Title:		ASE BEAM LIMITS PROCEDURE	
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Created by	Date	Approved by	Date
Name Jim Morel		Name Larry Phair	
Title Operations Supervisor		Title Experiment Safety Reviewer	

Approved by	Date
Name Claude Lyneis	
Title Program Head	

1.0 PURPOSE

This procedure provides the Accelerator Safety Envelope (ASE) operational limits to be used during the 88-Inch Cyclotron experiment authorization process. This document provides the complete beam list for the 88-Inch Cyclotron Accelerator Safety Envelope 2008. It is provided to augment the beam list included directly in the ASE.

2.0 QUALIFICATION

This procedure is to be used by the 88-Inch Cyclotron Program head or the program head's designee during the experiment authorization process.

3.0 HAZARD REVIEW

The use of this procedure will not subject the user to any hazard.

4.0 PROCEDURE

Use Attachment A during the experiment review process and prior to authorizing beam delivery to assure that the operational limits on beam parameters are within the Accelerator Safety Envelope. This applies to each experiment, beam development or other use of accelerated beam from the cyclotron. Attachment A is organized by element (Z), mass (A), total energy in MeV and maximum intensity in particle micro-Amps (pμA) for delivery into either the Vault or Cave 0 Total Exclusion Areas or the Cave 1, 2, 3, 4, 4a, 4b, 4c, and 5 Total Exclusion Areas.

Attachment A gives the maximum allowed beam intensity consistent with the 88-Inch Cyclotron ASE as a function of ion species, total energy and beam delivery point within the Total Exclusion Areas. The beam intensities listed in Attachment A meet the ASE requirements that the beam power will be less than or equal to 2 kW and that the radiation levels outside any Total Exclusion Area will be less than 1 rem in one hour at 30 cm. Both calculations and direct measurements were used to develop Attachment A. Calculations for the radiation production capability of each ion beam and energy were made following the formalism outlined by Back (Nuclear Instruments and Methods, B**74**, 527 (1993)). These radiation fields were combined with estimates of field attenuation calculated for the permanent shielding employed at the 88-Inch Cyclotron facility. The resulting calculated fields were analyzed and tabulated to develop this table. Direct measurements using beams from the Cyclotron were used to crosscheck the calculations of both radiation production and shielding effectiveness.

5.0 RECORDS

Records generated by compliance with this procedure are to be in compliance with RPM, Section 1.18, Records Management. The experiment authorization Tracking Form will contain the operational limits set during the experiment review process. The experiment authorization Tracking Form is governed by the 88-Inch Cyclotron Experiment Control Procedure 88-PRO-034.

6.0 REVIEW OF PROCEDURE

Under the guidelines for DOE Order 420.2B, this procedure will be reviewed at least once every three years, or sooner if changes occur that may impact the appropriateness or implementation of this procedure.

REVISION HISTORY

24 October 2008: New procedure written to establish formal process.

7.0 GLOSSARY

TOTAL EXCLUSION AREA (TEA): Are areas where total exclusion is required during beam acceleration or when accelerated ion beams are delivered to the TEA. These areas are the Vault, Pit or Trench during beam acceleration and any cave where the accelerated ion beam is delivered.

pμA: The beam intensity measured in particle micro-amps. This is calculated by dividing the electrical beam intensity by the ion beam charge state.

8.0 REFERENCES

1. LBNL Publication 3000, **Health and Safety Manual**
2. 88-Inch Cyclotron Accelerator Safety Envelope (ASE)
3. 88-Inch Cyclotron Experiment Control Procedure 88-PRO-034
4. DOE Order: DOE O 420.2B, *Safety of Accelerator Facilities*

9.0 ATTACHMENT

Attachment A: ASE Beam Limits

Attachment A
ASE BEAM LIMITS

The ion atomic number (Z), mass number (A), beam energy (MeV), and maximum allowed beam intensity (particle micro-amperes) are listed for the Vault/Cave 0 and for All Other Caves.

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
1	1	10.0	200	200
1	1	15.0	130	130
1	1	20.0	100	100
1	1	25.0	80	80
1	1	30.0	67	67
1	1	35.0	57	57
1	1	40.0	50	40
1	1	45.0	44	22
1	1	50.0	40	13
1	1	55.0	36	8.2
1	2	10.0	200	82
1	2	20.0	100	11
1	2	30.0	67	3.3
1	2	40.0	50	1.4
1	2	50.0	40	.75
1	2	60.0	33	.44
1	2	70.0	29	.28
1	2	80.0	25	.19
2	3	15.0	130	130
2	3	30.0	67	67
2	3	45.0	44	44
2	3	60.0	33	33
2	3	75.0	27	20
2	3	90.0	22	8.4
2	3	105.0	19	4.1
2	3	120.0	17	2.2
2	3	135.0	15	1.3
2	3	150.0	13	0.82
2	3	165.0	12	0.53
2	4	20.0	100	100
2	4	40.0	50	50
2	4	60.0	33	33
2	4	80.0	25	19
2	4	100.0	20	6.8
2	4	120.0	17	3
2	4	140.0	14	1.5

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
2	4	160.0	12	0.81
3	7	35.0	57	57
3	7	52.5	38	38
3	7	70.0	29	29
3	7	87.5	23	23
3	7	105.0	19	19
3	7	122.5	16	11
3	7	140.0	14	6
3	7	157.5	13	3.5
3	7	175.0	11	2.2
3	7	192.5	10	1.4
3	7	210.0	9.5	0.98
3	7	227.5	8.8	0.69
3	7	245.0	8.2	0.5
3	7	262.5	7.6	0.37
3	7	280.0	7.1	0.28
4	9	45.0	44	44
4	9	67.5	30	30
4	9	90.0	22	22
4	9	112.5	18	18
4	9	135.0	15	15
4	9	157.5	13	8.5
4	9	180.0	11	4.7
4	9	202.5	9.9	2.8
4	9	225.0	8.9	1.7
4	9	247.5	8.1	1.1
4	9	270.0	7.4	0.78
4	9	292.5	6.8	0.56
4	9	315.0	6.3	0.41
4	9	337.5	5.9	0.3
4	9	360.0	5.6	0.23
5	11	55.0	36	36
5	11	82.5	24	24
5	11	110.0	18	18
5	11	137.5	15	15
5	11	165.0	12	12
5	11	192.5	10	7
5	11	220.0	9.1	3.9
5	11	247.5	8.1	2.3

