

Meson Beam On Survey

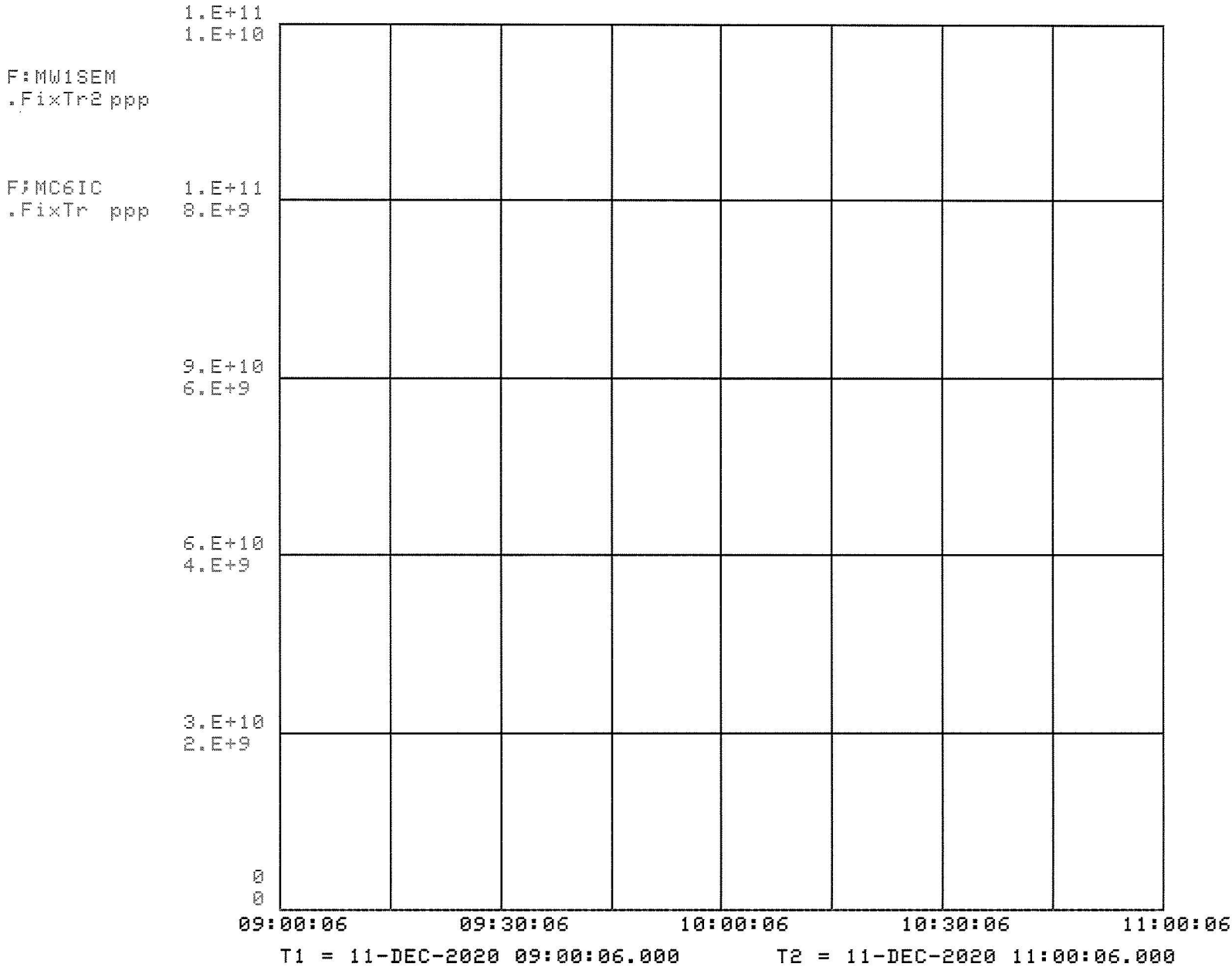
Created Dec 8, 2020



location	Gamma cpm	Neutron mrem
1	1383	
2	1100	
3	1096	
4	1103	
5	1422	
6	1536	
7	1423	
8	1455	
9	1344	
10	1510	
11	1337	
12	1595	
13	1473	
14	1422	
15	1436	
16	1438	
17	1040	
18	1144	
19	1333	
20	1280	
21	1640	
22		
23		
24		
25		

