

Attachment J

Excel™ Spreadsheet Formulas



Washington Division

Excel Spreadsheet with MCNP Conversion Factors (from Attachment B)

	A	B	C	D	E	F
1	MCNP Evaluation of Skyshine (and thin wall to ground scatter) from IRSF					
2						
3	CASE: HICs without Shield Bell					
4	Single HIC Source Term for 100 R/hr Contact					
5						
6	Factors used for conv					
7						
8	11600000000000		photons per second			
9	72		nominal source height (inches)			
10	30.5		nominal source radius (inches)			
11						
12	150		source height for two high stacking (inches)			
13	126		number of two high stack positions (for rectangular arrangement)			
14	135		number of two high stack positions (for hexagonal arrangement)			
15						
16	3045000000000000		source strength in photons/sec for IRSF filled with 100 R/hr containers (included in MCNP)			
17						
18	=A14/A13		factor to adjust number of positions from rectangular to hexagonal arrangement			



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Excel Spreadsheet with MCNP Detector Results (no shield bells) (from Attachment B)

	A	B	C	D	E	F	G	H	I
1	MCNP Eval:								
2									
3	Case: HICs wi								
4	Single HIC Source								
5									
6	Truck Bay Dos								
7	MCNP Output	CNP Err	Dose Rate	Dose Rate					
8	(Rem/hr)		(mRem/hr)	(mRem/year)					
9	0.238752	0.0134	=1000*A9*(1+B9)	=C9*8766					
10									
11	Truck Bay Dos								
12	MCNP Output	CNP Err	Dose Rate	Dose Rate					
13	(Rem/hr)		(mRem/hr)	(mRem/year)					
14	0.00611424	0.0132	=1000*A14*(1+B14)	=C14*8766					
15									
16	Rings Outside								
17	MCNP Output	CNP Err	Dose Rate	Dose Rate	Detector Descriptor				
18	(Rem/hr)		(Rem/hr)	(Rem/year)	(distance from IRSF				
19	0.00149723	0.0067	=A19*(1+B19)	=C19*8766	Average in ring betwe				
20	0.000951574	0.005	=A20*(1+B20)	=C20*8766	Average in ring betwe				
21	0.000469026	0.0046	=A21*(1+B21)	=C21*8766	Average in ring betwe				
22	0.000218907	0.0051	=A22*(1+B22)	=C22*8766	Average in ring betwe				
23	0.000100595	0.0058	=A23*(1+B23)	=C23*8766	Average in ring betwe				
24	0.000045625	0.0061	=A24*(1+B24)	=C24*8766	Average in ring betwe				
25	0.000022224	0.0045	=A25*(1+B25)	=C25*8766	Average in ring betwe				
26	0.00000992918	0.0042	=A26*(1+B26)	=C26*8766	Average in ring betwe				
27	0.00000394639	0.0045	=A27*(1+B27)	=C27*8766	Average in ring betwe				
28	0.00000145627	0.0049	=A28*(1+B28)	=C28*8766	Average in ring betwe				
29	0.000000480051	0.0048	=A29*(1+B29)	=C29*8766	Average in ring betwe				
30	0.000000189149	0.0109	=A30*(1+B30)	=C30*8766	Average in ring betwe				
31	0.0000000599581	0.0067	=A31*(1+B31)	=C31*8766	Average in ring betw				
32	0.0000000228327	0.0145	=A32*(1+B32)	=C32*8766	Average in ring betwe				
33	0.0000000048642	0.0068	=A33*(1+B33)	=C33*8766	Average in ring betwe				
34									
35	Slabs Adjacent								
36	MCNP Output	CNP Err	Dose Rate	Dose Rate	Detector Descriptor				
37	(Rem/hr)		(Rem/hr)	(Rem/year)					
38	0.00102533	0.0374	=A38*(1+B38)	=C38*8766	Average, at 0 to 2 me				
39	0.00158094	0.0363	=A39*(1+B39)	=C39*8766	Average, at 2 to 4 me				
40	0.00204249	0.0337	=A40*(1+B40)	=C40*8766	Average, at 4 to 6 me				
41	0.00276035	0.0395	=A41*(1+B41)	=C41*8766	Average, at 6 to 8 me				
42	0.00308498	0.0341	=A42*(1+B42)	=C42*8766	Average, at 8 to 10 m				
43	0.00336671	0.0338	=A43*(1+B43)	=C43*8766	Average, at 10 to 12 r				
44	0.00351156	0.0364	=A44*(1+B44)	=C44*8766	Average, at 12 to 14 r				
45	0.00363387	0.0336	=A45*(1+B45)	=C45*8766	Average, at 14 to 16 r				
46	0.00341682	0.0308	=A46*(1+B46)	=C46*8766	Average, at 16 to 18 r				
47	0.00365754	0.0424	=A47*(1+B47)	=C47*8766	Average, at 18 to 20				
48	0.00353387	0.0379	=A48*(1+B48)	=C48*8766	Average, at 20 to 22 r				
49	0.00328718	0.0468	=A49*(1+B49)	=C49*8766	Average, at 22 to 24 r				
50	0.00307167	0.0341	=A50*(1+B50)	=C50*8766	Average, at 24 to 26 r				
51	0.00277935	0.0311	=A51*(1+B51)	=C51*8766	Average, at 26 to 28 r				
52	0.00280378	0.0453	=A52*(1+B52)	=C52*8766	Average, at 28 to 30 r				
53	0.00278772	0.0557	=A53*(1+B53)	=C53*8766	Average, at 30 to 32 r				
54	0.00246937	0.0497	=A54*(1+B54)	=C54*8766	Average, at 32 to 34 r				
55	0.00230897	0.0436	=A55*(1+B55)	=C55*8766	Average, at 34 to 36 r				
56									
57	Dose Rate on \								
58	MCNP Output	CNP Err	Dose Rate	Dose Rate					
59	(Rem/hr)		(Rem/hr)	(Rem/year)					
60	0.00108909	0.0439	=A60*(1+B60)	=C60*8766					
61									
62	Vertical Detect								
63	MCNP Output	CNP Err	Dose Rate	Dose Rate	Detector Descriptor				
64	(Rem/hr)		(Rem/hr)	(Rem/year)					
65	0.000649783	0.0147	=A65*(1+B65)	=C65*8766	Average, at ring 2003				
66	0.000238085	0.0189	=A66*(1+B66)	=C66*8766	Average, at ring 2004				
67	0.000102047	0.0155	=A67*(1+B67)	=C67*8766	Average, at ring 2005				
68	0.0000487468	0.0199	=A68*(1+B68)	=C68*8766	Average, at ring 2006				
69	0.0000255212	0.022	=A69*(1+B69)	=C69*8766	Average, at ring 2007				
70	0.00000984831	0.0282	=A70*(1+B70)	=C70*8766	Average, at ring 2008				
71	0.00000391685	0.0279	=A71*(1+B71)	=C71*8766	Average, at ring 2009				
72	0.00000128596	0.036	=A72*(1+B72)	=C72*8766	Average, at ring 2010				
73	0.000000465356	0.0543	=A73*(1+B73)	=C73*8766	Average, at ring 2011				
74	0.000000181418	0.0711	=A74*(1+B74)	=C74*8766	Average, at ring 2012				
75	0.0000000820991	0.0883	=A75*(1+B75)	=C75*8766	Average, at ring 2013				
76									
77	Vertical Detect								
78	MCNP Output	CNP Err	Dose Rate	Dose Rate	Detector Descriptor				
79	(Rem/hr)		(Rem/hr)	(Rem/year)					



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	A	B	C	D	E	F	G	H	I
80	0.000414317	0.0105	=A80*(1+B80)	=C80*8766	Average, at ring 2003				
81	0.000159712	0.0126	=A81*(1+B81)	=C81*8766	Average, at ring 2004				
82	0.0000730172	0.0136	=A82*(1+B82)	=C82*8766	Average, at ring 2005				
83	0.0000359926	0.0178	=A83*(1+B83)	=C83*8766	Average, at ring 2006				
84	0.0000182098	0.0185	=A84*(1+B84)	=C84*8766	Average, at ring 2007				
85	0.00000759528	0.0249	=A85*(1+B85)	=C85*8766	Average, at ring 2008				
86	0.00000313498	0.0422	=A86*(1+B86)	=C86*8766	Average, at ring 2009				
87	0.000000951992	0.0429	=A87*(1+B87)	=C87*8766	Average, at ring 2010				
88	0.000000339324	0.0569	=A88*(1+B88)	=C88*8766	Average, at ring 2011				
89	0.000000136515	0.1015	=A89*(1+B89)	=C89*8766	Average, at ring 2012				
90	0.0000000382898	0.0711	=A90*(1+B90)	=C90*8766	Average, at ring 2013				
91									
92	Dose above HI								
93	MCNP Output	CNP Err	Dose Rate	Dose Rate					
94	(Rem/hr)		(Rem/hr)	(Rem/year)					
95	48.9797	0.0008	=A95*(1+B95)	=C95*8766					
96									



