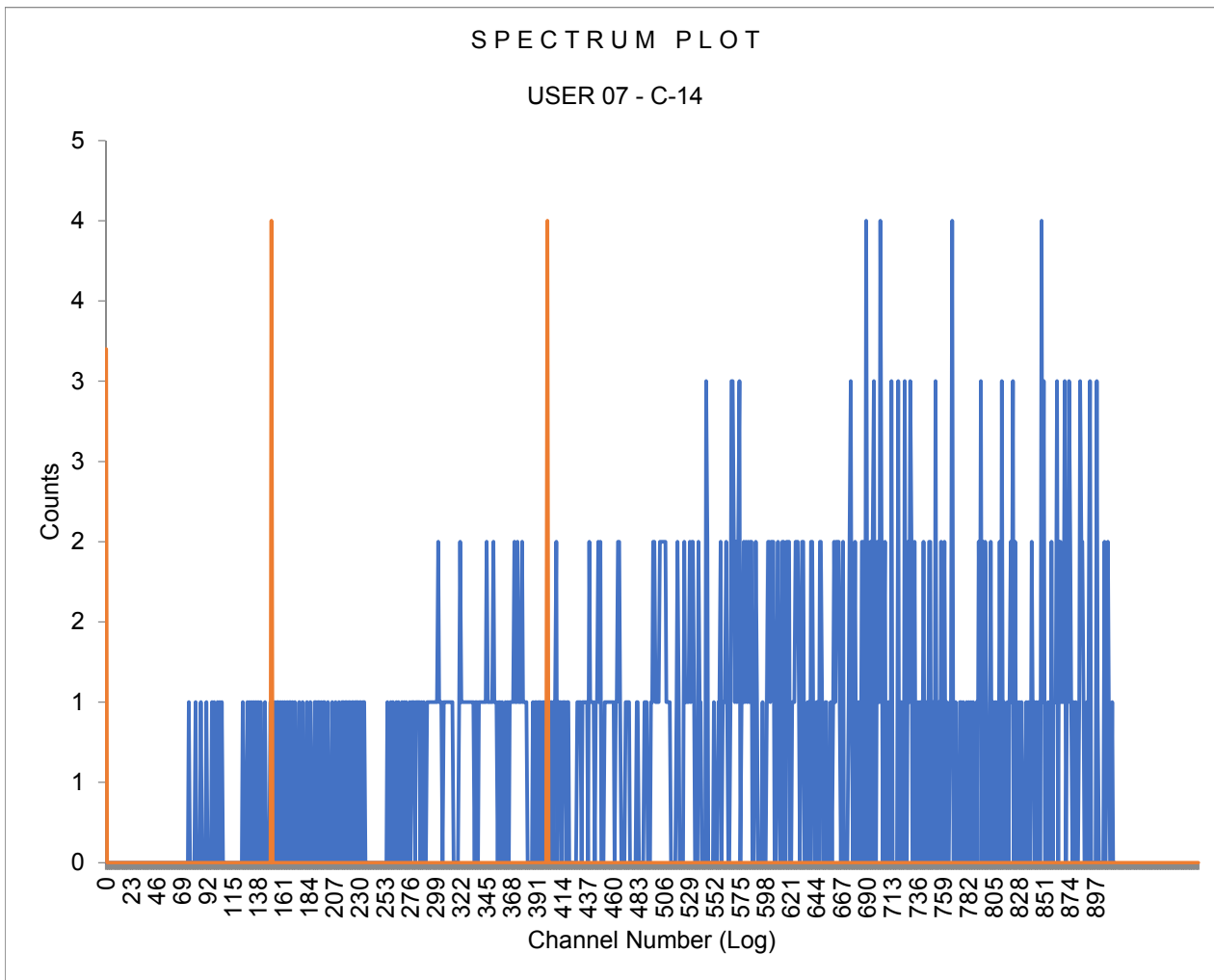
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 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 4 \*\* -4 15.00  
 H#, Total Counts: 193.6 543  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



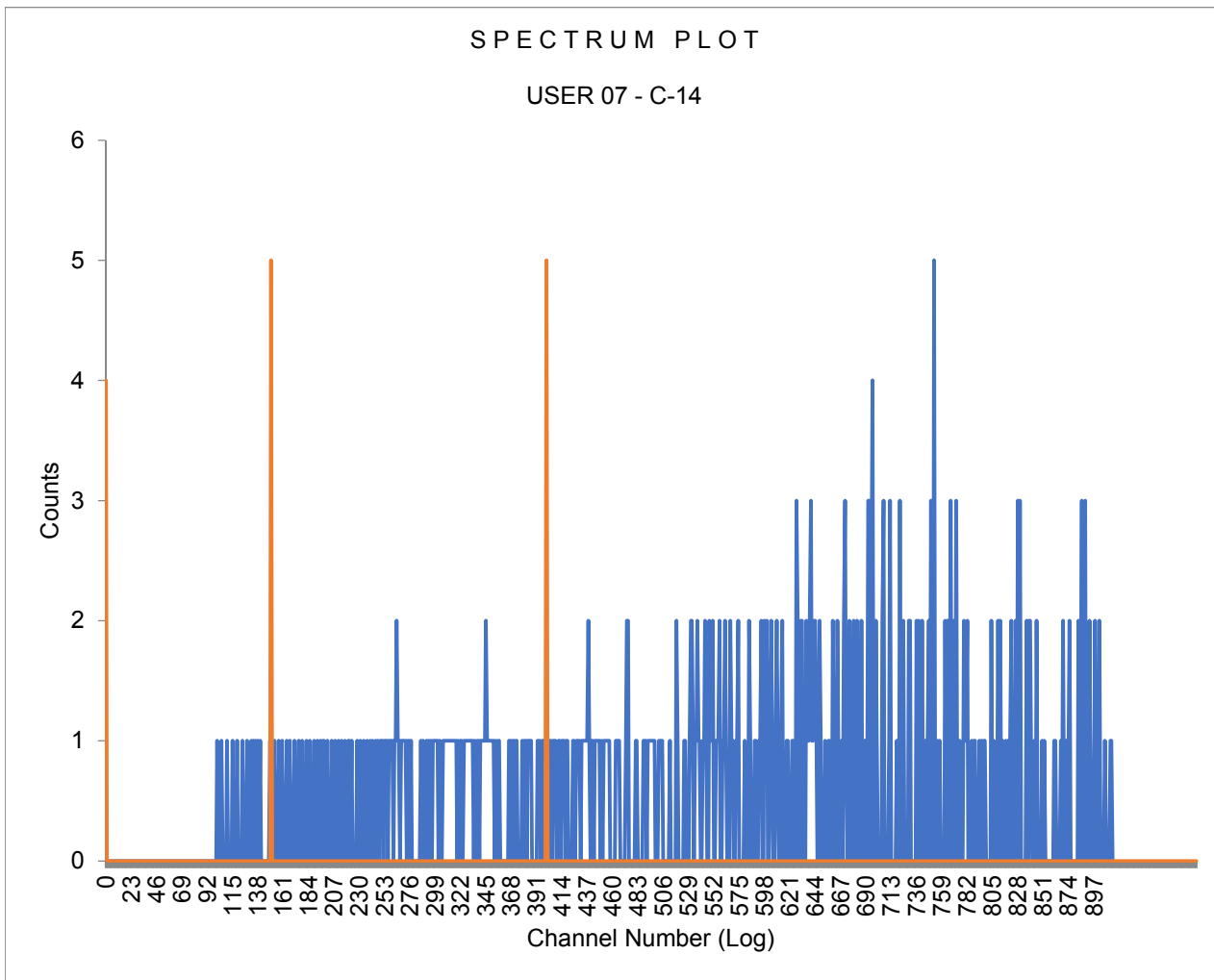
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 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 5 \*\*-.5 15.00  
 H#, Total Counts: 184.8 601  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



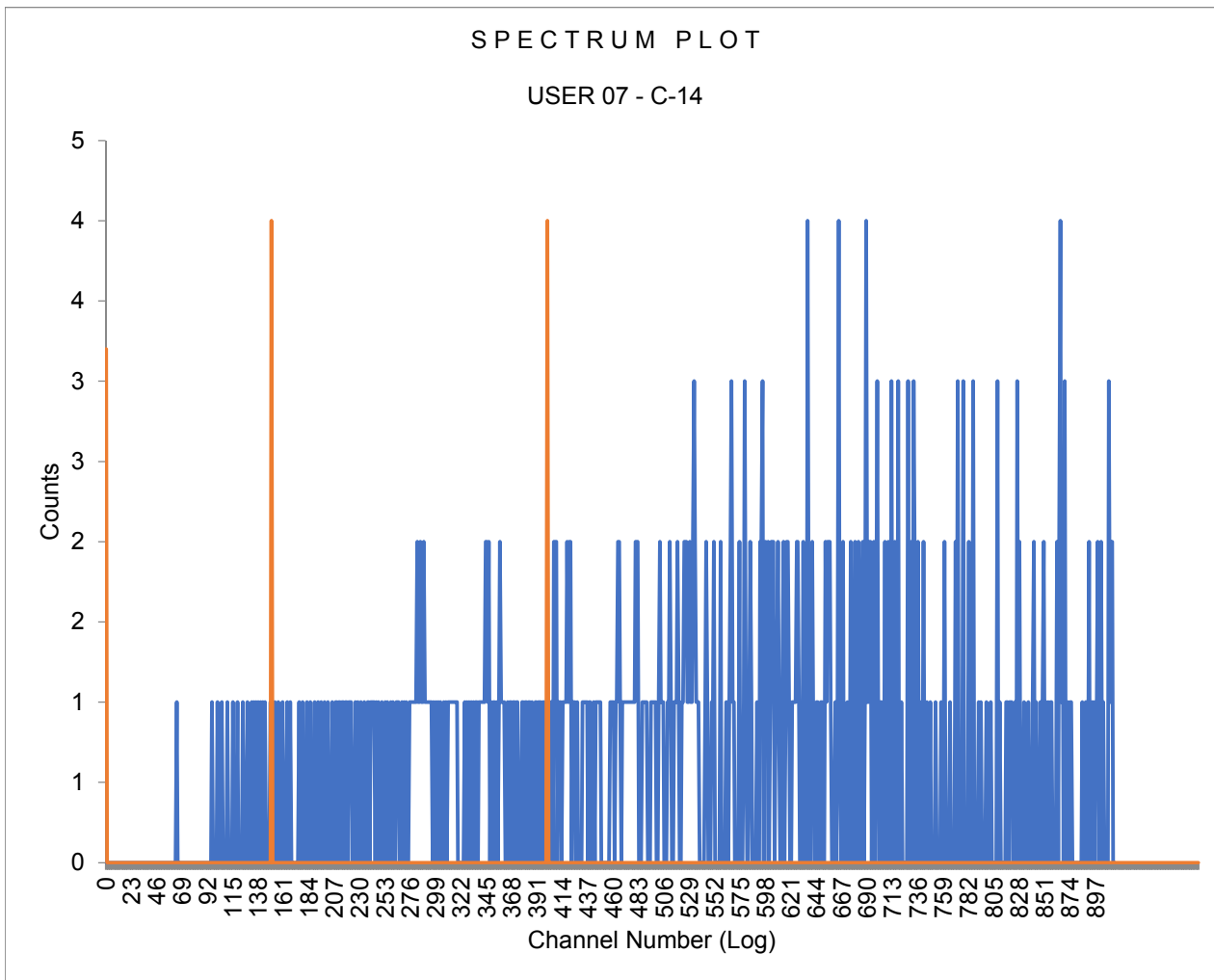
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 Data Capture Date: 01 Sep 2018 09:19:41  
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 U070901---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 6 \*\* -6 15.00  
 H#, Total Counts: 199.3 612  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



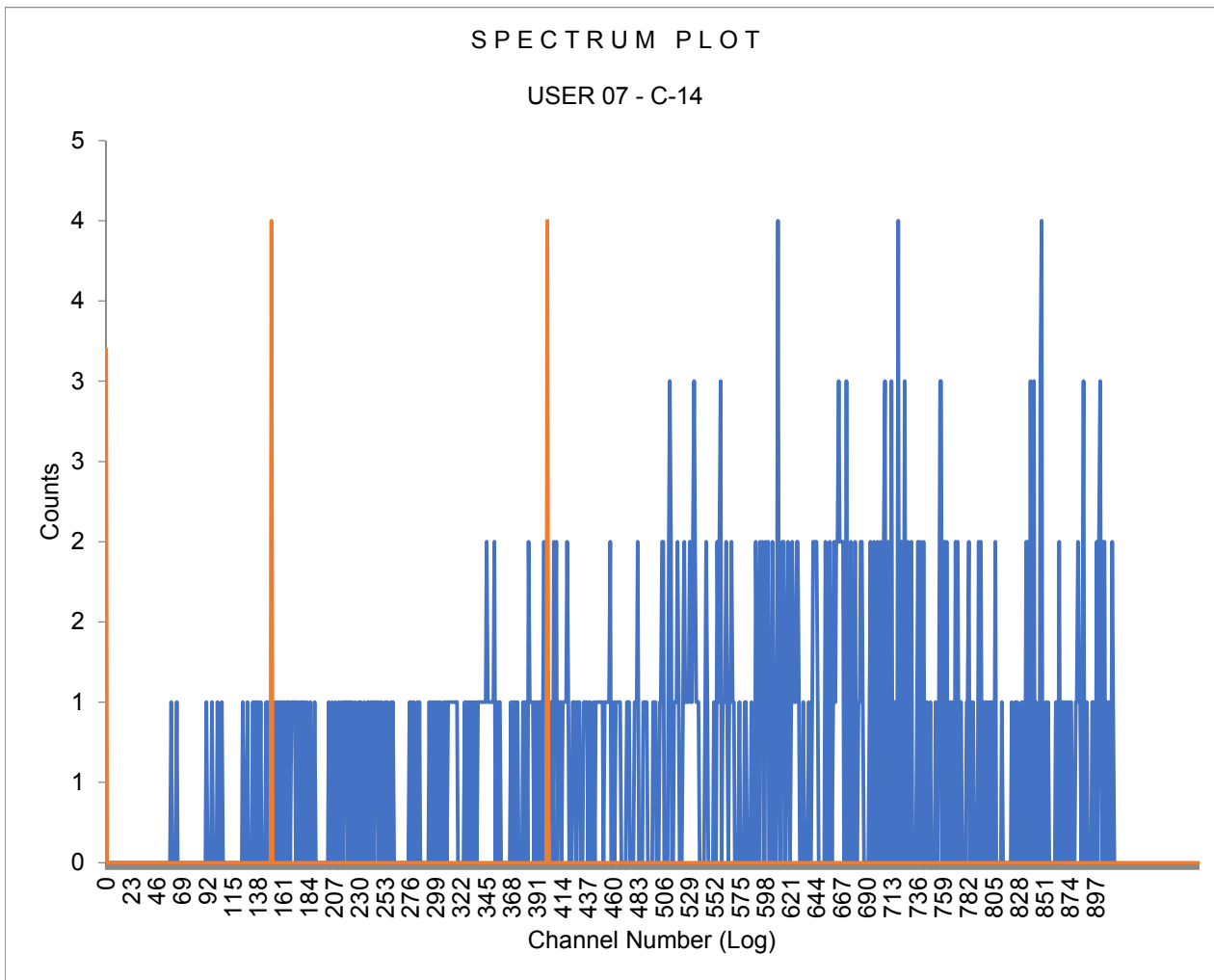
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 User Filename: S070901---7A.XLS  
 U070901---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 7 \*\*-.7 15.00  
 H#, Total Counts: 181.6 496  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



Sample Count Start Time: 1 Sep 2018 09:36:45  
 Data Capture Date: 01 Sep 2018 09:52:09  
 User Filename: S070901---8A.XLS  
 U070901---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 8 \*\* -8 15.00  
 H#, Total Counts: 192.8 543  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



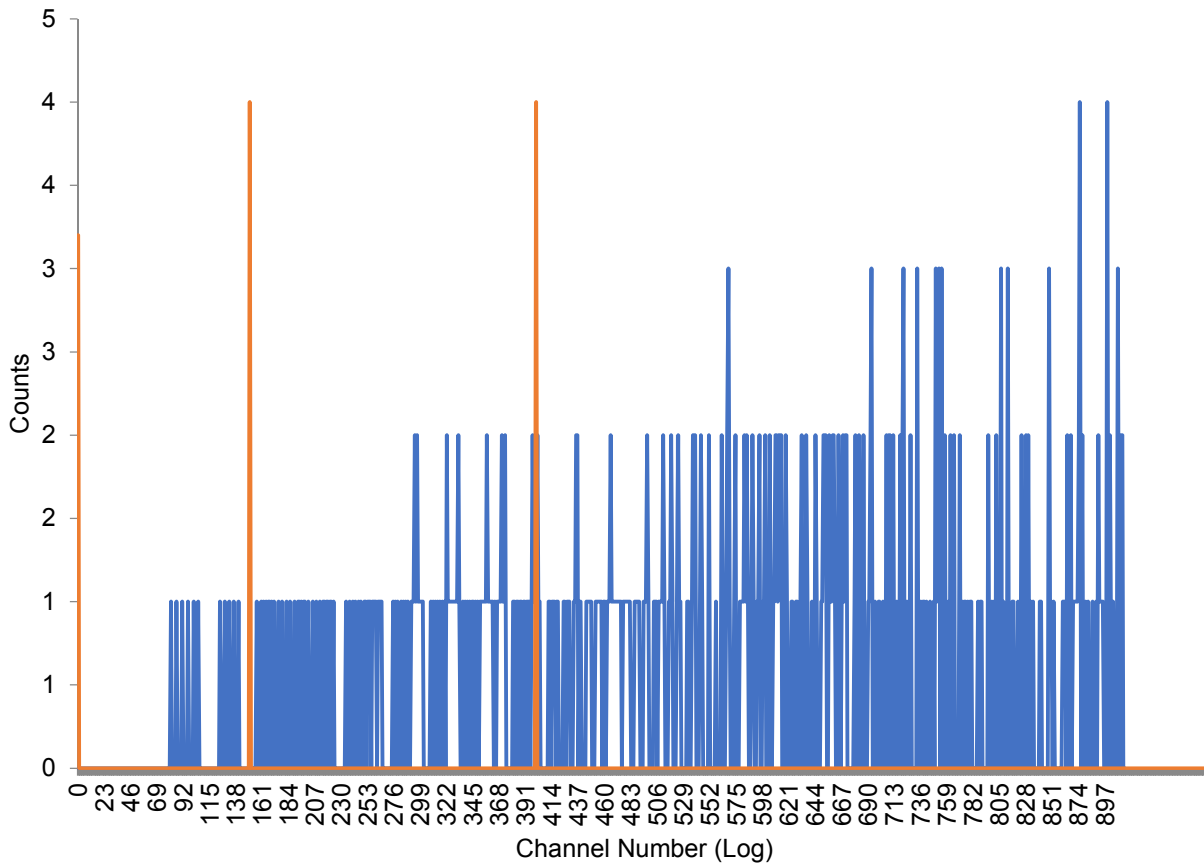
Sample Count Start Time: 1 Sep 2018 09:53:01  
 Data Capture Date: 01 Sep 2018 10:08:24  
 User Filename: S070901---9A.XLS  
 U070901---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 9 \*\*-.9 15.00  
 H#, Total Counts: 177.7 524  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



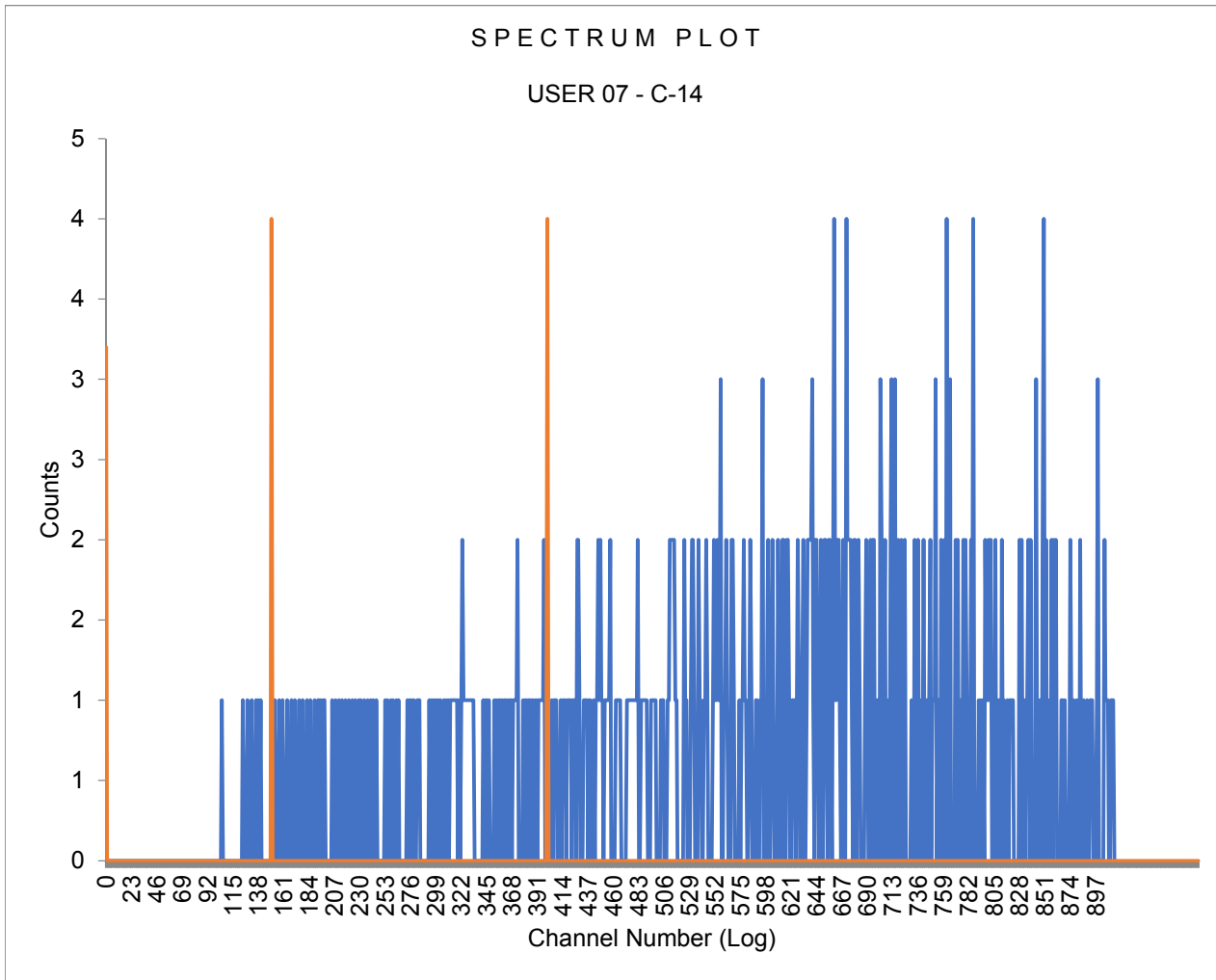
Sample Count Start Time: 1 Sep 2018 10:09:15  
 Data Capture Date: 01 Sep 2018 10:24:38  
 User Filename: S070901---10A.XLS  
 U070901---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 10 \*\* -10 15.00  
 H#, Total Counts: 201.1 511  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

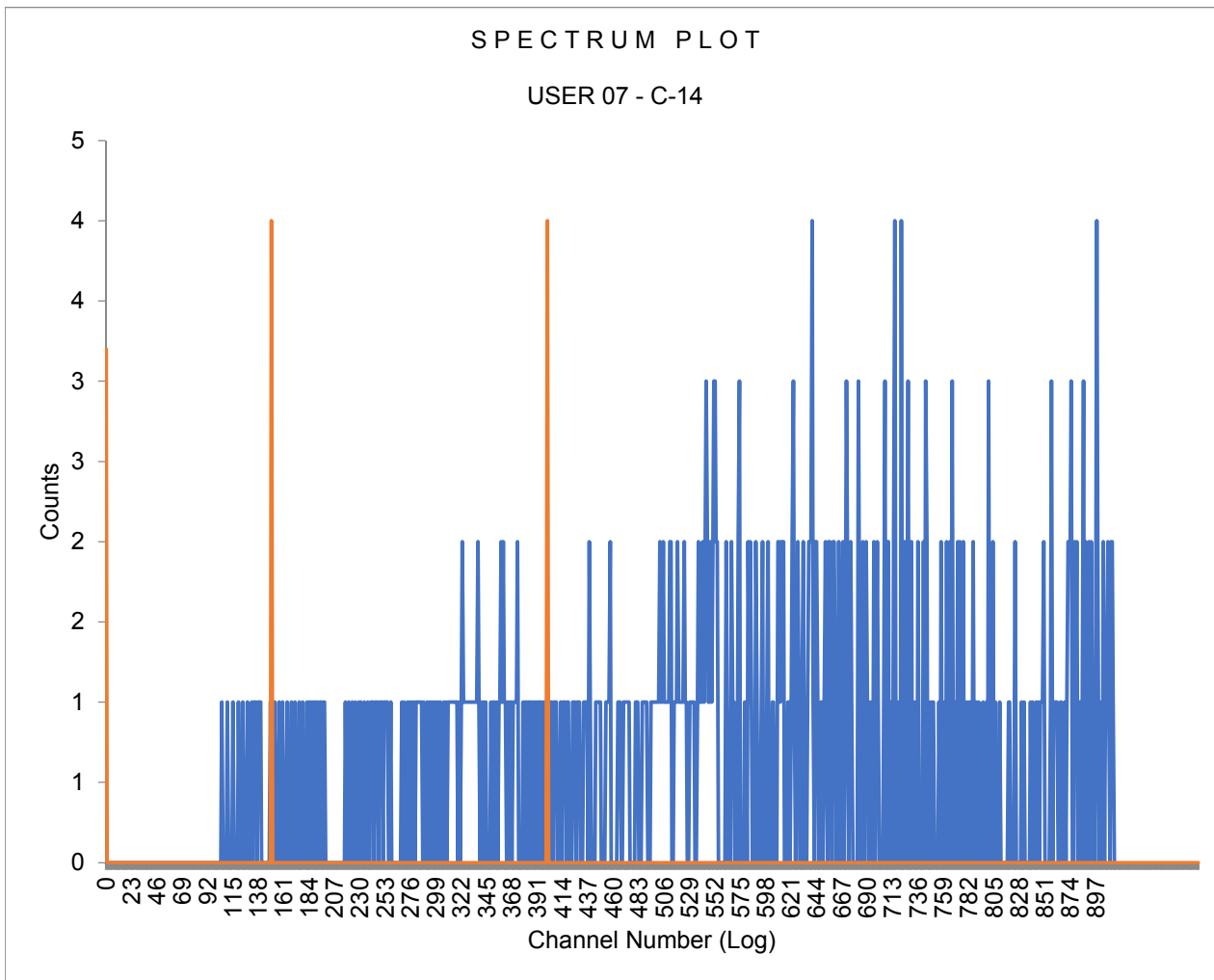
USER 07 - C-14



Sample Count Start Time: 1 Sep 2018 10:25:30  
 Data Capture Date: 01 Sep 2018 10:40:53  
 User Filename: S070901---11A.XLS  
 U070901---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 11 \*\* -11 15.00  
 H#, Total Counts: 177.1 527  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



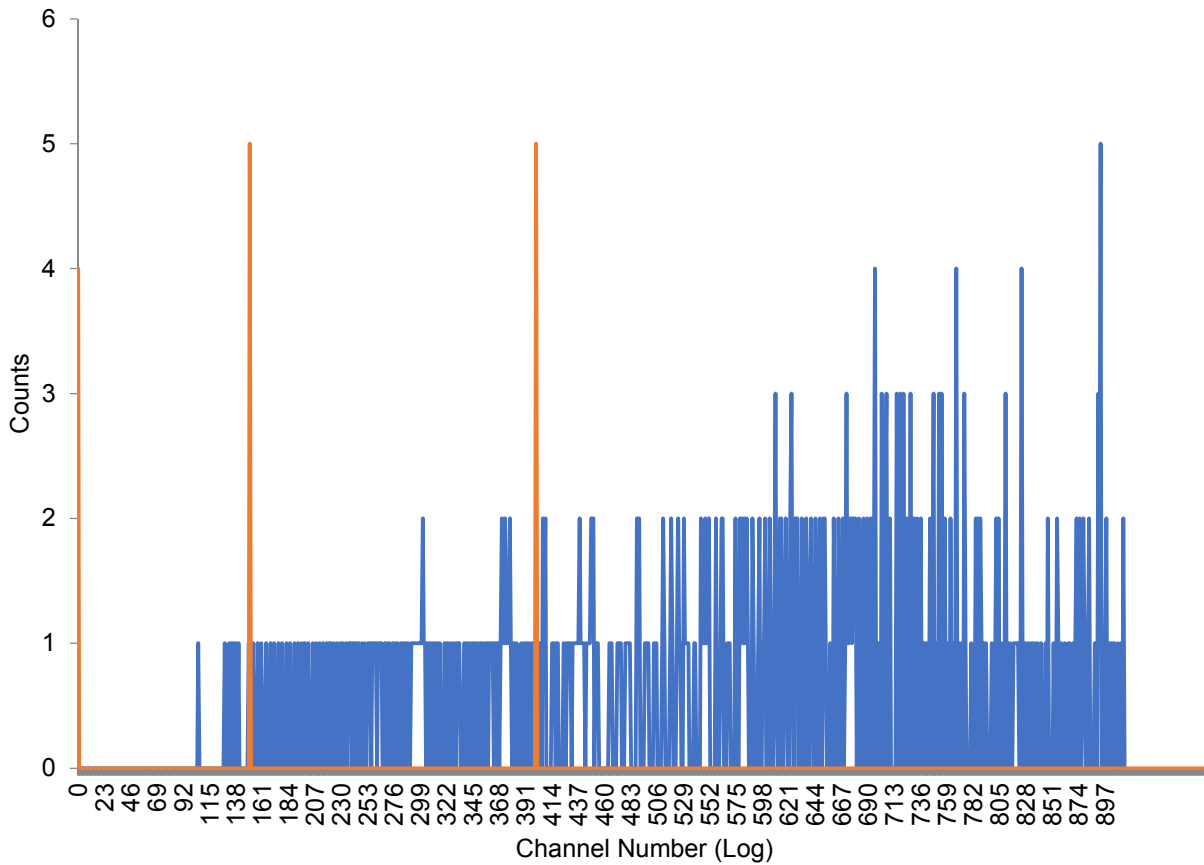
Sample Count Start Time: 1 Sep 2018 10:41:46  
 Data Capture Date: 01 Sep 2018 10:57:09  
 User Filename: S070901---12A.XLS  
 U070901---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 12 \*\* -12 15.00  
 H#, Total Counts: 219.5 550  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