All Areas < <u>N/A</u> mR/hr@1foot (Unless otherwise indicated)		Highest Dose Rate Found: <u>N/A</u> mR/hr@1foot	
Radiation Instruments Used			
Inst Type: <u>DICRON ANALYSI</u>		Bkgd _____ cpm	Comments: readings are 1 minute integration No neutron background taken due to no source from beam.
Inst No: <u>#33</u>		Wipe # Reading	
Batt/Source Chk: <u>SAT/SAT</u>		_____ ccpm	
Cal. Due Date: <u>AUG 2021</u>		_____ ccpm	
Background: <u>SEE ABOVE</u>		_____ ccpm	
LEGEND		_____ ccpm	Surveyed By: <u>[Signature]</u> Reviewed By: <u>Maddie Schoell, UID:maddiew</u> <small>Digitally signed by Maddie Schoell, UID:maddiew Date: 2021.02.02 11:15:26 -0600</small>
# - Dose Rate in mR/hr @ 1 ft. * - Unlabeled Radioactive Material		_____ ccpm	
Ⓡ - Radioactive Material Wipe Ⓢ - Wipe ⓈF - Floor Wipe		_____ ccpm	
		_____ ccpm	
		_____ ccpm	

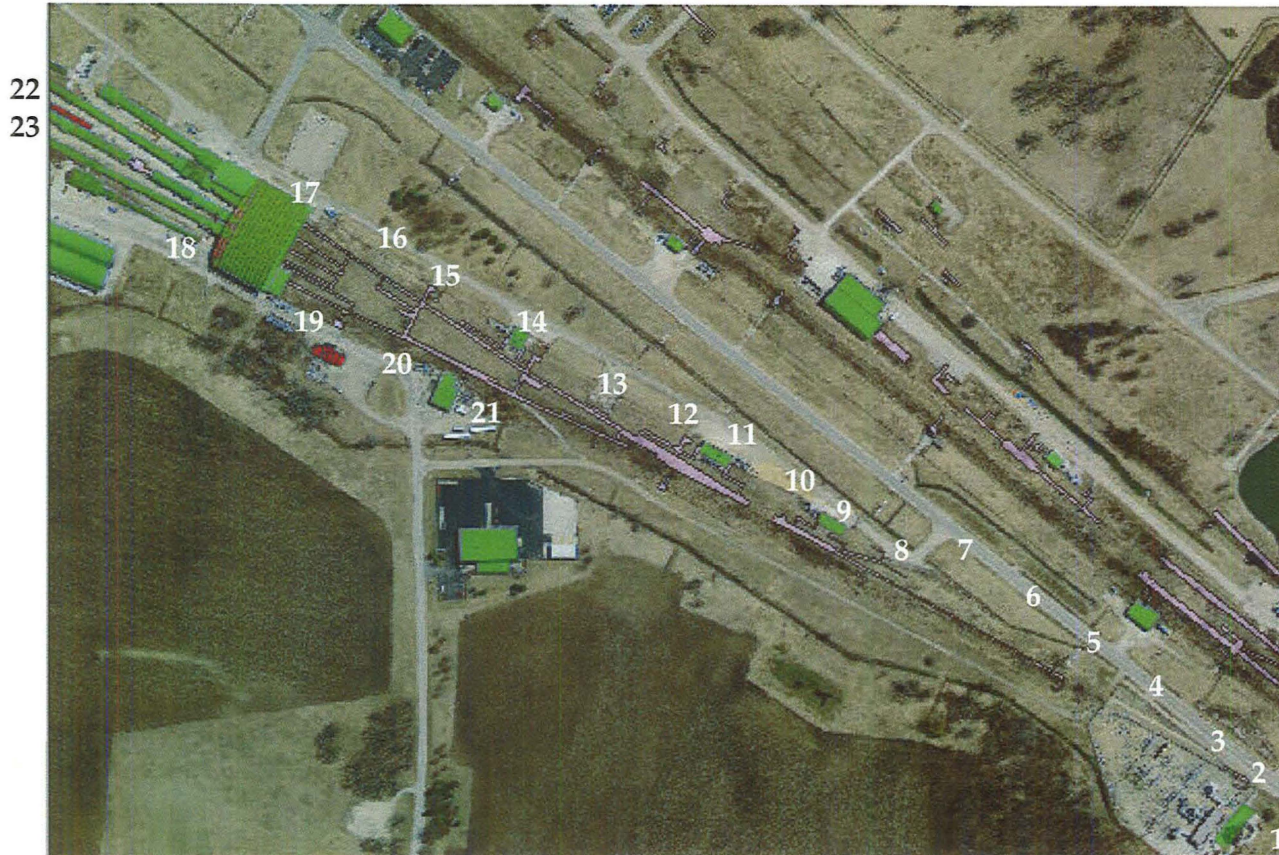
Fri 15-JAN-2021 12:48:06



Console Location 148, 15-JAN-21 12:48:34
Shots to Recycler

Meson Beam On Survey

Created Dec 8, 2020

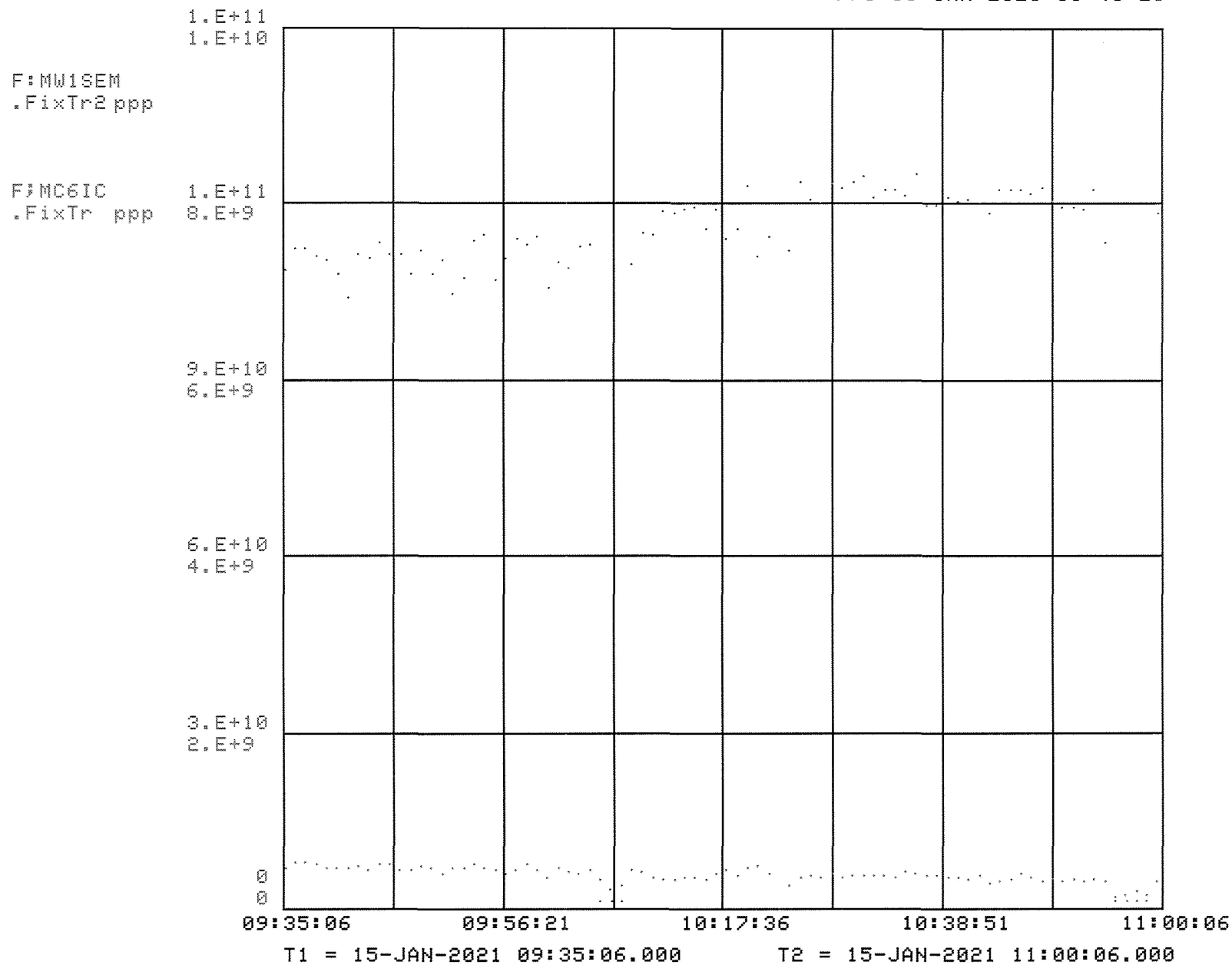


location	Gamma cpm	Neutron mrem
1	1162	0
2	1115	0
3	1200	0
4	1182	0
5	1202	0
6	1260	0
7	1309	0
8	1465	0
9	1371	0
10	1411	0