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Excel Spreadsheet with MCNP Detector Results (with shield bells) (from Attachment B)

	A	B	C	D	E	F	G	H	I	J
1	MCNP Evaluat									
2										
3	Case: HICs with									
4	Single HIC Source Te									
5										
6	Truck Bay Dose					BELL EFFECT				
7	MCNP Output	CNP Errr	Dose Rate	Dose Rate						
8	(Rem/hr)		(mRem/hr)	(mRem/year)						
9	0.00746846	0.0437	=1000*A9*(1+B9)	=C9*8766	=No Shield Bells-SS!C9/Shield Bells-SS (2)!C9					
10										
11	Truck Bay Dose					B.E.				
12	MCNP Output	CNP Errr	Dose Rate	Dose Rate						
13	(Rem/hr)		(mRem/hr)	(mRem/year)						
14	0.000187925	0.0244	=1000*A14*(1+B14)	=C14*8766	=No Shield Bells-SS!C14/Shield Bells-SS (2)!C14					
15										
16	Rings Outside Bt					B.E.				
17	MCNP Output	CNP Errr	Dose Rate	Dose Rate	Detector Descriptor					
18	(Rem/hr)		(Rem/hr)	(Rem/year)	(distance from IRSF					
19	0.0000415138	0.0106	=A19*(1+B19)	=C19*8766	Average in ring betwe	=No Shield Bells-SS!C19/Shield Bells-SS (2)!C19				
20	0.0000268793	0.0078	=A20*(1+B20)	=C20*8766	Average in ring betwe	=No Shield Bells-SS!C20/Shield Bells-SS (2)!C20				
21	0.000013953	0.0106	=A21*(1+B21)	=C21*8766	Average in ring betwe	=No Shield Bells-SS!C21/Shield Bells-SS (2)!C21				
22	0.00000650859	0.0082	=A22*(1+B22)	=C22*8766	Average in ring betwe	=No Shield Bells-SS!C22/Shield Bells-SS (2)!C22				
23	0.00000293722	0.0082	=A23*(1+B23)	=C23*8766	Average in ring betwe	=No Shield Bells-SS!C23/Shield Bells-SS (2)!C23				
24	0.00000136796	0.0131	=A24*(1+B24)	=C24*8766	Average in ring betwe	=No Shield Bells-SS!C24/Shield Bells-SS (2)!C24				
25	0.000000669764	0.0116	=A25*(1+B25)	=C25*8766	Average in ring betwe	=No Shield Bells-SS!C25/Shield Bells-SS (2)!C25				
26	0.000000292006	0.0089	=A26*(1+B26)	=C26*8766	Average in ring betwe	=No Shield Bells-SS!C26/Shield Bells-SS (2)!C26				
27	0.000000112359	0.0085	=A27*(1+B27)	=C27*8766	Average in ring betwe	=No Shield Bells-SS!C27/Shield Bells-SS (2)!C27				
28	0.000000041153	0.0128	=A28*(1+B28)	=C28*8766	Average in ring betwe	=No Shield Bells-SS!C28/Shield Bells-SS (2)!C28				
29	0.0000000127566	0.01	=A29*(1+B29)	=C29*8766	Average in ring betwe	=No Shield Bells-SS!C29/Shield Bells-SS (2)!C29				
30	0.00000000415772	0.0114	=A30*(1+B30)	=C30*8766	Average in ring betwe	=No Shield Bells-SS!C30/Shield Bells-SS (2)!C30				
31	0.0000000014713	0.022	=A31*(1+B31)	=C31*8766	Average in ring betw	=No Shield Bells-SS!C31/Shield Bells-SS (2)!C31				
32	0.000000000510839	0.0204	=A32*(1+B32)	=C32*8766	Average in ring betwe	=No Shield Bells-SS!C32/Shield Bells-SS (2)!C32				
33	0.000000000100504	0.0214	=A33*(1+B33)	=C33*8766	Average in ring betwe	=No Shield Bells-SS!C33/Shield Bells-SS (2)!C33				
34										
35	Slabs Adjacent t					B.E.				
36	MCNP Output	CNP Errr	Dose Rate	Dose Rate	Detector Descriptor					
37	(Rem/hr)		(Rem/hr)	(Rem/year)						
38	0.0000343876	0.0459	=A38*(1+B38)	=C38*8766	Average, at 0 to 2 me	=No Shield Bells-SS!C38/Shield Bells-SS (2)!C38				
39	0.0000469802	0.0512	=A39*(1+B39)	=C39*8766	Average, at 2 to 4 me	=No Shield Bells-SS!C39/Shield Bells-SS (2)!C39				
40	0.0000060162	0.0503	=A40*(1+B40)	=C40*8766	Average, at 4 to 6 me	=No Shield Bells-SS!C40/Shield Bells-SS (2)!C40				
41	0.0000686964	0.0439	=A41*(1+B41)	=C41*8766	Average, at 6 to 8 me	=No Shield Bells-SS!C41/Shield Bells-SS (2)!C41				
42	0.0000847297	0.0335	=A42*(1+B42)	=C42*8766	Average, at 8 to 10 m	=No Shield Bells-SS!C42/Shield Bells-SS (2)!C42				
43	0.0000864671	0.0318	=A43*(1+B43)	=C43*8766	Average, at 10 to 12 r	=No Shield Bells-SS!C43/Shield Bells-SS (2)!C43				
44	0.0000939759	0.0344	=A44*(1+B44)	=C44*8766	Average, at 12 to 14 r	=No Shield Bells-SS!C44/Shield Bells-SS (2)!C44				
45	0.0000950532	0.0398	=A45*(1+B45)	=C45*8766	Average, at 14 to 16 r	=No Shield Bells-SS!C45/Shield Bells-SS (2)!C45				
46	0.0000981019	0.0422	=A46*(1+B46)	=C46*8766	Average, at 16 to 18 r	=No Shield Bells-SS!C46/Shield Bells-SS (2)!C46				
47	0.000102627	0.0466	=A47*(1+B47)	=C47*8766	Average, at 18 to 20 r	=No Shield Bells-SS!C47/Shield Bells-SS (2)!C47				
48	0.000115195	0.0761	=A48*(1+B48)	=C48*8766	Average, at 20 to 22	=No Shield Bells-SS!C48/Shield Bells-SS (2)!C48				
49	0.0000925675	0.0438	=A49*(1+B49)	=C49*8766	Average, at 22 to 24 r	=No Shield Bells-SS!C49/Shield Bells-SS (2)!C49				
50	0.0000956741	0.0403	=A50*(1+B50)	=C50*8766	Average, at 24 to 26 r	=No Shield Bells-SS!C50/Shield Bells-SS (2)!C50				
51	0.0000821352	0.0567	=A51*(1+B51)	=C51*8766	Average, at 26 to 28 r	=No Shield Bells-SS!C51/Shield Bells-SS (2)!C51				
52	0.0000798147	0.07	=A52*(1+B52)	=C52*8766	Average, at 28 to 30 r	=No Shield Bells-SS!C52/Shield Bells-SS (2)!C52				
53	0.00007293	0.0447	=A53*(1+B53)	=C53*8766	Average, at 30 to 32 r	=No Shield Bells-SS!C53/Shield Bells-SS (2)!C53				
54	0.0000664943	0.0485	=A54*(1+B54)	=C54*8766	Average, at 32 to 34 r	=No Shield Bells-SS!C54/Shield Bells-SS (2)!C54				
55	0.0000669599	0.0445	=A55*(1+B55)	=C55*8766	Average, at 34 to 36 r	=No Shield Bells-SS!C55/Shield Bells-SS (2)!C55				
56										
57	Dose Rate on Ve					B.E.				
58	MCNP Output	CNP Errr	Dose Rate	Dose Rate						
59	(Rem/hr)		(Rem/hr)	(Rem/year)						
60	0.0000275384	0.059	=A60*(1+B60)	=C60*8766	=No Shield Bells-SS!C60/Shield Bells-SS (2)!C60					
61										
62	Vertical Detector					B.E.				
63	MCNP Output	CNP Errr	Dose Rate	Dose Rate	Detector Descriptor					
64	(Rem/hr)		(Rem/hr)	(Rem/year)						
65	0.0000202199	0.0249	=A65*(1+B65)	=C65*8766	Average, at ring 2003	=No Shield Bells-SS!C65/Shield Bells-SS (2)!C65				
66	0.00000690973	0.0299	=A66*(1+B66)	=C66*8766	Average, at ring 2004	=No Shield Bells-SS!C66/Shield Bells-SS (2)!C66				
67	0.00000302257	0.0497	=A67*(1+B67)	=C67*8766	Average, at ring 2005	=No Shield Bells-SS!C67/Shield Bells-SS (2)!C67				
68	0.00000145969	0.0477	=A68*(1+B68)	=C68*8766	Average, at ring 2006	=No Shield Bells-SS!C68/Shield Bells-SS (2)!C68				
69	0.000000668252	0.0531	=A69*(1+B69)	=C69*8766	Average, at ring 2007	=No Shield Bells-SS!C69/Shield Bells-SS (2)!C69				
70	0.000000277737	0.0736	=A70*(1+B70)	=C70*8766	Average, at ring 2008	=No Shield Bells-SS!C70/Shield Bells-SS (2)!C70				



