Fragment Separator Radiation Safety (RIA-MSU Estimates)

System	Item	Purchases					Labor		Notes
		Quantity	Cost Each	$K Total	Basis	$K System Total	Hours	Basis	
Target	Fragmentation Target	1	1,300,000	1,300	wag				
	Remote Handling	1	300,000	300	wag				
	Water Cooling Package	1	66,000	66	ISAC	1,666	51,000	wag	
Shielding	Target, local, steel	1	5,333	5	Ronningen				
	Dump, Concrete	1	260,000	260	Ronningen				
	Dump, steel	1	-	-	Ronningen/Nolen				
	Target + Dump, steel shipping	1	720,530	721	Nolen	986	1,834	ISAC	
Vacuum	Decay Storage Tanks	2	6,600	13	ISAC				
	High Vacuum Gauges	8	1,320	11	ISAC				
	Rough Vacuum Guages	5	132	1	ISAC				
	Extended Control Cables (lot)	1	3,300	3	ISAC				
	Mechanical Vacuum Pumps	3	1,980	6	ISAC				
	Operating Storage Tanks	2	1,980	4	ISAC				
	Turbo Pumps	12	13,200	158	ISAC				
	Rad Hard Valves	2	13,200	26	ISAC				
	Small Vacuum Valves	25	330	8	ISAC				
	Vacuum Exhaust Plumbing (Lot)	1	3,300	3	ISAC	234	4,000	wag	
				Total =		$2,886	56,834		
				Total$		$2,886	$4,263		
				Total		$7,148			

Gas Stopping Target Radiation Safety (RIA-MSU Estimates)

System	Item	Purchases					Labor		Notes
		Quantity	Cost Each	$K Total	Basis	$K System Total	Hours	Basis	
Target	Target Module	1	1,000,000	1,000	wag				
	Remote Handling	1	300,000	300	wag				
						1,300	51,000	wag	
Shielding	Local, steel	1	5,333	5	Ronningen	986	1,834	ISAC	
	Steel dump shield	1	-	-					
	Concrete dump shield	1	260,000	260	Ronningen				
	Target + Dump, steel shipping	1	720,530	721	Nolen				
Vacuum	Decay Storage Tanks	2	6,600	13	ISAC				
	High Vacuum Gauges	8	1,320	11	ISAC				
	Rough Vacuum Guages	5	132	1	ISAC				
	Extended Control Cables (lot)	1	3,300	3	ISAC				
	Mechanical Vacuum Pumps	3	1,980	6	ISAC				
	Operating Storage Tanks	2	1,980	4	ISAC				
	Turbo Pumps	12	13,200	158	ISAC				
	Rad Hard Valves	2	13,200	26	ISAC				
	Small Vacuum Valves	25	330	8	ISAC				
	Vacuum Exhaust Plumbing (Lot)	1	3,300	3	ISAC	234	2,000	wag	
				Total =		$2,520	54,834		
				Total$		$2,520	$4,113		
				Total		$6,632			

ISOL Radiation Safety (RIA-MSU Estimates)

System	Item	Purchases					Labor		Notes
		Quantity	Cost Each	$K Total	Basis	$K System Total	Hours	Basis	
Target	Target Dump Module	2	47,520	95	ISAC				
	Target Entrance Module	2	30,202	60	ISAC				
	Target Exit (1 and 2) Modules	4	102,300	409	ISAC				
	Target Module	4	100,320	401	ISAC				
	Target Station High Voltage System	2	118,008	236	ISAC				
	Target Vacuum Tanks	4	47,586	190	ISAC				
	Water Cooling Package	2	66,000	132	ISAC	1,524	51,000	ISAC	
Shielding	Target, Concrete-fixed	2	260,000	520	Ronningen				
	Target, Concrete-removable high density	2	6,082	12	ISAC				
	Target, steel from ORNL	2	-	-	Ronningen/Nolen				
	Target, steel shipping from ORNL	2	720,530	1,441	Nolen	1,973	3,700	ISAC	
Vacuum	Decay Storage Tanks	4	6,600	26	ISAC				
	High Vacuum Gauges	16	1,320	21	ISAC				
	Rough Vacuum Guages	10	132	1	ISAC				
	Extended Control Cables (lot)	2	3,300	7	ISAC				
	Mechanical Vacuum Pumps	6	1,980	12	ISAC				
	Operating Storage Tanks	4	1,980	8	ISAC				
	Turbo Pumps	24	13,200	317	ISAC				
	Rad Hard Valves	4	13,200	53	ISAC				
	Small Vacuum Valves	50	330	17	ISAC				
	Vacuum Exhaust Plumbing (Lot)	2	3,300	7	ISAC	468	4,000	wag	
				Total =		$3,965	58,700		
				Total$		$3,965	$4,403		
				Total		$8,368			