11	1546	0
12	1375	0
13	1285	0
14	1316	0
15	1286	0
16	1295	0
17	1065	0
18	1186	0
19	1241	0
20	1374	0
21	1398	0
22	1206	0
23	1434	0
24		
25		

All Areas < <u>NA</u> mR/hr@1foot (Unless otherwise indicated)			Highest Dose Rate Found: <u>NA</u> mR/hr@1foot	
Radiation Instruments Used			Bkgd _____ cpm	
Inst Type: <u>Analyst</u>	<u>Ran 500</u>			
Inst No: <u>26</u>	<u>1</u>		Wipe # Reading Wipe # Reading _____ ccpm _____ ccpm _____ ccpm _____ ccpm _____ ccpm _____ ccpm _____ ccpm _____ ccpm _____ ccpm _____ ccpm	
Batt/Source Chk: <u>SAT</u>	<u>SAT</u>			
Cal. Due Date: <u>4-21</u>	<u>10-21</u>			
Background: <u>NA</u>				
LEGEND				
# - Dose Rate in mR/hr @ 1 ft. * - Unlabeled Radioactive Material			Comments: readings are 1 minute integration	
(#R) - Radioactive Material Wipe (#) - Wipe (#F) - Floor Wipe				
			Surveyed By: <u>Fulghum</u> Reviewed By: <u>Maddie Schoell, UID:maddiew</u>	

Digitally signed by Maddie Schoell, UID:maddiew
Date: 2021.02.02 11:41:33 -0600

Fri 15-JAN-2021 11:43:26



Meson (Primary, Test & Center)

Gamma Survey Results

Bicron Results

Location	Background (cpm)	Gross Beam-On (cpm)	Net Beam-On (cpm)	Standard Deviation	Net ± St. Dev.	L _c	N _D