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	A	B	C	D	E	F	G	H	I	J
71	0.000000103187	0.0521	=A71*(1+B71)	=C71*8766	Average, at ring 2009					=No Shield Bells-SS'IC71/Shield Bells-SS (2)'IC71
72	0.0000000338179	0.0734	=A72*(1+B72)	=C72*8766	Average, at ring 2010					=No Shield Bells-SS'IC72/Shield Bells-SS (2)'IC72
73	0.00000001273	0.1707	=A73*(1+B73)	=C73*8766	Average, at ring 2011					=No Shield Bells-SS'IC73/Shield Bells-SS (2)'IC73
74	0.0000000465203	0.153	=A74*(1+B74)	=C74*8766	Average, at ring 2012					=No Shield Bells-SS'IC74/Shield Bells-SS (2)'IC74
75	0.00000000802377	0.2502	=A75*(1+B75)	=C75*8766	Average, at ring 2013					=No Shield Bells-SS'IC75/Shield Bells-SS (2)'IC75
76										
77	Vertical Detector									
78	MCNP Output	CNP Error	Dose Rate	Dose Rate	Detector Descriptor	B.E.				
79	(Rem/hr)		(Rem/hr)	(Rem/year)						
80	0.0000114339	0.0217	=A80*(1+B80)	=C80*8766	Average, at ring 2003	=No Shield Bells-SS'IC80/Shield Bells-SS (2)'IC80				
81	0.0000047457	0.0317	=A81*(1+B81)	=C81*8766	Average, at ring 2004	=No Shield Bells-SS'IC81/Shield Bells-SS (2)'IC81				
82	0.00000208811	0.0261	=A82*(1+B82)	=C82*8766	Average, at ring 2005	=No Shield Bells-SS'IC82/Shield Bells-SS (2)'IC82				
83	0.00000101818	0.03	=A83*(1+B83)	=C83*8766	Average, at ring 2006	=No Shield Bells-SS'IC83/Shield Bells-SS (2)'IC83				
84	0.000000482733	0.0399	=A84*(1+B84)	=C84*8766	Average, at ring 2007	=No Shield Bells-SS'IC84/Shield Bells-SS (2)'IC84				
85	0.000000208231	0.0986	=A85*(1+B85)	=C85*8766	Average, at ring 2008	=No Shield Bells-SS'IC85/Shield Bells-SS (2)'IC85				
86	0.0000000782192	0.0714	=A86*(1+B86)	=C86*8766	Average, at ring 2009	=No Shield Bells-SS'IC86/Shield Bells-SS (2)'IC86				
87	0.0000000227439	0.1002	=A87*(1+B87)	=C87*8766	Average, at ring 2010	=No Shield Bells-SS'IC87/Shield Bells-SS (2)'IC87				
88	0.0000000657557	0.1206	=A88*(1+B88)	=C88*8766	Average, at ring 2011	=No Shield Bells-SS'IC88/Shield Bells-SS (2)'IC88				
89	0.0000000443241	0.3952	=A89*(1+B89)	=C89*8766	Average, at ring 2012	=No Shield Bells-SS'IC89/Shield Bells-SS (2)'IC89				
90	0.00000000914267	0.2432	=A90*(1+B90)	=C90*8766	Average, at ring 2013	=No Shield Bells-SS'IC90/Shield Bells-SS (2)'IC90				
91										
92	Dose above HICs									
93	MCNP Output	CNP Error	Dose Rate	Dose Rate		B.E.				
94	(Rem/hr)		(Rem/hr)	(Rem/year)						
95	1.56381	0.0021	=A95*(1+B95)	=C95*8766		=No Shield Bells-SS'IC95/Shield Bells-SS (2)'IC95				
96										



Washington Division

Excel Spreadsheet with MCNP Detector Results – Direct Dose Only
(no shield bells)
(from Attachment B)

	A	B	C	D	E
1	MCNP Evalua				
2					
3	Case: HICs with				
4	Single HIC Source T _i				
31					
32	Vertical Detecto				
33	MCNP Output	CNP Err	Dose Rate	Dose Rate	Detector Description
34	(Rem/hr)		(Rem/hr)	(Rem/year)	
35	0.0000254871	0.0126	=A35*(1+B35)	=C35*8766	Average, at ring 2003: 100 m from IRSF center
36	0.00000814003	0.017	=A36*(1+B36)	=C36*8766	Average, at ring 2004: 150 m from IRSF center
37	0.00000325939	0.0211	=A37*(1+B37)	=C37*8766	Average, at ring 2005: 200 m from IRSF center
38	0.00000149667	0.024	=A38*(1+B38)	=C38*8766	Average, at ring 2006: 250 m from IRSF center
39	0.000000758689	0.0281	=A39*(1+B39)	=C39*8766	Average, at ring 2007: 300 m from IRSF center
40	0.000000300806	0.0346	=A40*(1+B40)	=C40*8766	Average, at ring 2008: 375 m from IRSF center
41	0.000000131741	0.0474	=A41*(1+B41)	=C41*8766	Average, at ring 2009: 450 m from IRSF center
42	0.0000000392152	0.0713	=A42*(1+B42)	=C42*8766	Average, at ring 2010: 550 m from IRSF center
43	0.0000000166288	0.0981	=A43*(1+B43)	=C43*8766	Average, at ring 2011: 650 m from IRSF center
44	0.00000000612076	0.154	=A44*(1+B44)	=C44*8766	Average, at ring 2012: 750 m from IRSF center
45	0.00000000280201	0.2078	=A45*(1+B45)	=C45*8766	Average, at ring 2013: 850 m from IRSF center



Washington Division

**Excel Spreadsheet with MCNP Detector Results – Direct Dose Only
(with shield bells)
(from Attachment B)**

	A	B	C	D	E
1	MCNP Evaluat				
2					
3	Case: HICs with				
4	Single HIC Source Te				
31					
32	Vertical Detector				
33	MCNP Output	MCNP Errc	Dose Rate	Dose Rate	Detector Description
34	(Rem/hr)		(Rem/hr)	(Rem/year)	
35	0.00000117136	0.0397	=A35*(1+B35)	=C35*8766	Average, at ring 2003: 100 m from IRSF center
36	0.000000356853	0.047	=A36*(1+B36)	=C36*8766	Average, at ring 2004: 150 m from IRSF center
37	0.00000014396	0.059	=A37*(1+B37)	=C37*8766	Average, at ring 2005: 200 m from IRSF center
38	0.0000000665734	0.0708	=A38*(1+B38)	=C38*8766	Average, at ring 2006: 250 m from IRSF center
39	0.000000034853	0.0887	=A39*(1+B39)	=C39*8766	Average, at ring 2007: 300 m from IRSF center
40	0.0000000123182	0.0929	=A40*(1+B40)	=C40*8766	Average, at ring 2008: 375 m from IRSF center
41	0.00000000565219	0.1155	=A41*(1+B41)	=C41*8766	Average, at ring 2009: 450 m from IRSF center
42	0.00000000211952	0.1521	=A42*(1+B42)	=C42*8766	Average, at ring 2010: 550 m from IRSF center
43	0.000000000832681	0.2164	=A43*(1+B43)	=C43*8766	Average, at ring 2011: 650 m from IRSF center
44	0.000000000386629	0.2351	=A44*(1+B44)	=C44*8766	Average, at ring 2012: 750 m from IRSF center
45	0.000000000175448	0.3056	=A45*(1+B45)	=C45*8766	Average, at ring 2013: 850 m from IRSF center



**Excel Spreadsheet with Comparison of Results to Onsite and Offsite Limits
(for no shield bell case)
(from Attachment B)**