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
5	11	275.0	7.3	1.5
5	11	302.5	6.6	0.96
5	11	330.0	6.1	0.66
5	11	357.5	5.6	0.47
5	11	385.0	5.2	0.35
5	11	412.5	4.8	0.26
5	11	440.0	4.5	0.2
6	12	60.0	33	33
6	12	90.0	22	22
6	12	120.0	17	17
6	12	150.0	13	13
6	12	180.0	11	11
6	12	210.0	9.5	7.7
6	12	240.0	8.3	4.3
6	12	270.0	7.4	2.5
6	12	300.0	6.7	1.6
6	12	330.0	6.1	1.1
6	12	360.0	5.6	0.74
6	12	390.0	5.1	0.53
6	12	420.0	4.8	0.39
6	12	450.0	4.4	0.29
6	12	480.0	4.2	0.22
7	14	70.0	29	29
7	14	105.0	19	19
7	14	140.0	14	14
7	14	175.0	11	11
7	14	210.0	9.5	9.5
7	14	245.0	8.2	6.6
7	14	280.0	7.1	3.7
7	14	315.0	6.3	2.2
7	14	350.0	5.7	1.4
7	14	385.0	5.2	0.93
7	14	420.0	4.8	0.64
7	14	455.0	4.4	0.46
7	14	490.0	4.1	0.34
7	14	525.0	3.8	0.25
7	14	560.0	3.6	0.19
8	16	80.0	25	25
8	16	120.0	17	17

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
8	16	160.0	12	12
8	16	200.0	10	10
8	16	240.0	8.3	8.3
8	16	280.0	7.1	5.8
8	16	320.0	6.2	3.3
8	16	360.0	5.6	2
8	16	400.0	5	1.3
8	16	440.0	4.5	0.84
8	16	480.0	4.2	0.58
8	16	520.0	3.8	0.41
8	16	560.0	3.6	0.3
8	16	600.0	3.3	0.23
8	16	640.0	3.1	0.18
9	19	95.0	21	21
9	19	142.5	14	14
9	19	190.0	11	11
9	19	237.5	8.4	8.4
9	19	285.0	7	7
9	19	332.5	6	4.6
9	19	380.0	5.3	2.6
9	19	427.5	4.7	1.5
9	19	475.0	4.2	0.99
9	19	522.5	3.8	0.66
9	19	570.0	3.5	0.46
9	19	617.5	3.2	0.33
9	19	665.0	3	0.24
9	19	712.5	2.8	0.18
9	19	760.0	2.6	0.14
10	20	100.0	20	20
10	20	150.0	13	13
10	20	200.0	10	10
10	20	250.0	8	8
10	20	300.0	6.7	6.7
10	20	350.0	5.7	4.9
10	20	400.0	5	2.8
10	20	450.0	4.4	1.7
10	20	500.0	4	1.1
10	20	550.0	3.6	0.72
10	20	600.0	3.3	0.5

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
10	20	650.0	3.1	0.36
10	20	700.0	2.9	0.26
10	20	750.0	2.7	0.2
10	20	800.0	2.5	0.15
11	23	115.0	17	17
11	23	172.5	12	12
11	23	230.0	8.7	8.7
11	23	287.5	7	7
11	23	345.0	5.8	5.8
11	23	402.5	5	4.1
11	23	460.0	4.3	2.3
11	23	517.5	3.9	1.4
11	23	575.0	3.5	0.9
11	23	632.5	3.2	0.6
11	23	690.0	2.9	0.42
11	23	747.5	2.7	0.3
11	23	805.0	2.5	0.22
11	23	862.5	2.3	0.17
11	23	920.0	2.2	0.13
12	24	120.0	17	17
12	24	180.0	11	11
12	24	240.0	8.3	8.3
12	24	300.0	6.7	6.7
12	24	360.0	5.6	5.6
12	24	420.0	4.8	4.4
12	24	480.0	4.2	2.5
12	24	540.0	3.7	1.5
12	24	600.0	3.3	0.96
12	24	660.0	3	0.65
12	24	720.0	2.8	0.45
12	24	780.0	2.6	0.32
12	24	840.0	2.4	0.24
12	24	900.0	2.2	0.18
12	24	960.0	2.1	0.14
13	27	135.0	15	15
13	27	202.5	9.9	9.9
13	27	270.0	7.4	7.4
13	27	337.5	5.9	5.9
13	27	405.0	4.9	4.9

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
13	27	472.5	4.2	3.8
13	27	540.0	3.7	2.2
13	27	607.5	3.3	1.3
13	27	675.0	3	0.85
13	27	742.5	2.7	0.57
13	27	810.0	2.5	0.4
13	27	877.5	2.3	0.29
13	27	945.0	2.1	0.21
13	27	1012.5	2	0.16
13	27	1080.0	1.9	0.12
14	28	140.0	14	14
14	28	210.0	9.5	9.5
14	28	280.0	7.1	7.1
14	28	350.0	5.7	5.7
14	28	420.0	4.8	4.8
14	28	490.0	4.1	4.1
14	28	560.0	3.6	2.3
14	28	630.0	3.2	1.4
14	28	700.0	2.9	0.9
14	28	770.0	2.6	0.61
14	28	840.0	2.4	0.42
14	28	910.0	2.2	0.3
14	28	980.0	2	0.23
14	28	1050.0	1.9	0.17
14	28	1120.0	1.8	0.13
15	31	155.0	13	13
15	31	232.5	8.6	8.6
15	31	310.0	6.5	6.5
15	31	387.5	5.2	5.2
15	31	465.0	4.3	4.3
15	31	542.5	3.7	3.7
15	31	620.0	3.2	2.1
15	31	697.5	2.9	1.3
15	31	775.0	2.6	0.81
15	31	852.5	2.3	0.55
15	31	930.0	2.2	0.38
15	31	1007.5	2	0.28
15	31	1085.0	1.8	0.2
15	31	1162.5	1.7	0.15

