Fermilab
ES&H Section/RAF

Radionuclide Analysis Facility

Gamma Analysis Report

Issued by Steven Benesch SKB

Report Date: October 9, 2009
Work Request #: 09-232
Submitted by: G. Lauten on 9/1/09
Workbook: P-HPGe #1-9, page(s) 139

MI-30 Region Study #2

The Accelerator Division/ES&H Group submitted 15 aluminum tag samples, on Work Request# 09-232, for analysis of accelerator produced radionuclides (Na-22 only). Each sample was counted on detector P-HPGe#1.

The following table lists the radionuclides detected in the sample, along with the corresponding specific activity. If a sample activity was reported it has been corrected back to the time of sampling.

SampleID#	Location	Container	Count Info	Mass/Vol.	Count Date	Radionuclide	Activity (pCi/g)
090826GL02	MI 30 Region (study #2) [Tag# 6167]	None	7200sec @ 10cm	2.309 g	9/25/09 @ 7:18	Na-22	6,660 ± 1,010
	[Tag# 6168]	None	7200sec @ 10cm	2.296 g	9/25/09 @ 10:04	Na-22	1,020 ± 160
	[Tag# 6198]	None	7200sec @ 10cm	2.293 g	9/25/09 @ 12:34	Na-22	434 ± 70
	[Tag# 6330]	None	7200sec @ 10cm	2.296 g	9/29/09 @ 7:24	Na-22	3,270 ± 500
	[Tag# 6335]	None	7200sec @ 10cm	2.3 g	9/30/09 @ 7:22	Na-22	6,510 ± 990
	[Tag# 6503]	None	7200sec @ 10cm	2.296 g	9/30/09 @ 10:13	Na-22	1,380 ± 210
	[Tag# 6504]	None	7200sec @ 10cm	2.301 g	10/5/09 @ 11:46	Na-22	13,200 ± 2,000
	[Tag# 6513]	None	7200sec @ 10cm	2.302 g	10/6/09 @ 7:15	Na-22	7,740 ± 1,170
	[Tag# 6515]	None	7200sec @ 10cm	2.306 g	10/6/09 @ 11:09	Na-22	1,640 ± 250
	[Tag# 6538]	None	7200sec @ 10cm	2.31 g	10/6/09 @ 13:13	Na-22	9,230 ± 1,400
	[Tag# 6605]	None	7200sec @ 10cm	2.342 g	10/7/09 @ 7:06	Na-22	5,920 ± 900
	[Tag# 6821]	None	7200sec @ 10cm	2.315 g	10/7/09 @ 9:27	Na-22	9,170 ± 1,390
	[Tag# 6822]	None	7200sec @ 10cm	2.301 g	10/7/09 @ 12:07	Na-22	10,300 ± 1,600
	[Tag# 6833]	None	7200sec @ 10cm	2.302 g	10/8/09 @ 7:37	Na-22	5,210 ± 790
	[Tag# 6834]	None	7200sec @ 10cm	2.303 g	10/8/09 @ 10:15	Na-22	14,300 ± 2,200

cc: Accelerator Div. Dist. List [MS-371] G. Eargle, D. Cossairt [MS-119]
V. Cupps, MS-325 RAF Folder
WC

WR# 09-232

Fermilab
ES&H Section/RAF

Radionuclide Analysis Facility

Work Request Form

Date Submitted: 9/1/2009

Customer Information:

Submitted By: G. Lauten *Ext:* 8360 *Group/Section:* Accelerator Division/ES&H Group

Reports To: T. Busch, D. White, G. Lauten, R. Zimmerman, M. Gerardi - [MS-371]

Extra Reports: *Rpt. To Grp:* Accel. Div.

Sample Information:

STD#(s): 090826GL02 *No. of Samples:* 1

Location: MI-30 RR Region Study #2 *Date Collected:* 8/26/2009

Matrix: Aluminum Tags *Processing:*

- Gamma Spectroscopy ☑
- Gamma Spectroscopy w/LTV ☐
- Tritium (Normal) ☐
- Tritium (Low Level) ☐
- Gross Alpha/Beta ☐
- Alpha Spectroscopy ☐

- Accelerator Produced Radionuclides ☑
- Depleted Uranium ☐
- Leachable Accel. Produced Radionuclides ☐
- Naturally Occuring Radionuclides ☐
- Other

Special Inst.: Na-22 Only

Beam Foil Information

Foil Material: *Foil Thickness:* *Beam Particle Type:*

Beam On: *Beam Off:* *Beam Energy:* *GeV*

AAL USE ONLY

Air Filter

Start		Stop
	Date	
	Time	
	LPM	

Logbook Information

Completed: 10/9/09

Logbk Name: ~~LSC~~ P-HPGE #9 *pg.* 139

Report Date: 10/9/09

Notes: 1. Clearly indicate the reason for a "RUSH" job on the special instructions line
2. Routine analysis total uncertainty is ± 10% unless otherwise indicated on the final report.
3. All Radionuclide activities will be decay corrected back to the the collection date unless otherwise indicated.