	A	B	C	D	E
1					
2					
3	Dose vs. Distance for Filled Bare HICs with 25 R/hr Average Contact for 40CFR190 Compliance Evaluation				
4		Side	Side		Ring Detector
5	distance	w/ HVAC	w/out HVAC	distance	around IRSF
6	(meters)	Rem/hr	Rem/hr	(meters)	Rem/hr
7	100	=0.25**No Shield Bells-SS!C65	=0.25**No Shield Bells-SS!C80	125	=0.25**No Shield Bells-SS!C22
8	150	=0.25**No Shield Bells-SS!C66	=0.25**No Shield Bells-SS!C81	175	=0.25**No Shield Bells-SS!C23
9	200	=0.25**No Shield Bells-SS!C67	=0.25**No Shield Bells-SS!C82	225	=0.25**No Shield Bells-SS!C24
10	250	=0.25**No Shield Bells-SS!C68	=0.25**No Shield Bells-SS!C83	275	=0.25**No Shield Bells-SS!C25
11	300	=0.25**No Shield Bells-SS!C69	=0.25**No Shield Bells-SS!C84	337.5	=0.25**No Shield Bells-SS!C26
12	375	=0.25**No Shield Bells-SS!C70	=0.25**No Shield Bells-SS!C85	412.5	=0.25**No Shield Bells-SS!C27
13	450	=0.25**No Shield Bells-SS!C71	=0.25**No Shield Bells-SS!C86	500	=0.25**No Shield Bells-SS!C28
14	550	=0.25**No Shield Bells-SS!C72	=0.25**No Shield Bells-SS!C87	600	=0.25**No Shield Bells-SS!C29
15	650	=0.25**No Shield Bells-SS!C73	=0.25**No Shield Bells-SS!C88	700	=0.25**No Shield Bells-SS!C30
16	750	=0.25**No Shield Bells-SS!C74	=0.25**No Shield Bells-SS!C89	800	=0.25**No Shield Bells-SS!C31
17	850	=0.25**No Shield Bells-SS!C75	=0.25**No Shield Bells-SS!C90		
18					
19					
20	Dose Limit applicable to bounding La Salle nearest resident		Dose Limit applicable to bounding La Salle onsite 40CFR190 receptors (with occupancy)		
21					
22					
23	distance		distance	Occupancy	
24	(meters)	limit (Rem/hr) at 1mR/yr	(meters)	(hr/yr)	limit (Rem/hr) at 2.5 mR
25	880	=(1/8766)*(1/1000)	395	20	=(2.5/D25)*(1/1000)
26			767	20	=(2.5/D26)*(1/1000)
27	Observations:				
28	1.				
29					
30					
31					
32					
33	2.				
34					
35					
36					
37					
38					



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**Excel Spreadsheet with MCNP Detector Results
(with Hexagonal HIC Geometry and I-Beams)
(from Attachment B)**

	A	B	C	D	E	F	G
1	MCNP Evaluation of Skyshine (and thin wall to ground sc						
2							
3	Case: HICs without Shield Bells - Hexagonal Arrangement w/ I-Bea						
4	Single HIC Source Term for 100 R/hr Contact						
5							
6	1.07142857 factor to a						
7							
8	Truck Ba						
9	MCNP Output	CNP Errc	Dose Rate	Dose Rate			
10	(Rem/hr)		(mRem/hr)	(mRem/year)			
11	0.154633	0.0057	=1000*A11*(1+B11)*A6	=C11*8766			
12							
13	Rings Ou						
14	MCNP Output	CNP Errc	Dose Rate	Dose Rate	Detector Descripor		
15	(Rem/hr)		(Rem/hr)	(Rem/year)	(distance from IRSF		
16	0.00123824	0.0069	=A16*(1+B16)*\$A\$6	=C16*8766	Average in ring betwe		
17	0.00078079	0.0052	=A17*(1+B17)*\$A\$6	=C17*8766	Average in ring betwe		
18	0.00038666	0.0054	=A18*(1+B18)*\$A\$6	=C18*8766	Average in ring betwe		
19	0.00017966	0.0047	=A19*(1+B19)*\$A\$6	=C19*8766	Average in ring betwe		
20	0.00008296	0.0066	=A20*(1+B20)*\$A\$6	=C20*8766	Average in ring betwe		
21	0.00003828	0.0082	=A21*(1+B21)*\$A\$6	=C21*8766	Average in ring betwe		
22	0.00001862	0.006	=A22*(1+B22)*\$A\$6	=C22*8766	Average in ring betwe		
23	0.00000831	0.0054	=A23*(1+B23)*\$A\$6	=C23*8766	Average in ring betwe		
24	0.00000331	0.0058	=A24*(1+B24)*\$A\$6	=C24*8766	Average in ring betwe		
25	0.00000122	0.0061	=A25*(1+B25)*\$A\$6	=C25*8766	Average in ring betwe		
26	0.00000041	0.0192	=A26*(1+B26)*\$A\$6	=C26*8766	Average in ring betwe		
27	0.00000014	0.0094	=A27*(1+B27)*\$A\$6	=C27*8766	Average in ring betwe		
28	0.00000005	0.012	=A28*(1+B28)*\$A\$6	=C28*8766	Average in ring betw		
29	0.00000002	0.1403	=A29*(1+B29)*\$A\$6	=C29*8766	Average in ring betwe		
30	0.00000000	0.015	=A30*(1+B30)*\$A\$6	=C30*8766	Average in ring betwe		
31							
32	Slabs Adj						
33	MCNP Output	CNP Errc	Dose Rate	Dose Rate	Detector Descripor		
34	(Rem/hr)		(Rem/hr)	(Rem/year)			
35	0.00085199	0.0425	=A35*(1+B35)*\$A\$6	=C35*8766	Average, at 0 to 2 me		
36	0.00121744	0.0337	=A36*(1+B36)*\$A\$6	=C36*8766	Average, at 2 to 4 me		
37	0.00167074	0.0327	=A37*(1+B37)*\$A\$6	=C37*8766	Average, at 4 to 6 me		
38	0.00195171	0.0251	=A38*(1+B38)*\$A\$6	=C38*8766	Average, at 6 to 8 me		
39	0.00233751	0.0316	=A39*(1+B39)*\$A\$6	=C39*8766	Average, at 8 to 10 m		
40	0.00281594	0.0369	=A40*(1+B40)*\$A\$6	=C40*8766	Average, at 10 to 12 r		
41	0.00294336	0.0331	=A41*(1+B41)*\$A\$6	=C41*8766	Average, at 12 to 14 r		
42	0.0030542	0.0369	=A42*(1+B42)*\$A\$6	=C42*8766	Average, at 14 to 16 r		
43	0.00281264	0.0227	=A43*(1+B43)*\$A\$6	=C43*8766	Average, at 16 to 18 r		
44	0.00310359	0.0396	=A44*(1+B44)*\$A\$6	=C44*8766	Average, at 18 to 20		
45	0.00266328	0.0245	=A45*(1+B45)*\$A\$6	=C45*8766	Average, at 20 to 22 r		
46	0.00285292	0.052	=A46*(1+B46)*\$A\$6	=C46*8766	Average, at 22 to 24 r		
47	0.00257305	0.0348	=A47*(1+B47)*\$A\$6	=C47*8766	Average, at 24 to 26 r		
48	0.00240073	0.0396	=A48*(1+B48)*\$A\$6	=C48*8766	Average, at 26 to 28 r		
49	0.00231325	0.0379	=A49*(1+B49)*\$A\$6	=C49*8766	Average, at 28 to 30 r		
50	0.0021787	0.0424	=A50*(1+B50)*\$A\$6	=C50*8766	Average, at 30 to 32 r		
51	0.00213633	0.0603	=A51*(1+B51)*\$A\$6	=C51*8766	Average, at 32 to 34 r		
52	0.00187747	0.0405	=A52*(1+B52)*\$A\$6	=C52*8766	Average, at 34 to 36 r		
53							
54	Dose Rat						
55	MCNP Output	CNP Errc	Dose Rate	Dose Rate			
56	(Rem/hr)		(Rem/hr)	(Rem/year)			
57	0.0007825	0.0389	=A57*(1+B57)*A6	=C57*8766			
58							