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
15	31	1240.0	1.6	0.12
16	32	160.0	12	12
16	32	240.0	8.3	8.3
16	32	320.0	6.2	6.2
16	32	400.0	5	5
16	32	480.0	4.2	4.2
16	32	560.0	3.6	3.6
16	32	640.0	3.1	2.2
16	32	720.0	2.8	1.3
16	32	800.0	2.5	0.86
16	32	880.0	2.3	0.58
16	32	960.0	2.1	0.41
16	32	1040.0	1.9	0.29
16	32	1120.0	1.8	0.22
16	32	1200.0	1.7	0.16
16	32	1280.0	1.6	0.13
17	35	175.0	11	11
17	35	262.5	7.6	7.6
17	35	350.0	5.7	5.7
17	35	437.5	4.6	4.6
17	35	525.0	3.8	3.8
17	35	612.5	3.3	3.3
17	35	700.0	2.9	2
17	35	787.5	2.5	1.2
17	35	875.0	2.3	0.79
17	35	962.5	2.1	0.54
17	35	1050.0	1.9	0.37
17	35	1137.5	1.8	0.27
17	35	1225.0	1.6	0.2
17	35	1312.5	1.5	0.15
17	35	1400.0	1.4	0.12
18	36	180.0	11	11
18	36	270.0	7.4	7.4
18	36	360.0	5.6	5.6
18	36	450.0	4.4	4.4
18	36	540.0	3.7	3.7
18	36	630.0	3.2	3.2
18	36	720.0	2.8	2.1
18	36	810.0	2.5	1.3

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
18	36	900.0	2.2	0.84
18	36	990.0	2	0.56
18	36	1080.0	1.9	0.4
18	36	1170.0	1.7	0.29
18	36	1260.0	1.6	0.21
18	36	1350.0	1.5	0.16
18	36	1440.0	1.4	0.12
19	39	195.0	10	10
19	39	292.5	6.8	6.8
19	39	390.0	5.1	5.1
19	39	487.5	4.1	4.1
19	39	585.0	3.4	3.4
19	39	682.5	2.9	2.9
19	39	780.0	2.6	2
19	39	877.5	2.3	1.2
19	39	975.0	2.1	0.79
19	39	1072.5	1.9	0.53
19	39	1170.0	1.7	0.37
19	39	1267.5	1.6	0.27
19	39	1365.0	1.5	0.2
19	39	1462.5	1.4	0.15
19	39	1560.0	1.3	0.12
20	40	200.0	10	10
20	40	300.0	6.7	6.7
20	40	400.0	5	5
20	40	500.0	4	4
20	40	600.0	3.3	3.3
20	40	700.0	2.9	2.9
20	40	800.0	2.5	2.1
20	40	900.0	2.2	1.3
20	40	1000.0	2	0.82
20	40	1100.0	1.8	0.56
20	40	1200.0	1.7	0.39
20	40	1300.0	1.5	0.28
20	40	1400.0	1.4	0.21
20	40	1500.0	1.3	0.16
20	40	1600.0	1.2	0.12
21	45	225.0	8.9	8.9
21	45	337.5	5.9	5.9

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
21	45	450.0	4.4	4.4
21	45	562.5	3.6	3.6
21	45	675.0	3	3
21	45	787.5	2.5	2.5
21	45	900.0	2.2	1.8
21	45	1012.5	2	1.1
21	45	1125.0	1.8	0.71
21	45	1237.5	1.6	0.48
21	45	1350.0	1.5	0.34
21	45	1462.5	1.4	0.24
21	45	1575.0	1.3	0.18
21	45	1687.5	1.2	0.14
21	45	1800.0	1.1	0.11
22	48	240.0	8.3	8.3
22	48	360.0	5.6	5.6
22	48	480.0	4.2	4.2
22	48	600.0	3.3	3.3
22	48	720.0	2.8	2.8
22	48	840.0	2.4	2.4
22	48	960.0	2.1	1.7
22	48	1080.0	1.9	1.1
22	48	1200.0	1.7	0.69
22	48	1320.0	1.5	0.47
22	48	1440.0	1.4	0.33
22	48	1560.0	1.3	0.24
22	48	1680.0	1.2	0.17
22	48	1800.0	1.1	0.13
22	48	1920.0	1	0.1
23	51	255.0	7.8	7.8
23	51	382.5	5.2	5.2
23	51	510.0	3.9	3.9
23	51	637.5	3.1	3.1
23	51	765.0	2.6	2.6
23	51	892.5	2.2	2.2
23	51	1020.0	2	1.7
23	51	1147.5	1.7	1
23	51	1275.0	1.6	0.67
23	51	1402.5	1.4	0.45
23	51	1530.0	1.3	0.32

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
23	51	1657.5	1.2	0.23
23	51	1785.0	1.1	0.17
23	51	1912.5	1	0.13
23	51	2040.0	0.98	0.099
24	52	260.0	7.7	7.7
24	52	390.0	5.1	5.1
24	52	520.0	3.8	3.8
24	52	650.0	3.1	3.1
24	52	780.0	2.6	2.6
24	52	910.0	2.2	2.2
24	52	1040.0	1.9	1.8
24	52	1170.0	1.7	1.1
24	52	1300.0	1.5	0.7
24	52	1430.0	1.4	0.47
24	52	1560.0	1.3	0.33
24	52	1690.0	1.2	0.24
24	52	1820.0	1.1	0.18
24	52	1950.0	1	0.13
24	52	2080.0	0.96	0.1
25	55	275.0	7.3	7.3
25	55	412.5	4.8	4.8
25	55	550.0	3.6	3.6
25	55	687.5	2.9	2.9
25	55	825.0	2.4	2.4
25	55	962.5	2.1	2.1
25	55	1100.0	1.8	1.7
25	55	1237.5	1.6	1.1
25	55	1375.0	1.5	0.69
25	55	1512.5	1.3	0.46
25	55	1650.0	1.2	0.33
25	55	1787.5	1.1	0.23
25	55	1925.0	1	0.17
25	55	2062.5	0.97	0.13
25	55	2200.0	0.91	0.1
26	56	280.0	7.1	7.1
26	56	420.0	4.8	4.8
26	56	560.0	3.6	3.6
26	56	700.0	2.9	2.9
26	56	840.0	2.4	2.4