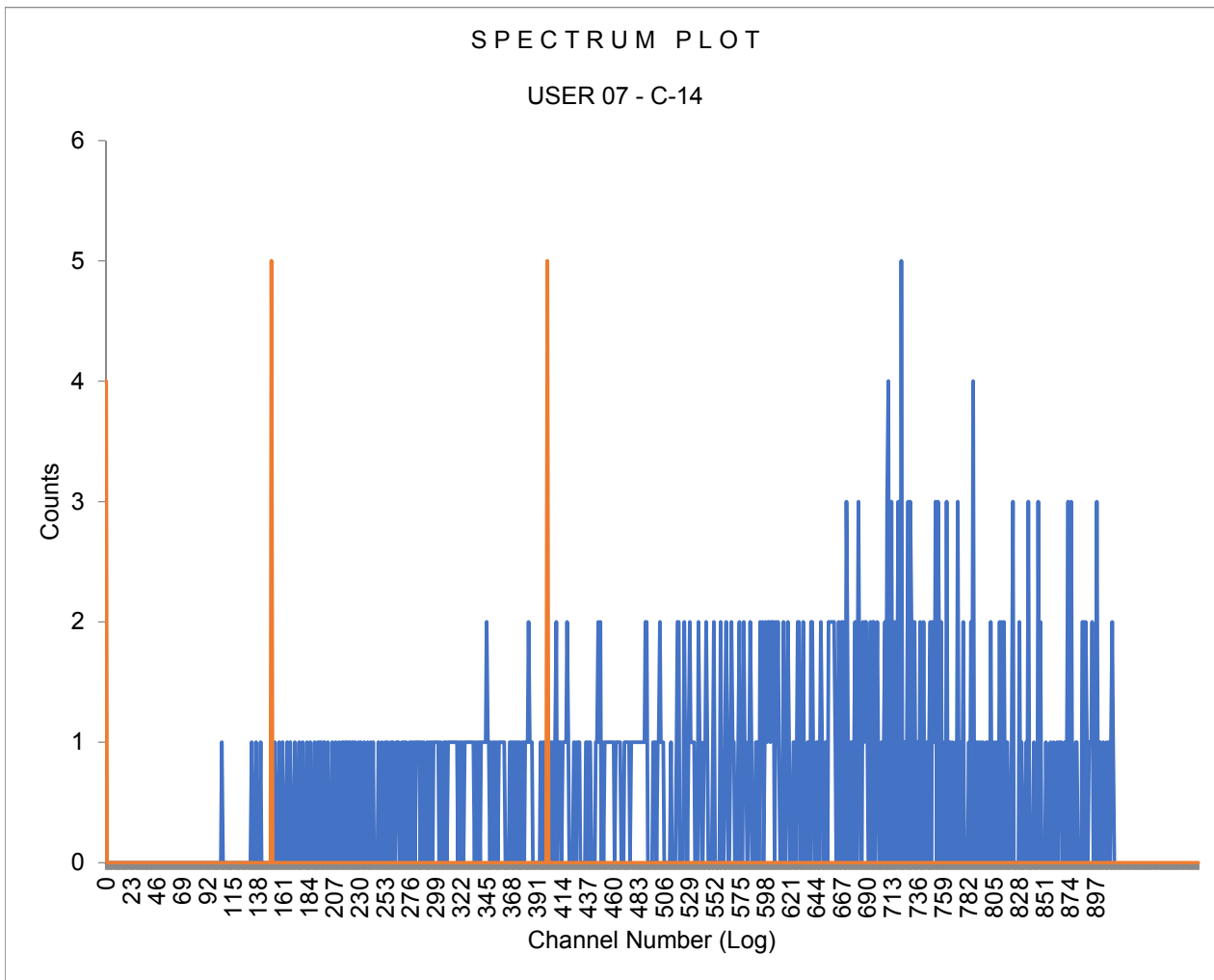
Sample Count Start Time:	1 Sep 2018 10:58:06		
Data Capture Date	01 Sep 2018 11:13:29		
User Filename	S07090135-1A.XLS		
	U070901---1A.XLS		
Spectrum Type	Log Counts		
User Number	07		
User Id	C-14		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	13	35-1	15.00
H#, Total Counts:	175.6	525	
Win1: C-14 - Start, End:	150	400	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

USER 07 - C-14



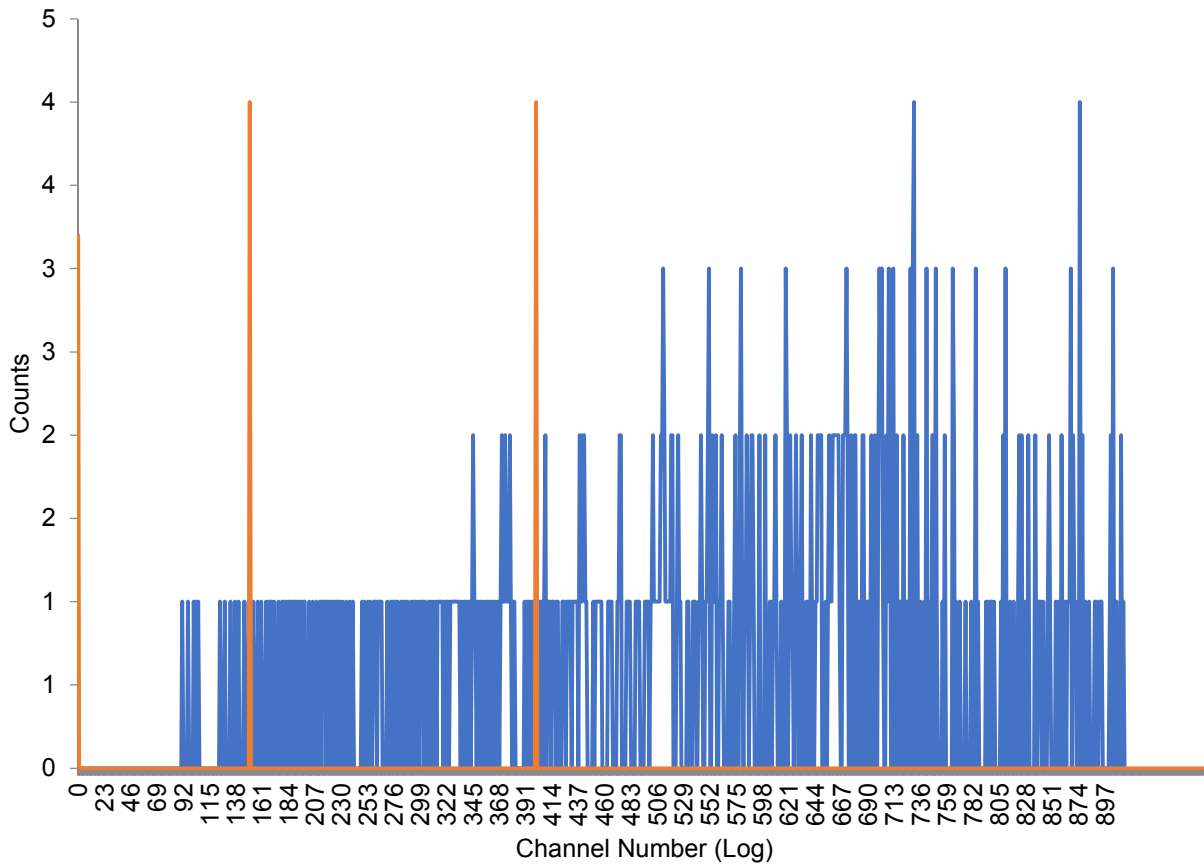
Sample Count Start Time:	1 Sep 2018 11:14:19		
Data Capture Date	01 Sep 2018 11:29:43		
User Filename	S07090135-2A.XLS		
	U070901---1A.XLS		
Spectrum Type	Log Counts		
User Number	07		
User Id	C-14		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	14	35-2	15.00
H#, Total Counts:	188.0	540	
Win1: C-14 - Start, End:	150	400	
Win2: - Start, End:	0	990	



Sample Count Start Time: 1 Sep 2018 11:30:35  
 Data Capture Date: 01 Sep 2018 11:45:58  
 User Filename: S07090135-3A.XLS  
 U070901---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 15 35-3 15.00  
 H#, Total Counts: 181.1 534  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

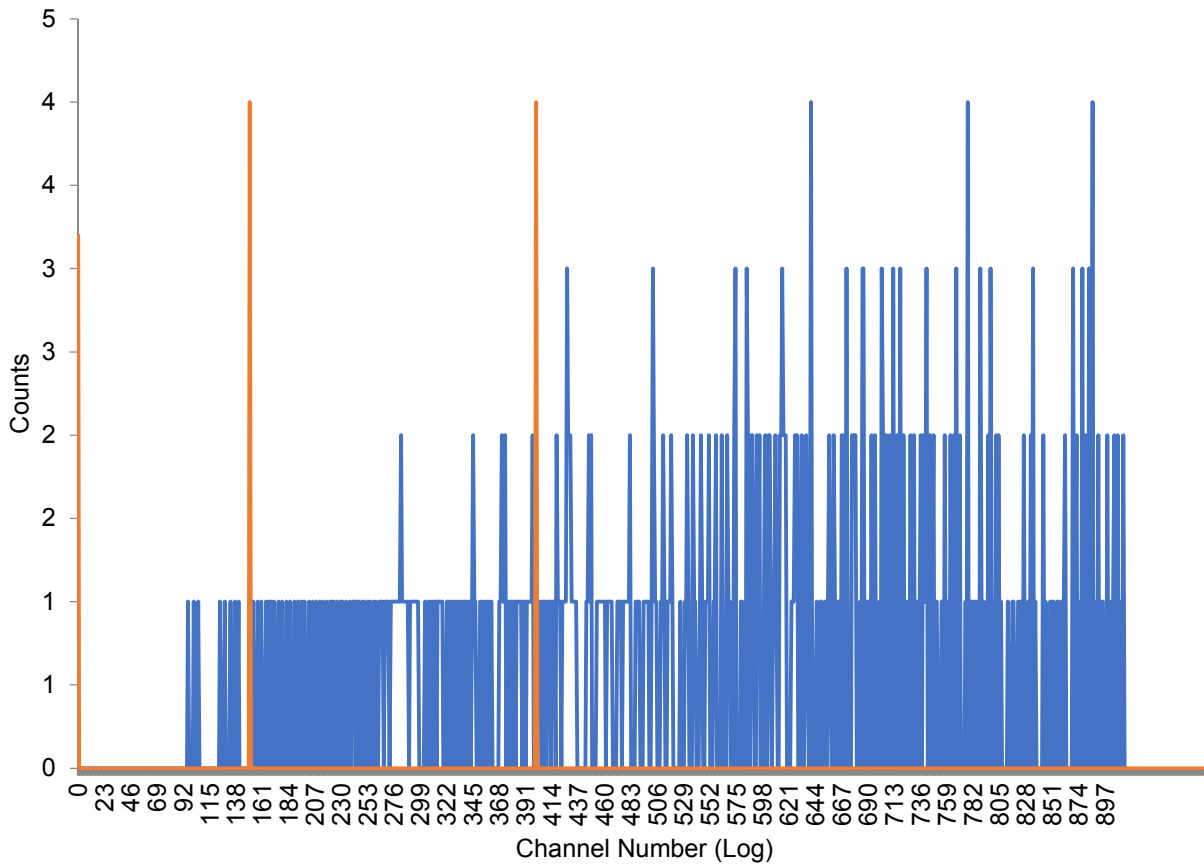
USER 07 - C-14



Sample Count Start Time:	1 Sep 2018 11:46:49		
Data Capture Date	01 Sep 2018 12:02:12		
User Filename	S07090135-4A.XLS		
	U070901---1A.XLS		
Spectrum Type	Log Counts		
User Number	07		
User Id	C-14		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	16	35-4	15.00
H#, Total Counts:	184.4	535	
Win1: C-14 - Start, End:	150	400	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

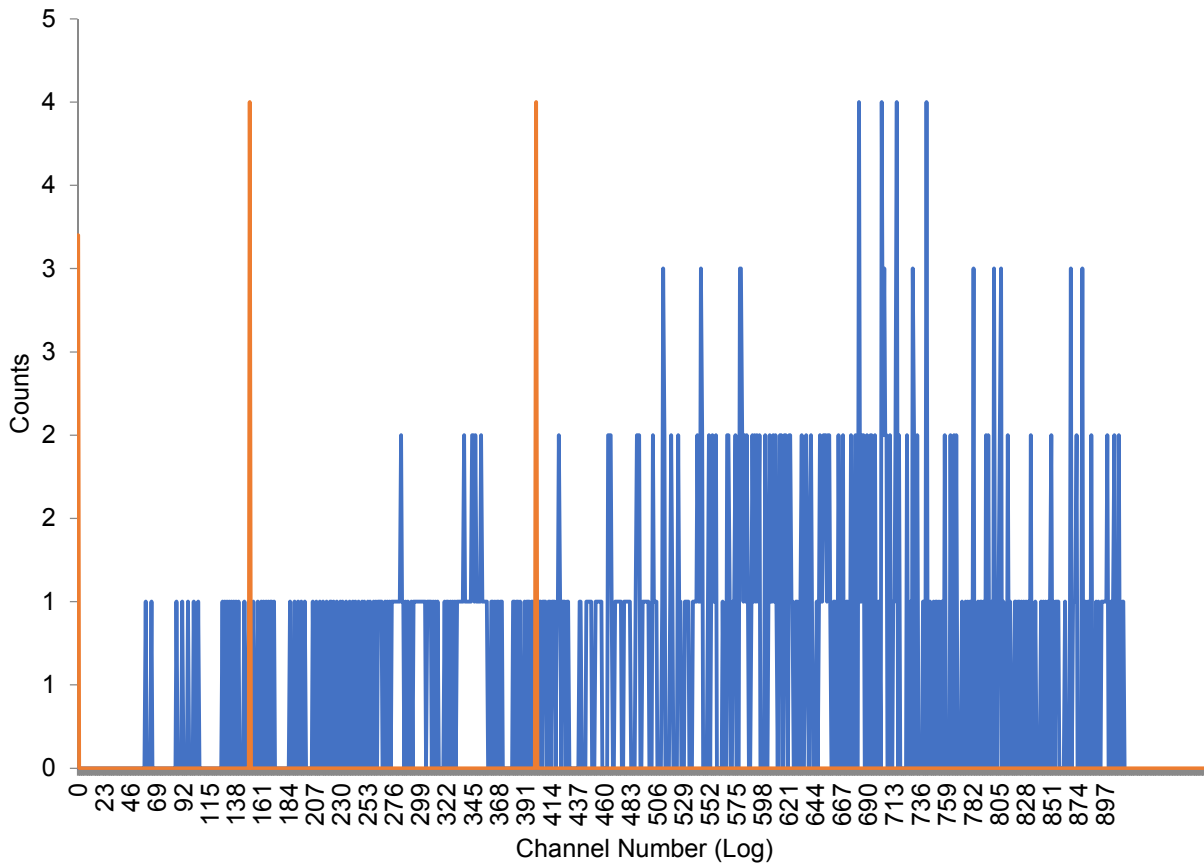
USER 07 - C-14



Sample Count Start Time:	1 Sep 2018 12:03:03		
Data Capture Date	01 Sep 2018 12:18:26		
User Filename	S07090135-5A.XLS		
	U070901---1A.XLS		
Spectrum Type	Log Counts		
User Number	07		
User Id	C-14		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	17	35-5	15.00
H#, Total Counts:	182.1	537	
Win1: C-14 - Start, End:	150	400	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

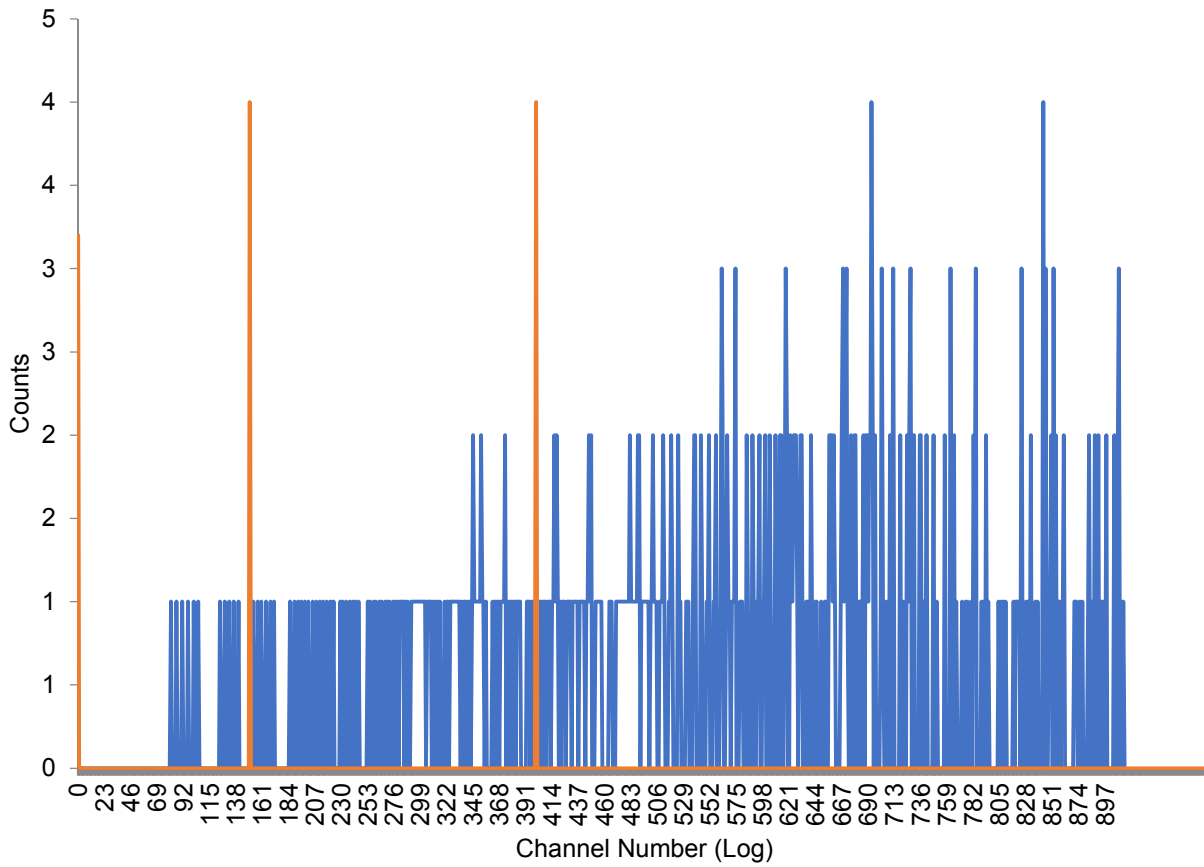
USER 07 - C-14



Sample Count Start Time: 1 Sep 2018 12:19:17  
 Data Capture Date: 01 Sep 2018 12:34:40  
 User Filename: S07090135-6A.XLS  
 U070901---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 18 35-6 15.00  
 H#, Total Counts: 188.7 512  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

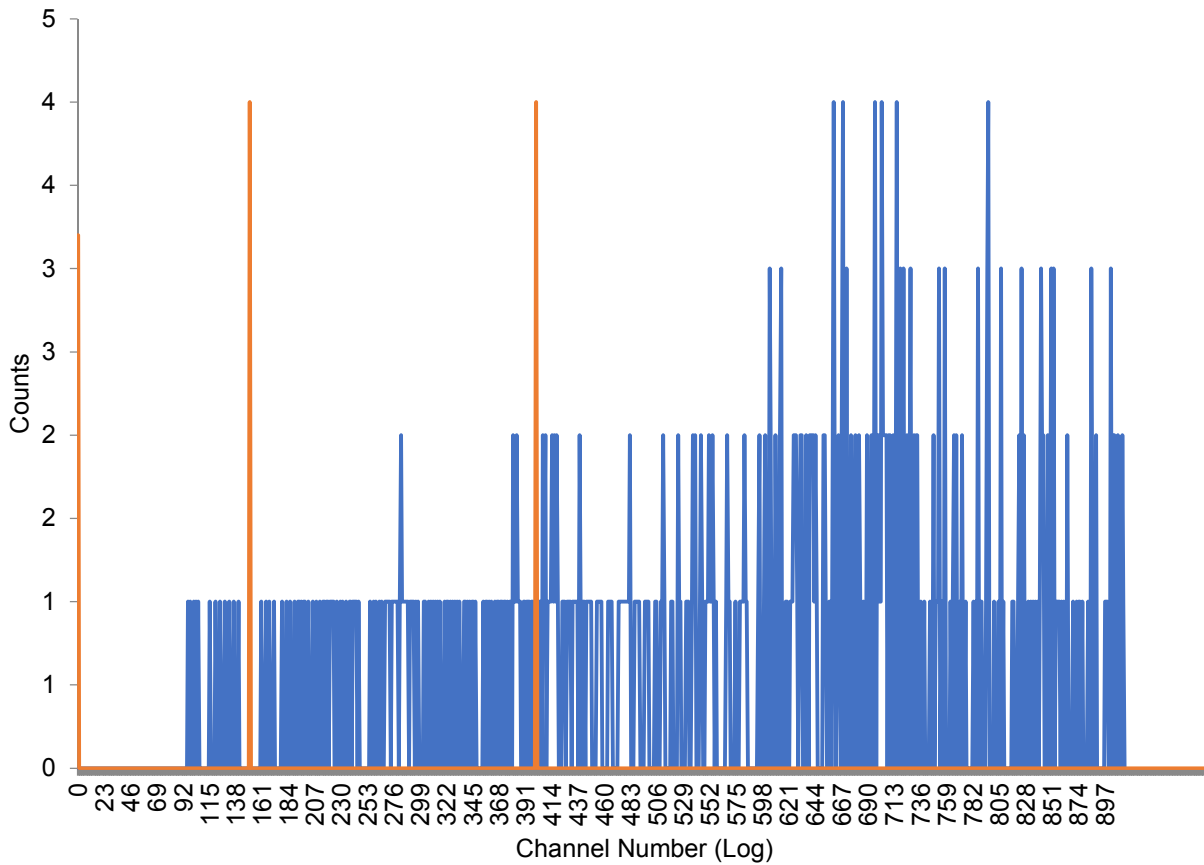
USER 07 - C-14



Sample Count Start Time: 1 Sep 2018 12:35:31  
 Data Capture Date: 01 Sep 2018 12:50:54  
 User Filename: S07090135-7A.XLS  
 U070901---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 19 35-7 15.00  
 H#, Total Counts: 192.5 520  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

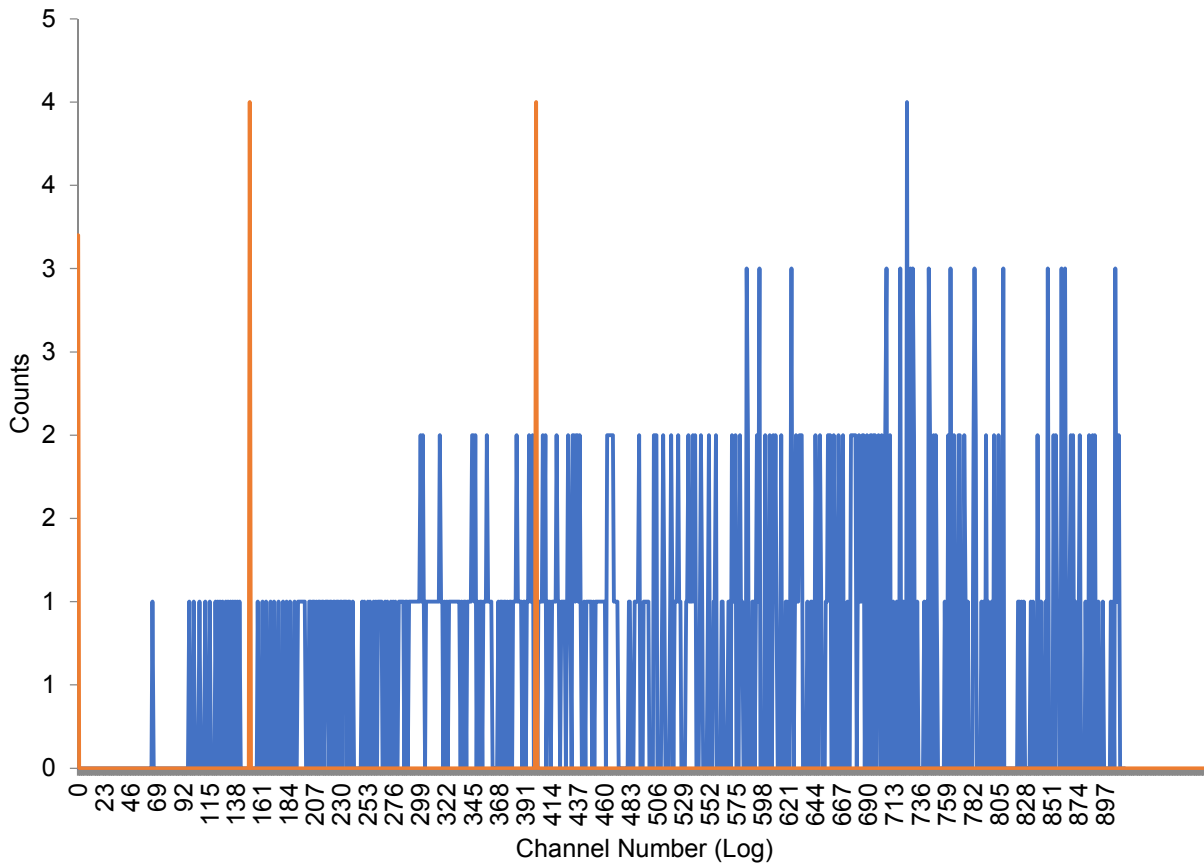
USER 07 - C-14



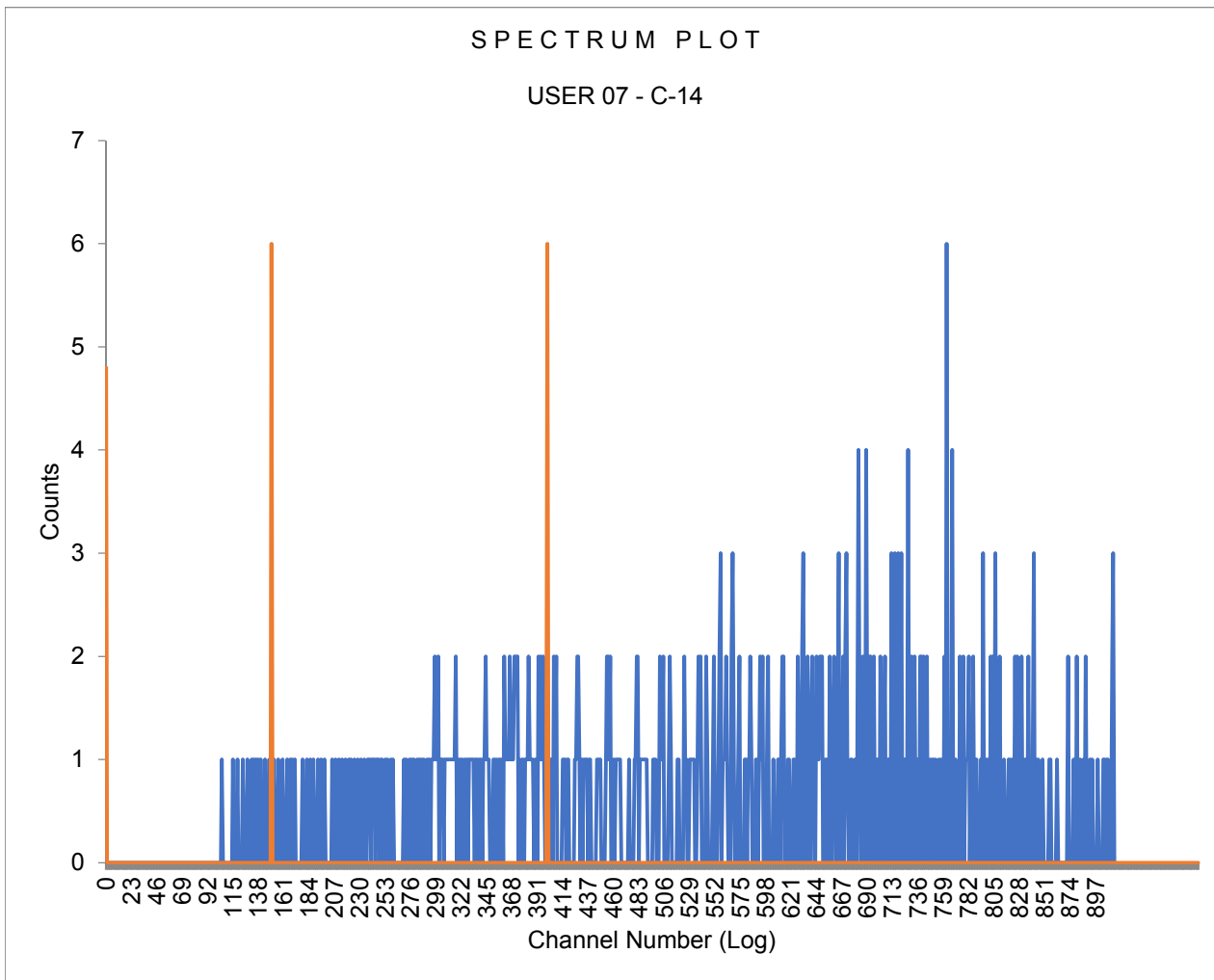
Sample Count Start Time:	1 Sep 2018 12:51:45		
Data Capture Date	01 Sep 2018 13:07:09		
User Filename	S07090135-8A.XLS		
	U070901---1A.XLS		
Spectrum Type	Log Counts		
User Number	07		
User Id	C-14		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	20	35-8	15.00
H#, Total Counts:	187.1	567	
Win1: C-14 - Start, End:	150	400	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