1	1383	1162	-221	50.45	-221 ± 50.45	86.501	175.745
2	1100	1115	15	47.06	15 ± 47.06	77.145	157.029
3	1096	1200	104	47.92	104 ± 47.92	77.004 !	156.748
4	1103	1182	79	47.80	79 ± 47.8	77.250 !	157.239
5	1422	1202	-220	51.22	-220 ± 51.22	87.712	178.168
6	1536	1260	-276	52.88	-276 ± 52.88	91.160	185.066
7	1423	1309	-114	52.27	-114 ± 52.27	87.743	178.230
8	1455	1465	10	54.04	10 ± 54.04	88.724	180.192
9	1344	1371	27	52.11	27 ± 52.11	85.273	173.288
10	1510	1411	-99	54.05	-99 ± 54.05	90.385	183.516
11	1337	1546	209	53.69	209 ± 53.69	85.050 !	172.843
12	1595	1375	-220	54.50	-220 ± 54.5	92.895	188.535
13	1473	1285	-188	52.52	-188 ± 52.52	89.271	181.287
14	1422	1316	-106	52.33	-106 ± 52.33	87.712	178.168
15	1436	1286	-150	52.17	-150 ± 52.17	88.143	179.030
16	1438	1295	-143	52.28	-143 ± 52.28	88.204	179.152
17	1040	1065	25	45.88	25 ± 45.88	75.011	152.761
18	1144	1186	42	48.27	42 ± 48.27	78.672	160.085
19	1333	1241	-92	50.73	-92 ± 50.73	84.923	172.588
20	1280	1374	94	51.52	94 ± 51.52	83.218 !	169.177
21	1640	1298	-342	54.20	-342 ± 54.2	94.196	191.138
22*	1358	1206	-152	50.64	-152 ± 50.64	85.716	174.174
23*	1358	1434	76	52.84	76 ± 52.84	85.716	174.174