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
26	56	980.0	2	2
26	56	1120.0	1.8	1.8
26	56	1260.0	1.6	1.1
26	56	1400.0	1.4	0.72
26	56	1540.0	1.3	0.49
26	56	1680.0	1.2	0.34
26	56	1820.0	1.1	0.25
26	56	1960.0	1	0.18
26	56	2100.0	0.95	0.14
26	56	2240.0	0.89	0.11
27	59	295.0	6.8	6.8
27	59	442.5	4.5	4.5
27	59	590.0	3.4	3.4
27	59	737.5	2.7	2.7
27	59	885.0	2.3	2.3
27	59	1032.5	1.9	1.9
27	59	1180.0	1.7	1.7
27	59	1327.5	1.5	1.1
27	59	1475.0	1.4	0.71
27	59	1622.5	1.2	0.48
27	59	1770.0	1.1	0.33
27	59	1917.5	1	0.24
27	59	2065.0	0.97	0.18
27	59	2212.5	0.9	0.14
27	59	2360.0	0.85	0.1
28	58	290.0	6.9	6.9
28	58	435.0	4.6	4.6
28	58	580.0	3.4	3.4
28	58	725.0	2.8	2.8
28	58	870.0	2.3	2.3
28	58	1015.0	2	2
28	58	1160.0	1.7	1.7
28	58	1305.0	1.5	1.2
28	58	1450.0	1.4	0.78
28	58	1595.0	1.3	0.53
28	58	1740.0	1.1	0.37
28	58	1885.0	1.1	0.27
28	58	2030.0	0.99	0.2
28	58	2175.0	0.92	0.15

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
28	58	2320.0	0.86	0.12
29	63	315.0	6.3	6.3
29	63	472.5	4.2	4.2
29	63	630.0	3.2	3.2
29	63	787.5	2.5	2.5
29	63	945.0	2.1	2.1
29	63	1102.5	1.8	1.8
29	63	1260.0	1.6	1.6
29	63	1417.5	1.4	1.1
29	63	1575.0	1.3	0.72
29	63	1732.5	1.2	0.49
29	63	1890.0	1.1	0.34
29	63	2047.5	0.98	0.25
29	63	2205.0	0.91	0.18
29	63	2362.5	0.85	0.14
29	63	2520.0	0.79	0.11
30	64	320.0	6.2	6.2
30	64	480.0	4.2	4.2
30	64	640.0	3.1	3.1
30	64	800.0	2.5	2.5
30	64	960.0	2.1	2.1
30	64	1120.0	1.8	1.8
30	64	1280.0	1.6	1.6
30	64	1440.0	1.4	1.2
30	64	1600.0	1.2	0.75
30	64	1760.0	1.1	0.51
30	64	1920.0	1	0.36
30	64	2080.0	0.96	0.26
30	64	2240.0	0.89	0.19
30	64	2400.0	0.83	0.14
30	64	2560.0	0.78	0.11
31	69	345.0	5.8	5.8
31	69	517.5	3.9	3.9
31	69	690.0	2.9	2.9
31	69	862.5	2.3	2.3
31	69	1035.0	1.9	1.9
31	69	1207.5	1.7	1.7
31	69	1380.0	1.4	1.4
31	69	1552.5	1.3	1.1

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
31	69	1725.0	1.2	0.71
31	69	1897.5	1.1	0.48
31	69	2070.0	0.97	0.34
31	69	2242.5	0.89	0.24
31	69	2415.0	0.83	0.18
31	69	2587.5	0.77	0.14
31	69	2760.0	0.72	0.1
32	72	360.0	5.6	5.6
32	72	540.0	3.7	3.7
32	72	720.0	2.8	2.8
32	72	900.0	2.2	2.2
32	72	1080.0	1.9	1.9
32	72	1260.0	1.6	1.6
32	72	1440.0	1.4	1.4
32	72	1620.0	1.2	1.1
32	72	1800.0	1.1	0.7
32	72	1980.0	1	0.48
32	72	2160.0	0.93	0.33
32	72	2340.0	0.85	0.24
32	72	2520.0	0.79	0.18
32	72	2700.0	0.74	0.13
32	72	2880.0	0.69	0.1
33	75	375.0	5.3	5.3
33	75	562.5	3.6	3.6
33	75	750.0	2.7	2.7
33	75	937.5	2.1	2.1
33	75	1125.0	1.8	1.8
33	75	1312.5	1.5	1.5
33	75	1500.0	1.3	1.3
33	75	1687.5	1.2	1.1
33	75	1875.0	1.1	0.7
33	75	2062.5	0.97	0.47
33	75	2250.0	0.89	0.33
33	75	2437.5	0.82	0.24
33	75	2625.0	0.76	0.18
33	75	2812.5	0.71	0.13
33	75	3000.0	0.67	0.1
34	80	400.0	5	5
34	80	600.0	3.3	3.3

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
34	80	800.0	2.5	2.5
34	80	1000.0	2	2
34	80	1200.0	1.7	1.7
34	80	1400.0	1.4	1.4
34	80	1600.0	1.2	1.2
34	80	1800.0	1.1	1
34	80	2000.0	1	0.67
34	80	2200.0	0.91	0.45
34	80	2400.0	0.83	0.32
34	80	2600.0	0.77	0.23
34	80	2800.0	0.71	0.17
34	80	3000.0	0.67	0.13
34	80	3200.0	0.62	0.099
35	79	395.0	5.1	5.1
35	79	592.5	3.4	3.4
35	79	790.0	2.5	2.5
35	79	987.5	2	2
35	79	1185.0	1.7	1.7
35	79	1382.5	1.4	1.4
35	79	1580.0	1.3	1.3
35	79	1777.5	1.1	1.1
35	79	1975.0	1	0.73
35	79	2172.5	0.92	0.49
35	79	2370.0	0.84	0.34
35	79	2567.5	0.78	0.25
35	79	2765.0	0.72	0.18
35	79	2962.5	0.68	0.14
35	79	3160.0	0.63	0.11
36	84	420.0	4.8	4.8
36	84	630.0	3.2	3.2
36	84	840.0	2.4	2.4
36	84	1050.0	1.9	1.9
36	84	1260.0	1.6	1.6
36	84	1470.0	1.4	1.4
36	84	1680.0	1.2	1.2
36	84	1890.0	1.1	1.1
36	84	2100.0	0.95	0.7
36	84	2310.0	0.87	0.47
36	84	2520.0	0.79	0.33