P-HPGe Activation Tag Calculation Sheet

Portable HpGe Activation Tag Worksheet
WinWP rev. 11/19/08 skb

WR # : 09-232
Sample ID # : 090826GL02

Prepared By: SKB skb

Location: MI 30 Region (study #2)
*Avg. Tag Mass : 2.3048 g.
Live Time : 7200 sec.
Sample Date : 8/26/09 12:00
*Tag Thickness : 0.0763 cm.
Count Distance : 10.0 10.4948cm.
Sample Diam. : 3.8 cm.
* Mean of all 15 Tags.

Material : Al
Density : 2.6989
Half Life [days]: 950.35
Branching Ratio: 0.99937
Detector Efficiency: 0.0815
Efficiency Date: 4/23/08
Detector Used: P-HPGe#1

Percent Error : 8%
Absorption Error : 8%
Solid Angle : 0.01589139
Avg. K : 0.001355
Avg. dK : 0.000108
Avg. (dK/K)2 : 0.0064

Radio-nuclide	Energy [keV]	Tag ID#	Tag Mass [g]	Thickness [cm]	Count Date & Time	Real Time	Net Counts		Dt [days]	K	dK	(dK/K) 2	Absorp. Correct.	Specific Activity [pCi/g]		
Na-22	1,274.53	6167	2.309	0.0763	9/25/09 7:18	7204.6	5158	73	29.804	0.00135755	0.000109	0.0064	0.9943	6659.5600	±	1009.9789
Na-22	1,274.53	6168	2.296	0.0757	9/25/09 10:04	7201.2	782	28	29.919	0.00134977	0.000108	0.0064	0.9944	1015.4530	±	157.5820
Na-22	1,274.53	6198	2.293	0.0757	9/25/09 12:34	7200.8	334	19	30.024	0.00134800	0.000108	0.0064	0.9944	434.3126	±	70.0793
Na-22	1,274.53	6330	2.296	0.0759	9/29/09 7:24	7202.5	2510	50	33.808	0.00134981	0.000108	0.0064	0.9944	3268.4796	±	497.8059
Na-22	1,274.53	6335	2.300	0.0765	9/30/09 7:22	7204.5	5008	72	34.807	0.00135231	0.000108	0.0064	0.9943	6514.6750	±	988.1432
Na-22	1,274.53	6503	2.296	0.0762	9/30/09 10:13	7201.4	1060	33	34.926	0.00134989	0.000108	0.0064	0.9944	1381.3576	±	212.9676
Na-22	1,274.53	6504	2.301	0.0765	10/5/09 11:46	7208.4	10122	102	39.99	0.00135290	0.000108	0.0064	0.9943	13211.3499	±	1999.3076
Na-22	1,274.53	6513	2.302	0.0761	10/6/09 7:15	7205.3	5927	78	40.802	0.00135339	0.000108	0.0064	0.9944	7736.9891	±	1172.6884
Na-22	1,274.53	6515	2.306	0.0764	10/6/09 11:09	7201.6	1260	36	40.965	0.00135581	0.000108	0.0064	0.9943	1642.2031	±	252.3673
Na-22	1,274.53	6538	2.310	0.0768	10/6/09 13:13	7206.1	7095	85	41.051	0.00135826	0.000109	0.0064	0.9943	9231.0678	±	1398.2410
Na-22	1,274.53	6605	2.342	0.0777	10/7/09 7:06	7204.1	4610	69	41.796	0.00137730	0.000110	0.0064	0.9942	5918.8118	±	898.1009
Na-22	1,274.53	6821	2.315	0.0763	10/7/09 9:27	7206.1	7057	85	41.894	0.00136108	0.000109	0.0064	0.9943	9168.2397	±	1388.7712
Na-22	1,274.53	6822	2.301	0.0763	10/7/09 12:07	7206.8	7876	92	42.005	0.00135285	0.000108	0.0064	0.9943	10295.3414	±	1559.2072
Na-22	1,274.53	6833	2.302	0.0760	10/8/09 7:37	7203.6	3988	65	42.817	0.00135337	0.000108	0.0064	0.9944	5213.5912	±	791.8080
Na-22	1,274.53	6834	2.303	0.0762	10/8/09 10:15	7209.3	10914	106	42.927	0.00135400	0.000108	0.0064	0.9944	14262.5909	±	2158.0544