Converted to mR/hr

Background (mR/hr)	Gross Beam-On (mR/hr)	Net Beam-On (mR/hr)	Standard Deviation	Net ± St. Dev.	D _D
0.007	0.006	0.000	0.0003	0 ± 0.0003	0.001
0.006	0.006	0.000	0.0002	0 ± 0.0002	0.001
0.005	0.006	0.001	0.0002	0.001 ± 0.0002	0.001
0.006	0.006	0.000	0.0002	0 ± 0.0002	0.001
0.007	0.006	0.000	0.0003	0 ± 0.0003	0.001
0.008	0.006	0.000	0.0003	0 ± 0.0003	0.001
0.007	0.007	0.000	0.0003	0 ± 0.0003	0.001
0.007	0.007	0.000	0.0003	0 ± 0.0003	0.001
0.007	0.007	0.000	0.0003	0 ± 0.0003	0.001
0.008	0.007	0.000	0.0003	0 ± 0.0003	0.001
0.007	0.008	0.001	0.0003	0.001 ± 0.0003	0.001
0.008	0.007	0.000	0.0003	0 ± 0.0003	0.001
0.007	0.006	0.000	0.0003	0 ± 0.0003	0.001
0.007	0.007	0.000	0.0003	0 ± 0.0003	0.001
0.007	0.006	0.000	0.0003	0 ± 0.0003	0.001
0.007	0.006	0.000	0.0003	0 ± 0.0003	0.001
0.005	0.005	0.000	0.0002	0 ± 0.0002	0.001
0.006	0.006	0.000	0.0002	0 ± 0.0002	0.001
0.007	0.006	0.000	0.0003	0 ± 0.0003	0.001
0.006	0.007	0.000	0.0003	0 ± 0.0003	0.001
0.008	0.006	0.000	0.0003	0 ± 0.0003	0.001
0.007	0.006	0.000	0.0003	0 ± 0.0003	0.001
0.007	0.007	0.000	0.0003	0 ± 0.0003	0.001

*When original background measurements were taken, only MTest & MPrimary were planned to be operational for the beam-on survey, so locations 22 and 23 weren't included. MCenter was approved to run prior to the beam-on survey, locations 22 and 23 added. Beam-on readings were consistent with other near-background measurements. Background taken to be the average of the other 21 background measurements.

Meson (Primary, Test & Center)

Neutron Survey Results

Location	Average Background (mrem)	Average Background (mrem/hr)	Gross Beam-On (mrem/hr)	Net Beam-On (mrem/hr)	Sample Standard Deviation (mrem/hr)	Net ± St. Dev. (mrem/hr)	L _{C,N}	D _{D,N}
1	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
2	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
3	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
4	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
5	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
6	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
7	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
8	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
9	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
10	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
11	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
12	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
13	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
14	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
15	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
16	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
17	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
18	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
19	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
20	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
21	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
22	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04
23	0.01933	0.01933	0.000	0.000	1.08E-04	0 ± 0.000108	2.52E-04	5.04E-04

Meson (Primary, Test & Center) - Meson Primary Locations

Scaling Dose Rates to Meson Primary Operating Limit Intensity & Calculate Annual Dose