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
36	84	2730.0	0.73	0.24
36	84	2940.0	0.68	0.18
36	84	3150.0	0.63	0.13
36	84	3360.0	0.6	0.1
37	85	425.0	4.7	4.7
37	85	637.5	3.1	3.1
37	85	850.0	2.4	2.4
37	85	1062.5	1.9	1.9
37	85	1275.0	1.6	1.6
37	85	1487.5	1.3	1.3
37	85	1700.0	1.2	1.2
37	85	1912.5	1	1
37	85	2125.0	0.94	0.73
37	85	2337.5	0.86	0.49
37	85	2550.0	0.78	0.34
37	85	2762.5	0.72	0.25
37	85	2975.0	0.67	0.18
37	85	3187.5	0.63	0.14
37	85	3400.0	0.59	0.11
38	88	440.0	4.5	4.5
38	88	660.0	3	3
38	88	880.0	2.3	2.3
38	88	1100.0	1.8	1.8
38	88	1320.0	1.5	1.5
38	88	1540.0	1.3	1.3
38	88	1760.0	1.1	1.1
38	88	1980.0	1	1
38	88	2200.0	0.91	0.73
38	88	2420.0	0.83	0.49
38	88	2640.0	0.76	0.34
38	88	2860.0	0.7	0.25
38	88	3080.0	0.65	0.18
38	88	3300.0	0.61	0.14
38	88	3520.0	0.57	0.11
39	89	445.0	4.5	4.5
39	89	667.5	3	3
39	89	890.0	2.2	2.2
39	89	1112.5	1.8	1.8
39	89	1335.0	1.5	1.5

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
39	89	1557.5	1.3	1.3
39	89	1780.0	1.1	1.1
39	89	2002.5	1	1
39	89	2225.0	0.9	0.75
39	89	2447.5	0.82	0.51
39	89	2670.0	0.75	0.36
39	89	2892.5	0.69	0.26
39	89	3115.0	0.64	0.19
39	89	3337.5	0.6	0.14
39	89	3560.0	0.56	0.11
40	90	450.0	4.4	4.4
40	90	675.0	3	3
40	90	900.0	2.2	2.2
40	90	1125.0	1.8	1.8
40	90	1350.0	1.5	1.5
40	90	1575.0	1.3	1.3
40	90	1800.0	1.1	1.1
40	90	2025.0	0.99	0.99
40	90	2250.0	0.89	0.78
40	90	2475.0	0.81	0.53
40	90	2700.0	0.74	0.37
40	90	2925.0	0.68	0.27
40	90	3150.0	0.63	0.2
40	90	3375.0	0.59	0.15
40	90	3600.0	0.56	0.11
41	93	465.0	4.3	4.3
41	93	697.5	2.9	2.9
41	93	930.0	2.2	2.2
41	93	1162.5	1.7	1.7
41	93	1395.0	1.4	1.4
41	93	1627.5	1.2	1.2
41	93	1860.0	1.1	1.1
41	93	2092.5	0.96	0.96
41	93	2325.0	0.86	0.78
41	93	2557.5	0.78	0.53
41	93	2790.0	0.72	0.37
41	93	3022.5	0.66	0.27
41	93	3255.0	0.61	0.2
41	93	3487.5	0.57	0.15

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
41	93	3720.0	0.54	0.11
42	98	490.0	4.1	4.1
42	98	735.0	2.7	2.7
42	98	980.0	2	2
42	98	1225.0	1.6	1.6
42	98	1470.0	1.4	1.4
42	98	1715.0	1.2	1.2
42	98	1960.0	1	1
42	98	2205.0	0.91	0.91
42	98	2450.0	0.82	0.76
42	98	2695.0	0.74	0.51
42	98	2940.0	0.68	0.36
42	98	3185.0	0.63	0.26
42	98	3430.0	0.58	0.19
42	98	3675.0	0.54	0.14
42	98	3920.0	0.51	0.11
43	99	495.0	4	4
43	99	742.5	2.7	2.7
43	99	990.0	2	2
43	99	1237.5	1.6	1.6
43	99	1485.0	1.3	1.3
43	99	1732.5	1.2	1.2
43	99	1980.0	1	1
43	99	2227.5	0.9	0.9
43	99	2475.0	0.81	0.79
43	99	2722.5	0.73	0.53
43	99	2970.0	0.67	0.37
43	99	3217.5	0.62	0.27
43	99	3465.0	0.58	0.2
43	99	3712.5	0.54	0.15
43	99	3960.0	0.51	0.12
44	104	520.0	3.8	3.8
44	104	780.0	2.6	2.6
44	104	1040.0	1.9	1.9
44	104	1300.0	1.5	1.5
44	104	1560.0	1.3	1.3
44	104	1820.0	1.1	1.1
44	104	2080.0	0.96	0.96
44	104	2340.0	0.85	0.85

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
44	104	2600.0	0.77	0.77
44	104	2860.0	0.7	0.52
44	104	3120.0	0.64	0.36
44	104	3380.0	0.59	0.26
44	104	3640.0	0.55	0.19
44	104	3900.0	0.51	0.15
44	104	4160.0	0.48	0.11
45	103	515.0	3.9	3.9
45	103	772.5	2.6	2.6
45	103	1030.0	1.9	1.9
45	103	1287.5	1.6	1.6
45	103	1545.0	1.3	1.3
45	103	1802.5	1.1	1.1
45	103	2060.0	0.97	0.97
45	103	2317.5	0.86	0.86
45	103	2575.0	0.78	0.78
45	103	2832.5	0.71	0.55
45	103	3090.0	0.65	0.38
45	103	3347.5	0.6	0.28
45	103	3605.0	0.55	0.21
45	103	3862.5	0.52	0.16
45	103	4120.0	0.49	0.12
46	108	540.0	3.7	3.7
46	108	810.0	2.5	2.5
46	108	1080.0	1.9	1.9
46	108	1350.0	1.5	1.5
46	108	1620.0	1.2	1.2
46	108	1890.0	1.1	1.1
46	108	2160.0	0.93	0.93
46	108	2430.0	0.82	0.82
46	108	2700.0	0.74	0.74
46	108	2970.0	0.67	0.54
46	108	3240.0	0.62	0.38
46	108	3510.0	0.57	0.27
46	108	3780.0	0.53	0.2
46	108	4050.0	0.49	0.15
46	108	4320.0	0.46	0.12
47	107	535.0	3.7	3.7
47	107	802.5	2.5	2.5