System	Services (RIA-MSU Estimates) Item	Purchases Quantity	ISAC Cost Each	Scaled up Cost (x1.5)	$K Total	Basis	$K System Total	Labor Hours	Basis	Notes
Hot Cell	Hot Cell	2	66,000	99,000	99	ISAC				
	Access Door	2	9,900	14,850	15	ISAC				
	Roof and Concrete Fill	2	80,520	120,780	121	ISAC				
	Windows, Installation	2	114,510	171,765	172	ISAC				
	Manipulators	4	58,740	88,110	88	ISAC				
	Scissor Lift Tables	2	4,620	6,930	7	ISAC				
	Target Alignment Optics	1	40,920	61,380	61	ISAC				
	Turntables	1	10,890	16,335	16	ISAC	579	23,550	ISAC	Scaled up
				-	-					
				-	-					
				-	-					
Crane	20T overhead crane with 3T aux.	1	145,378	218,067	218	ISAC				
	Crane remote console and controls	1	75,900	113,850	114	ISAC	332	500	wag	
				-	-					
				-	-					
Decontamination	Decontamination Room	1	33,000	49,500	50	ISAC	50	300	wag	
				-	-					
				-	-					
Storage Pit	Decontamination Tank	1	5,014	7,521	8	ISAC				
	Storage Silos	6	13,860	20,790	21	ISAC				
	Target Alignment Frame	1	1,320	1,980	2	ISAC	30	1,000	wag	
				-	-					
				-	-					
Target Storage	Spent Target Storage Vault Shielding	1	58,080	87,120	87	ISAC				
	STSV Electrical Controls	1	1,320	1,980	2	ISAC				
	STSV Mechanical Components	1	16,500	24,750	25	ISAC	114	1,000	wag	
				-	-					
				-	-					
Services	Secondary Water System (low-active)	1	33,000	49,500	50	ISAC				
	Nuclear Exhaust System	1	330,000	495,000	495	ISAC				
	Tertiary Water System (raw water)	1	19,800	29,700	30	ISAC	574	6,000	wag	
				-	-					
				-	-					
Safety Monitoring, System	Safety and Computing Sytems	1	708,089	708,089	708	NISOL		7,488	NISOL	
	Target Hall Safety System (lockout)	2	8,316	8,316	8	ISAC				
	Neutron	30	10,000	10,000	10	Ronningen		300	wag	
	alpha, beta, gamma	30	10,000	10,000	10	Ronningen		300	wag	
	Water sump monitoring	1	200,000	200,000	200	Ronningen		1,500	wag	
	Air stack monitoring	1	200,000	200,000	200	Ronningen		1,500	wag	
	(particulate, iodine, noble, tritium)			-	-					
	Waste Monitoring	1	100,000	100,000	100	Ronningen		500	wag	
	Portal (monitor+access control) (4)	4	80,000	80,000	80	Ronningen	1,316	1,000	wag	
				-	-					
				-	-					
Project Support	Management & Administration			-	-	NISOL				
	Systems Design/Integration			-	-	NISOL				
	Safety			-	-	NISOL				
	Environmental and WM Planning			-	-	NISOL				
	QA			-	-	NISOL				
	Regulatory Compliance			-	-	NISOL		71,867	NISOL	
				-						
				-	Total =		$2,995	116,805		
					Total$		$2,995	$8,760		
					Total		$11,756			

2/3 of these hrs,