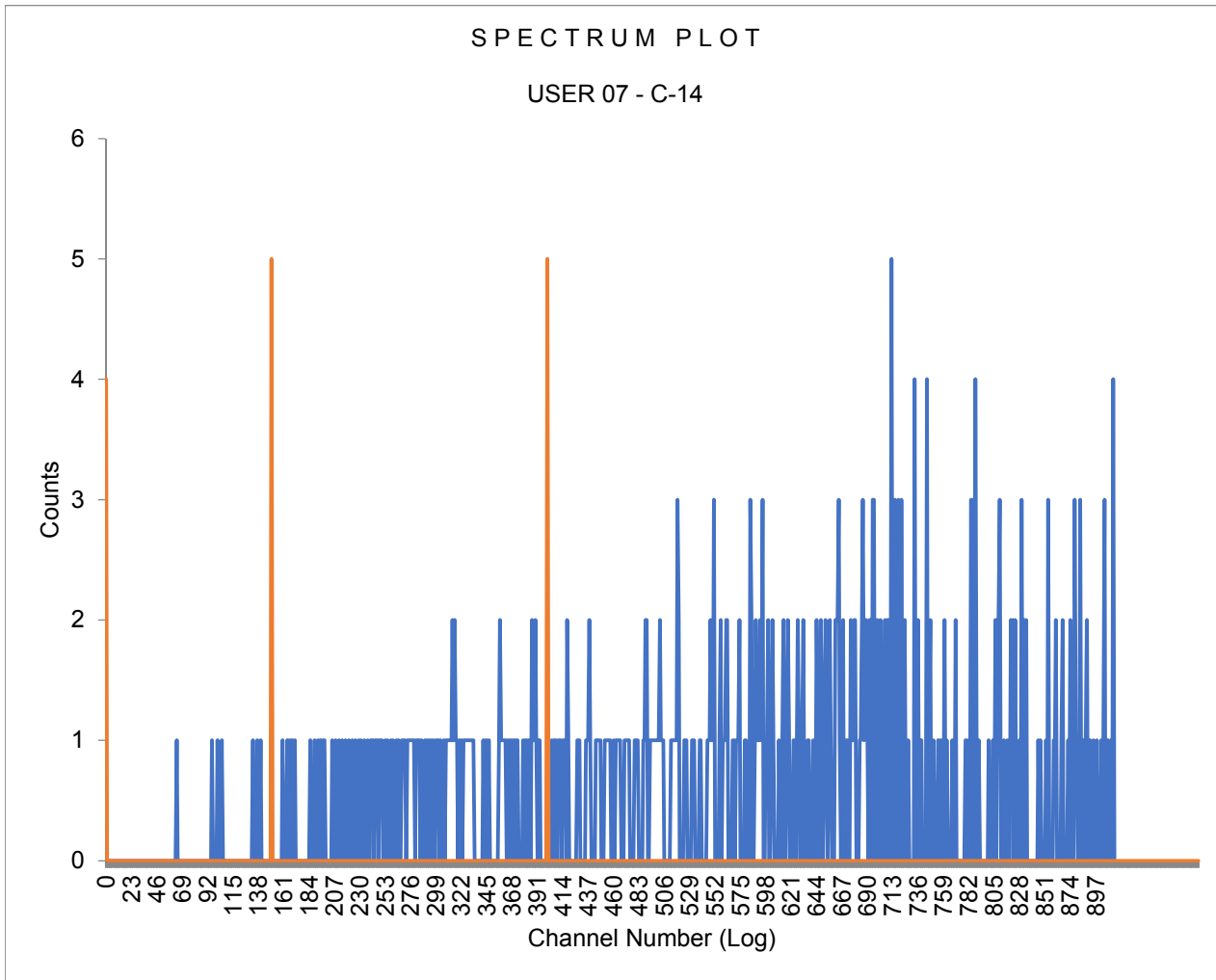
USER 07 - C-14



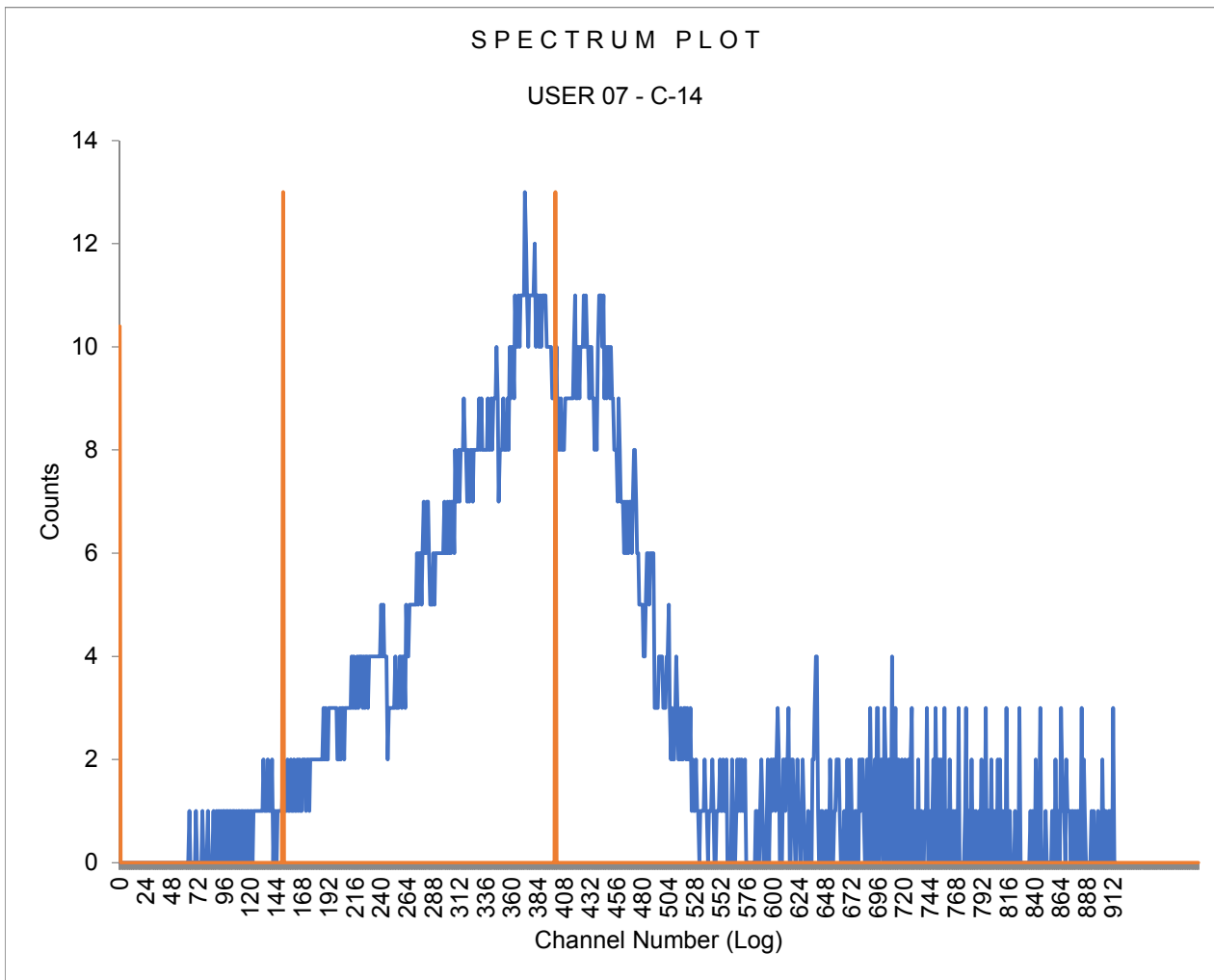
Sample Count Start Time: 1 Sep 2018 13:08:00  
 Data Capture Date: 01 Sep 2018 13:23:23  
 User Filename: S07090135-9A.XLS  
 U070901---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 21 35-9 15.00  
 H#, Total Counts: 181.4 512  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



Sample Count Start Time: 1 Sep 2018 13:24:13  
 Data Capture Date: 01 Sep 2018 13:39:37  
 User Filename: S07090135-10A.XLS  
 U070901---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 22 35-10 15.00  
 H#, Total Counts: 163.4 501  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



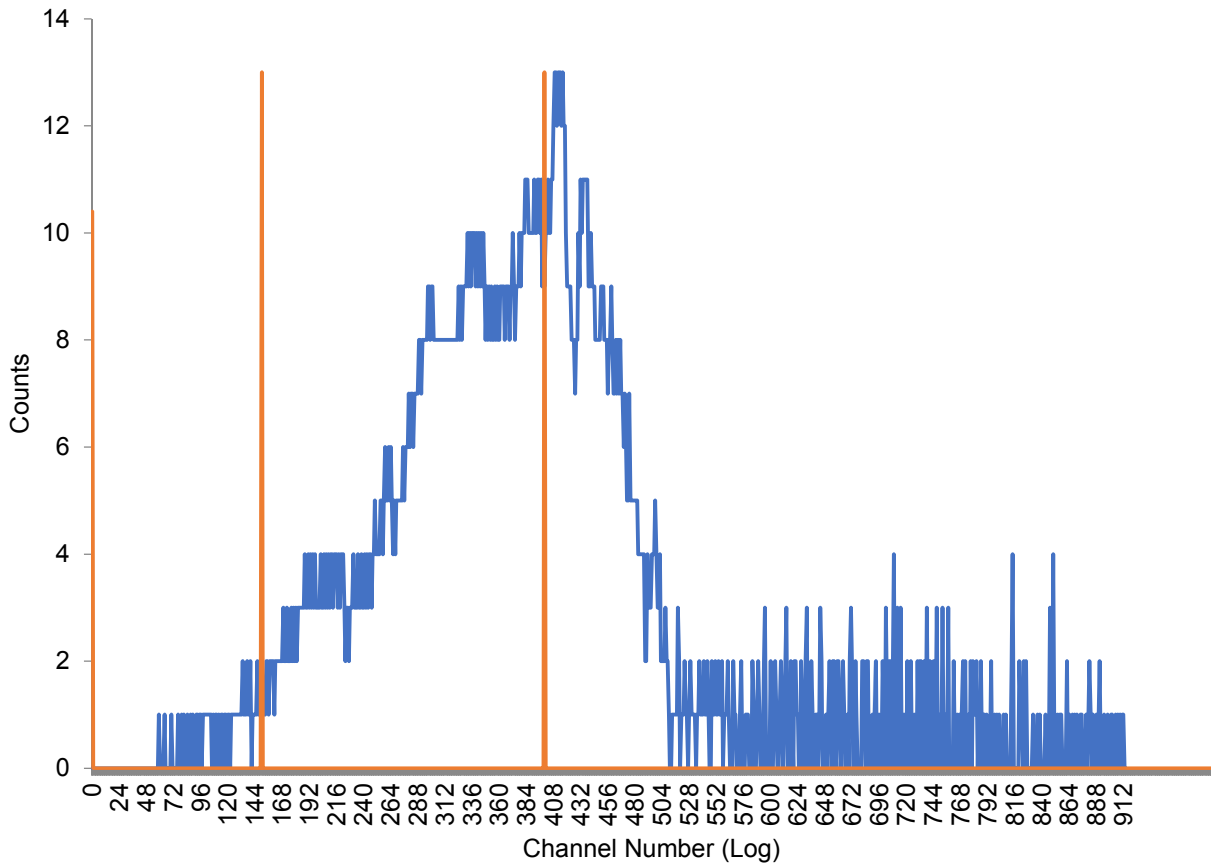
Sample Count Start Time:	1 Sep 2018 13:40:28		
Data Capture Date	01 Sep 2018 13:55:51		
User Filename	S07090135-11A.XLS		
	U070901---1A.XLS		
Spectrum Type	Log Counts		
User Number	07		
User Id	C-14		
User Comment	GREEN		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	23	35-11	15.00
H#, Total Counts:	164.7	2641	
Win1: C-14 - Start, End:	150	400	
Win2: - Start, End:	0	990	



Sample Count Start Time: 1 Sep 2018 13:56:41  
 Data Capture Date: 01 Sep 2018 14:12:04  
 User Filename: S07090135-12A.XLS  
 U070901---1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 07  
 User Id: C-14  
 User Comment: GREEN  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 24 35-12 15.00  
 H#, Total Counts: 165.9 2692  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

USER 07 - C-14



# Batch 1794274 Check-list

This check-list was completed on 04-SEP-18 by Lyndsey Pace

This batch was reviewed by Gregory Ramsay on 04-SEP-18 and Lyndsey Pace on 04-SEP-18.

**Batch ID:** 1794274

**Product:** LSC\_DH3F

**Description:** Tritium GL-RAD-A-002

#	Criteria	Yes	No	Comments
<b>Preparation Information</b>				
1	Were all of the samples homogenous?	Yes		
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
3	Are instrument source checks within limits?	Yes		
4	Have client special requirements have been reviewed and met?	Yes		
5	Has a hit notification been completed?		No	
6	Has an Aliquot Correction been completed for this batch?		No	
7	Have sample historical results been reviewed for this batch?	Yes		
<b>Technical Information</b>				
8	Were all the samples prepared/analyzed within the required holding time period?	Yes		
9	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
10	Was the method blank (MB) within the acceptance criteria?	Yes		
11	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
12	Were the relative percent differences and/or error (RPD/RER) between the LCS and the LCSD recoveries within the acceptance limits?	Yes		
13	Has the method required detection limit been met?	Yes		
<b>Miscellaneous Information</b>				
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

# Prep Logbook

## Direct Tritium Filters

**Batch ID:** 1794274  
**Analyst:** Brittany Moorer (BXM4)  
**Method:** GL-RAD-A-002  
**Lab SOP:** GL-RAD-A-002 REV# 22  
**Instrument:** No instrument-manual method

Due Dates for Lab: 02-SEP-2018			Package: 03-SEP-2018	SDG: 05-SEP-2018		
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
LCS	1204095797	Tritium SPIKE	1753-D	.1	mL	
LCSD	1204095798	Tritium SPIKE	1753-D	.1	mL	

#	Sample ID	Prep Date	Min RDL ( )	Aliquot (Filter)
1	457261021	31-AUG-2018		1
2	457261022	31-AUG-2018		1
3	457261023	31-AUG-2018		1
4	457261024	31-AUG-2018		1
5	457261025	31-AUG-2018		1
6	457261026	31-AUG-2018		1
7	457261027	31-AUG-2018		1
8	457261028	31-AUG-2018		1
9	457261029	31-AUG-2018		1
10	457261030	31-AUG-2018		1
11	457261031	31-AUG-2018		1
12	457261032	31-AUG-2018		1
13	1204095794 MB	31-AUG-2018		1
14	1204095797 LCS	31-AUG-2018		1
15	1204095798 LCSD	31-AUG-2018		1

Reagent/Solvent Lot ID	Description	Amount	Comments:
REGNT 2605985	Quenching Agent	20 uL	Pipet Id: RAD-LSC-2970968
REGNT 2802196.4	Ecoscint Ultra Scintillation Solution	13 mL	Data Entry Date2: 31-AUG-2018 00:00

### Tritium Filter

Filename : H3DIR.XLS  
 File type : Excel  
 Version # : 1.2.12

**Batch :** 1794274  
**Analyst :** BXM4  
**Prep Date :** 8/31/2018  
**Method Uncertainty :** 0

**Procedure Code :** LSC\_DH3F  
**Parmname :** Tritium  
**Required MDA :** 50 pCi/F  
**H-3 Abundance :** 1.00  
**Halflife of Tritium :** 12.32 years

**Geometry:**  
 10mL DW/13mL Ecoscint Ultra/Swipe

Sample Characteristics					Count raw Data									
Pos.	Sample ID	Sample Aliquot F	Sample Aliquot StDev. F	Sample Date/Time	Rack Position #	Counting Time (min.)	Quench#	Gross cpm	Bkg cpm	Bkg Count Time (min.)	Bkg Quench#	Corrected Bkg cpm	Count Start Date/Time	Sample Decay
1	457261021.1	1.0000	1.0000E-05	8/9/2018 13:16	39-2	15	197.8	2.53	3.13	15	168.8	3.0625	9/1/2018 0:28	0.997
2	457261022.1	1.0000	1.0000E-05	8/9/2018 12:40	39-3	15	211	2.87	3.13	15	168.8	3.0074	9/1/2018 0:45	0.997
3	457261023.1	1.0000	1.0000E-05	8/9/2018 13:05	39-4	15	184.8	2.8	3.13	15	168.8	3.1038	9/1/2018 1:01	0.997
4	457261024.1	1.0000	1.0000E-05	8/9/2018 12:29	39-5	15	180.6	3.07	3.13	15	168.8	3.1136	9/1/2018 1:17	0.997
5	457261025.1	1.0000	1.0000E-05	8/9/2018 13:19	39-6	15	199	4.33	3.13	15	168.8	3.0580	9/1/2018 1:34	0.997
6	457261026.1	1.0000	1.0000E-05	8/9/2018 12:20	39-7	15	183.7	2.8	3.13	15	168.8	3.1065	9/1/2018 1:50	0.997
7	457261027.1	1.0000	1.0000E-05	8/9/2018 13:24	39-8	15	196.3	2.33	3.13	15	168.8	3.0681	9/1/2018 2:06	0.997
8	457261028.1	1.0000	1.0000E-05	8/9/2018 12:37	39-9	15	198.6	2.93	3.13	15	168.8	3.0595	9/1/2018 2:23	0.997
9	457261029.1	1.0000	1.0000E-05	8/9/2018 13:14	39-10	15	217.4	2.93	3.13	15	168.8	2.9773	9/1/2018 2:39	0.997
10	457261030.1	1.0000	1.0000E-05	8/9/2018 13:38	39-11	15	180.4	2.87	3.13	15	168.8	3.1140	9/1/2018 2:55	0.997
11	457261031.1	1.0000	1.0000E-05	8/9/2018 13:30	39-12	15	188.6	3.33	3.13	15	168.8	3.0933	9/1/2018 3:11	0.997
12	457261032.1	1.0000	1.0000E-05	8/9/2018 12:22	52-1	15	178.9	2.73	3.13	15	168.8	3.1170	9/1/2018 3:28	0.997
13	1204095794.1	1.0000	1.0000E-05	8/31/2018 0:00	52-2	15	168.5	3.73	3.13	15	168.8	3.1302	9/1/2018 3:44	1.000
14	1204095797.1	1.0000	1.0000E-05	8/31/2018 0:00	52-3	15	168.7	43.07	3.13	15	168.8	3.1301	9/1/2018 4:00	1.000
15	1204095798.1	1.0000	1.0000E-05	8/31/2018 0:00	52-4	15	170.4	42.47	3.13	15	168.8	3.1288	9/1/2018 4:17	1.000

**Pipet, 0.1 ml Stdev : +/-** 0.000200 ml  
**Pipet, 0.5 ml Stdev : +/-** 0.001000 ml  
**Pipet, 1.0 ml Stdev : +/-** 0.002000 ml  
**Pipet, 5.0 ml Stdev : +/-** 0.010000 ml

**Analytical SOP:** GL-RAD-A-002  
**Instrument SOP:** GL-RAD-I-004

Calibration Data							
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Background Rack Position #	Background Count Start Date/Time
1	LSCRED	10/1/2017	9/30/2018	0.1135	0.00792	39-1	9/1/2018 0:12
2	LSCRED	10/1/2017	9/30/2018	0.0971	0.00792	39-1	9/1/2018 0:12
3	LSCRED	10/1/2017	9/30/2018	0.1312	0.00792	39-1	9/1/2018 0:12
4	LSCRED	10/1/2017	9/30/2018	0.1372	0.00792	39-1	9/1/2018 0:12
5	LSCRED	10/1/2017	9/30/2018	0.1120	0.00792	39-1	9/1/2018 0:12
6	LSCRED	10/1/2017	9/30/2018	0.1328	0.00792	39-1	9/1/2018 0:12
7	LSCRED	10/1/2017	9/30/2018	0.1155	0.00792	39-1	9/1/2018 0:12
8	LSCRED	10/1/2017	9/30/2018	0.1125	0.00792	39-1	9/1/2018 0:12
9	LSCRED	10/1/2017	9/30/2018	0.0897	0.00792	39-1	9/1/2018 0:12
10	LSCRED	10/1/2017	9/30/2018	0.1375	0.00792	39-1	9/1/2018 0:12
11	LSCRED	10/1/2017	9/30/2018	0.1259	0.00792	39-1	9/1/2018 0:12
12	LSCRED	10/1/2017	9/30/2018	0.1397	0.00792	39-1	9/1/2018 0:12
13	LSCRED	10/1/2017	9/30/2018	0.1556	0.00792	39-1	9/1/2018 0:12
14	LSCRED	10/1/2017	9/30/2018	0.1553	0.00792	39-1	9/1/2018 0:12
15	LSCRED	10/1/2017	9/30/2018	0.1526	0.00792	39-1	9/1/2018 0:12

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

**Spike S/N :** N/A  
**Spike Exp Date :** N/A  
**Spike Activity (dpm/ml):** N/A  
**Spike Volume Added:** N/A

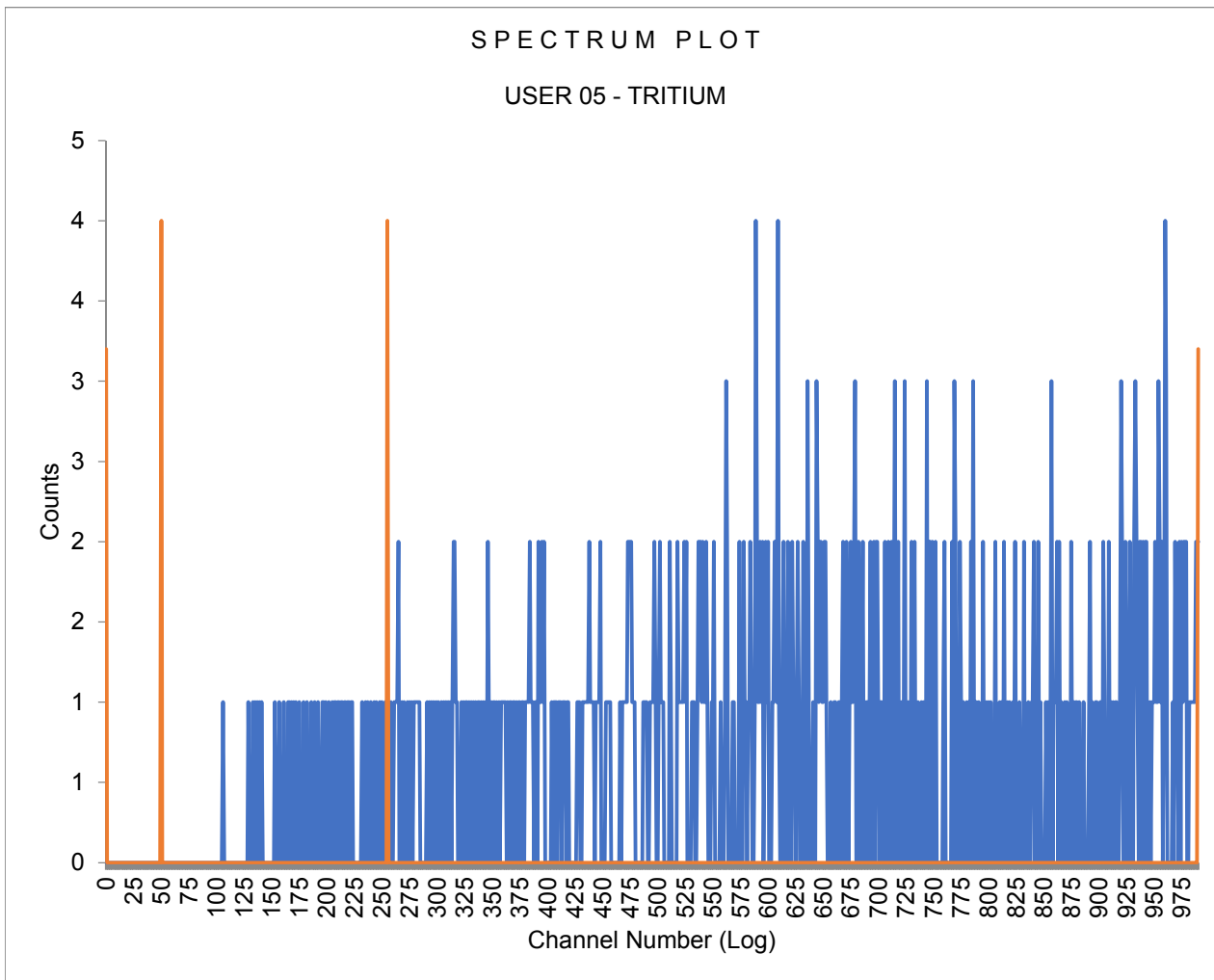
**LCS S/N :** 1753-D  
**LCS Exp Date :** 12/12/2018  
**LCS Activity (dpm/ml):** 2779.02  
**LCS Volume Added:** 0.10

<b>Results</b>																
Pos.	Decision	Critical	Required		Sample Act.	Sample Act.	Net Count	Net Count	<b>2 SIGMA</b>	<b>2 SIGMA</b>	Sample	Sample	RPD	RER	Nominal	Recovery
	Level	Level	MDA	MDA	Conc.	Error	Rate	Rate Error	Counting	Total Prop.						
	pCi/F	pCi/F	pCi/F	pCi/F	pCi/F	%	CPM	CPM	Uncertainty	Uncertainty						
1	5.9288	4.1858	50	9.1680	<b>-2.1206</b>	114.66%	-0.5325	0.6106	4.7656	4.7656		SAMPLE				
2	6.8662	4.8476	50	10.6259	<b>-0.6394</b>	455.57%	-0.1374	0.6260	5.7095	5.7095		SAMPLE				
3	5.1643	3.6461	50	7.9812	<b>-1.0467</b>	206.51%	-0.3038	0.6274	4.2366	4.2366		SAMPLE				
4	4.9447	3.4910	50	7.6407	<b>-0.1436</b>	1472.68%	-0.0436	0.6421	4.1449	4.1449		SAMPLE				
5	6.0067	4.2408	50	9.2890	<b>5.1354</b>	55.18%	1.2720	0.7018	5.5535	5.5541		SAMPLE				
6	5.1057	3.6046	50	7.8902	<b>-1.0437</b>	204.70%	-0.3065	0.6275	4.1876	4.1876		SAMPLE				
7	5.8334	4.1185	50	9.0198	<b>-2.8890</b>	81.28%	-0.7381	0.5999	4.6025	4.6025		SAMPLE				
8	5.9807	4.2224	50	9.2486	<b>-0.5206</b>	487.84%	-0.1295	0.6319	4.9774	4.9774		SAMPLE				
9	7.3938	5.2201	50	11.4475	<b>-0.2382</b>	1327.17%	-0.0473	0.6275	6.1949	6.1949		SAMPLE				
10	4.9345	3.4838	50	7.6250	<b>-0.8020</b>	258.84%	-0.2440	0.6316	4.0688	4.0688		SAMPLE				
11	5.3739	3.7940	50	8.3064	<b>0.8499</b>	276.52%	0.2367	0.6544	4.6062	4.6062		SAMPLE				
12	4.8592	3.4306	50	7.5082	<b>-1.2520</b>	161.33%	-0.3870	0.6243	3.9586	3.9586		SAMPLE				
13	4.3591	3.0776	50	6.7343	<b>1.7370</b>	112.75%	0.5998	0.6763	3.8386	3.8386		MB				
14	4.3679	3.0838	50	6.7479	<b>115.8979</b>	4.46%	39.9399	1.7550	9.9816	10.1424		LCS			125.1811	92.6%
15	4.4430	3.1368	50	6.8641	<b>116.1476</b>	4.50%	39.3412	1.7435	10.0890	10.2489		LCSD	0.2%		125.1811	92.8%