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
47	107	1070.0	1.9	1.9
47	107	1337.5	1.5	1.5
47	107	1605.0	1.2	1.2
47	107	1872.5	1.1	1.1
47	107	2140.0	0.93	0.93
47	107	2407.5	0.83	0.83
47	107	2675.0	0.75	0.75
47	107	2942.5	0.68	0.57
47	107	3210.0	0.62	0.4
47	107	3477.5	0.58	0.29
47	107	3745.0	0.53	0.21
47	107	4012.5	0.5	0.16
47	107	4280.0	0.47	0.12
48	114	570.0	3.5	3.5
48	114	855.0	2.3	2.3
48	114	1140.0	1.8	1.8
48	114	1425.0	1.4	1.4
48	114	1710.0	1.2	1.2
48	114	1995.0	1	1
48	114	2280.0	0.88	0.88
48	114	2565.0	0.78	0.78
48	114	2850.0	0.7	0.7
48	114	3135.0	0.64	0.55
48	114	3420.0	0.58	0.38
48	114	3705.0	0.54	0.28
48	114	3990.0	0.5	0.2
48	114	4275.0	0.47	0.15
48	114	4560.0	0.44	0.12
49	113	565.0	3.5	3.5
49	113	847.5	2.4	2.4
49	113	1130.0	1.8	1.8
49	113	1412.5	1.4	1.4
49	113	1695.0	1.2	1.2
49	113	1977.5	1	1
49	113	2260.0	0.88	0.88
49	113	2542.5	0.79	0.79
49	113	2825.0	0.71	0.71
49	113	3107.5	0.64	0.58
49	113	3390.0	0.59	0.4

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
49	113	3672.5	0.54	0.29
49	113	3955.0	0.51	0.21
49	113	4237.5	0.47	0.16
49	113	4520.0	0.44	0.12
50	120	600.0	3.3	3.3
50	120	900.0	2.2	2.2
50	120	1200.0	1.7	1.7
50	120	1500.0	1.3	1.3
50	120	1800.0	1.1	1.1
50	120	2100.0	0.95	0.95
50	120	2400.0	0.83	0.83
50	120	2700.0	0.74	0.74
50	120	3000.0	0.67	0.67
50	120	3300.0	0.61	0.56
50	120	3600.0	0.56	0.39
50	120	3900.0	0.51	0.28
50	120	4200.0	0.48	0.21
50	120	4500.0	0.44	0.16
50	120	4800.0	0.42	0.12
51	121	605.0	3.3	3.3
51	121	907.5	2.2	2.2
51	121	1210.0	1.7	1.7
51	121	1512.5	1.3	1.3
51	121	1815.0	1.1	1.1
51	121	2117.5	0.94	0.94
51	121	2420.0	0.83	0.83
51	121	2722.5	0.73	0.73
51	121	3025.0	0.66	0.66
51	121	3327.5	0.6	0.57
51	121	3630.0	0.55	0.4
52	130	650.0	3.1	3.1
52	130	975.0	2.1	2.1
52	130	1300.0	1.5	1.5
52	130	1625.0	1.2	1.2
52	130	1950.0	1	1
52	130	2275.0	0.88	0.88
52	130	2600.0	0.77	0.77
52	130	2925.0	0.68	0.68
52	130	3250.0	0.62	0.62

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
52	130	3575.0	0.56	0.55
52	130	3900.0	0.51	0.38
53	127	635.0	3.1	3.1
53	127	952.5	2.1	2.1
53	127	1270.0	1.6	1.6
53	127	1587.5	1.3	1.3
53	127	1905.0	1	1
53	127	2222.5	0.9	0.9
53	127	2540.0	0.79	0.79
53	127	2857.5	0.7	0.7
53	127	3175.0	0.63	0.63
53	127	3492.5	0.57	0.57
53	127	3810.0	0.52	0.41
54	124	620.0	3.2	3.2
54	124	930.0	2.2	2.2
54	124	1240.0	1.6	1.6
54	124	1550.0	1.3	1.3
54	124	1860.0	1.1	1.1
54	124	2170.0	0.92	0.92
54	124	2480.0	0.81	0.81
54	124	2790.0	0.72	0.72
54	124	3100.0	0.65	0.65
54	124	3410.0	0.59	0.59
54	124	3720.0	0.54	0.44
55	133	665.0	3	3
55	133	997.5	2	2
55	133	1330.0	1.5	1.5
55	133	1662.5	1.2	1.2
55	133	1995.0	1	1
55	133	2327.5	0.86	0.86
55	133	2660.0	0.75	0.75
55	133	2992.5	0.67	0.67
55	133	3325.0	0.6	0.6
55	133	3657.5	0.55	0.55
55	133	3990.0	0.5	0.42
56	138	690.0	2.9	2.9
56	138	1035.0	1.9	1.9
56	138	1380.0	1.4	1.4
56	138	1725.0	1.2	1.2

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
56	138	2070.0	0.97	0.97
56	138	2415.0	0.83	0.83
56	138	2760.0	0.72	0.72
56	138	3105.0	0.64	0.64
56	138	3450.0	0.58	0.58
56	138	3795.0	0.53	0.53
56	138	4140.0	0.48	0.41
57	139	695.0	2.9	2.9
57	139	1042.5	1.9	1.9
57	139	1390.0	1.4	1.4
57	139	1737.5	1.2	1.2
57	139	2085.0	0.96	0.96
57	139	2432.5	0.82	0.82
57	139	2780.0	0.72	0.72
57	139	3127.5	0.64	0.64
57	139	3475.0	0.58	0.58
57	139	3822.5	0.52	0.52
57	139	4170.0	0.48	0.42
58	140	700.0	2.9	2.9
58	140	1050.0	1.9	1.9
58	140	1400.0	1.4	1.4
58	140	1750.0	1.1	1.1
58	140	2100.0	0.95	0.95
58	140	2450.0	0.82	0.82
58	140	2800.0	0.71	0.71
58	140	3150.0	0.63	0.63
58	140	3500.0	0.57	0.57
58	140	3850.0	0.52	0.52
58	140	4200.0	0.48	0.44
59	141	705.0	2.8	2.8
59	141	1057.5	1.9	1.9
59	141	1410.0	1.4	1.4
59	141	1762.5	1.1	1.1
59	141	2115.0	0.95	0.95
59	141	2467.5	0.81	0.81
59	141	2820.0	0.71	0.71
59	141	3172.5	0.63	0.63
59	141	3525.0	0.57	0.57
59	141	3877.5	0.52	0.52