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	A	B	C	D	E	F	G
59	Vertical C						
60	ICNP Output	ICNP Errc	Dose Rate	Dose Rate	Detector Descriptior		
61	(Rem/hr)		(Rem/hr)	(Rem/year)			
62	0.00054583	0.0158	=A62*(1+B62)*\$A\$6	=C62*8766	Average, at ring 2003		
63	0.00019947	0.0191	=A63*(1+B63)*\$A\$6	=C63*8766	Average, at ring 2004		
64	0.00008443	0.0165	=A64*(1+B64)*\$A\$6	=C64*8766	Average, at ring 2005		
65	0.00004049	0.0191	=A65*(1+B65)*\$A\$6	=C65*8766	Average, at ring 2006		
66	0.00002029	0.0216	=A66*(1+B66)*\$A\$6	=C66*8766	Average, at ring 2007		
67	0.00000793	0.026	=A67*(1+B67)*\$A\$6	=C67*8766	Average, at ring 2008		
68	0.00000323	0.0403	=A68*(1+B68)*\$A\$6	=C68*8766	Average, at ring 2009		
69	0.00000114	0.057	=A69*(1+B69)*\$A\$6	=C69*8766	Average, at ring 2010		
70	0.00000037	0.0495	=A70*(1+B70)*\$A\$6	=C70*8766	Average, at ring 2011		
71	0.00000013	0.0667	=A71*(1+B71)*\$A\$6	=C71*8766	Average, at ring 2012		
72	0.00000005	0.1441	=A72*(1+B72)*\$A\$6	=C72*8766	Average, at ring 2013		
73							
74	Vertical C						
75	ICNP Output	ICNP Errc	Dose Rate	Dose Rate	Detector Descriptior		
76	(Rem/hr)		(Rem/hr)	(Rem/year)			
77	0.00034725	0.0133	=A77*(1+B77)*\$A\$6	=C77*8766	Average, at ring 2003		
78	0.00013191	0.0138	=A78*(1+B78)*\$A\$6	=C78*8766	Average, at ring 2004		
79	0.00006412	0.0205	=A79*(1+B79)*\$A\$6	=C79*8766	Average, at ring 2005		
80	0.00002976	0.021	=A80*(1+B80)*\$A\$6	=C80*8766	Average, at ring 2006		
81	0.00001584	0.0284	=A81*(1+B81)*\$A\$6	=C81*8766	Average, at ring 2007		
82	0.00000598	0.0371	=A82*(1+B82)*\$A\$6	=C82*8766	Average, at ring 2008		
83	0.00000241	0.0463	=A83*(1+B83)*\$A\$6	=C83*8766	Average, at ring 2009		
84	0.00000079	0.0568	=A84*(1+B84)*\$A\$6	=C84*8766	Average, at ring 2010		
85	0.00000027	0.0845	=A85*(1+B85)*\$A\$6	=C85*8766	Average, at ring 2011		
86	0.00000009	0.1034	=A86*(1+B86)*\$A\$6	=C86*8766	Average, at ring 2012		
87	0.00000003	0.1695	=A87*(1+B87)*\$A\$6	=C87*8766	Average, at ring 2013		
88							
89	Dose abo						
90	ICNP Output	ICNP Errc	Dose Rate	Dose Rate	Detector Descriptior		
91	(Rem/hr)		(Rem/hr)	(Rem/year)			
92	45.5167	0.0012	=A92*(1+B92)*A6	=C92*8766			
93							



Washington Division

Excel Spreadsheet with MCNP Detector Results (no HVAC Penetrations) (from Attachment M)

	A	B	C	D	E	J
1	MCNP Evaluation of Skyshine (and thin wall to ground scatter)					
2						
3	Case: HICs without Shield Bells - Hexagonal Arrangeme					
4	Single HIC Source Term for 100 R/hr Contact					
5						
6	1.071428571428! factor to ac					
7						
8	Truck Bay Do					Fraction of Hex Base
9	MCNP Output	MCNP Erro	Dose Rate	Dose Rate		
10	(Rem/hr)		(mRem/hr)	(mRem/year)		
11	0.153794	0.0065	=1000*A11*(1+B11)*A6	=C11*8766	=D11/Hex + Beam!D11	
12						
13	Rings Outside					
14	MCNP Output	MCNP Erro	Dose Rate	Dose Rate	Detector Description	
15	(Rem/hr)		(Rem/hr)	(Rem/year)	(distance from IRSF	
16	0.000905249	0.0053	=A16*(1+B16)*\$A\$6	=C16*8766	Average in ring betwe	=D16/Hex + Beam!D16
17	0.000604759	0.0043	=A17*(1+B17)*\$A\$6	=C17*8766	Average in ring betwe	=D17/Hex + Beam!D17
18	0.000314315	0.0049	=A18*(1+B18)*\$A\$6	=C18*8766	Average in ring betwe	=D18/Hex + Beam!D18
19	0.000151616	0.0045	=A19*(1+B19)*\$A\$6	=C19*8766	Average in ring betwe	=D19/Hex + Beam!D19
20	0.0000705773	0.0057	=A20*(1+B20)*\$A\$6	=C20*8766	Average in ring betwe	=D20/Hex + Beam!D20
21	0.0000331501	0.0093	=A21*(1+B21)*\$A\$6	=C21*8766	Average in ring betwe	=D21/Hex + Beam!D21
22	0.0000161934	0.0052	=A22*(1+B22)*\$A\$6	=C22*8766	Average in ring betwe	=D22/Hex + Beam!D22
23	0.00000727773	0.0046	=A23*(1+B23)*\$A\$6	=C23*8766	Average in ring betwe	=D23/Hex + Beam!D23
24	0.0000029007	0.0048	=A24*(1+B24)*\$A\$6	=C24*8766	Average in ring betwe	=D24/Hex + Beam!D24
25	0.00000106677	0.0053	=A25*(1+B25)*\$A\$6	=C25*8766	Average in ring betwe	=D25/Hex + Beam!D25
26	0.000000352861	0.007	=A26*(1+B26)*\$A\$6	=C26*8766	Average in ring betwe	=D26/Hex + Beam!D26
27	0.000000121636	0.009	=A27*(1+B27)*\$A\$6	=C27*8766	Average in ring betwe	=D27/Hex + Beam!D27
28	0.000000043580	0.0153	=A28*(1+B28)*\$A\$6	=C28*8766	Average in ring betw	=D28/Hex + Beam!D28
29	0.000000020465	0.2087	=A29*(1+B29)*\$A\$6	=C29*8766	Average in ring betwe	=D29/Hex + Beam!D29
30	0.000000003488	0.02	=A30*(1+B30)*\$A\$6	=C30*8766	Average in ring betwe	=D30/Hex + Beam!D30
31						
32	Slabs Adjace					
33	MCNP Output	MCNP Erro	Dose Rate	Dose Rate	Detector Description	
34	(Rem/hr)		(Rem/hr)	(Rem/year)		
35	0.000421856	0.0352	=A35*(1+B35)*\$A\$6	=C35*8766	Average, at 0 to 2 me	=D35/Hex + Beam!D35
36	0.000613409	0.0278	=A36*(1+B36)*\$A\$6	=C36*8766	Average, at 2 to 4 me	=D36/Hex + Beam!D36
37	0.000784311	0.0275	=A37*(1+B37)*\$A\$6	=C37*8766	Average, at 4 to 6 me	=D37/Hex + Beam!D37
38	0.000931937	0.0219	=A38*(1+B38)*\$A\$6	=C38*8766	Average, at 6 to 8 me	=D38/Hex + Beam!D38
39	0.00112141	0.0252	=A39*(1+B39)*\$A\$6	=C39*8766	Average, at 8 to 10 m	=D39/Hex + Beam!D39
40	0.00130202	0.0295	=A40*(1+B40)*\$A\$6	=C40*8766	Average, at 10 to 12	=D40/Hex + Beam!D40
41	0.00137535	0.0422	=A41*(1+B41)*\$A\$6	=C41*8766	Average, at 12 to 14	=D41/Hex + Beam!D41
42	0.00143535	0.0299	=A42*(1+B42)*\$A\$6	=C42*8766	Average, at 14 to 16	=D42/Hex + Beam!D42
43	0.00140791	0.0301	=A43*(1+B43)*\$A\$6	=C43*8766	Average, at 16 to 18	=D43/Hex + Beam!D43
44	0.00139962	0.0313	=A44*(1+B44)*\$A\$6	=C44*8766	Average, at 18 to 20	=D44/Hex + Beam!D44
45	0.00133948	0.0271	=A45*(1+B45)*\$A\$6	=C45*8766	Average, at 20 to 22	=D45/Hex + Beam!D45
46	0.00129741	0.0284	=A46*(1+B46)*\$A\$6	=C46*8766	Average, at 22 to 24	=D46/Hex + Beam!D46
47	0.00135276	0.047	=A47*(1+B47)*\$A\$6	=C47*8766	Average, at 24 to 26	=D47/Hex + Beam!D47
48	0.0011523	0.0305	=A48*(1+B48)*\$A\$6	=C48*8766	Average, at 26 to 28	=D48/Hex + Beam!D48
49	0.00117936	0.0351	=A49*(1+B49)*\$A\$6	=C49*8766	Average, at 28 to 30	=D49/Hex + Beam!D49
50	0.00107801	0.0395	=A50*(1+B50)*\$A\$6	=C50*8766	Average, at 30 to 32	=D50/Hex + Beam!D50
51	0.00101225	0.0409	=A51*(1+B51)*\$A\$6	=C51*8766	Average, at 32 to 34	=D51/Hex + Beam!D51
52	0.00100598	0.0407	=A52*(1+B52)*\$A\$6	=C52*8766	Average, at 34 to 36	=D52/Hex + Beam!D52
53						
54	Dose Rate on					
55	MCNP Output	MCNP Erro	Dose Rate	Dose Rate		
56	(Rem/hr)		(Rem/hr)	(Rem/year)		
57	0.000404194	0.0636	=A57*(1+B57)*A6	=C57*8766	=D57/Hex + Beam!D57	
58						