U05090139-1A

SampleID	Rack	Time (min.)	H#	CPM Iso1	CPM Iso2	LumEx	Count Start Time	Count End Time	Machine
39-1		15	168.8	3.13	39.60	0.51	9/1/2018 0:12	9/1/2018 0:27	RED
39-2		15	197.8	2.53	38.80	0.66	9/1/2018 0:28	9/1/2018 0:43	RED
39-3		15	211.0	2.87	39.40	0.62	9/1/2018 0:45	9/1/2018 1:00	RED
39-4		15	184.8	2.80	39.93	0.79	9/1/2018 1:01	9/1/2018 1:16	RED
39-5		15	180.6	3.07	41.40	0.64	9/1/2018 1:17	9/1/2018 1:32	RED
39-6		15	199.0	4.33	41.93	0.59	9/1/2018 1:34	9/1/2018 1:49	RED
39-7		15	183.7	2.80	38.80	0.62	9/1/2018 1:50	9/1/2018 2:05	RED
39-8		15	196.3	2.33	36.20	0.78	9/1/2018 2:06	9/1/2018 2:21	RED
39-9		15	198.6	2.93	37.87	0.59	9/1/2018 2:23	9/1/2018 2:38	RED
39-10		15	217.4	2.93	38.40	0.78	9/1/2018 2:39	9/1/2018 2:54	RED
39-11		15	180.4	2.87	38.67	1.27	9/1/2018 2:55	9/1/2018 3:10	RED
39-12		15	188.6	3.33	40.80	0.55	9/1/2018 3:11	9/1/2018 3:26	RED
52-1		15	178.9	2.73	38.93	0.53	9/1/2018 3:28	9/1/2018 3:43	RED
52-2		15	168.5	3.73	39.33	0.47	9/1/2018 3:44	9/1/2018 3:59	RED
52-3		15	168.7	43.07	83.73	0.22	9/1/2018 4:00	9/1/2018 4:15	RED
52-4		15	170.4	42.47	82.60	0.23	9/1/2018 4:17	9/1/2018 4:32	RED

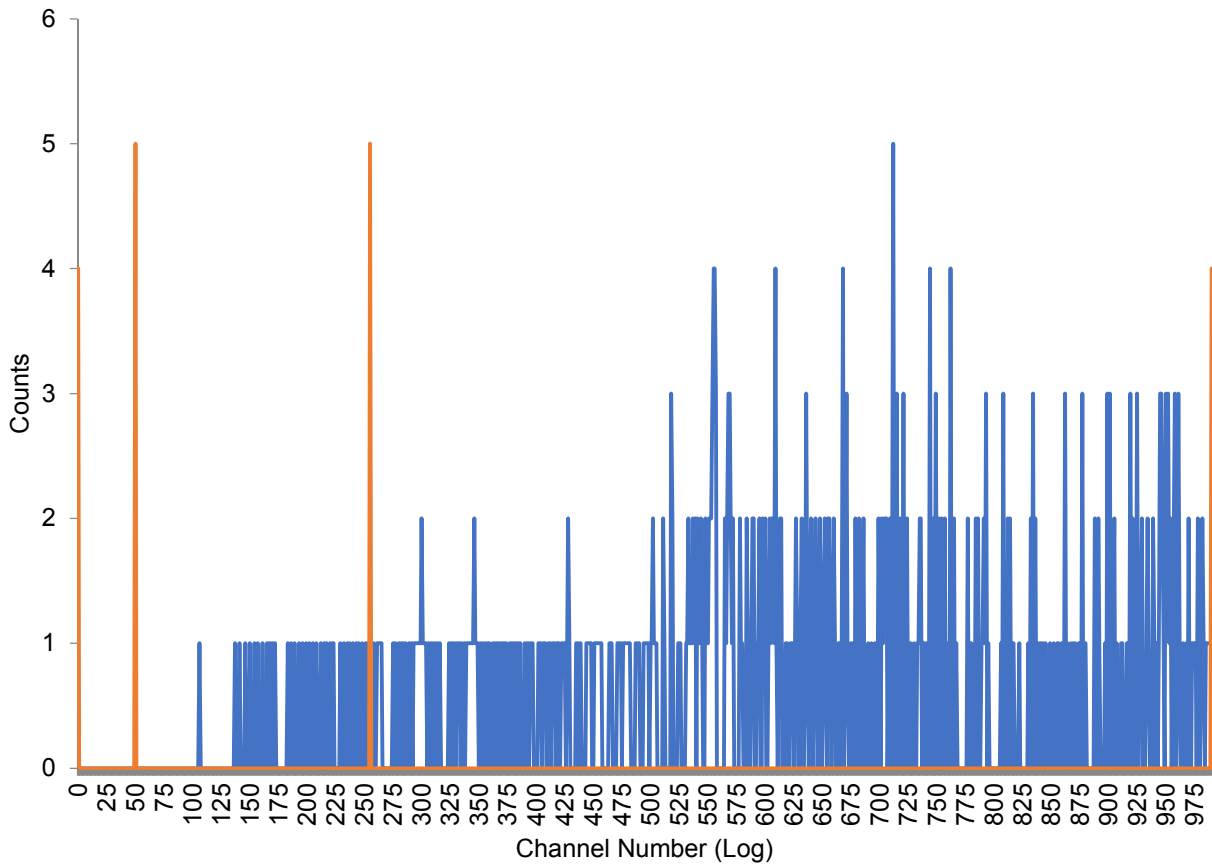
Sample Count Start Time:	1 Sep 2018 00:12:35		
Data Capture Date	01 Sep 2018 00:27:49		
User Filename	S05090139-1A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	1	39-1	15.00
H#, Total Counts:	168.8	610	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



Sample Count Start Time:	1 Sep 2018 00:28:55		
Data Capture Date	01 Sep 2018 00:44:08		
User Filename	S05090139-2A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	2	39-2	15.00
H#, Total Counts:	197.8	600	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

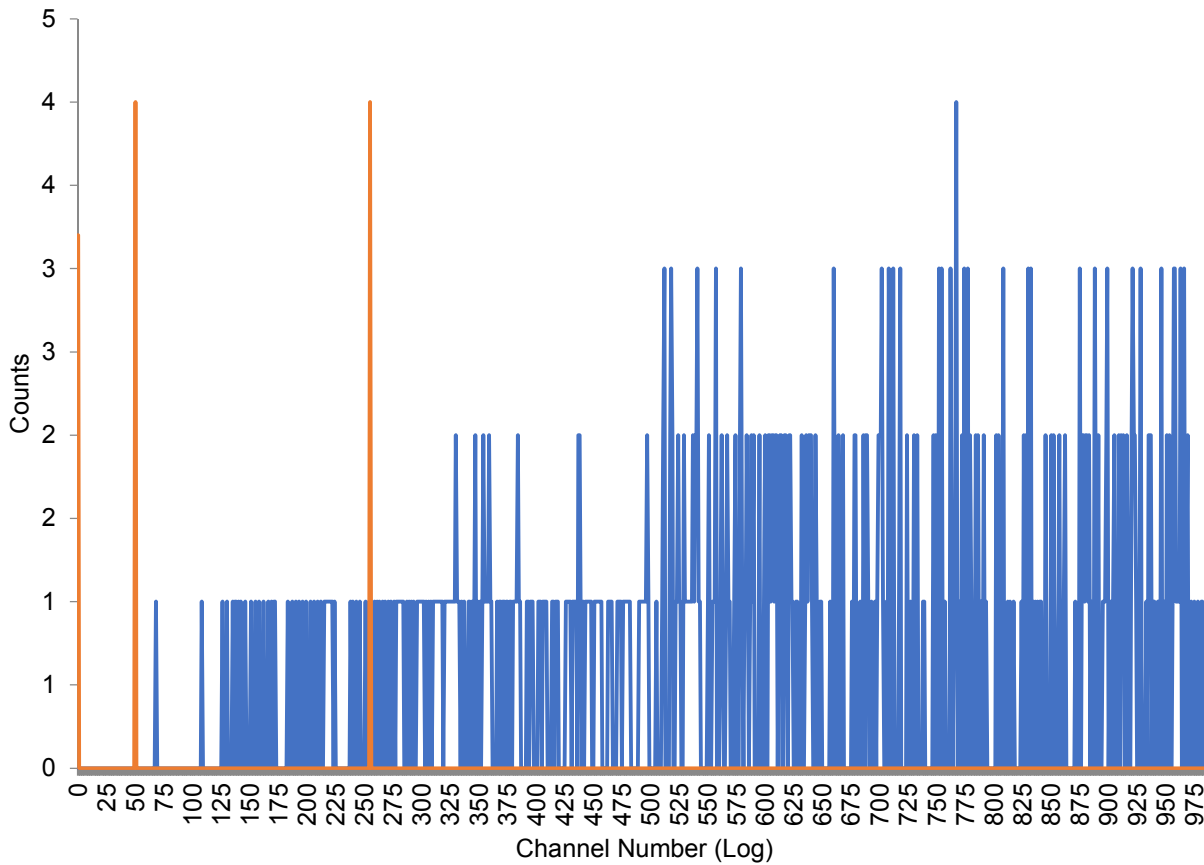
USER 05 - TRITIUM



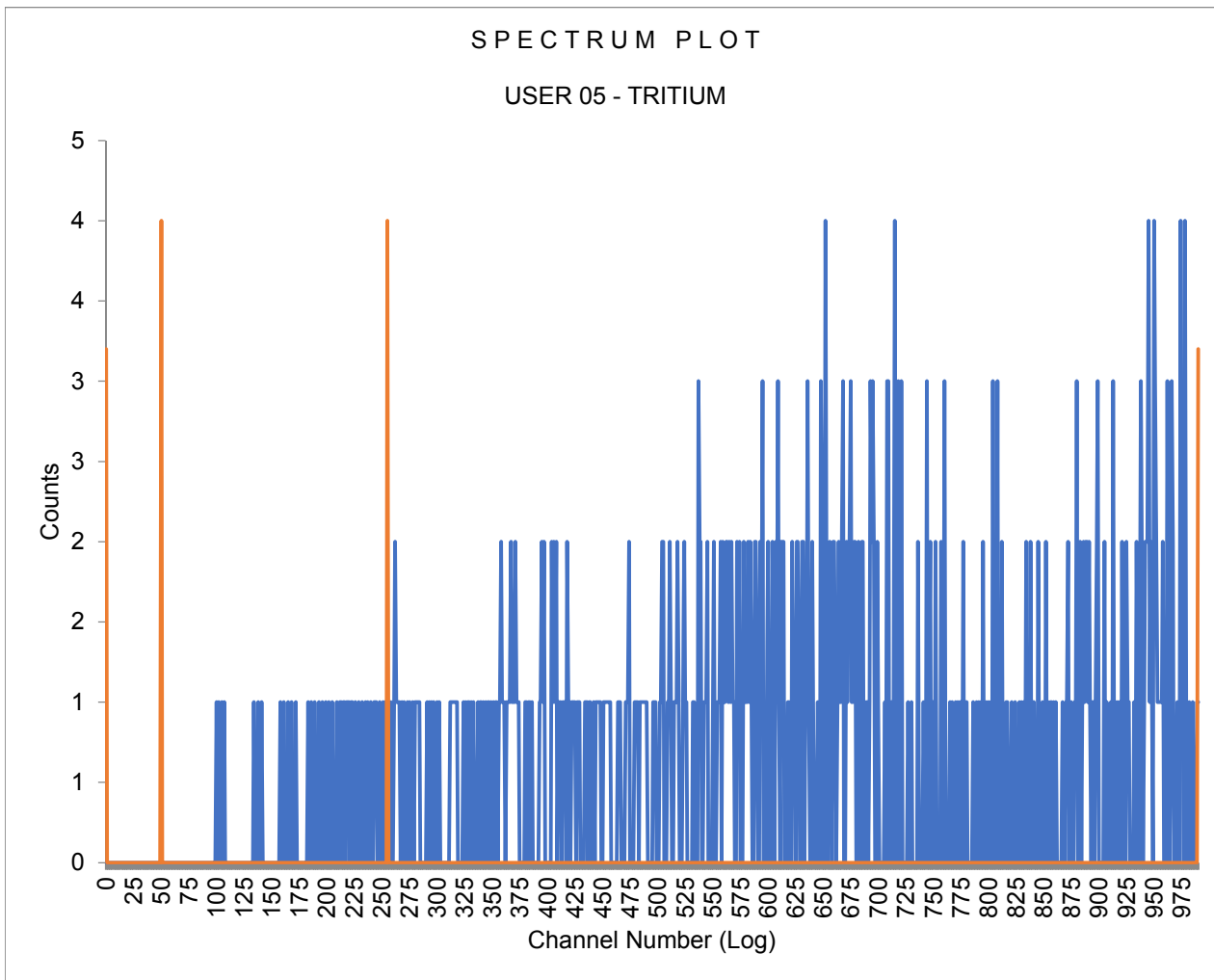
Sample Count Start Time:	1 Sep 2018 00:45:13		
Data Capture Date	01 Sep 2018 01:00:27		
User Filename	S05090139-3A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	3	39-3	15.00
H#, Total Counts:	211.0	597	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

USER 05 - TRITIUM



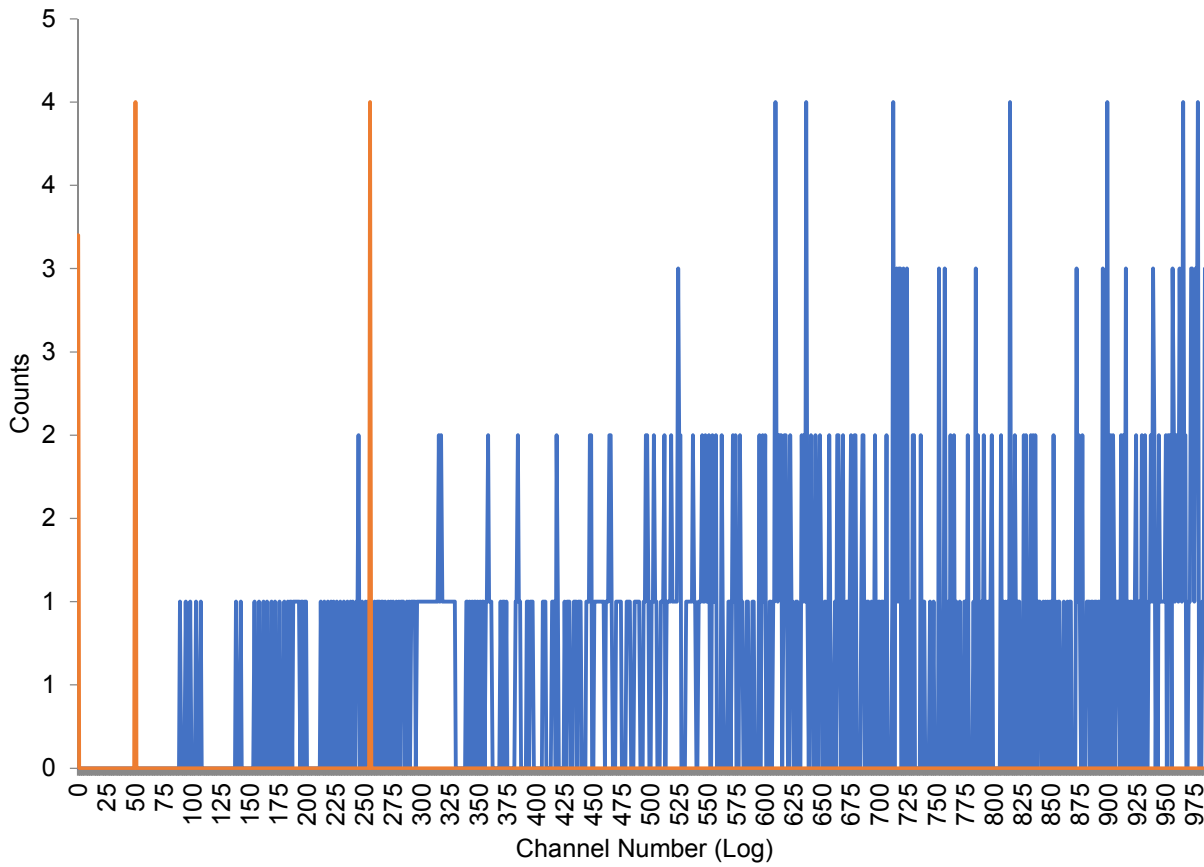
Sample Count Start Time:	1 Sep 2018 01:01:31		
Data Capture Date	01 Sep 2018 01:16:45		
User Filename	S05090139-4A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	4	39-4	15.00
H#, Total Counts:	184.8	609	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



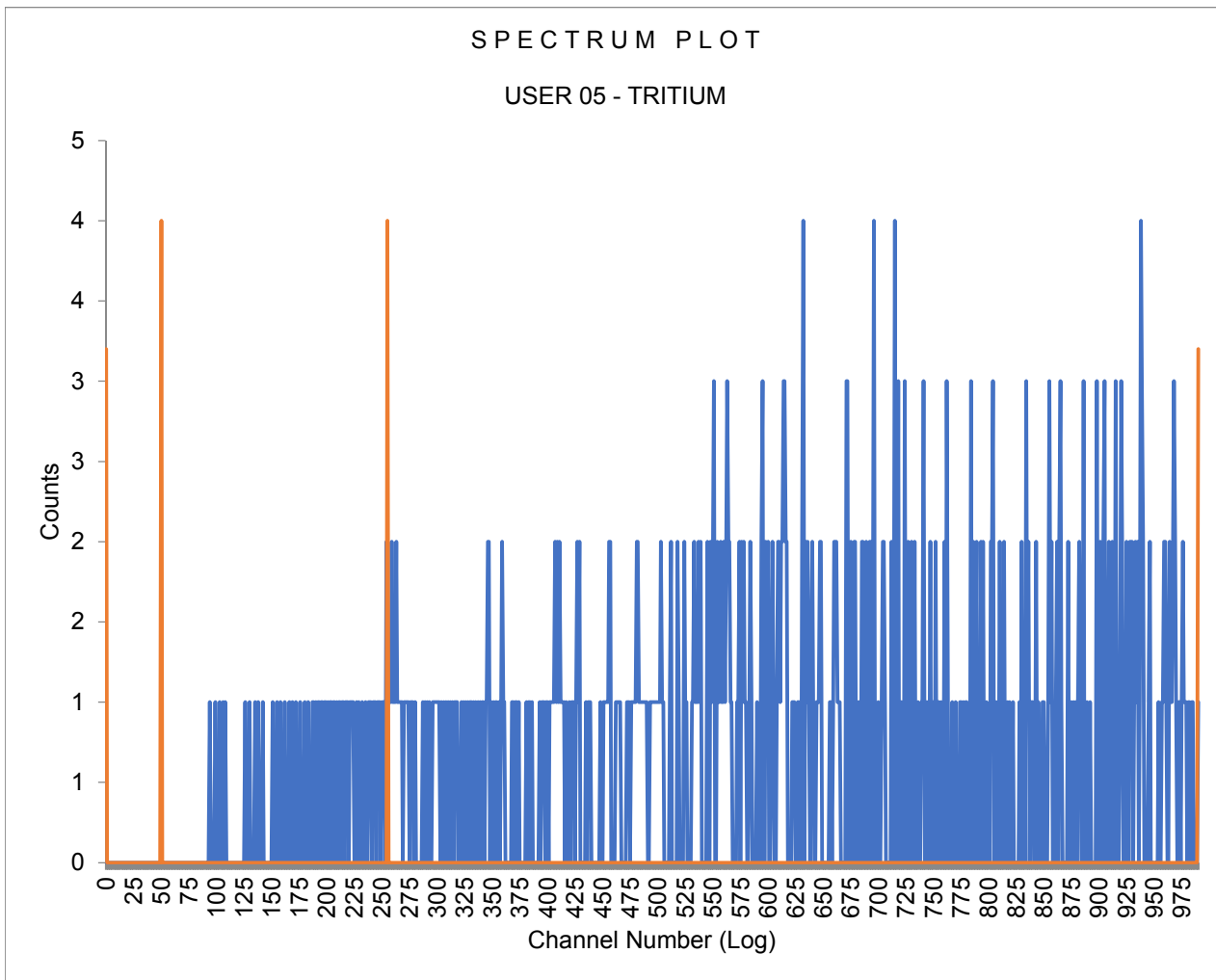
Sample Count Start Time:	1 Sep 2018 01:17:49		
Data Capture Date	01 Sep 2018 01:33:03		
User Filename	S05090139-5A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	5	39-5	15.00
H#, Total Counts:	180.6	632	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

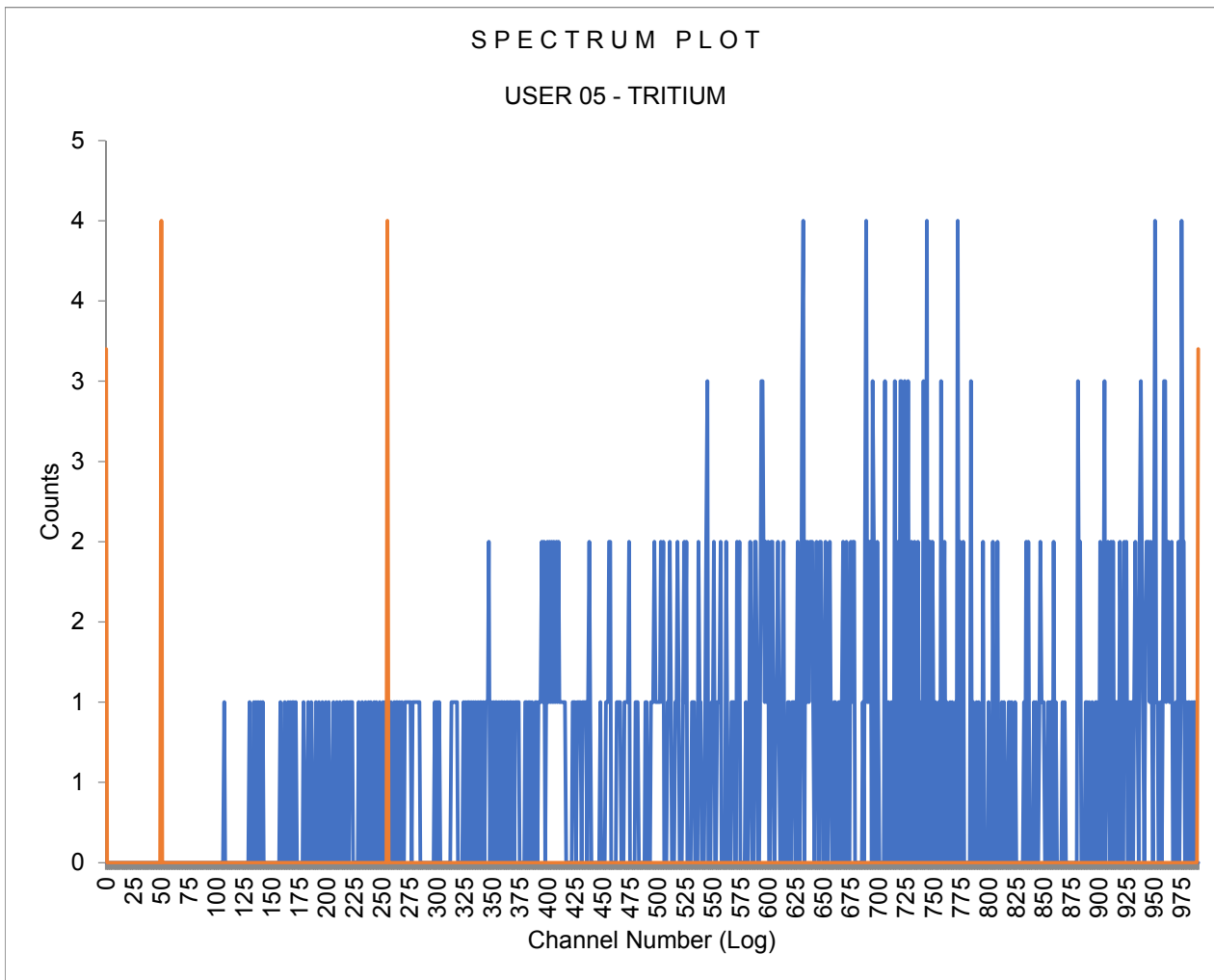
USER 05 - TRITIUM



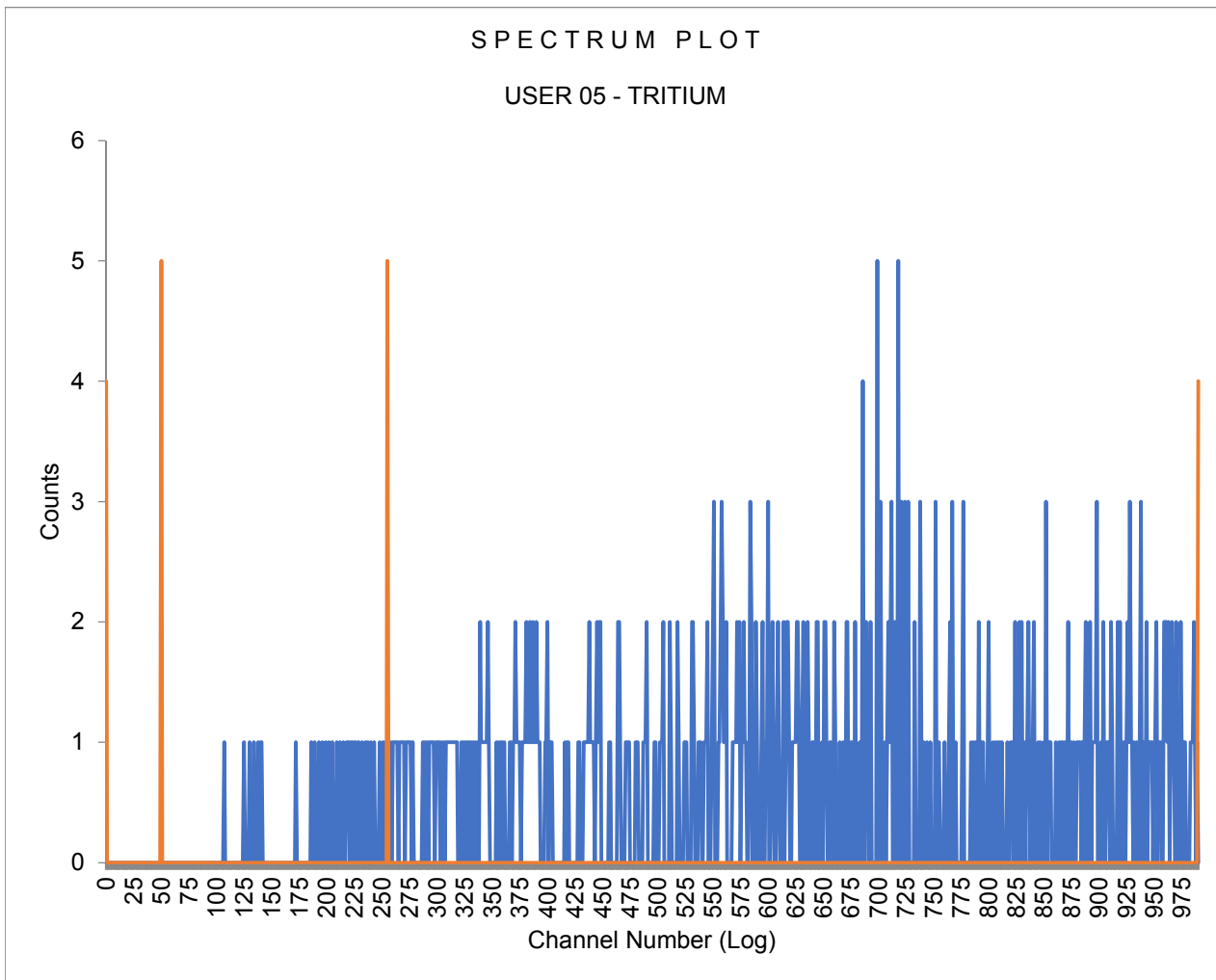
Sample Count Start Time:	1 Sep 2018 01:34:07		
Data Capture Date	01 Sep 2018 01:49:20		
User Filename	S05090139-6A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	6	39-6	15.00
H#, Total Counts:	199.0	638	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