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
59	141	4230.0	0.47	0.45
60	142	710.0	2.8	2.8
60	142	1065.0	1.9	1.9
60	142	1420.0	1.4	1.4
60	142	1775.0	1.1	1.1
60	142	2130.0	0.94	0.94
60	142	2485.0	0.8	0.8
60	142	2840.0	0.7	0.7
60	142	3195.0	0.63	0.63
60	142	3550.0	0.56	0.56
60	142	3905.0	0.51	0.51
60	142	4260.0	0.47	0.46
61	145	725.0	2.8	2.8
61	145	1087.5	1.8	1.8
61	145	1450.0	1.4	1.4
61	145	1812.5	1.1	1.1
61	145	2175.0	0.92	0.92
61	145	2537.5	0.79	0.79
61	145	2900.0	0.69	0.69
61	145	3262.5	0.61	0.61
61	145	3625.0	0.55	0.55
61	145	3987.5	0.5	0.5
61	145	4350.0	0.46	0.46
62	152	760.0	2.6	2.6
62	152	1140.0	1.8	1.8
62	152	1520.0	1.3	1.3
62	152	1900.0	1.1	1.1
62	152	2280.0	0.88	0.88
62	152	2660.0	0.75	0.75
62	152	3040.0	0.66	0.66
62	152	3420.0	0.58	0.58
62	152	3800.0	0.53	0.53
62	152	4180.0	0.48	0.48
62	152	4560.0	0.44	0.44
63	153	765.0	2.6	2.6
63	153	1147.5	1.7	1.7
63	153	1530.0	1.3	1.3
63	153	1912.5	1	1
63	153	2295.0	0.87	0.87

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
63	153	2677.5	0.75	0.75
63	153	3060.0	0.65	0.65
63	153	3442.5	0.58	0.58
63	153	3825.0	0.52	0.52
63	153	4207.5	0.48	0.48
63	153	4590.0	0.44	0.44
64	158	790.0	2.5	2.5
64	158	1185.0	1.7	1.7
64	158	1580.0	1.3	1.3
64	158	1975.0	1	1
64	158	2370.0	0.84	0.84
64	158	2765.0	0.72	0.72
64	158	3160.0	0.63	0.63
64	158	3555.0	0.56	0.56
64	158	3950.0	0.51	0.51
64	158	4345.0	0.46	0.46
64	158	4740.0	0.42	0.42
65	159	795.0	2.5	2.5
65	159	1192.5	1.7	1.7
65	159	1590.0	1.3	1.3
65	159	1987.5	1	1
65	159	2385.0	0.84	0.84
65	159	2782.5	0.72	0.72
65	159	3180.0	0.63	0.63
65	159	3577.5	0.56	0.56
65	159	3975.0	0.5	0.5
65	159	4372.5	0.46	0.46
65	159	4770.0	0.42	0.42
66	164	820.0	2.4	2.4
66	164	1230.0	1.6	1.6
66	164	1640.0	1.2	1.2
66	164	2050.0	0.98	0.98
66	164	2460.0	0.81	0.81
66	164	2870.0	0.7	0.7
66	164	3280.0	0.61	0.61
66	164	3690.0	0.54	0.54
66	164	4100.0	0.49	0.49
66	164	4510.0	0.44	0.44
66	164	4920.0	0.41	0.41

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
67	166	830.0	2.4	2.4
67	166	1245.0	1.6	1.6
67	166	1660.0	1.2	1.2
67	166	2075.0	0.96	0.96
67	166	2490.0	0.8	0.8
67	166	2905.0	0.69	0.69
67	166	3320.0	0.6	0.6
67	166	3735.0	0.54	0.54
67	166	4150.0	0.48	0.48
67	166	4565.0	0.44	0.44
67	166	4980.0	0.4	0.4
68	168	840.0	2.4	2.4
68	168	1260.0	1.6	1.6
68	168	1680.0	1.2	1.2
68	168	2100.0	0.95	0.95
68	168	2520.0	0.79	0.79
68	168	2940.0	0.68	0.68
68	168	3360.0	0.6	0.6
68	168	3780.0	0.53	0.53
68	168	4200.0	0.48	0.48
68	168	4620.0	0.43	0.43
68	168	5040.0	0.4	0.4
69	169	845.0	2.4	2.4
69	169	1267.5	1.6	1.6
69	169	1690.0	1.2	1.2
69	169	2112.5	0.95	0.95
69	169	2535.0	0.79	0.79
69	169	2957.5	0.68	0.68
69	169	3380.0	0.59	0.59
69	169	3802.5	0.53	0.53
69	169	4225.0	0.47	0.47
69	169	4647.5	0.43	0.43
69	169	5070.0	0.39	0.39
70	174	870.0	2.3	2.3
70	174	1305.0	1.5	1.5
70	174	1740.0	1.1	1.1
70	174	2175.0	0.92	0.92
70	174	2610.0	0.77	0.77
70	174	3045.0	0.66	0.66

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
70	174	3480.0	0.57	0.57
70	174	3915.0	0.51	0.51
70	174	4350.0	0.46	0.46
70	174	4785.0	0.42	0.42
70	174	5220.0	0.38	0.38
71	175	875.0	2.3	2.3
71	175	1312.5	1.5	1.5
71	175	1750.0	1.1	1.1
71	175	2187.5	0.91	0.91
71	175	2625.0	0.76	0.76
71	175	3062.5	0.65	0.65
71	175	3500.0	0.57	0.57
71	175	3937.5	0.51	0.51
71	175	4375.0	0.46	0.46
71	175	4812.5	0.42	0.42
71	175	5250.0	0.38	0.38
72	180	900.0	2.2	2.2
72	180	1350.0	1.5	1.5
72	180	1800.0	1.1	1.1
72	180	2250.0	0.89	0.89
72	180	2700.0	0.74	0.74
72	180	3150.0	0.63	0.63
72	180	3600.0	0.56	0.56
72	180	4050.0	0.49	0.49
72	180	4500.0	0.44	0.44
72	180	4950.0	0.4	0.4
72	180	5400.0	0.37	0.37
73	181	905.0	2.2	2.2
73	181	1357.5	1.5	1.5
73	181	1810.0	1.1	1.1
73	181	2262.5	0.88	0.88
73	181	2715.0	0.74	0.74
73	181	3167.5	0.63	0.63
73	181	3620.0	0.55	0.55
73	181	4072.5	0.49	0.49
73	181	4525.0	0.44	0.44
73	181	4977.5	0.4	0.4
73	181	5430.0	0.37	0.37
74	186	930.0	2.2	2.2