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	A	B	C	D	E	J
59	Vertical Detec					
60	MCNP Output	MCNP Error	Dose Rate	Dose Rate	Detector Description	
61	(Rem/hr)		(Rem/hr)	(Rem/year)		
62	0.000332279	0.0148	=A62*(1+B62)*\$A\$6	=C62*8766	Average, at ring 2003	=D62/'Hex + Beam!D62
63	0.00013189	0.0164	=A63*(1+B63)*\$A\$6	=C63*8766	Average, at ring 2004	=D63/'Hex + Beam!D63
64	0.0000598833	0.0194	=A64*(1+B64)*\$A\$6	=C64*8766	Average, at ring 2005	=D64/'Hex + Beam!D64
65	0.0000299353	0.0261	=A65*(1+B65)*\$A\$6	=C65*8766	Average, at ring 2006	=D65/'Hex + Beam!D65
66	0.0000148256	0.0295	=A66*(1+B66)*\$A\$6	=C66*8766	Average, at ring 2007	=D66/'Hex + Beam!D66
67	0.00000592448	0.0352	=A67*(1+B67)*\$A\$6	=C67*8766	Average, at ring 2008	=D67/'Hex + Beam!D67
68	0.00000221795	0.0398	=A68*(1+B68)*\$A\$6	=C68*8766	Average, at ring 2009	=D68/'Hex + Beam!D68
69	0.000000822519	0.091	=A69*(1+B69)*\$A\$6	=C69*8766	Average, at ring 2010	=D69/'Hex + Beam!D69
70	0.0000002536	0.0671	=A70*(1+B70)*\$A\$6	=C70*8766	Average, at ring 2011	=D70/'Hex + Beam!D70
71	0.000000084913	0.0869	=A71*(1+B71)*\$A\$6	=C71*8766	Average, at ring 2012	=D71/'Hex + Beam!D71
72	0.000000025577	0.1099	=A72*(1+B72)*\$A\$6	=C72*8766	Average, at ring 2013	=D72/'Hex + Beam!D72
73						
74	Vertical Detec					
75	MCNP Output	MCNP Error	Dose Rate	Dose Rate	Detector Description	
76	(Rem/hr)		(Rem/hr)	(Rem/year)		
77	0.000343081	0.0161	=A77*(1+B77)*\$A\$6	=C77*8766	Average, at ring 2003	=D77/'Hex + Beam!D77
78	0.000129996	0.0162	=A78*(1+B78)*\$A\$6	=C78*8766	Average, at ring 2004	=D78/'Hex + Beam!D78
79	0.0000620728	0.0228	=A79*(1+B79)*\$A\$6	=C79*8766	Average, at ring 2005	=D79/'Hex + Beam!D79
80	0.0000296577	0.0232	=A80*(1+B80)*\$A\$6	=C80*8766	Average, at ring 2006	=D80/'Hex + Beam!D80
81	0.0000149923	0.0275	=A81*(1+B81)*\$A\$6	=C81*8766	Average, at ring 2007	=D81/'Hex + Beam!D81
82	0.00000567963	0.0337	=A82*(1+B82)*\$A\$6	=C82*8766	Average, at ring 2008	=D82/'Hex + Beam!D82
83	0.00000230063	0.0406	=A83*(1+B83)*\$A\$6	=C83*8766	Average, at ring 2009	=D83/'Hex + Beam!D83
84	0.000000775644	0.0667	=A84*(1+B84)*\$A\$6	=C84*8766	Average, at ring 2010	=D84/'Hex + Beam!D84
85	0.000000285366	0.1027	=A85*(1+B85)*\$A\$6	=C85*8766	Average, at ring 2011	=D85/'Hex + Beam!D85
86	0.000000101449	0.1245	=A86*(1+B86)*\$A\$6	=C86*8766	Average, at ring 2012	=D86/'Hex + Beam!D86
87	0.000000040160	0.2128	=A87*(1+B87)*\$A\$6	=C87*8766	Average, at ring 2013	=D87/'Hex + Beam!D87
88						
89	Dose above F					
90	MCNP Output	MCNP Error	Dose Rate	Dose Rate		
91	(Rem/hr)		(Rem/hr)	(Rem/year)		
92	45.5403	0.0014	=A92*(1+B92)*A6	=C92*8766		=D92/'Hex + Beam!D92
93						



Washington Division

Excel Spreadsheet with MCNP Detector Results (1" HVAC Shield) (from Attachment M)

	A	B	C	D	E	J
1	MCNP Evaluation of Skyshine (and thin wall to ground scatter) from IRSF					
2						
3	Case: HICs without Shield Bells - Hexagonal Arrang					
4	Single HIC Source Term for 100 R/hr Contact					
5						
6	1.0714285714 factor to a					
7						
8	Truck Bay					Fraction of Hex Base
9	MCNP Output	MCNP Error	Dose Rate	Dose Rate		
10	(Rem/hr)		(mRem/hr)	(mRem/year)		
11	0.154862	0.0059	=1000*A11*(1+B11)*A6	=C11*8766		=D11/Hex + Beam!D11
12						
13	Rings Outs					
14	MCNP Output	MCNP Error	Dose Rate	Dose Rate	Detector Description	
15	(Rem/hr)		(Rem/hr)	(Rem/year)	(distance from IRSF)	
16	0.00115835	0.0065	=A16*(1+B16)*\$A\$6	=C16*8766	Average in ring between 0 and 1 m	=D16/Hex + Beam!D16
17	0.000722578	0.0048	=A17*(1+B17)*\$A\$6	=C17*8766	Average in ring between 1 and 2 m	=D17/Hex + Beam!D17
18	0.000366297	0.006	=A18*(1+B18)*\$A\$6	=C18*8766	Average in ring between 2 and 3 m	=D18/Hex + Beam!D18
19	0.000172962	0.0061	=A19*(1+B19)*\$A\$6	=C19*8766	Average in ring between 3 and 4 m	=D19/Hex + Beam!D19
20	0.000080295	0.0057	=A20*(1+B20)*\$A\$6	=C20*8766	Average in ring between 4 and 5 m	=D20/Hex + Beam!D20
21	0.000037007	0.0055	=A21*(1+B21)*\$A\$6	=C21*8766	Average in ring between 5 and 6 m	=D21/Hex + Beam!D21
22	0.000018166	0.005	=A22*(1+B22)*\$A\$6	=C22*8766	Average in ring between 6 and 7 m	=D22/Hex + Beam!D22
23	0.000008198	0.0053	=A23*(1+B23)*\$A\$6	=C23*8766	Average in ring between 7 and 8 m	=D23/Hex + Beam!D23
24	0.000003270	0.0058	=A24*(1+B24)*\$A\$6	=C24*8766	Average in ring between 8 and 9 m	=D24/Hex + Beam!D24
25	0.000001216	0.0061	=A25*(1+B25)*\$A\$6	=C25*8766	Average in ring between 9 and 10 m	=D25/Hex + Beam!D25
26	0.000000404	0.0074	=A26*(1+B26)*\$A\$6	=C26*8766	Average in ring between 10 and 11 m	=D26/Hex + Beam!D26
27	0.000000141	0.0085	=A27*(1+B27)*\$A\$6	=C27*8766	Average in ring between 11 and 12 m	=D27/Hex + Beam!D27
28	0.0000000517	0.0106	=A28*(1+B28)*\$A\$6	=C28*8766	Average in ring between 12 and 13 m	=D28/Hex + Beam!D28
29	0.000000018	0.0141	=A29*(1+B29)*\$A\$6	=C29*8766	Average in ring between 13 and 14 m	=D29/Hex + Beam!D29
30	0.000000003	0.1854	=A30*(1+B30)*\$A\$6	=C30*8766	Average in ring between 14 and 15 m	=D30/Hex + Beam!D30
31						
32	Slabs Adja					
33	MCNP Output	MCNP Error	Dose Rate	Dose Rate	Detector Description	
34	(Rem/hr)		(Rem/hr)	(Rem/year)		
35	0.000808986	0.0367	=A35*(1+B35)*\$A\$6	=C35*8766	Average, at 0 to 2 m	=D35/Hex + Beam!D35
36	0.00118227	0.029	=A36*(1+B36)*\$A\$6	=C36*8766	Average, at 2 to 4 m	=D36/Hex + Beam!D36
37	0.00163234	0.0349	=A37*(1+B37)*\$A\$6	=C37*8766	Average, at 4 to 6 m	=D37/Hex + Beam!D37
38	0.00204487	0.0413	=A38*(1+B38)*\$A\$6	=C38*8766	Average, at 6 to 8 m	=D38/Hex + Beam!D38
39	0.00236299	0.0327	=A39*(1+B39)*\$A\$6	=C39*8766	Average, at 8 to 10 m	=D39/Hex + Beam!D39
40	0.00275091	0.0426	=A40*(1+B40)*\$A\$6	=C40*8766	Average, at 10 to 12 m	=D40/Hex + Beam!D40
41	0.00267286	0.0303	=A41*(1+B41)*\$A\$6	=C41*8766	Average, at 12 to 14 m	=D41/Hex + Beam!D41
42	0.0028962	0.0375	=A42*(1+B42)*\$A\$6	=C42*8766	Average, at 14 to 16 m	=D42/Hex + Beam!D42
43	0.00269459	0.034	=A43*(1+B43)*\$A\$6	=C43*8766	Average, at 16 to 18 m	=D43/Hex + Beam!D43
44	0.00249903	0.032	=A44*(1+B44)*\$A\$6	=C44*8766	Average, at 18 to 20 m	=D44/Hex + Beam!D44
45	0.00229133	0.0258	=A45*(1+B45)*\$A\$6	=C45*8766	Average, at 20 to 22 m	=D45/Hex + Beam!D45
46	0.0022968	0.0511	=A46*(1+B46)*\$A\$6	=C46*8766	Average, at 22 to 24 m	=D46/Hex + Beam!D46
47	0.00208354	0.0426	=A47*(1+B47)*\$A\$6	=C47*8766	Average, at 24 to 26 m	=D47/Hex + Beam!D47
48	0.00188371	0.0381	=A48*(1+B48)*\$A\$6	=C48*8766	Average, at 26 to 28 m	=D48/Hex + Beam!D48
49	0.0018832	0.0473	=A49*(1+B49)*\$A\$6	=C49*8766	Average, at 28 to 30 m	=D49/Hex + Beam!D49
50	0.00162633	0.0276	=A50*(1+B50)*\$A\$6	=C50*8766	Average, at 30 to 32 m	=D50/Hex + Beam!D50
51	0.00169096	0.0424	=A51*(1+B51)*\$A\$6	=C51*8766	Average, at 32 to 34 m	=D51/Hex + Beam!D51
52	0.00145046	0.0316	=A52*(1+B52)*\$A\$6	=C52*8766	Average, at 34 to 36 m	=D52/Hex + Beam!D52
53						
54	Dose Rate					
55	MCNP Output	MCNP Error	Dose Rate	Dose Rate		
56	(Rem/hr)		(Rem/hr)	(Rem/year)		
57	0.000711182	0.0353	=A57*(1+B57)*A6	=C57*8766		=D57/Hex + Beam!C57
58						