Sample Count Start Time:	1 Sep 2018 01:50:25		
Data Capture Date	01 Sep 2018 02:05:38		
User Filename	S05090139-7A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	7	39-7	15.00
H#, Total Counts:	183.7	594	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



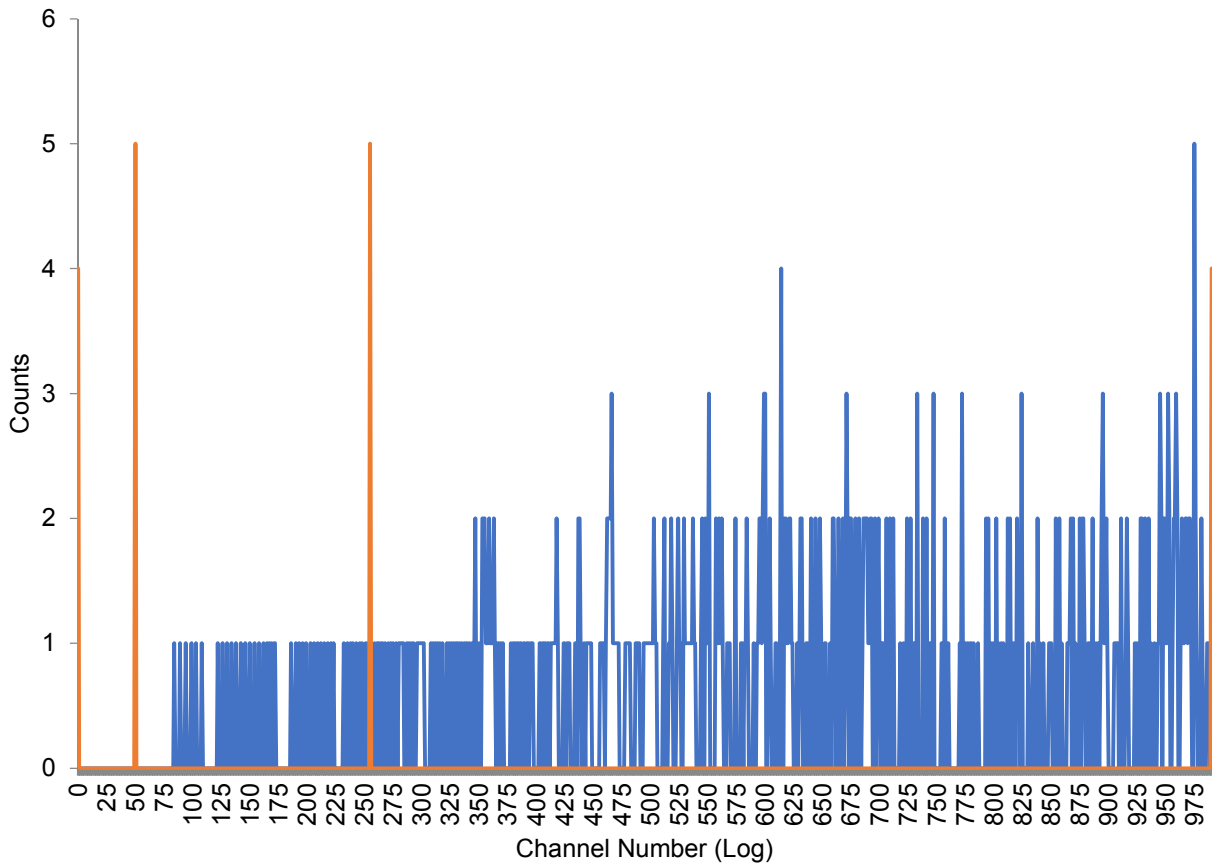
Sample Count Start Time:	1 Sep 2018 02:06:43		
Data Capture Date	01 Sep 2018 02:21:57		
User Filename	S05090139-8A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	8	39-8	15.00
H#, Total Counts:	196.3	549	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



Sample Count Start Time:	1 Sep 2018 02:23:02		
Data Capture Date	01 Sep 2018 02:38:14		
User Filename	S05090139-9A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	9	39-9	15.00
H#, Total Counts:	198.6	575	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

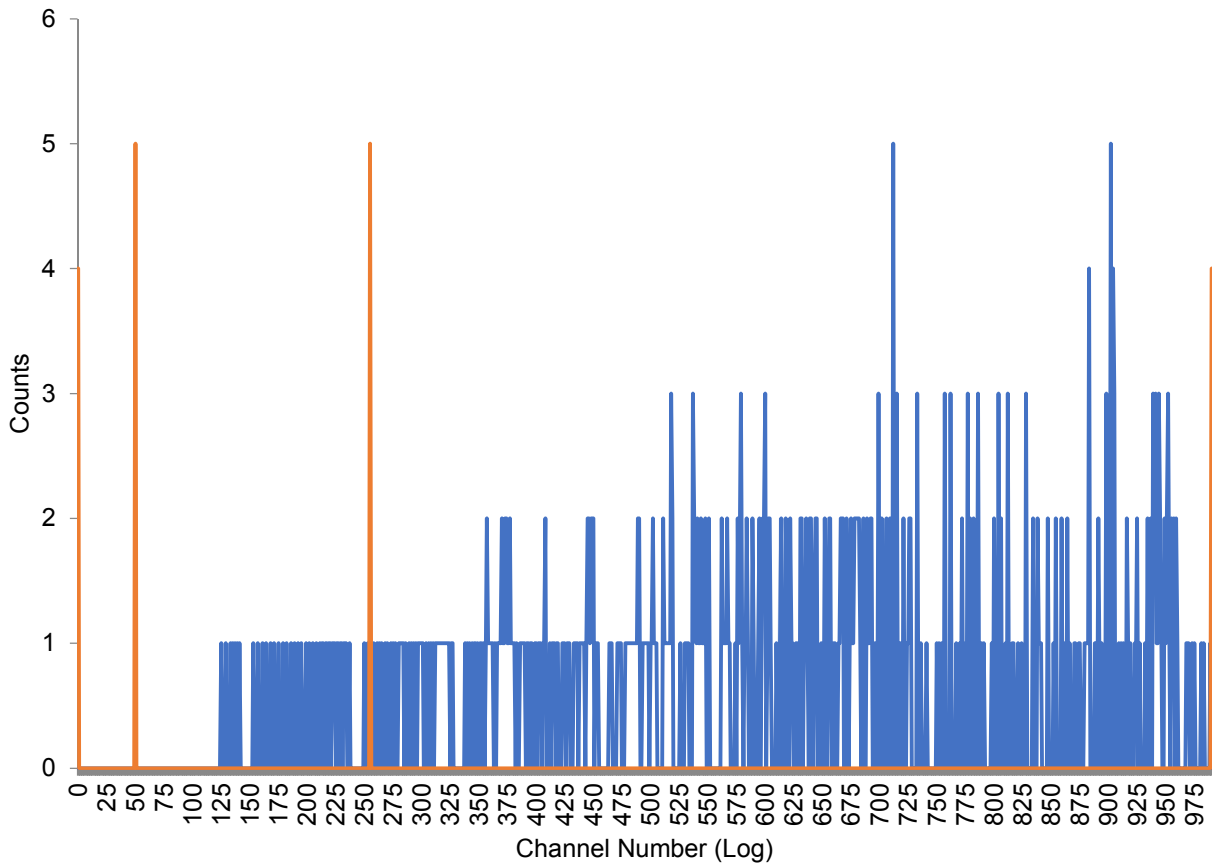
USER 05 - TRITIUM



Sample Count Start Time:	1 Sep 2018 02:39:19		
Data Capture Date	01 Sep 2018 02:54:32		
User Filename	S05090139-10A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	10	39-10	15.00
H#, Total Counts:	217.4	585	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

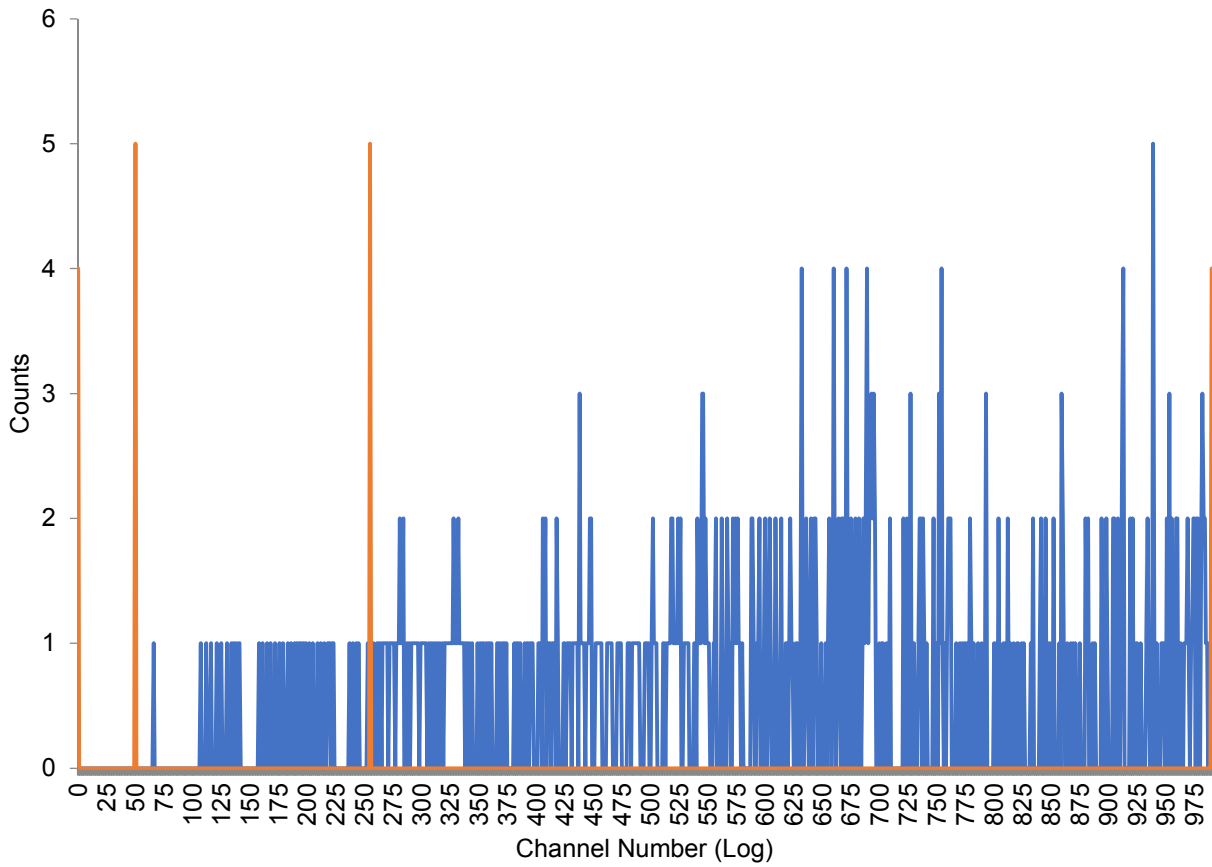
USER 05 - TRITIUM



Sample Count Start Time:	1 Sep 2018 02:55:38		
Data Capture Date	01 Sep 2018 03:10:51		
User Filename	S05090139-11A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	11	39-11	15.00
H#, Total Counts:	180.4	596	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

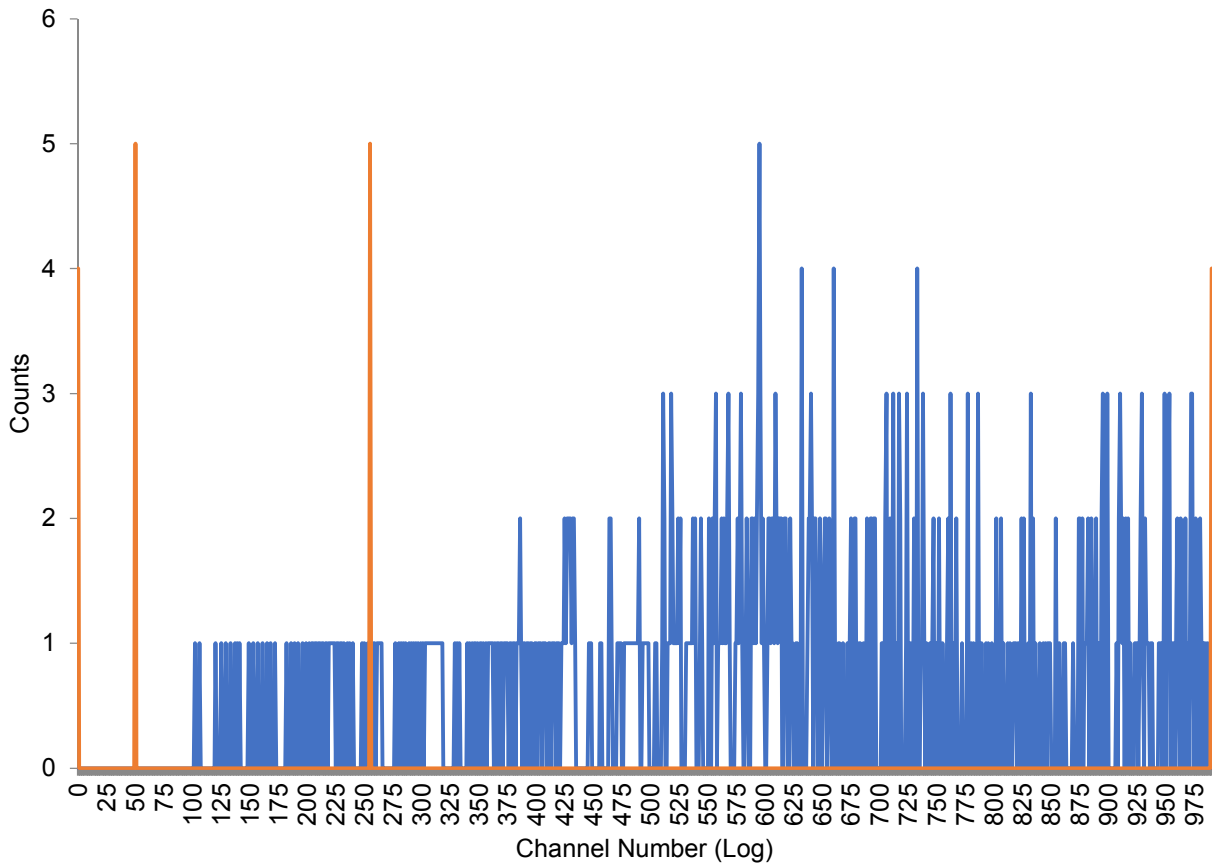
USER 05 - TRITIUM



Sample Count Start Time:	1 Sep 2018 03:11:55		
Data Capture Date	01 Sep 2018 03:27:09		
User Filename	S05090139-12A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	12	39-12	15.00
H#, Total Counts:	188.6	618	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

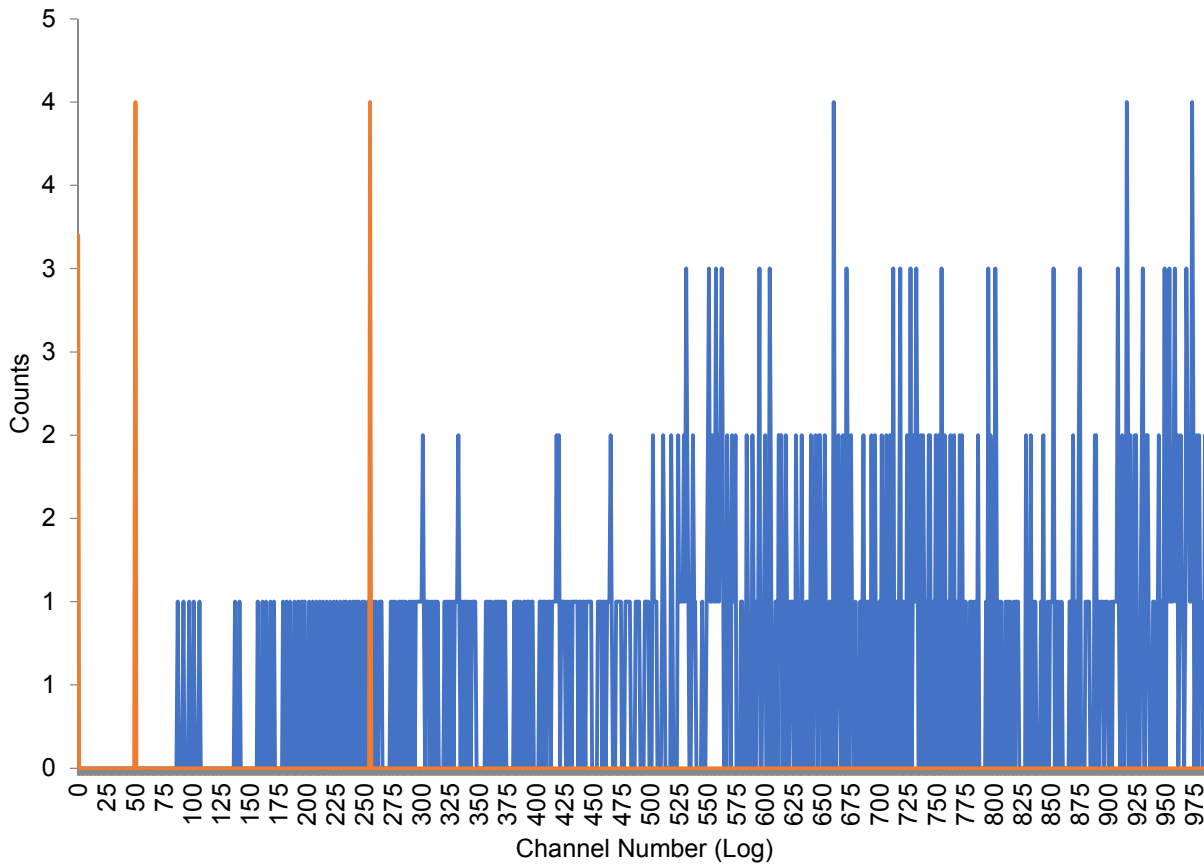
USER 05 - TRITIUM



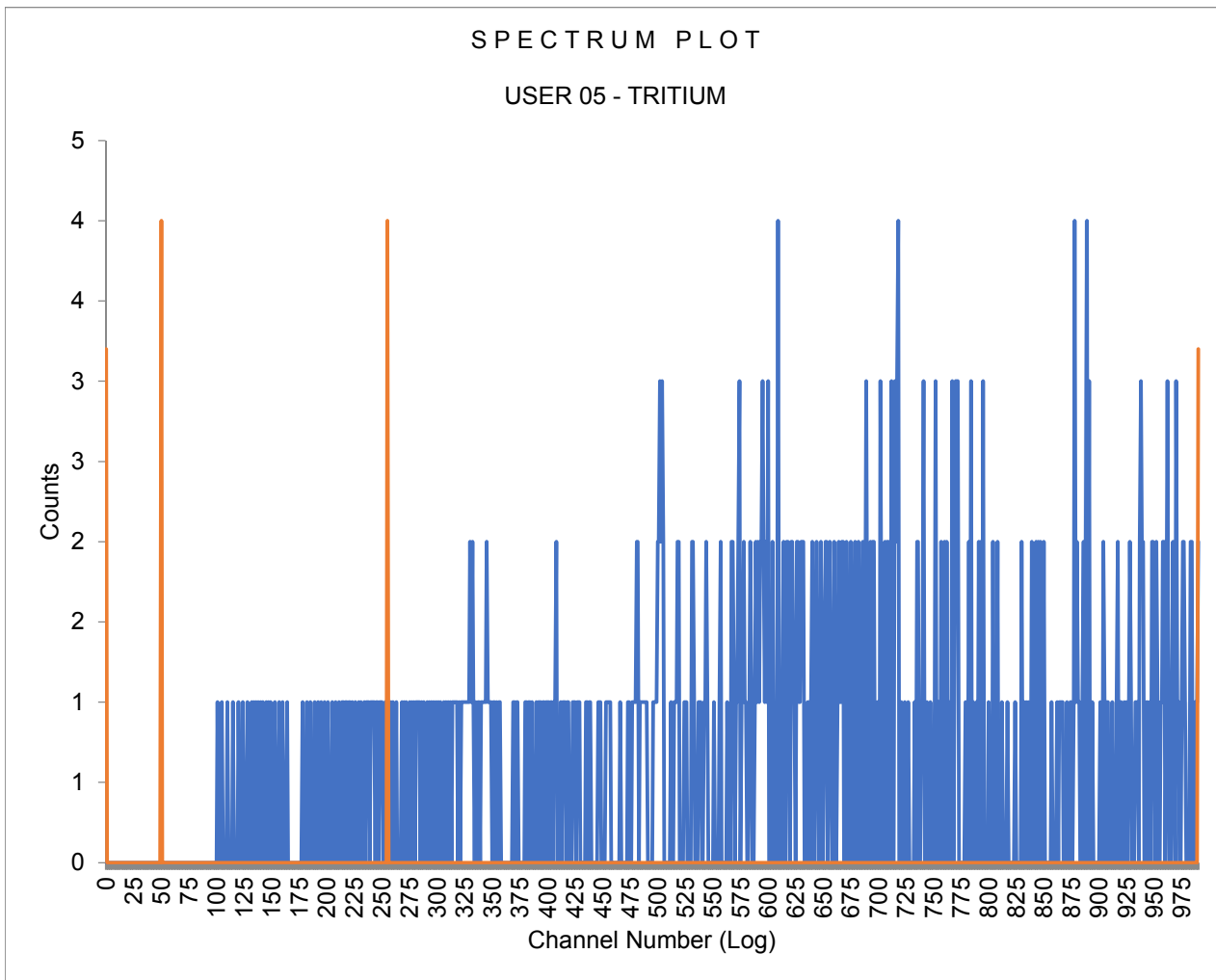
Sample Count Start Time:	1 Sep 2018 03:28:20		
Data Capture Date	01 Sep 2018 03:43:33		
User Filename	S05090152-1A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	13	52-1	15.00
H#, Total Counts:	178.9	594	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

USER 05 - TRITIUM



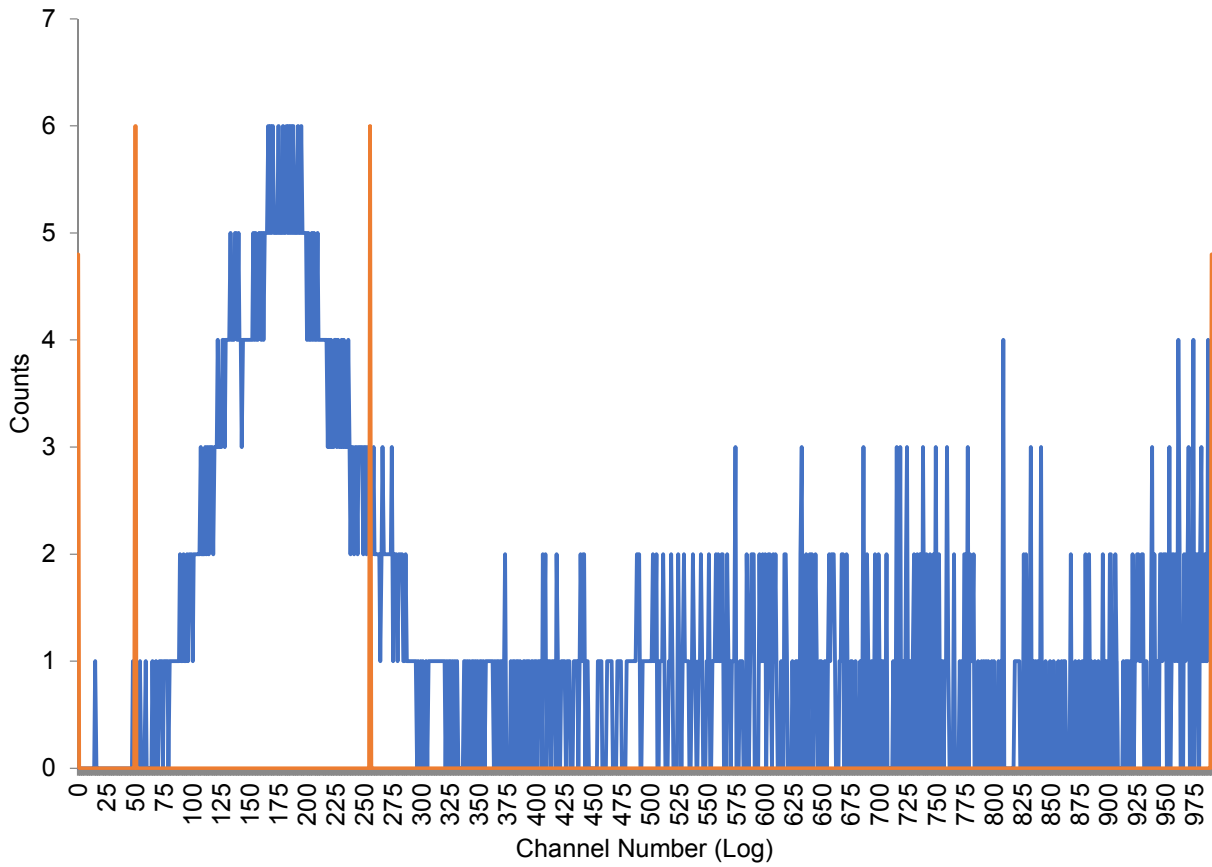
Sample Count Start Time:	1 Sep 2018 03:44:39		
Data Capture Date	01 Sep 2018 03:59:52		
User Filename	S05090152-2A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	14	52-2	15.00
H#, Total Counts:	168.5	608	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



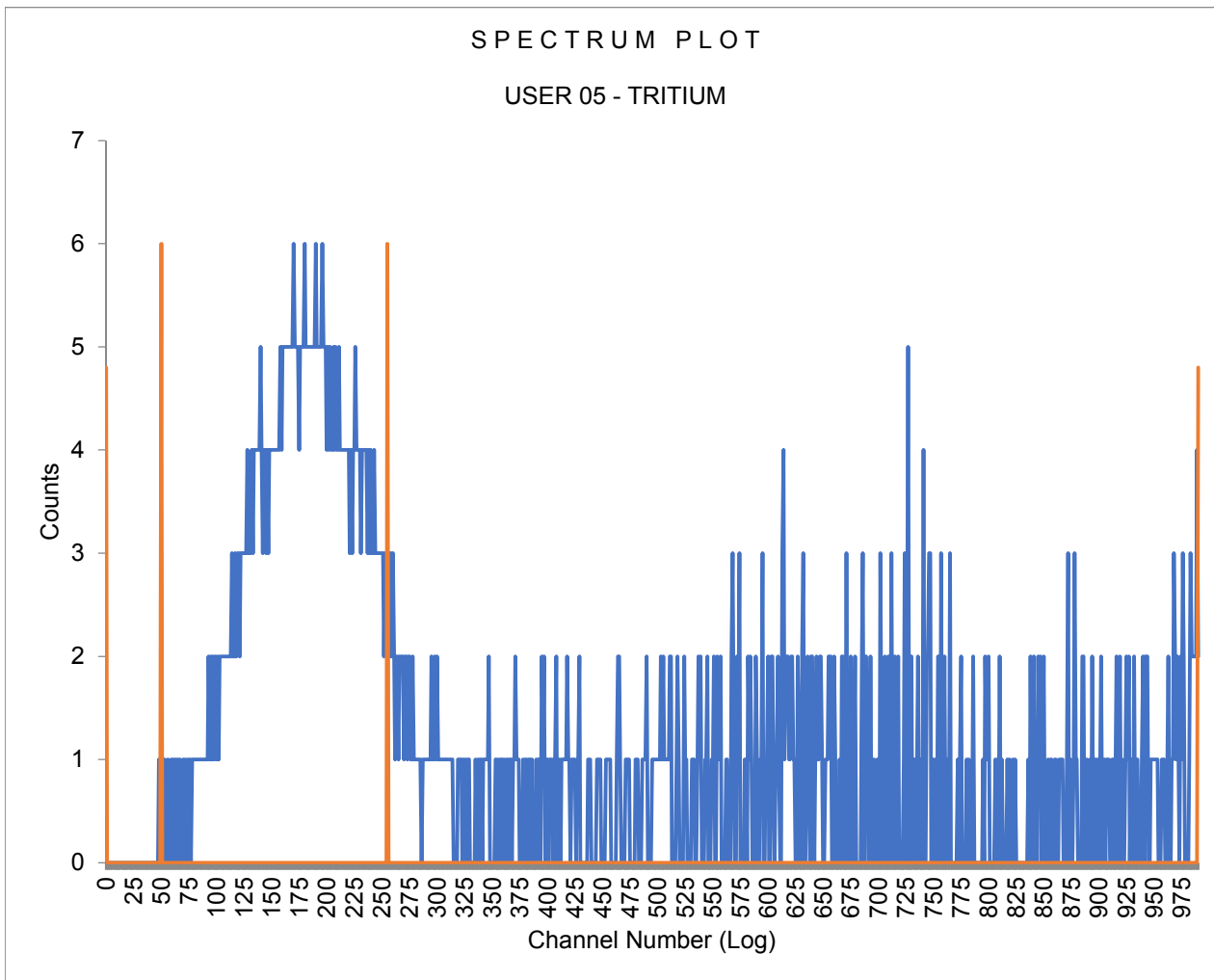
Sample Count Start Time:	1 Sep 2018 04:00:56		
Data Capture Date	01 Sep 2018 04:16:09		
User Filename	S05090152-3A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	15	52-3	15.00
H#, Total Counts:	168.7	1274	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

USER 05 - TRITIUM



Sample Count Start Time:	1 Sep 2018 04:17:14		
Data Capture Date	01 Sep 2018 04:32:27		
User Filename	S05090152-4A.XLS		
	U05090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	05		
User Id	TRITIUM		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	16	52-4	15.00
H#, Total Counts:	170.4	1278	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



# Batch 1794255 Check-list

This check-list was completed on 04-SEP-18 by Lyndsey Pace

This batch was reviewed by Gregory Ramsay on 04-SEP-18 and Lyndsey Pace on 04-SEP-18.