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
74	186	1395.0	1.4	1.4
74	186	1860.0	1.1	1.1
74	186	2325.0	0.86	0.86
74	186	2790.0	0.72	0.72
74	186	3255.0	0.61	0.61
74	186	3720.0	0.54	0.54
74	186	4185.0	0.48	0.48
74	186	4650.0	0.43	0.43
74	186	5115.0	0.39	0.39
74	186	5580.0	0.36	0.36
75	185	925.0	2.2	2.2
75	185	1387.5	1.4	1.4
75	185	1850.0	1.1	1.1
75	185	2312.5	0.86	0.86
75	185	2775.0	0.72	0.72
75	185	3237.5	0.62	0.62
75	185	3700.0	0.54	0.54
75	185	4162.5	0.48	0.48
75	185	4625.0	0.43	0.43
75	185	5087.5	0.39	0.39
75	185	5550.0	0.36	0.36
76	190	950.0	2.1	2.1
76	190	1425.0	1.4	1.4
76	190	1900.0	1.1	1.1
76	190	2375.0	0.84	0.84
76	190	2850.0	0.7	0.7
76	190	3325.0	0.6	0.6
76	190	3800.0	0.53	0.53
76	190	4275.0	0.47	0.47
76	190	4750.0	0.42	0.42
76	190	5225.0	0.38	0.38
76	190	5700.0	0.35	0.35
77	193	965.0	2.1	2.1
77	193	1447.5	1.4	1.4
77	193	1930.0	1	1
77	193	2412.5	0.83	0.83
77	193	2895.0	0.69	0.69
77	193	3377.5	0.59	0.59
77	193	3860.0	0.52	0.52

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
77	193	4342.5	0.46	0.46
77	193	4825.0	0.41	0.41
77	193	5307.5	0.38	0.38
77	193	5790.0	0.35	0.35
78	195	975.0	2.1	2.1
78	195	1462.5	1.4	1.4
78	195	1950.0	1	1
78	195	2437.5	0.82	0.82
78	195	2925.0	0.68	0.68
78	195	3412.5	0.59	0.59
78	195	3900.0	0.51	0.51
78	195	4387.5	0.46	0.46
78	195	4875.0	0.41	0.41
78	195	5362.5	0.37	0.37
78	195	5850.0	0.34	0.34
79	197	985.0	2	2
79	197	1477.5	1.4	1.4
79	197	1970.0	1	1
79	197	2462.5	0.81	0.81
79	197	2955.0	0.68	0.68
79	197	3447.5	0.58	0.58
79	197	3940.0	0.51	0.51
79	197	4432.5	0.45	0.45
79	197	4925.0	0.41	0.41
79	197	5417.5	0.37	0.37
79	197	5910.0	0.34	0.34
80	202	1010.0	2	2
80	202	1515.0	1.3	1.3
80	202	2020.0	0.99	0.99
80	202	2525.0	0.79	0.79
80	202	3030.0	0.66	0.66
80	202	3535.0	0.57	0.57
80	202	4040.0	0.5	0.5
80	202	4545.0	0.44	0.44
80	202	5050.0	0.4	0.4
80	202	5555.0	0.36	0.36
80	202	6060.0	0.33	0.33
81	205	1025.0	2	2
81	205	1537.5	1.3	1.3

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
81	205	2050.0	0.98	0.98
81	205	2562.5	0.78	0.78
81	205	3075.0	0.65	0.65
81	205	3587.5	0.56	0.56
81	205	4100.0	0.49	0.49
81	205	4612.5	0.43	0.43
81	205	5125.0	0.39	0.39
81	205	5637.5	0.35	0.35
81	205	6150.0	0.33	0.33
82	208	1040.0	1.9	1.9
82	208	1560.0	1.3	1.3
82	208	2080.0	0.96	0.96
82	208	2600.0	0.77	0.77
82	208	3120.0	0.64	0.64
82	208	3640.0	0.55	0.55
82	208	4160.0	0.48	0.48
82	208	4680.0	0.43	0.43
82	208	5200.0	0.38	0.38
82	208	5720.0	0.35	0.35
82	208	6240.0	0.32	0.32
83	209	1045.0	1.9	1.9
83	209	1567.5	1.3	1.3
83	209	2090.0	0.96	0.96
83	209	2612.5	0.77	0.77
83	209	3135.0	0.64	0.64
83	209	3657.5	0.55	0.55
83	209	4180.0	0.48	0.48
83	209	4702.5	0.43	0.43
83	209	5225.0	0.38	0.38
83	209	5747.5	0.35	0.35
83	209	6270.0	0.32	0.32
90	232	1160.0	1.7	1.7
90	232	1740.0	1.1	1.1
90	232	2320.0	0.86	0.86
90	232	2900.0	0.69	0.69
90	232	3480.0	0.57	0.57
90	232	4060.0	0.49	0.49
90	232	4640.0	0.43	0.43
90	232	5220.0	0.38	0.38

Attachment A
ASE BEAM LIMITS

Z	A	E_{beam} (MeV)	Cave0 / Vault I_{limit} (pμA)	Other caves I_{limit} (pμA)
90	232	5800.0	0.34	0.34
90	232	6380.0	0.31	0.31
90	232	6960.0	0.29	0.29
92	238	1190.0	1.7	1.7
92	238	1785.0	1.1	1.1
92	238	2380.0	0.84	0.84
92	238	2975.0	0.67	0.67
92	238	3570.0	0.56	0.56
92	238	4165.0	0.48	0.48
92	238	4760.0	0.42	0.42
92	238	5355.0	0.37	0.37
92	238	5950.0	0.34	0.34
92	238	6545.0	0.31	0.31
92	238	7140.0	0.28	0.28