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	A	B	C	D	E	J
59	Vertical De					
60	MCNP Output	CNP Error	Dose Rate	Dose Rate	Detector Description	
61	(Rem/hr)		(Rem/hr)	(Rem/year)		
62	0.000462187	0.0142	=A62*(1+B62)*SA\$6	=C62*8766	Average, at ring 2003	=D62/Hex + Beam!D62
63	0.000179945	0.0189	=A63*(1+B63)*SA\$6	=C63*8766	Average, at ring 2004	=D63/Hex + Beam!D63
64	0.00007832710	0.0195	=A64*(1+B64)*SA\$6	=C64*8766	Average, at ring 2005	=D64/Hex + Beam!D64
65	0.000038117E	0.0182	=A65*(1+B65)*SA\$6	=C65*8766	Average, at ring 2006	=D65/Hex + Beam!D65
66	0.000019508E	0.0215	=A66*(1+B66)*SA\$6	=C66*8766	Average, at ring 2007	=D66/Hex + Beam!D66
67	0.000007667E	0.0316	=A67*(1+B67)*SA\$6	=C67*8766	Average, at ring 2008	=D67/Hex + Beam!D67
68	0.000003242E	0.0415	=A68*(1+B68)*SA\$6	=C68*8766	Average, at ring 2009	=D68/Hex + Beam!D68
69	0.00000114370	0.0614	=A69*(1+B69)*SA\$6	=C69*8766	Average, at ring 2010	=D69/Hex + Beam!D69
70	0.00000036940	0.0539	=A70*(1+B70)*SA\$6	=C70*8766	Average, at ring 2011	=D70/Hex + Beam!D70
71	0.00000013720	0.0819	=A71*(1+B71)*SA\$6	=C71*8766	Average, at ring 2012	=D71/Hex + Beam!D71
72	0.00000006370	0.1624	=A72*(1+B72)*SA\$6	=C72*8766	Average, at ring 2013	=D72/Hex + Beam!D72
73						
74	Vertical De					
75	MCNP Output	CNP Error	Dose Rate	Dose Rate	Detector Description	
76	(Rem/hr)		(Rem/hr)	(Rem/year)		
77	0.0003466	0.0141	=A77*(1+B77)*SA\$6	=C77*8766	Average, at ring 2003	=D77/Hex + Beam!D77
78	0.00013858	0.0175	=A78*(1+B78)*SA\$6	=C78*8766	Average, at ring 2004	=D78/Hex + Beam!D78
79	0.00006296840	0.0226	=A79*(1+B79)*SA\$6	=C79*8766	Average, at ring 2005	=D79/Hex + Beam!D79
80	0.000030595E	0.0252	=A80*(1+B80)*SA\$6	=C80*8766	Average, at ring 2006	=D80/Hex + Beam!D80
81	0.000016542E	0.0307	=A81*(1+B81)*SA\$6	=C81*8766	Average, at ring 2007	=D81/Hex + Beam!D81
82	0.000006082E	0.0368	=A82*(1+B82)*SA\$6	=C82*8766	Average, at ring 2008	=D82/Hex + Beam!D82
83	0.000002536E	0.0504	=A83*(1+B83)*SA\$6	=C83*8766	Average, at ring 2009	=D83/Hex + Beam!D83
84	0.00000078970	0.0501	=A84*(1+B84)*SA\$6	=C84*8766	Average, at ring 2010	=D84/Hex + Beam!D84
85	0.000000250E	0.0624	=A85*(1+B85)*SA\$6	=C85*8766	Average, at ring 2011	=D85/Hex + Beam!D85
86	0.00000008410	0.0666	=A86*(1+B86)*SA\$6	=C86*8766	Average, at ring 2012	=D86/Hex + Beam!D86
87	0.000000029E	0.0741	=A87*(1+B87)*SA\$6	=C87*8766	Average, at ring 2013	=D87/Hex + Beam!D87
88						
89	Dose above					
90	MCNP Output	CNP Error	Dose Rate	Dose Rate	Detector Description	
91	(Rem/hr)		(Rem/hr)	(Rem/year)		
92	45.5248	0.0013	=A92*(1+B92)*A6	=C92*8766		=D92/Hex Base!D92
93						



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Excel Spreadsheet with MCNP Detector Results (2" HVAC Shield) (from Attachment M)