**Batch ID:** 1794255

**Product:** LSC\_14CF

**Description:** Carbon-14 GL-RAD-A-003

#	Criteria	Yes	No	Comments
<b>Preparation Information</b>				
1	Were all of the samples homogenous?	Yes		
2	Was the preservation correct for this analysis?	Yes		
<b>Internal Checklist Information</b>				
3	Are instrument source checks within limits?	Yes		
4	Have client special requirements have been reviewed and met?	Yes		
5	Has a hit notification been completed?		No	
6	Has an Aliquot Correction been completed for this batch?		No	
7	Have sample historical results been reviewed for this batch?	Yes		
<b>Technical Information</b>				
8	Were all the samples prepared/analyzed within the required holding time period?	Yes		
9	Are any sample results more negative than 3xTPU?		No	
<b>Quality Control (QC) Information</b>				
10	Was the method blank (MB) within the acceptance criteria?	Yes		
11	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
12	Were the relative percent differences and/or error (RPD/RER) between the LCS and the LCSD recoveries within the acceptance limits?	Yes		
13	Has the method required detection limit been met?	Yes		
<b>Miscellaneous Information</b>				
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

# Prep Logbook

## Carbon-14 in Filter

**Batch ID:** 1794255

**Analyst:** Brittany Moorer (BXM4)

**Method:** EPA EERF C-01 Modified

**Lab SOP:** GL-RAD-A-003 REV# 16

**Instrument:** Liquid Scintillation Counter  
No instrument-manual method

**Due Dates for Lab:** 02-SEP-2018

**Package:** 03-SEP-2018

**SDG:** 05-SEP-2018

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204095741	Carbon-14 SPIKE	1709-B	.1	mL
LCSD	1204095742	Carbon-14 SPIKE	1709-B	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/Filter)	Unadjusted Aliquot (g)	Aliquot (Filter)
1	457261021	31-AUG-2018	10	1	1
2	457261022	31-AUG-2018	10	1	1
3	457261023	31-AUG-2018	10	1	1
4	457261024	31-AUG-2018	10	1	1
5	457261025	31-AUG-2018	10	1	1
6	457261026	31-AUG-2018	10	1	1
7	457261027	31-AUG-2018	10	1	1
8	457261028	31-AUG-2018	10	1	1
9	457261029	31-AUG-2018	10	1	1
10	457261030	31-AUG-2018	10	1	1
11	457261031	31-AUG-2018	10	1	1
12	457261032	31-AUG-2018	10	1	1
13	1204095740 MB	31-AUG-2018	10	1	1
14	1204095741 LCS	31-AUG-2018	10	1	1
15	1204095742 LCSD	31-AUG-2018	10	1	1

Reagent/Solvent Lot ID	Description	Amount	Comments:
REGNT 2605985	Quenching Agent	30 uL	Spike Pipet ID: RAD-LSC-2970968 Data Entry Date2: 31-AUG-2018 00:00
REGNT 2631957.10	Ecoscint A Scintillation Solution	10 mL	
REGNT 2802942.1	Ethanolamine 99%	3 mL	
REGNT 2813676.2	Methanol 4L Plastic Bottle Reagent	9 mL	
REGNT 2815842	RL-0.4M Hydrochloric Acid	50 mL	
REGNT 2821312.4	99% For Analysis, 500g	5 g	
REGNT 2821417.11	HNO3	25 mL	
REGNT 2822318	RL-1M Silver Nitrate	2 mL	

### Carbon-14 Filter

Filename : C14.XLS  
 File type : Excel  
 Version # : 1.3.10

**Batch :** 1794255  
**Analyst :** BXM4  
**Prep Date :** 8/31/2018  
**Method Uncertainty :** 0.0648

**Procedure Code :** LSC\_14CF  
**Parmname :** Carbon-14  
**Required MDA :** 10 pCi/F  
**C-14 Abundance :** 1.00  
**Halflife of Carbon-14 :** 5700.00 years

**Geometry:**  
 10mL DW/13mL Ecoscint Ultra/Swipe

Sample Characteristics					Count raw Data										
Pos.	Sample ID	Sample Aliquot F	Sample Aliquot StDev. F	Sample Date/Time	Rack Position #	Counting Time (min.)	Quench#	Gross cpm	Bkg cpm	Bkg Count Time (min.)	Bkg Quench#	Corrected Bkg cpm	Count Start Date/Time	C-14 Normalization Factor	Sample Decay
1	457261021.1	1.0000	2.0399E-05	8/9/2018 13:16	39-2	15	197.5	7	8.00	15	168.5	8.2426	9/1/2018 18:22	1.00000	1.000
2	457261022.1	1.0000	2.0399E-05	8/9/2018 12:40	39-3	15	209.7	6.67	8.00	15	168.5	8.3700	9/1/2018 18:38	1.00000	1.000
3	457261023.1	1.0000	2.0399E-05	8/9/2018 13:05	39-4	15	185.4	6.8	8.00	15	168.5	8.1171	9/1/2018 18:54	1.00000	1.000
4	457261024.1	1.0000	2.0399E-05	8/9/2018 12:29	39-5	15	180.1	6.87	8.00	15	168.5	8.0700	9/1/2018 19:10	1.00000	1.000
5	457261025.1	1.0000	2.0399E-05	8/9/2018 13:19	39-6	15	201.1	6.27	8.00	15	168.5	8.2815	9/1/2018 19:26	1.00000	1.000
6	457261026.1	1.0000	2.0399E-05	8/9/2018 12:20	39-7	15	184.4	7.47	8.00	15	168.5	8.1077	9/1/2018 19:42	1.00000	1.000
7	457261027.1	1.0000	2.0399E-05	8/9/2018 13:24	39-8	15	194.6	6.8	8.00	15	168.5	8.2113	9/1/2018 19:58	1.00000	1.000
8	457261028.1	1.0000	2.0399E-05	8/9/2018 12:37	39-9	15	196.8	5.87	8.00	15	168.5	8.2351	9/1/2018 20:14	1.00000	1.000
9	457261029.1	1.0000	2.0399E-05	8/9/2018 13:14	39-10	15	212.7	8.2	8.00	15	168.5	8.3980	9/1/2018 20:30	1.00000	1.000
10	457261030.1	1.0000	2.0399E-05	8/9/2018 13:38	39-11	15	180.8	5.33	8.00	15	168.5	8.0758	9/1/2018 20:47	1.00000	1.000
11	457261031.1	1.0000	2.0399E-05	8/9/2018 13:30	39-12	15	186.7	7.27	8.00	15	168.5	8.1296	9/1/2018 21:03	1.00000	1.000
12	457261032.1	1.0000	2.0399E-05	8/9/2018 12:22	52-1	15	178	7.33	8.00	15	168.5	8.0536	9/1/2018 21:19	1.00000	1.000
13	1204095740.1	1.0000	2.0399E-05	8/31/2018 0:00	52-2	15	167.8	6.6	8.00	15	168.5	7.9976	9/1/2018 21:35	1.00000	1.000
14	1204095741.1	1.0000	2.0399E-05	8/31/2018 0:00	52-3	15	170.2	80.67	8.00	15	168.5	8.0067	9/1/2018 21:51	1.00000	1.000
15	1204095742.1	1.0000	2.0399E-05	8/31/2018 0:00	52-4	15	170.9	81.4	8.00	15	168.5	8.0099	9/1/2018 22:07	1.00000	1.000

Pipet, 0.1 ml Stdev : +/- 0.000200 ml  
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml

Analytical SOP: GL-RAD-A-003  
 Instrument SOP: GL-RAD-I-004

Calibration Data							
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Background Rack Position #	Background Count Start Date/Time
1	LSCRED	6/18/2018	6/30/2019	0.5145	0.00792	39-1	9/1/2018 18:06
2	LSCRED	6/18/2018	6/30/2019	0.5232	0.00792	39-1	9/1/2018 18:06
3	LSCRED	6/18/2018	6/30/2019	0.4999	0.00792	39-1	9/1/2018 18:06
4	LSCRED	6/18/2018	6/30/2019	0.4918	0.00792	39-1	9/1/2018 18:06
5	LSCRED	6/18/2018	6/30/2019	0.5177	0.00792	39-1	9/1/2018 18:06
6	LSCRED	6/18/2018	6/30/2019	0.4985	0.00792	39-1	9/1/2018 18:06
7	LSCRED	6/18/2018	6/30/2019	0.5115	0.00792	39-1	9/1/2018 18:06
8	LSCRED	6/18/2018	6/30/2019	0.5138	0.00792	39-1	9/1/2018 18:06
9	LSCRED	6/18/2018	6/30/2019	0.5244	0.00792	39-1	9/1/2018 18:06
10	LSCRED	6/18/2018	6/30/2019	0.4929	0.00792	39-1	9/1/2018 18:06
11	LSCRED	6/18/2018	6/30/2019	0.5018	0.00792	39-1	9/1/2018 18:06
12	LSCRED	6/18/2018	6/30/2019	0.4883	0.00792	39-1	9/1/2018 18:06
13	LSCRED	6/18/2018	6/30/2019	0.4690	0.00792	39-1	9/1/2018 18:06
14	LSCRED	6/18/2018	6/30/2019	0.4739	0.00792	39-1	9/1/2018 18:06
15	LSCRED	6/18/2018	6/30/2019	0.4752	0.00792	39-1	9/1/2018 18:06

Notes:

- \* - Results are decay corrected to Sample Date/Time
- \* - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- \* - Spike Nominals are decay corrected to Sample Date/Time

**Spike S/N :** N/A  
**Spike Exp Date :** N/A  
**Spike Activity (dpm/ml):** N/A  
**Spike Volume Added:** N/A

**LCS S/N :** 1709-B  
**LCS Exp Date :** 12/12/2018  
**LCS Activity (dpm/ml):** 1666.37  
**LCS Volume Added:** 0.10

<b>Results</b>																	
Pos.	Decision	Critical	Required	Sample Act.	Sample Act.	Net Count	Net Count	2 SIGMA	2 SIGMA	Sample	Sample	RPD	RER	Nominal	Recovery		
	Level	Level	MDA													MDA	Conc.
	pCi/F	pCi/F	pCi/F	pCi/F	pCi/F	CPM	CPM	pCi/F	pCi/F					pCi/F			
1	2.1388	1.5100	10	3.1951	<b>-1.0881</b>	81.13%	-1.2426	1.0081	1.7300	1.7300							SAMPLE
2	2.1191	1.4961	10	3.1644	<b>-1.4636</b>	58.91%	-1.7000	1.0013	1.6897	1.6897							SAMPLE
3	2.1841	1.5420	10	3.2642	<b>-1.1868</b>	75.72%	-1.3171	0.9972	1.7612	1.7612							SAMPLE
4	2.2137	1.5629	10	3.3090	<b>-1.0991</b>	83.17%	-1.2000	0.9980	1.7916	1.7916							SAMPLE
5	2.1305	1.5042	10	3.1823	<b>-1.7503</b>	48.97%	-2.0115	0.9849	1.6798	1.6798							SAMPLE
6	2.1892	1.5456	10	3.2719	<b>-0.5763</b>	159.81%	-0.6377	1.0191	1.8050	1.8050							SAMPLE
7	2.1471	1.5159	10	3.2078	<b>-1.2429</b>	70.89%	-1.4113	1.0004	1.7268	1.7268							SAMPLE
8	2.1406	1.5113	10	3.1980	<b>-2.0736</b>	41.01%	-2.3651	0.9697	1.6664	1.6664							SAMPLE
9	2.1177	1.4951	10	3.1620	<b>-0.1700</b>	531.37%	-0.1980	1.0519	1.7709	1.7709							SAMPLE
10	2.2094	1.5599	10	3.3025	<b>-2.5092</b>	34.44%	-2.7458	0.9454	1.6932	1.6932							SAMPLE
11	2.1778	1.5375	10	3.2546	<b>-0.7717</b>	117.87%	-0.8596	1.0132	1.7829	1.7829							SAMPLE
12	2.2273	1.5725	10	3.3295	<b>-0.6675</b>	139.96%	-0.7236	1.0127	1.8311	1.8311							SAMPLE
13	2.3110	1.6316	10	3.4553	<b>-1.3424</b>	70.59%	-1.3976	0.9865	1.8571	1.8572							MB
14	2.2885	1.6157	10	3.4215	<b>69.0735</b>	3.44%	72.6633	2.4314	4.5301	9.9315							LCS
15	2.2823	1.6113	10	3.4122	<b>69.5611</b>	3.42%	73.3901	2.4414	4.5356	9.9896		0.7%					LCSD
														75.0617			92.0%
														75.0617			92.7%

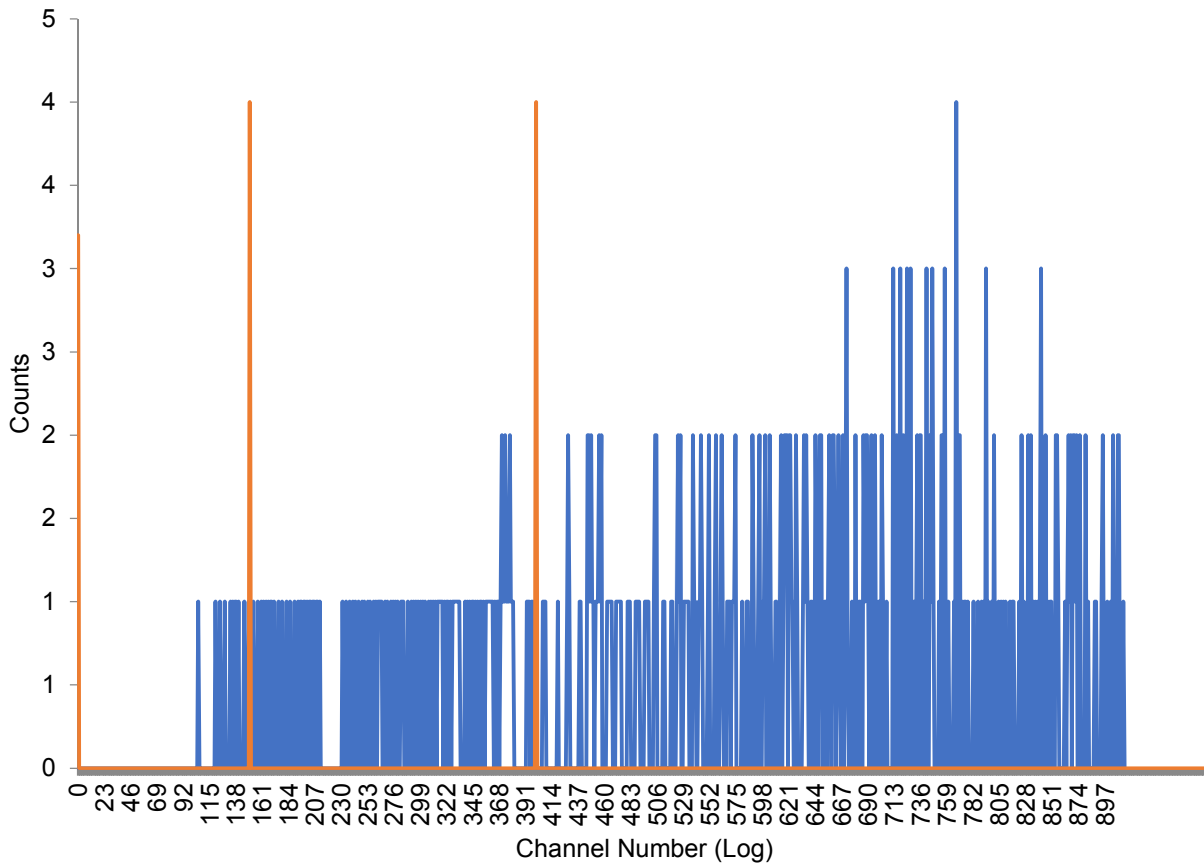
U11090139-1A

SampleID	Rack	Time (min.)	H#	CPM Iso1	CPM Iso2	LumEx	Count Start Time	Count End Time	Machine
	39-1	15	168.5	8.00	30.20	0.51	9/1/2018 18:06	9/1/2018 18:21	RED
	39-2	15	197.5	7.00	29.33	0.62	9/1/2018 18:22	9/1/2018 18:37	RED
	39-3	15	209.7	6.67	28.33	0.61	9/1/2018 18:38	9/1/2018 18:53	RED
	39-4	15	185.4	6.80	28.47	0.73	9/1/2018 18:54	9/1/2018 19:09	RED
	39-5	15	180.1	6.87	27.00	0.64	9/1/2018 19:10	9/1/2018 19:25	RED
	39-6	15	201.1	6.27	29.60	0.60	9/1/2018 19:26	9/1/2018 19:41	RED
	39-7	15	184.4	7.47	29.20	0.60	9/1/2018 19:42	9/1/2018 19:57	RED
	39-8	15	194.6	6.80	28.47	0.70	9/1/2018 19:58	9/1/2018 20:13	RED
	39-9	15	196.8	5.87	28.40	0.61	9/1/2018 20:14	9/1/2018 20:29	RED
	39-10	15	212.7	8.20	32.73	0.62	9/1/2018 20:30	9/1/2018 20:45	RED
	39-11	15	180.8	5.33	27.60	0.89	9/1/2018 20:47	9/1/2018 21:02	RED
	39-12	15	186.7	7.27	29.07	0.59	9/1/2018 21:03	9/1/2018 21:18	RED
	52-1	15	178.0	7.33	28.27	0.53	9/1/2018 21:19	9/1/2018 21:34	RED
	52-2	15	167.8	6.60	29.73	0.50	9/1/2018 21:35	9/1/2018 21:50	RED
	52-3	15	170.2	80.67	141.67	0.11	9/1/2018 21:51	9/1/2018 22:06	RED
	52-4	15	170.9	81.40	144.33	0.12	9/1/2018 22:07	9/1/2018 22:22	RED

Sample Count Start Time: 1 Sep 2018 18:06:05  
 Data Capture Date: 01 Sep 2018 18:21:17  
 User Filename: S11090139-1A.XLS  
 U11090139-1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 11  
 User Id: C-14  
 User Comment: RED  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 1 39-1 15.00  
 H#, Total Counts: 168.5 461  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

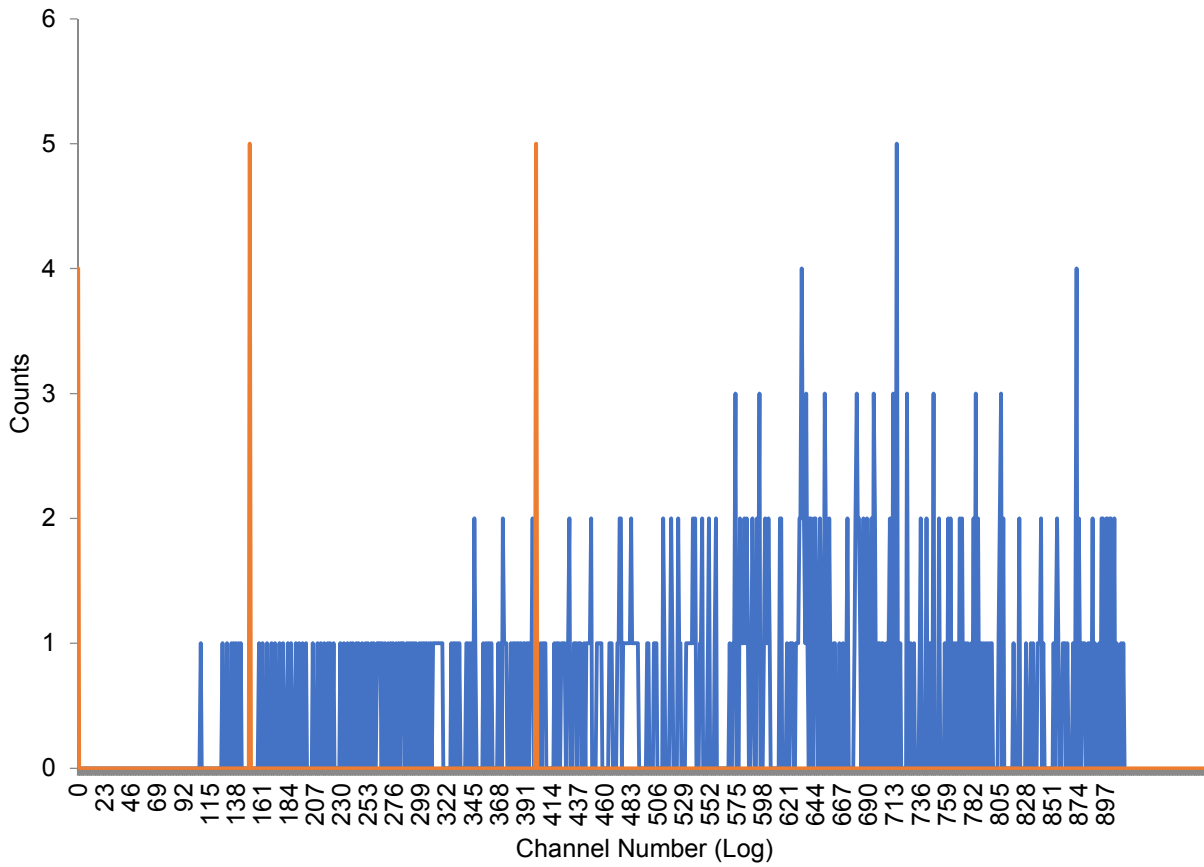
USER 11 - C-14



Sample Count Start Time:	1 Sep 2018 18:22:11		
Data Capture Date	01 Sep 2018 18:37:22		
User Filename	S11090139-2A.XLS		
	U11090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	11		
User Id	C-14		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	2	39-2	15.00
H#, Total Counts:	197.5	449	
Win1: C-14 - Start, End:	150	400	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

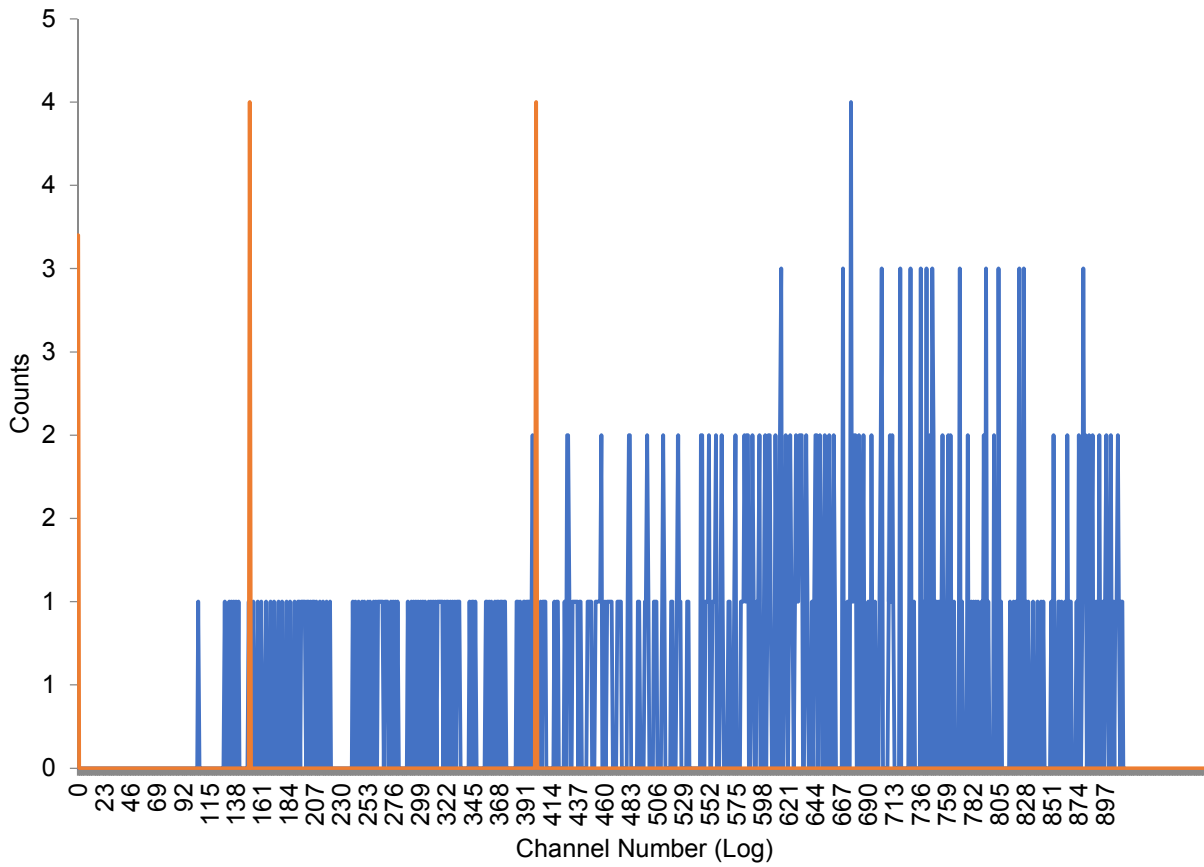
USER 11 - C-14



Sample Count Start Time: 1 Sep 2018 18:38:17  
 Data Capture Date: 01 Sep 2018 18:53:27  
 User Filename: S11090139-3A.XLS  
 U11090139-1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 11  
 User Id: C-14  
 User Comment: RED  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 3 39-3 15.00  
 H#, Total Counts: 209.7 435  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

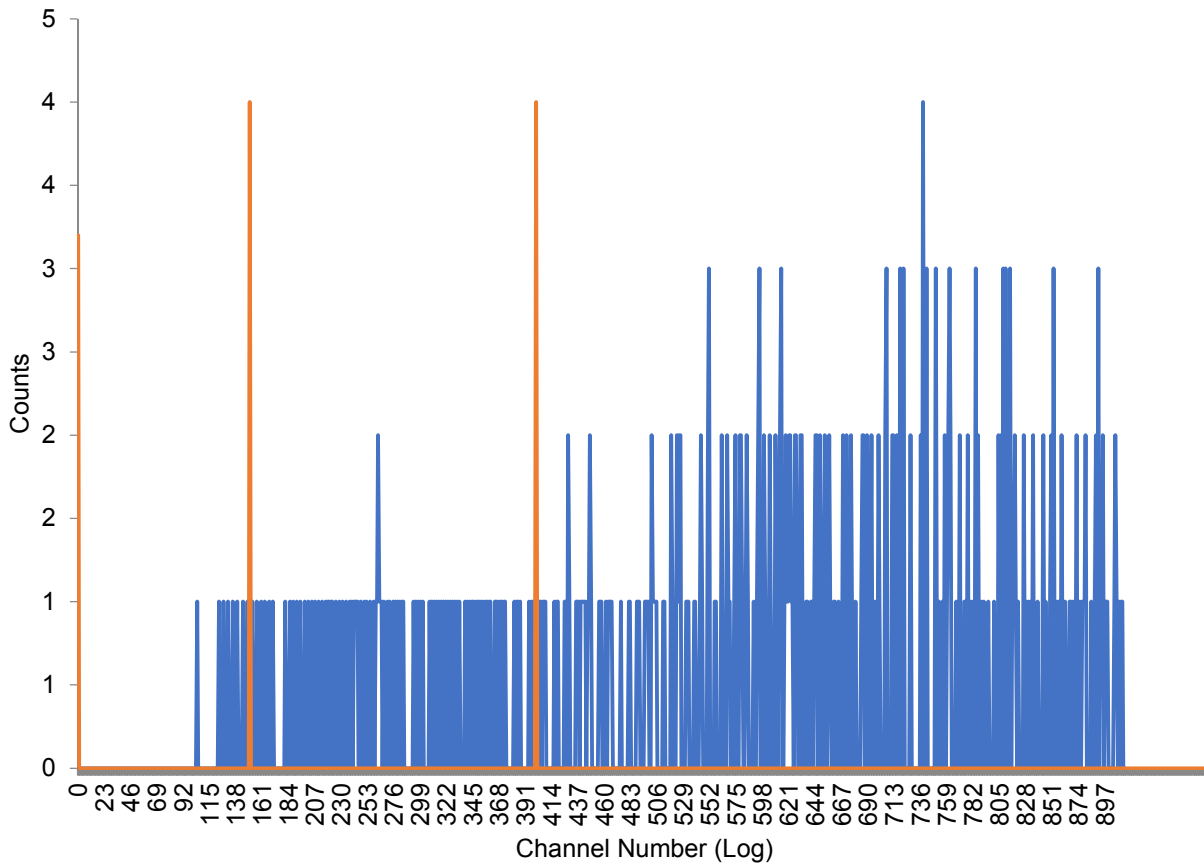
USER 11 - C-14



Sample Count Start Time:	1 Sep 2018 18:54:21		
Data Capture Date	01 Sep 2018 19:09:33		
User Filename	S11090139-4A.XLS		
	U11090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	11		
User Id	C-14		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	4	39-4	15.00
H#, Total Counts:	185.4	434	
Win1: C-14 - Start, End:	150	400	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