Location	At Survey Intensity		Scaled to Operating Limit Intensity at Standard Beam Up-Time					
	Gamma	Neutron	Gamma			Neutron		
	Net Beam-On (mR/hr)	Net Beam-On (mrem/hr)	Net Beam-On (mR/hr)	2,000 hr Working Year (mrem)	24/7/365 (mrem)	Net Beam-On (mrem/hr)	2,000 hr Working Year (mrem)	24/7/365 (mrem)
1	0.000	0.000	0.000	0.000	0.000	0	0	0
2	0.000	0.000	0.000	0.000	0.000	0	0	0
3	0.001	0.000	0.012	24.000	71.158	0	0	0
4	0.000	0.000	0.000	0.000	0.000	0	0	0
5	0.000	0.000	0.000	0.000	0.000	0	0	0
6	0.000	0.000	0.000	0.000	0.000	0	0	0
7	0.000	0.000	0.000	0.000	0.000	0	0	0
8	0.000	0.000	0.000	0.000	0.000	0	0	0
9	0.000	0.000	0.000	0.000	0.000	0	0	0
10	0.000	0.000	0.000	0.000	0.000	0	0	0
11	0.001	0.000	0.012	24.000	71.158	0	0	0
12	0.000	0.000	0.000	0.000	0.000	0	0	0
13	0.000	0.000	0.000	0.000	0.000	0	0	0
14	0.000	0.000	0.000	0.000	0.000	0	0	0
15	0.000	0.000	0.000	0.000	0.000	0	0	0
16	0.000	0.000	0.000	0.000	0.000	0	0	0
19	0.000	0.000	0.000	0.000	0.000	0	0	0
20	0.000	0.000	0.000	0.000	0.000	0	0	0
21	0.000	0.000	0.000	0.000	0.000	0	0	0

Intensities (protons/hr)		Beam Up-Time	
Survey	Op. Limit	# Weeks	Efficiency
1.40E+13	1.68E+14	44	80%
		67.7%	

Meson (Primary, Test & Center) - Meson Test Locations

Scaling Dose Rates to Meson Test Operating Limit Intensity & Calculate Annual Dose

At Survey Intensity

Scaled to Operating Limit Intensity at Standard Beam Up-Time

Location	At Survey Intensity		Scaled to Operating Limit Intensity at Standard Beam Up-Time					
	Gamma Net Beam- On (mR/hr)	Neutron Net Beam- On (mrem/hr)	Gamma			Neutron		
			Net Beam- On (mR/hr)	2,000 hr Working Year (mrem)	24/7/365 (mrem)	Net Beam- On (mrem/hr)	2,000 hr Working Year (mrem)	24/7/365 (mrem)
16	0.000	0.000	0.000	0.000	0.000	0	0	0
17	0.000	0.000	0.000	0.000	0.000	0	0	0
18	0.000	0.000	0.000	0.000	0.000	0	0	0
19	0.000	0.000	0.000	0.000	0.000	0	0	0

Intensities (protons/hr)		Beam Up-Time	
Survey	Op. Limit	# Weeks	Efficiency
6.50E+12	1.20E+13	44	80%
		67.7%	

Meson (Primary, Test & Center) - Meson Center Locations

Scaling Dose Rates to Meson Center Operating Limit Intensity & Calculate Annual Dose

At Survey Intensity

Scaled to Operating Limit Intensity at Standard Beam Up-Time

Location	At Survey Intensity		Scaled to Operating Limit Intensity at Standard Beam Up-Time					
	Gamma Net Beam- On (mR/hr)	Neutron Net Beam- On (mrem/hr)	Gamma			Neutron		
			Net Beam- On (mR/hr)	2,000 hr Working Year (mrem)	24/7/365 (mrem)	Net Beam- On (mrem/hr)	2,000 hr Working Year (mrem)	24/7/365 (mrem)
16	0.000	0.000	0.000	0.000	0.000	0	0	0
17	0.000	0.000	0.000	0.000	0.000	0	0	0
19	0.000	0.000	0.000	0.000	0.000	0	0	0
22	0.000	0.000	0.000	0.000	0.000	0	0	0
23	0.000	0.000	0.000	0.000	0.000	0	0	0

Intensities (protons/hr)	
Survey	Op. Limit
2.50E+10	1.02E+12

Beam Up-Time	
# Weeks	44
Efficiency	80%
67.7%	