	A	B	C	D	E	J
1	MCNP Evaluation of Skyshine (and thin wall to g					
2						
3	Case: HICs without Shield Bells - Hexagonal Arrangeme					
4	Single HIC Source Term for 100 R/hr Contact					
5						
6	1.07142857142857 factor to :					
7						
8	Truck Bay Dose					Fraction of Hex Base
9	MCNP Output	ICNP Errc	Dose Rate	Dose Rate		
10	(Rem/hr)		(mRem/hr)	(mRem/year)		
11	0.154329	0.0063	=1000*A11*(1+B11)*A6	=C11*8766	=D11/Hex + Beam!D11	
12						
13	Rings Outside E					
14	MCNP Output	ICNP Errc	Dose Rate	Dose Rate	Detector Description	
15	(Rem/hr)		(Rem/hr)	(Rem/year)	(distance from IRSF	
16	0.00107879	0.0066	=A16*(1+B16)*\$A\$6	=C16*8766	Average in ring betwe	=D16/Hex + Beam!D16
17	0.000704819	0.0052	=A17*(1+B17)*\$A\$6	=C17*8766	Average in ring betwe	=D17/Hex + Beam!D17
18	0.00035972	0.0064	=A18*(1+B18)*\$A\$6	=C18*8766	Average in ring betwe	=D18/Hex + Beam!D18
19	0.000170746	0.0068	=A19*(1+B19)*\$A\$6	=C19*8766	Average in ring betwe	=D19/Hex + Beam!D19
20	0.0000793705	0.0061	=A20*(1+B20)*\$A\$6	=C20*8766	Average in ring betwe	=D20/Hex + Beam!D20
21	0.0000365581	0.0058	=A21*(1+B21)*\$A\$6	=C21*8766	Average in ring betwe	=D21/Hex + Beam!D21
22	0.0000179787	0.0054	=A22*(1+B22)*\$A\$6	=C22*8766	Average in ring betwe	=D22/Hex + Beam!D22
23	0.00000812092	0.0057	=A23*(1+B23)*\$A\$6	=C23*8766	Average in ring betwe	=D23/Hex + Beam!D23
24	0.00000324277	0.0061	=A24*(1+B24)*\$A\$6	=C24*8766	Average in ring betwe	=D24/Hex + Beam!D24
25	0.00000120156	0.0064	=A25*(1+B25)*\$A\$6	=C25*8766	Average in ring betwe	=D25/Hex + Beam!D25
26	0.000000401105	0.0076	=A26*(1+B26)*\$A\$6	=C26*8766	Average in ring betwe	=D26/Hex + Beam!D26
27	0.000000140319	0.0093	=A27*(1+B27)*\$A\$6	=C27*8766	Average in ring betwe	=D27/Hex + Beam!D27
28	0.0000000512743	0.0114	=A28*(1+B28)*\$A\$6	=C28*8766	Average in ring betw	=D28/Hex + Beam!D28
29	0.0000000184857	0.0153	=A29*(1+B29)*\$A\$6	=C29*8766	Average in ring betwe	=D29/Hex + Beam!D29
30	0.00000000346127	0.1967	=A30*(1+B30)*\$A\$6	=C30*8766	Average in ring betwe	=D30/Hex + Beam!D30
31						
32	Slabs Adjacent f					
33	MCNP Output	ICNP Errc	Dose Rate	Dose Rate	Detector Description	
34	(Rem/hr)		(Rem/hr)	(Rem/year)		
35	0.00074835	0.0419	=A35*(1+B35)*\$A\$6	=C35*8766	Average, at 0 to 2 me	=D35/Hex + Beam!D35
36	0.0011391	0.03	=A36*(1+B36)*\$A\$6	=C36*8766	Average, at 2 to 4 me	=D36/Hex + Beam!D36
37	0.00144639	0.033	=A37*(1+B37)*\$A\$6	=C37*8766	Average, at 4 to 6 me	=D37/Hex + Beam!D37
38	0.00150886	0.0286	=A38*(1+B38)*\$A\$6	=C38*8766	Average, at 6 to 8 me	=D38/Hex + Beam!D38
39	0.00162669	0.0238	=A39*(1+B39)*\$A\$6	=C39*8766	Average, at 8 to 10 m	=D39/Hex + Beam!D39
40	0.00175284	0.0216	=A40*(1+B40)*\$A\$6	=C40*8766	Average, at 10 to 12 f	=D40/Hex + Beam!D40
41	0.00183295	0.0239	=A41*(1+B41)*\$A\$6	=C41*8766	Average, at 12 to 14 f	=D41/Hex + Beam!D41
42	0.00199544	0.0378	=A42*(1+B42)*\$A\$6	=C42*8766	Average, at 14 to 16	=D42/Hex + Beam!D42
43	0.00196752	0.0312	=A43*(1+B43)*\$A\$6	=C43*8766	Average, at 16 to 18 f	=D43/Hex + Beam!D43
44	0.00189957	0.0329	=A44*(1+B44)*\$A\$6	=C44*8766	Average, at 18 to 20 f	=D44/Hex + Beam!D44
45	0.00192035	0.0421	=A45*(1+B45)*\$A\$6	=C45*8766	Average, at 20 to 22 f	=D45/Hex + Beam!D45
46	0.00183072	0.0508	=A46*(1+B46)*\$A\$6	=C46*8766	Average, at 22 to 24 f	=D46/Hex + Beam!D46
47	0.00175506	0.0334	=A47*(1+B47)*\$A\$6	=C47*8766	Average, at 24 to 26 f	=D47/Hex + Beam!D47
48	0.00158519	0.0305	=A48*(1+B48)*\$A\$6	=C48*8766	Average, at 26 to 28 f	=D48/Hex + Beam!D48
49	0.00166784	0.058	=A49*(1+B49)*\$A\$6	=C49*8766	Average, at 28 to 30 f	=D49/Hex + Beam!D49
50	0.00147593	0.0319	=A50*(1+B50)*\$A\$6	=C50*8766	Average, at 30 to 32 f	=D50/Hex + Beam!D50
51	0.00158996	0.0484	=A51*(1+B51)*\$A\$6	=C51*8766	Average, at 32 to 34 f	=D51/Hex + Beam!D51
52	0.00128614	0.0319	=A52*(1+B52)*\$A\$6	=C52*8766	Average, at 34 to 36 f	=D52/Hex + Beam!D52
53						
54	Dose Rate on Vε					
55	MCNP Output	ICNP Errc	Dose Rate	Dose Rate		
56	(Rem/hr)		(Rem/hr)	(Rem/year)		
57	0.000643805	0.0345	=A57*(1+B57)*A6	=C57*8766	=C57/Hex + Beam!C57	
58						



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	A	B	C	D	E	J
59	Vertical Detecto					
60	MCNP Output	ICNP Errc	Dose Rate	Dose Rate	Detector Description	
61	(Rem/hr)		(Rem/hr)	(Rem/year)		
62	0.000441942	0.016	=A62*(1+B62)*\$A\$6	=C62*8766	Average, at ring 2003	=D62/Hex + Beam!D62
63	0.000172028	0.0211	=A63*(1+B63)*\$A\$6	=C63*8766	Average, at ring 2004	=D63/Hex + Beam!D63
64	0.0000759261	0.0218	=A64*(1+B64)*\$A\$6	=C64*8766	Average, at ring 2005	=D64/Hex + Beam!D64
65	0.0000371508	0.0187	=A65*(1+B65)*\$A\$6	=C65*8766	Average, at ring 2006	=D65/Hex + Beam!D65
66	0.0000189925	0.0225	=A66*(1+B66)*\$A\$6	=C66*8766	Average, at ring 2007	=D66/Hex + Beam!D66
67	0.00000747195	0.0334	=A67*(1+B67)*\$A\$6	=C67*8766	Average, at ring 2008	=D67/Hex + Beam!D67
68	0.00000306551	0.0328	=A68*(1+B68)*\$A\$6	=C68*8766	Average, at ring 2009	=D68/Hex + Beam!D68
69	0.00000108522	0.0648	=A69*(1+B69)*\$A\$6	=C69*8766	Average, at ring 2010	=D69/Hex + Beam!D69
70	0.000000373926	0.059	=A70*(1+B70)*\$A\$6	=C70*8766	Average, at ring 2011	=D70/Hex + Beam!D70
71	0.000000137374	0.093	=A71*(1+B71)*\$A\$6	=C71*8766	Average, at ring 2012	=D71/Hex + Beam!D71
72	0.0000000660848	0.1778	=A72*(1+B72)*\$A\$6	=C72*8766	Average, at ring 2013	=D72/Hex + Beam!D72
73						
74	Vertical Detecto					
75	MCNP Output	ICNP Errc	Dose Rate	Dose Rate	Detector Description	
76	(Rem/hr)		(Rem/hr)	(Rem/year)		
77	0.000347994	0.0155	=A77*(1+B77)*\$A\$6	=C77*8766	Average, at ring 2003	=D77/Hex + Beam!D77
78	0.00013779	0.0187	=A78*(1+B78)*\$A\$6	=C78*8766	Average, at ring 2004	=D78/Hex + Beam!D78
79	0.0000633094	0.0249	=A79*(1+B79)*\$A\$6	=C79*8766	Average, at ring 2005	=D79/Hex + Beam!D79
80	0.0000309163	0.0276	=A80*(1+B80)*\$A\$6	=C80*8766	Average, at ring 2006	=D80/Hex + Beam!D80
81	0.0000166609	0.0333	=A81*(1+B81)*\$A\$6	=C81*8766	Average, at ring 2007	=D81/Hex + Beam!D81
82	0.00000611052	0.0373	=A82*(1+B82)*\$A\$6	=C82*8766	Average, at ring 2008	=D82/Hex + Beam!D82
83	0.00000245176	0.0415	=A83*(1+B83)*\$A\$6	=C83*8766	Average, at ring 2009	=D83/Hex + Beam!D83
84	0.000000786603	0.0543	=A84*(1+B84)*\$A\$6	=C84*8766	Average, at ring 2010	=D84/Hex + Beam!D84
85	0.00000025142	0.0688	=A85*(1+B85)*\$A\$6	=C85*8766	Average, at ring 2011	=D85/Hex + Beam!D85
86	0.0000000837579	0.0714	=A86*(1+B86)*\$A\$6	=C86*8766	Average, at ring 2012	=D86/Hex + Beam!D86
87	0.0000000295207	0.0763	=A87*(1+B87)*\$A\$6	=C87*8766	Average, at ring 2013	=D87/Hex + Beam!D87
88						
89	Dose above HIC					
90	MCNP Output	ICNP Errc	Dose Rate	Dose Rate		
91	(Rem/hr)		(Rem/hr)	(Rem/year)		
92	45.4993	0.0014	=A92*(1+B92)*A6	=C92*8766		=D92/Hex Base!D92
93						



Washington Division

**Excel Spreadsheet with MCNP Detector Results (100 Filled HICs)
(from Attachment N)**

	A	B	C	D
1	MCNP Evaluation of Skyshine (and thin wall to ground scatter) from IRSF			
2				
3	Case: HICs without Shield Bells - Hexagonal Arrangement			
4	Single HIC Source Term for 100 R/hr Contact			
5				
6	=50/126	factor to adjust for number of filled HICS (100)		
7				
8	Truck Bay			
9	MCNP Output	MCNP Error	Dose Rate	Dose Rate
10	(Rem/hr)		(mRem/hr)	(mRem/year)
11	0.117582	0.019	=1000*A11*(1+B11)*A6	=C11*8766
12				