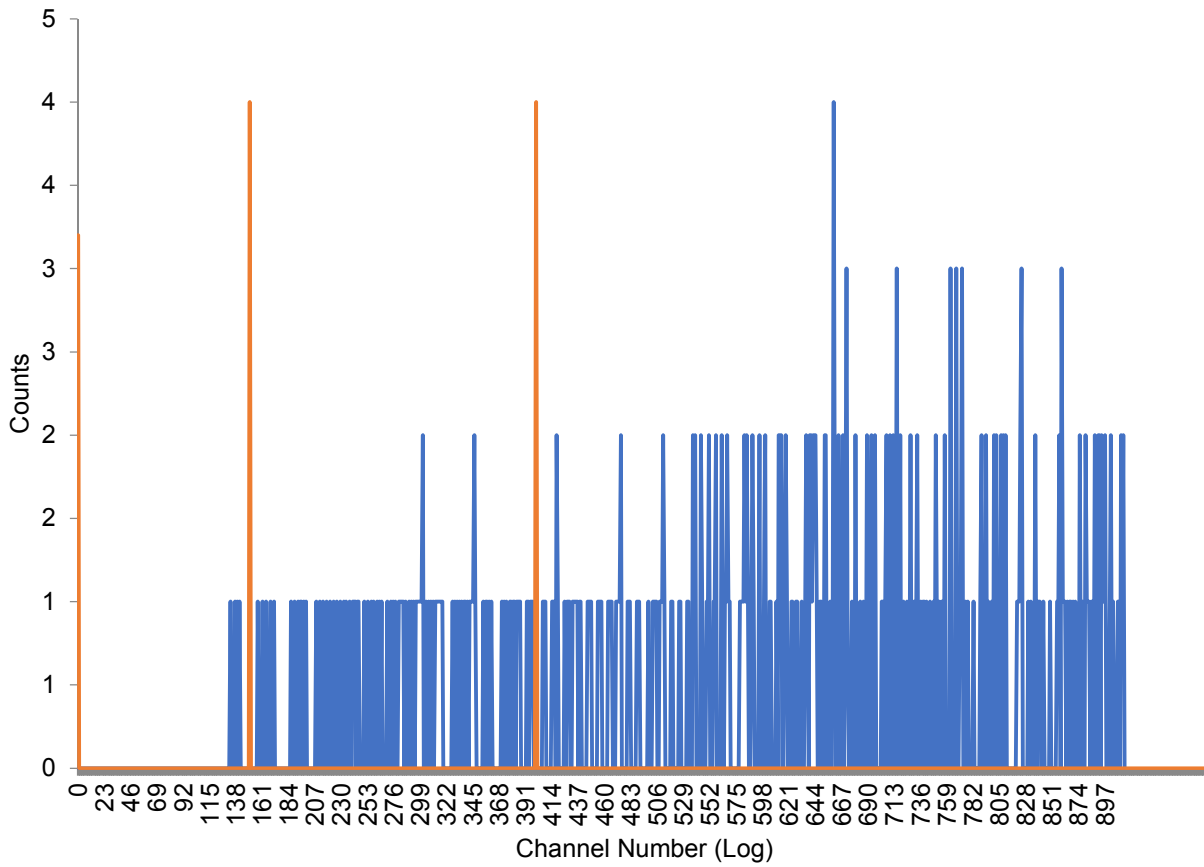
USER 11 - C-14



Sample Count Start Time: 1 Sep 2018 19:10:29  
 Data Capture Date: 01 Sep 2018 19:25:39  
 User Filename: S11090139-5A.XLS  
 U11090139-1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 11  
 User Id: C-14  
 User Comment: RED  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 5 39-5 15.00  
 H#, Total Counts: 180.1 416  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

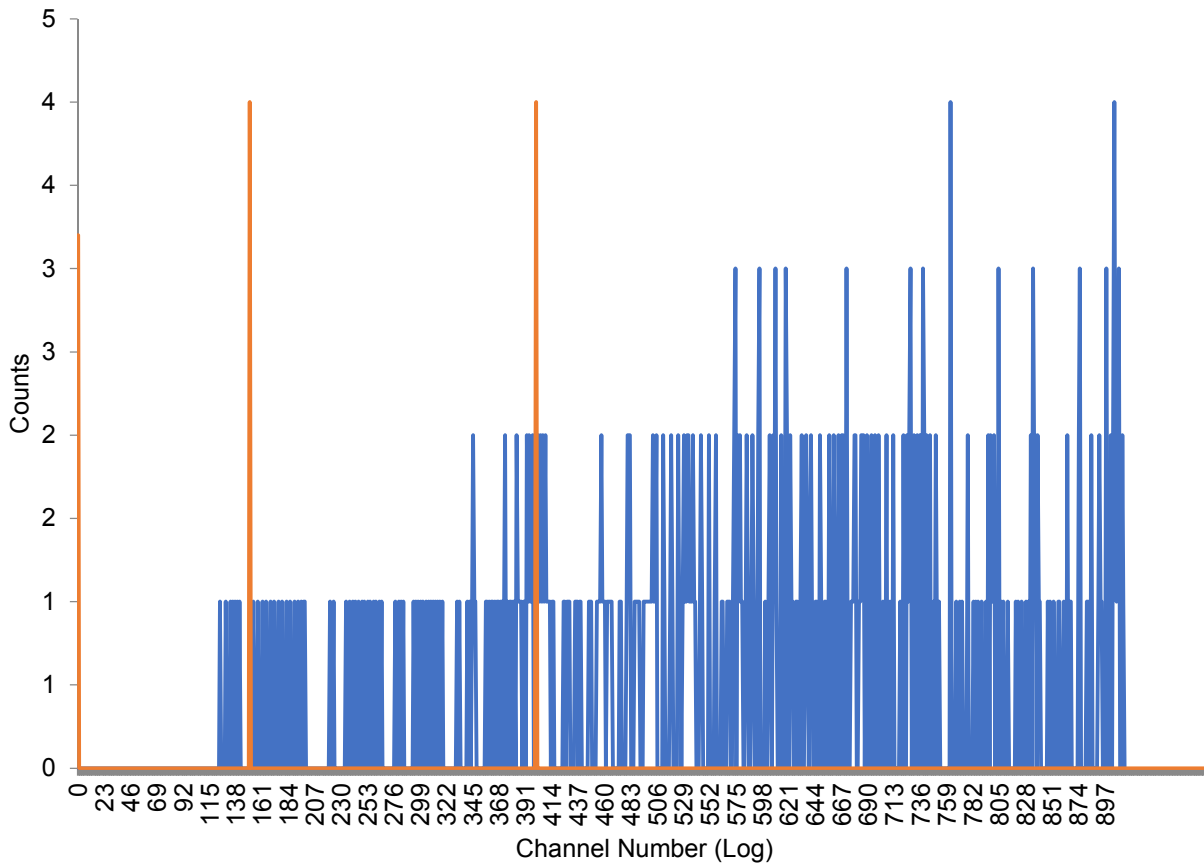
USER 11 - C-14



Sample Count Start Time: 1 Sep 2018 19:26:34  
 Data Capture Date: 01 Sep 2018 19:41:44  
 User Filename: S11090139-6A.XLS  
 U11090139-1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 11  
 User Id: C-14  
 User Comment: RED  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 6 39-6 15.00  
 H#, Total Counts: 201.1 463  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

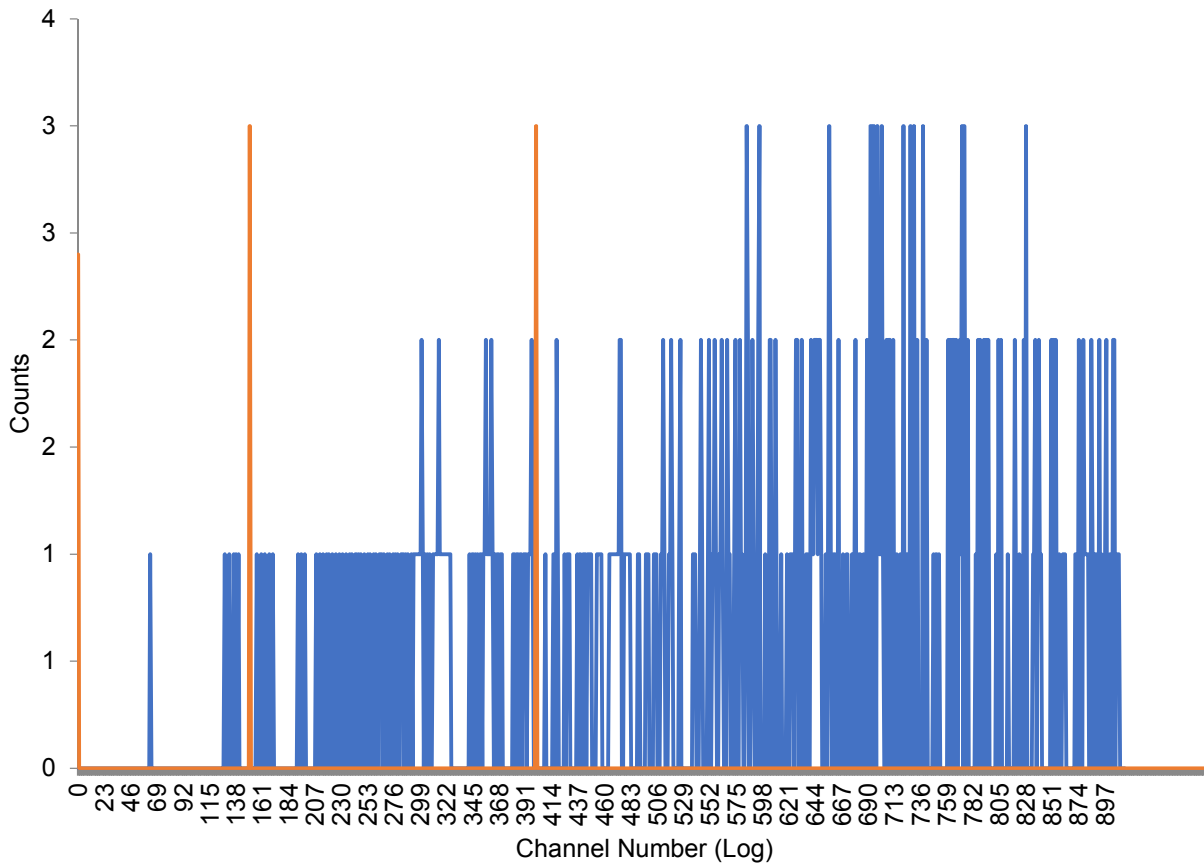
USER 11 - C-14



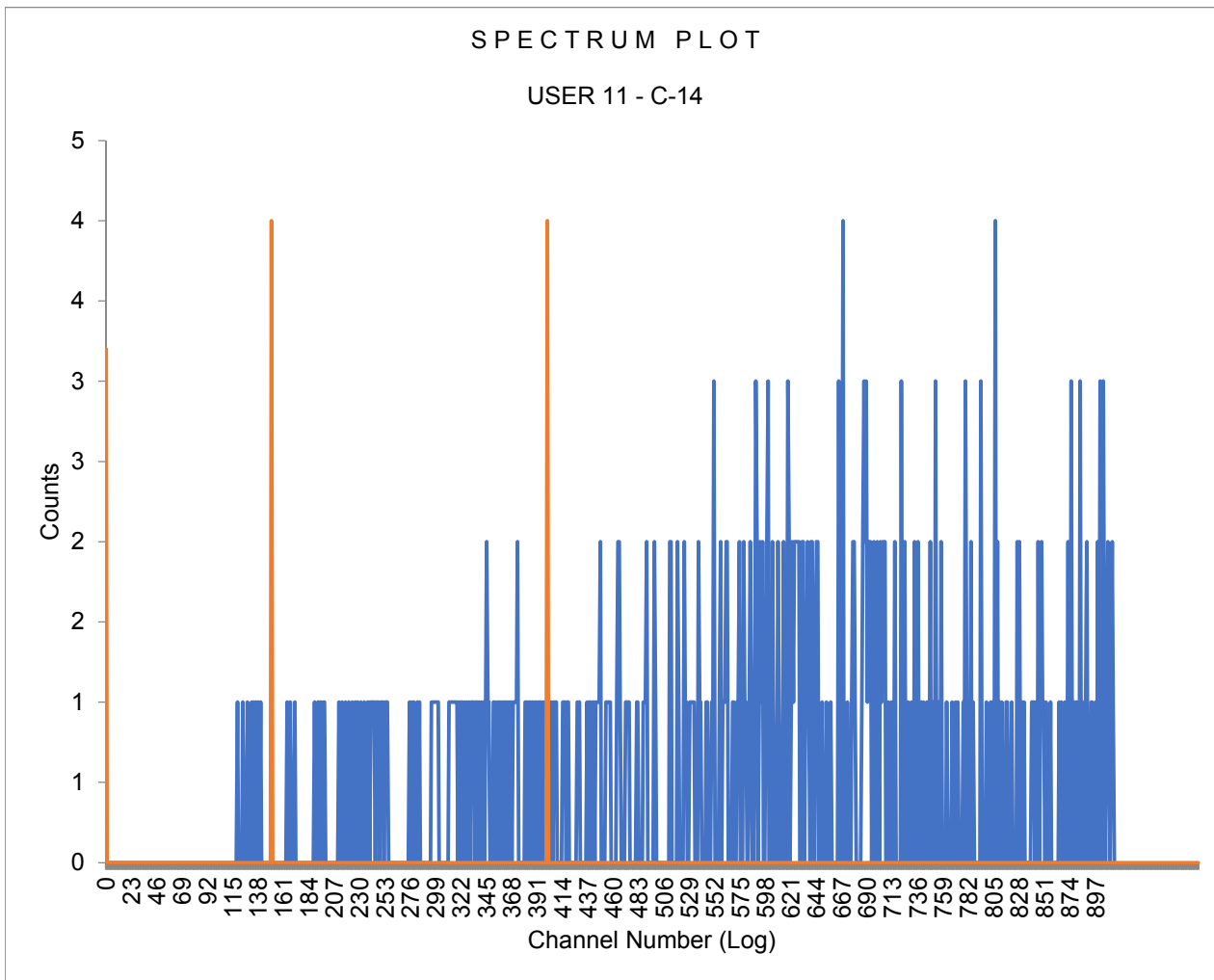
Sample Count Start Time:	1 Sep 2018 19:42:41		
Data Capture Date	01 Sep 2018 19:57:51		
User Filename	S11090139-7A.XLS		
	U11090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	11		
User Id	C-14		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	7	39-7	15.00
H#, Total Counts:	184.4	446	
Win1: C-14 - Start, End:	150	400	
Win2: - Start, End:	0	990	

SPECTRUM PLOT

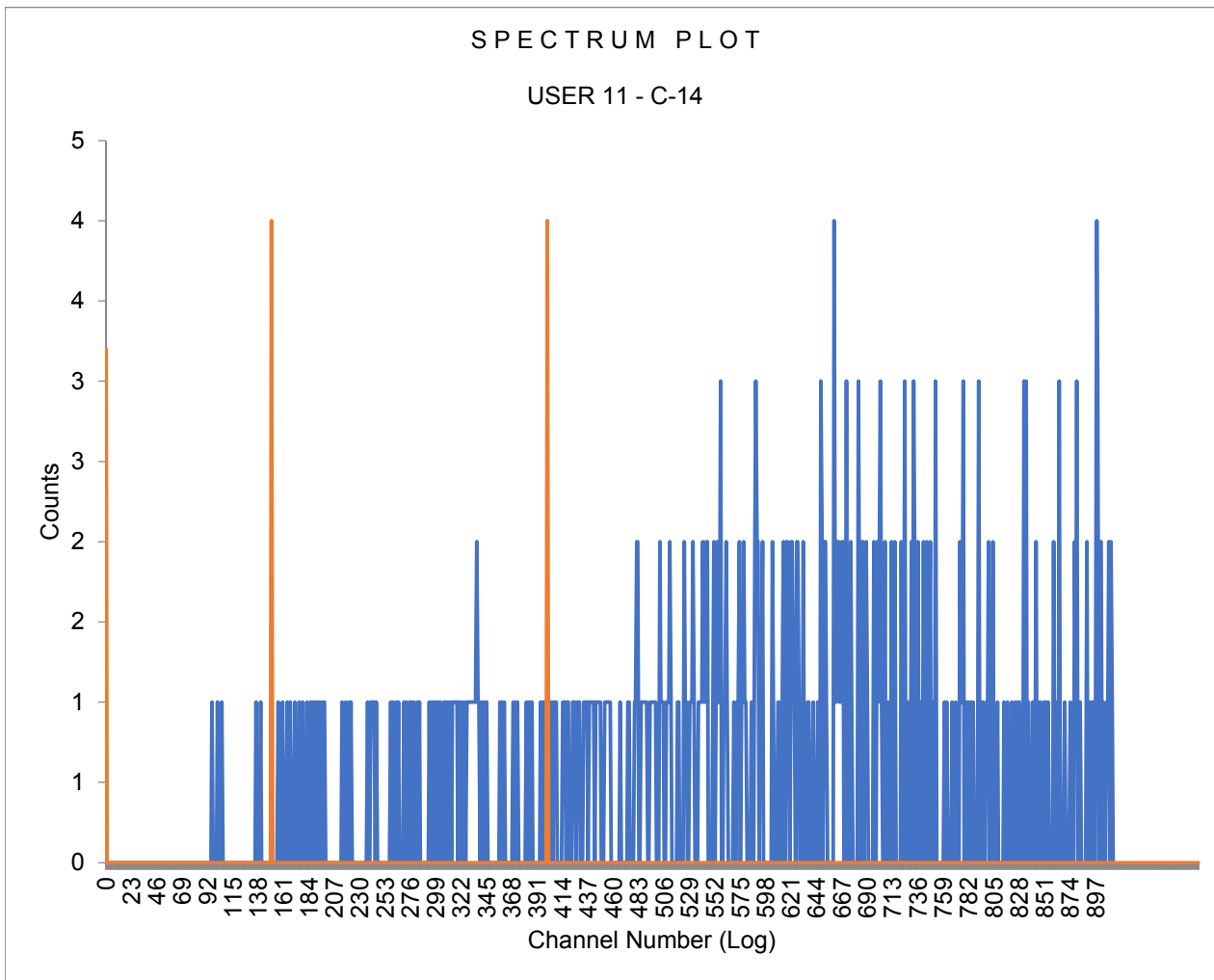
USER 11 - C-14



Sample Count Start Time: 1 Sep 2018 19:58:48  
 Data Capture Date: 01 Sep 2018 20:13:58  
 User Filename: S11090139-8A.XLS  
 U11090139-1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 11  
 User Id: C-14  
 User Comment: RED  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 8 39-8 15.00  
 H#, Total Counts: 194.6 442  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



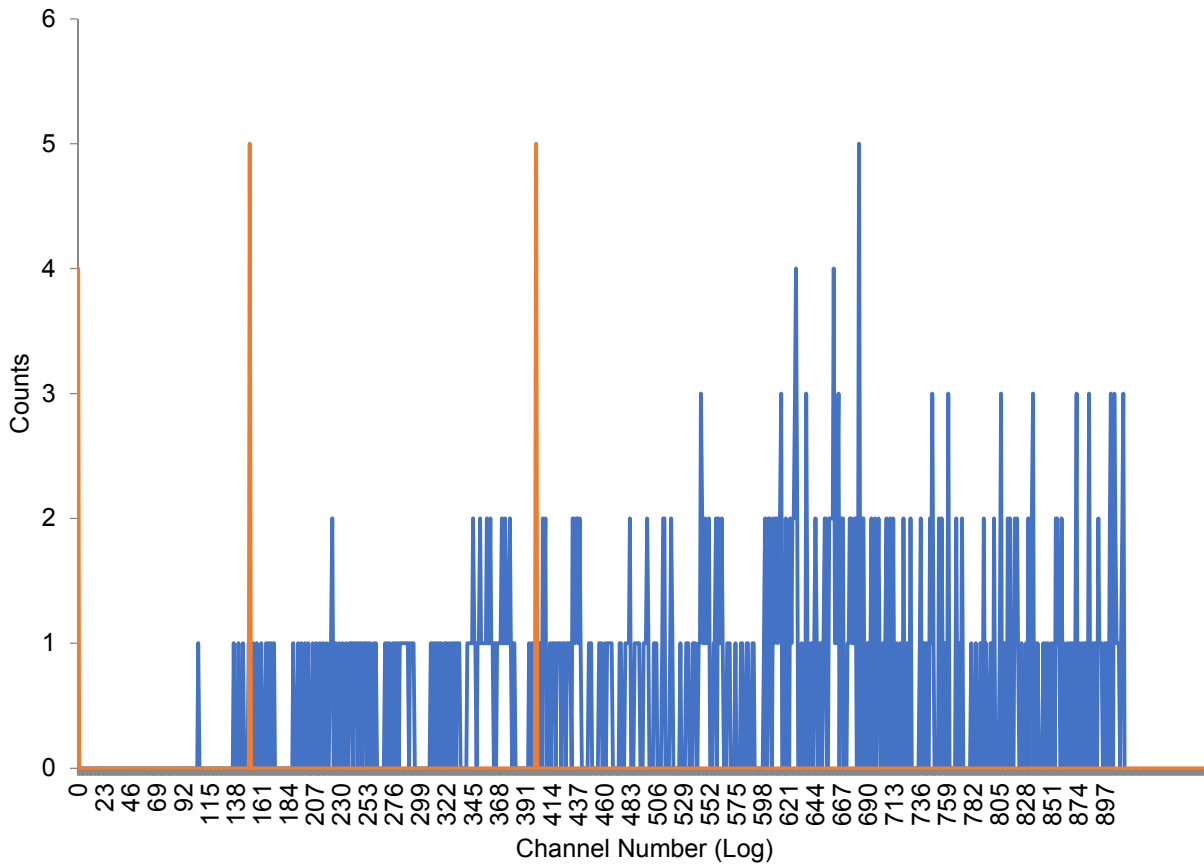
Sample Count Start Time: 1 Sep 2018 20:14:52  
 Data Capture Date: 01 Sep 2018 20:30:02  
 User Filename: S11090139-9A.XLS  
 U11090139-1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 11  
 User Id: C-14  
 User Comment: RED  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 9 39-9 15.00  
 H#, Total Counts: 196.8 438  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



Sample Count Start Time: 1 Sep 2018 20:30:57  
 Data Capture Date: 01 Sep 2018 20:46:07  
 User Filename: S11090139-10A.XLS  
 U11090139-1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 11  
 User Id: C-14  
 User Comment: RED  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 10 39-10 15.00  
 H#, Total Counts: 212.7 510  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

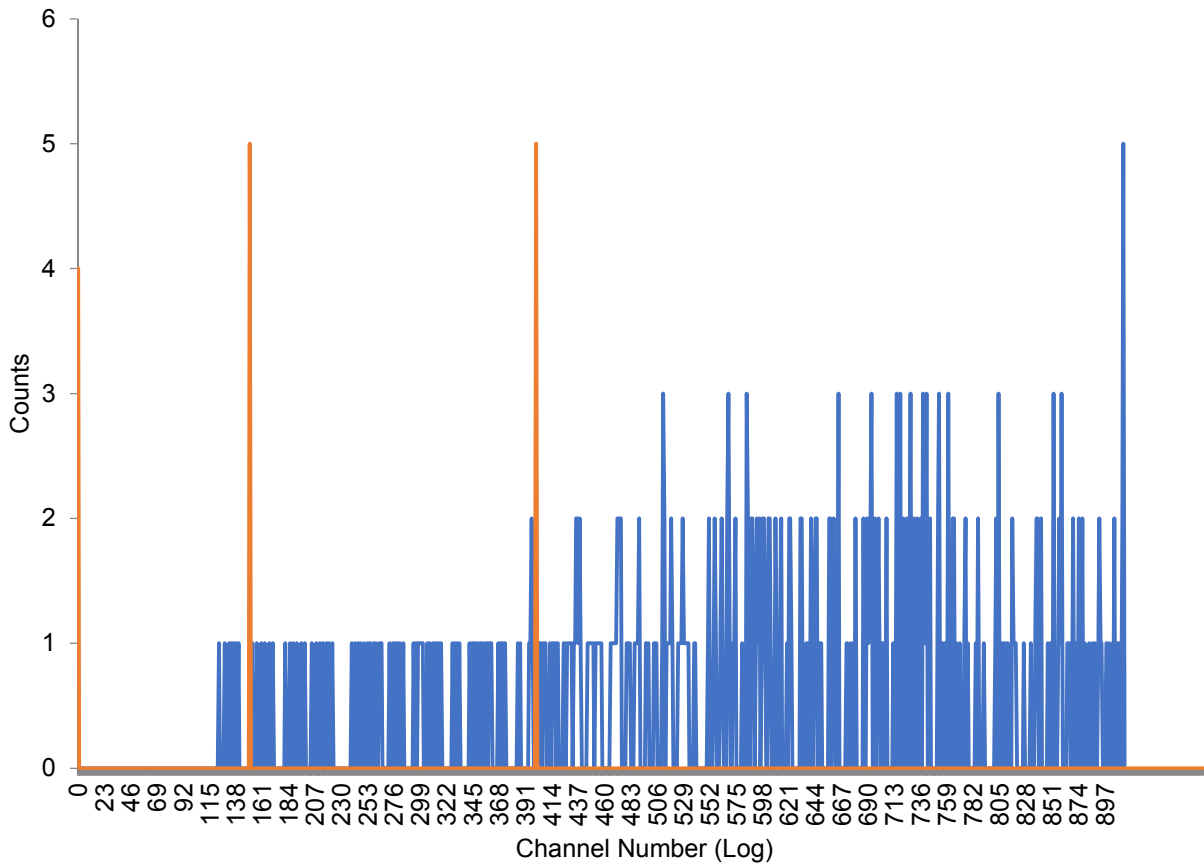
USER 11 - C-14



Sample Count Start Time: 1 Sep 2018 20:47:04  
 Data Capture Date: 01 Sep 2018 21:02:14  
 User Filename: S11090139-11A.XLS  
 U11090139-1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 11  
 User Id: C-14  
 User Comment: RED  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 11 39-11 15.00  
 H#, Total Counts: 180.8 426  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

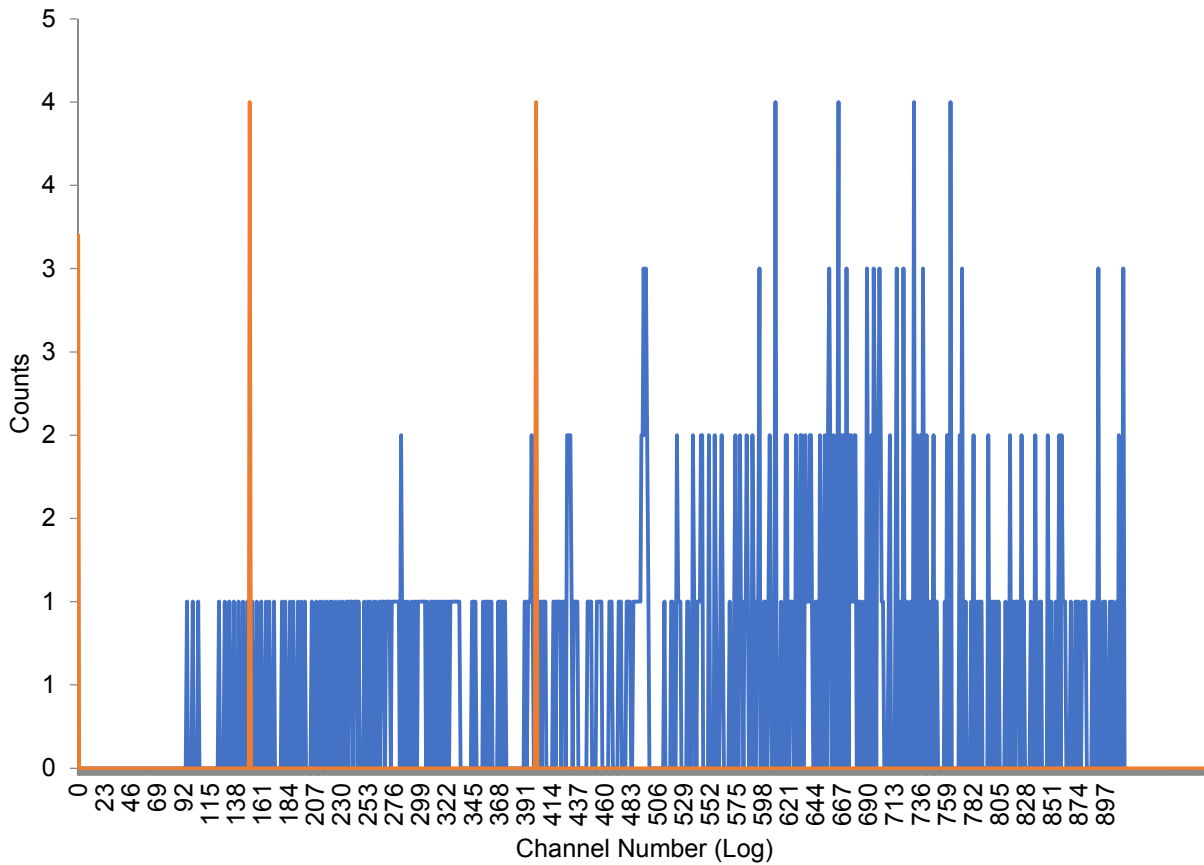
USER 11 - C-14



Sample Count Start Time: 1 Sep 2018 21:03:08  
 Data Capture Date: 01 Sep 2018 21:18:18  
 User Filename: S11090139-12A.XLS  
 U11090139-1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 11  
 User Id: C-14  
 User Comment: RED  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 12 39-12 15.00  
 H#, Total Counts: 186.7 454  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

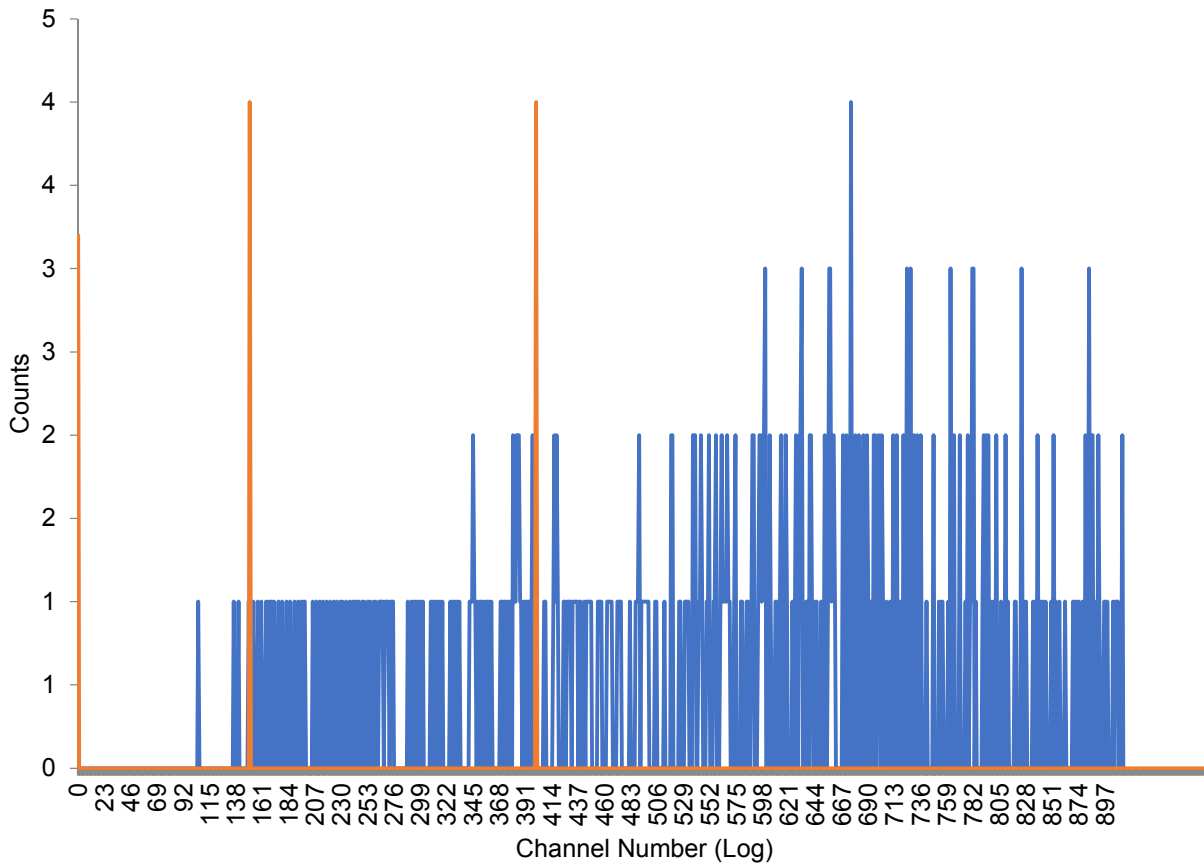
USER 11 - C-14



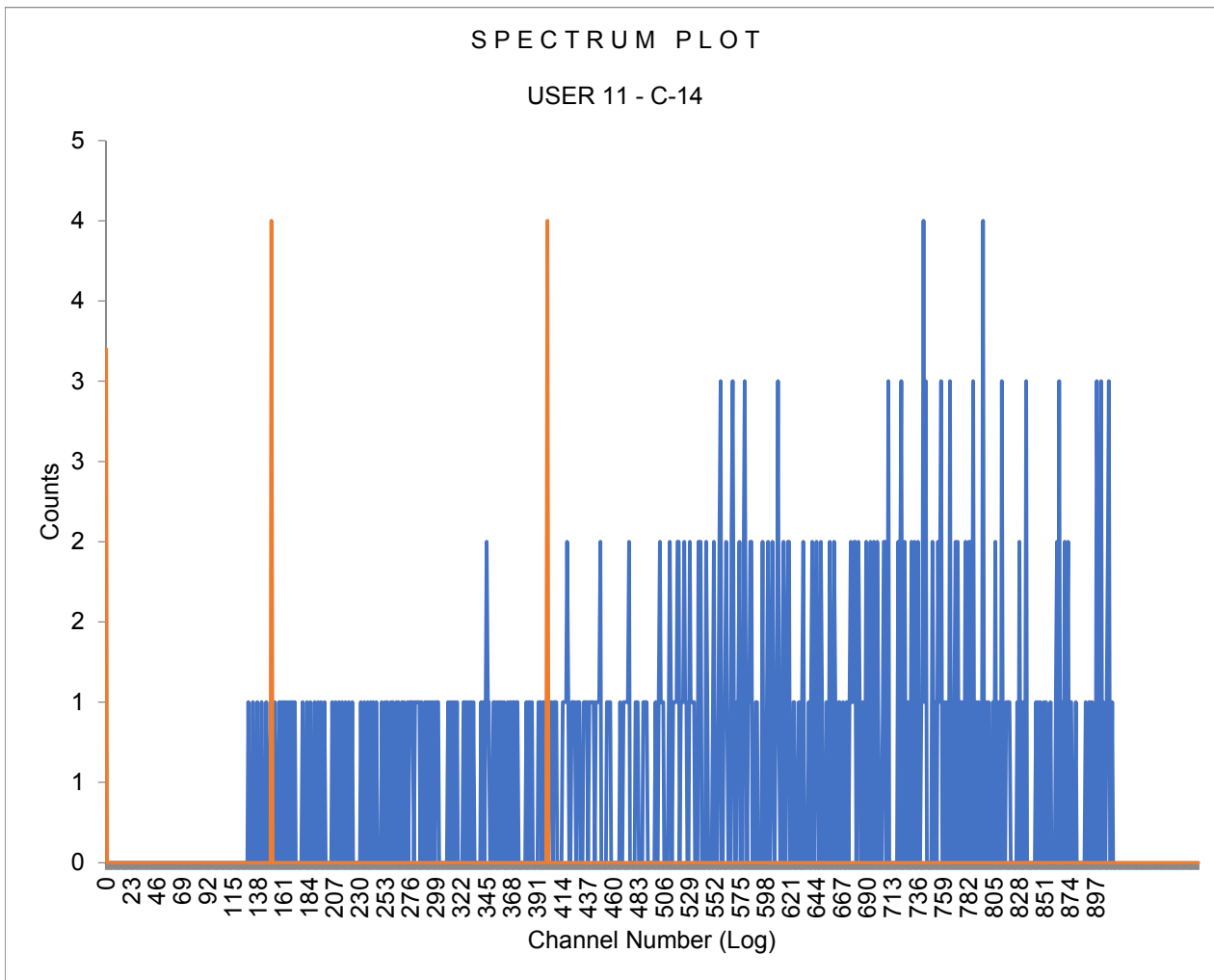
Sample Count Start Time: 1 Sep 2018 21:19:20  
 Data Capture Date: 01 Sep 2018 21:34:29  
 User Filename: S11090152-1A.XLS  
 U11090139-1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 11  
 User Id: C-14  
 User Comment: RED  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 13 52-1 15.00  
 H#, Total Counts: 178.0 430  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

USER 11 - C-14



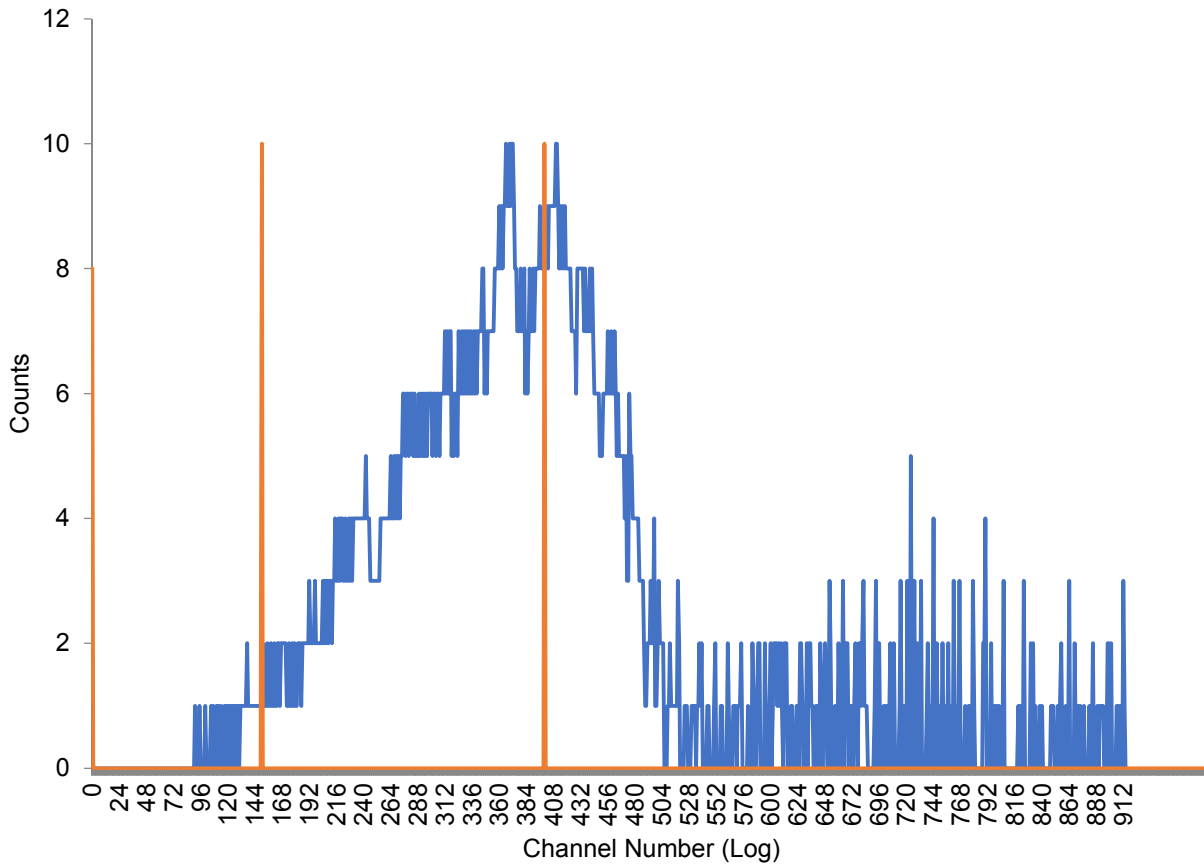
Sample Count Start Time: 1 Sep 2018 21:35:26  
 Data Capture Date: 01 Sep 2018 21:50:35  
 User Filename: S11090152-2A.XLS  
 U11090139-1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 11  
 User Id: C-14  
 User Comment: RED  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 14 52-2 15.00  
 H#, Total Counts: 167.8 458  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990



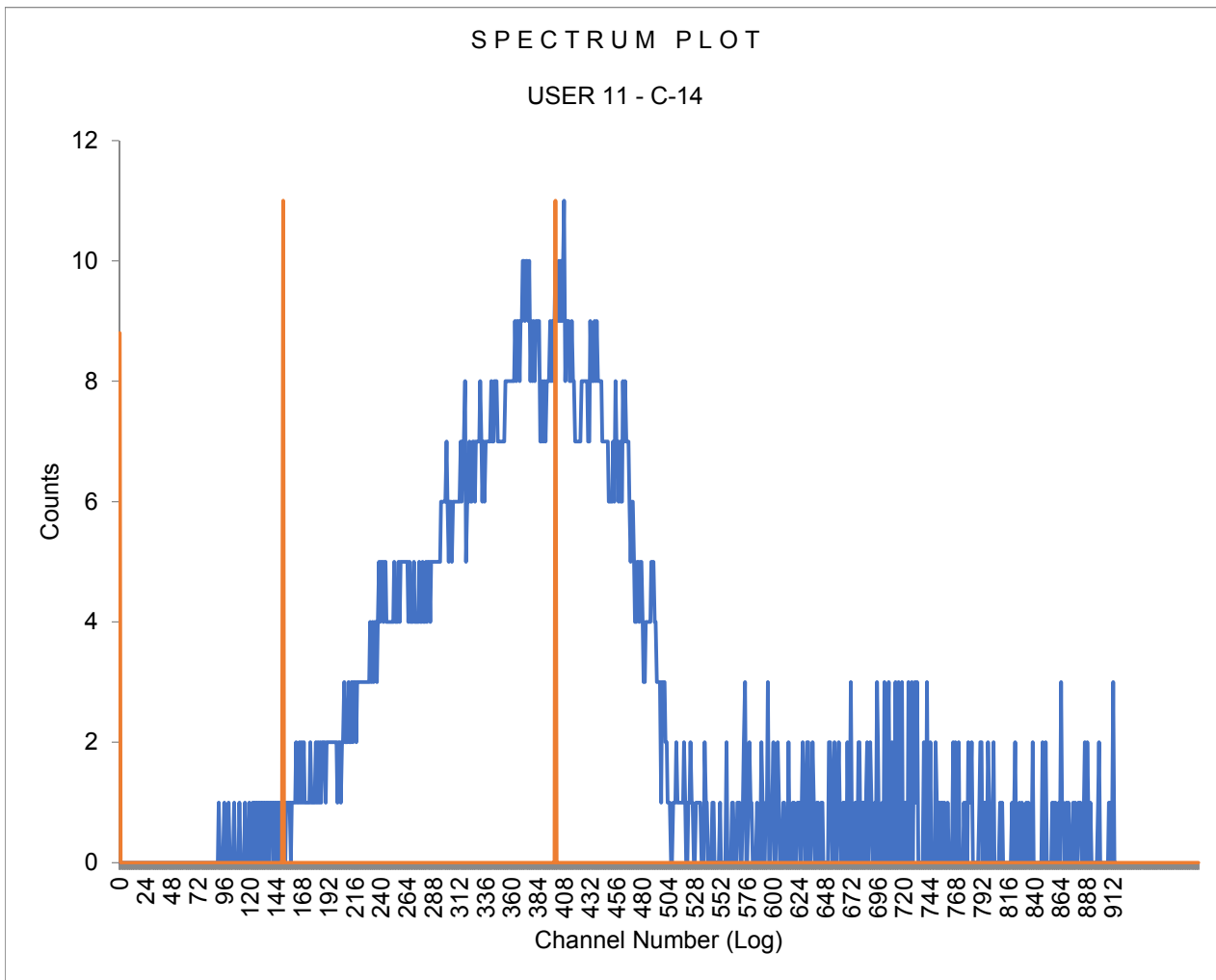
Sample Count Start Time: 1 Sep 2018 21:51:32  
 Data Capture Date: 01 Sep 2018 22:06:41  
 User Filename: S11090152-3A.XLS  
 U11090139-1A.XLS  
 Spectrum Type: Log Counts  
 User Number: 11  
 User Id: C-14  
 User Comment: RED  
 Scintillator: LIQUID  
 Sample, Rack-Pos, Time: 15 52-3 15.00  
 H#, Total Counts: 170.2 2134  
 Win1: C-14 - Start, End: 150 400  
 Win2: - Start, End: 0 990

SPECTRUM PLOT

USER 11 - C-14



Sample Count Start Time:	1 Sep 2018 22:07:36		
Data Capture Date	01 Sep 2018 22:22:45		
User Filename	S11090152-4A.XLS		
	U11090139-1A.XLS		
Spectrum Type	Log Counts		
User Number	11		
User Id	C-14		
User Comment	RED		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	16	52-4	15.00
H#, Total Counts:	170.9	2171	
Win1: C-14 - Start, End:	150	400	
Win2: - Start, End:	0	990	



# **Continuing Calibration Data**



# Liquid Scintillation Counter Checks for 31-AUG-2018

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LSCBLUE	Carbon-14	00:59	1.5		107415	-0.3		
	Carbon-14	01:00	1.5		108059	1.99		
	Tritium	01:03	1.1		169121	-0.36		
	Tritium	01:04	1.1		169322	0.04		
	BKG	01:06	30		23	0.43		
	BKG	01:36	30		21	-1.61		
LSCBROWN	Carbon-14	03:10	1.45		111236	-0.99		
	Carbon-14	03:12	1.45		111087	-1.54		
	Tritium	03:14	1.1		167396	-0.68		
	Tritium	03:15	1.1		167703	-0.16		
	BKG	03:17	30		22	-1.39		
	BKG	03:48	30		22	-1.66		
LSCGREEN	Carbon-14	00:58	1.5		107572	0.25		
	Carbon-14	01:00	1.5		107605	0.37		
	Tritium	01:02	1.1		167426	-2.46		
	Tritium	01:04	1.1		166836	-3		
	BKG	01:06	30		23	-0.34		
	BKG	01:36	30		22	-1.15		
LSCMOCHA	Carbon-14	05:06	1.5		107907	1.07		
	Carbon-14	05:08	1.5		107371	-0.79		
	Tritium	05:10	1.1		170031	-1.97		
	Tritium	05:11	1.05		171017	-1.11		
	BKG	05:13	30		22	-1.55		
	BKG	05:43	30		23	-0.46		
LSCORANGE	Carbon-14	04:06	1.012433		107866	1.03		
	Tritium	04:09	1.012433		178226	0.41		
	BKG	04:42	30.01243		11	0.66		
	Carbon-14	04:43	1.012433		107697	0.55		
	Tritium	04:45	1.012333		178779	1.4		
	BKG	05:15	30.01243		11	0.1		

LSCPINK	Carbon-14	04:17	1.012433	106541	0.12	
	Tritium	04:20	1.012433	145144	0.29	
	BKG	04:53	30.01243	7.72	0.01	
	Carbon-14	04:54	1.012433	106130	-1.07	
	Tritium	04:56	1.012333	144582	-0.83	
	BKG	05:26	30.01243	8.03	0.6	
LSCRED	Carbon-14	01:45	1.5	110182	-1.63	
	Carbon-14	01:47	1.45	110669	0.27	
	Tritium	01:49	1.15	159806	-0.71	
	Tritium	01:51	1.15	159047	-2.06	
	BKG	01:53	30	23	0.37	
	BKG	02:23	30	20	-3.12	Outside Three Sigma
	BKG	06:27	30	22	-1.08	
	BKG	06:57	30	21	-1.6	
LSCSILVER	Carbon-14	04:05	1.5	108227	1.1	
	Carbon-14	04:07	1.5	108293	1.32	
	Tritium	04:09	1.05	173377	-0.58	
	Tritium	04:11	1.05	173151	-0.98	
	BKG	04:13	30	22	-0.55	
	BKG	04:43	30	22	-1.6	
LSCYELLOW	Carbon-14	04:00	1.517	110891	-0.39	
	Carbon-14	04:02	1.517	111085	0.31	
	Tritium	04:05	1.267	151156	0.08	
	Tritium	04:07	1.283	150510	-0.87	
	BKG	04:09	30	13	-0.61	
	BKG	04:40	30	14	0.58	

LSCRED: CLEARED BY RERUN

**Reviewed by:**



Lyndsey Pace

**Date:** 31-AUG-18






# Liquid Scintillation Counter Checks for 01-SEP-2018

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LSCBLUE	Carbon-14	03:08	1.5		107333	-0.59		
	Carbon-14	03:10	1.5		107030	-1.67		
	Tritium	03:12	1.1		168820	-0.96		
	Tritium	03:13	1.1		169526	0.45		
	BKG	03:15	30		24	1.7		
	BKG	03:46	30		23	0.33		
LSCBROWN	Carbon-14	03:18	1.45		111591	0.34		
	Carbon-14	03:20	1.45		111852	1.31		
	Tritium	03:22	1.1		167297	-0.85		
	Tritium	03:24	1.1		167233	-0.96		
	BKG	03:25	30		24	0.97		
	BKG	03:56	30		25	1.79		
LSCGREEN	Carbon-14	02:49	1.5		106975	-1.84		
	Carbon-14	02:51	1.5		107271	-0.8		
	Tritium	02:53	1.1		166832	-3	Outside Three Sigma	
	Tritium	02:55	1.1		167357	-2.52		
	BKG	02:56	30		22	-1.1		
	BKG	03:27	30		22	-1.57		
	Tritium	07:27	1.1		167411	-2.47		
	Tritium	07:29	1.1		166556	-3.25	Outside Three Sigma	
	Tritium	07:40	1.1		167444	-2.44		
	Tritium	07:42	1.1		167462	-2.42		
LSCMOCHA	Carbon-14	04:10	1.5		106870	-2.53		
	Carbon-14	04:12	1.5		107557	-0.15		
	Tritium	04:14	1.05		170841	-1.27		
	Tritium	04:15	1.1		170552	-1.52		
	BKG	04:17	30		24	1.03		
	BKG	04:47	30		23	-0.28		
LSCORANGE	Carbon-14	01:48	1.012433		107770	0.76		
	Tritium	01:52	1.012433		178250	0.45		

	BKG	02:24	30.01243	11	1.01	
	Carbon-14	02:26	1.012433	107917	1.17	
	Tritium	02:27	1.012333	178178	0.32	
	BKG	02:58	30.01243	11	0.1	
LSCPINK	Carbon-14	06:14	1.012433	106466	-0.1	
	Tritium	06:18	1.012433	145287	0.57	
	BKG	06:50	30.01243	7.15	-1.08	
	Carbon-14	06:52	1.012433	106995	1.43	
	Tritium	06:53	1.01235	144429	-1.13	
	BKG	07:23	30.01243	7.55	-0.31	
LSCRED	Carbon-14	04:33	1.5	110120	-1.87	
	Carbon-14	04:35	1.5	110282	-1.24	
	Tritium	04:37	1.15	159282	-1.64	
	Tritium	04:38	1.15	159612	-1.05	
	BKG	04:40	30	20	-3.27	Outside Three Sigma
	BKG	05:11	30	21	-1.79	
	BKG	12:14	30	21	-1.6	
	BKG	12:45	30	21	-1.6	
LSCSILVER	Carbon-14	03:07	1.5	107709	-0.64	
	Carbon-14	03:09	1.5	107944	0.15	
	Tritium	03:11	1.05	173285	-0.74	
	Tritium	03:13	1.05	172504	-2.14	
	BKG	03:14	30	22	-0.71	
	BKG	03:45	30	21	-1.9	
LSCYELLOW	Carbon-14	02:18	1.517	110706	-1.06	
	Carbon-14	02:20	1.517	110774	-0.81	
	Tritium	02:23	1.283	149598	-2.21	
	Tritium	02:25	1.283	149733	-2.01	
	BKG	02:27	30	12	-2.4	
	BKG	02:58	30	14	0.58	

LSCGREEN, LSCRED: CLEARED BY RERUN

**Reviewed by:**   
Lyndsey Pace

**Date:** 02-SEP-18

GEL Laboratories LLC

# Runlogs

# Instrument Run Log

**Instrument Type: LSC**

**Batch ID: 1794252**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
457261001	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 07:59:22	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261002	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 08:15:36	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261003	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 08:31:49	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261004	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 08:48:03	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261005	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 09:04:18	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261006	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 09:20:31	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261007	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 09:36:45	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261008	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 09:53:01	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261009	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 10:09:15	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261010	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 10:25:30	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261011	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 10:41:46	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261012	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 10:58:06	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261013	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 11:14:19	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261014	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 11:30:35	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261015	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 11:46:49	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261016	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 12:03:03	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261017	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 12:19:17	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261018	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 12:35:31	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261019	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 12:51:45	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261020	SAMPLE	TXJ1	LSCGREEN	SEP-01-18 13:08:00	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
1204095737	MB	TXJ1	LSCGREEN	SEP-01-18 13:24:13	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
1204095738	LCS	TXJ1	LSCGREEN	SEP-01-18 13:40:28	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
1204095739	LCSD	TXJ1	LSCGREEN	SEP-01-18 13:56:41	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00

# Instrument Run Log

**Instrument Type: LSC**

**Batch ID: 1794255**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
457261021	SAMPLE	BXM4	LSCRED	SEP-01-18 18:22:11	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261022	SAMPLE	BXM4	LSCRED	SEP-01-18 18:38:17	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261023	SAMPLE	BXM4	LSCRED	SEP-01-18 18:54:21	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261024	SAMPLE	BXM4	LSCRED	SEP-01-18 19:10:29	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261025	SAMPLE	BXM4	LSCRED	SEP-01-18 19:26:34	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261026	SAMPLE	BXM4	LSCRED	SEP-01-18 19:42:41	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261027	SAMPLE	BXM4	LSCRED	SEP-01-18 19:58:48	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261028	SAMPLE	BXM4	LSCRED	SEP-01-18 20:14:52	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261029	SAMPLE	BXM4	LSCRED	SEP-01-18 20:30:57	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261030	SAMPLE	BXM4	LSCRED	SEP-01-18 20:47:04	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261031	SAMPLE	BXM4	LSCRED	SEP-01-18 21:03:08	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
457261032	SAMPLE	BXM4	LSCRED	SEP-01-18 21:19:20	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
1204095740	MB	BXM4	LSCRED	SEP-01-18 21:35:26	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
1204095741	LCS	BXM4	LSCRED	SEP-01-18 21:51:32	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00
1204095742	LCSD	BXM4	LSCRED	SEP-01-18 22:07:36	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	18-JUN-18 00:00

# Instrument Run Log

**Instrument Type: LSC**

**Batch ID: 1794273**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
457261001	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 12:43:34	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261002	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 12:59:49	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261003	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 13:16:04	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261004	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 13:32:19	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261005	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 13:48:36	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261006	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 14:04:50	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261007	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 14:21:06	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261008	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 14:37:24	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261009	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 14:53:39	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261010	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 15:09:56	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261011	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 15:26:23	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261012	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 15:42:43	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261013	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 15:58:58	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261014	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 16:15:18	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261015	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 16:31:33	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261016	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 16:47:48	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261017	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 17:04:03	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261018	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 17:20:27	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261019	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 17:36:43	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261020	SAMPLE	TXJ1	LSCGREEN	AUG-31-18 17:52:58	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
1204095791	MB	TXJ1	LSCGREEN	AUG-31-18 18:09:12	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
1204095792	LCS	TXJ1	LSCGREEN	AUG-31-18 18:25:25	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
1204095793	LCSD	TXJ1	LSCGREEN	AUG-31-18 18:41:39	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00

# Instrument Run Log

**Instrument Type: LSC**

**Batch ID: 1794274**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
457261021	SAMPLE	BXM4	LSCRED	SEP-01-18 00:28:55	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261022	SAMPLE	BXM4	LSCRED	SEP-01-18 00:45:13	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261023	SAMPLE	BXM4	LSCRED	SEP-01-18 01:01:31	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261024	SAMPLE	BXM4	LSCRED	SEP-01-18 01:17:49	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261025	SAMPLE	BXM4	LSCRED	SEP-01-18 01:34:07	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261026	SAMPLE	BXM4	LSCRED	SEP-01-18 01:50:25	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261027	SAMPLE	BXM4	LSCRED	SEP-01-18 02:06:43	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261028	SAMPLE	BXM4	LSCRED	SEP-01-18 02:23:02	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261029	SAMPLE	BXM4	LSCRED	SEP-01-18 02:39:19	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261030	SAMPLE	BXM4	LSCRED	SEP-01-18 02:55:38	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261031	SAMPLE	BXM4	LSCRED	SEP-01-18 03:11:55	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
457261032	SAMPLE	BXM4	LSCRED	SEP-01-18 03:28:20	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
1204095794	MB	BXM4	LSCRED	SEP-01-18 03:44:39	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
1204095797	LCS	BXM4	LSCRED	SEP-01-18 04:00:56	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00
1204095798	LCSD	BXM4	LSCRED	SEP-01-18 04:17:14	DONE	10mL DW/13mL Ecoscint Ultra/Swipe	01-OCT-17 00:00