

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$	
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total			
1	04					UNDULATOR SYSTEM						78,906	15,002,122	7,138,372	15,539,633	22,678,005		4,296,474	
1	04	01				Undulator System Management & Integration						16,803	334,827	1,558,847	401,335	1,960,182		7,039	
1	04	01	01			Undulator System Management						16,803	228,222	1,558,847	242,475	1,801,322		-	
1	04	01	01	01		Undulator System Management - Technical						15,396	37,500	1,404,299	46,531	1,450,830		-	
1	04	01	01	01		Project Management ETC (CNST)	1-Aug-06	2-Apr-07	C	AN_PM1	Hrs	895		98,272		98,272	0%	-	
1	04	01	01	01		Administrative Assistant (CNST)	1-Aug-06	2-Apr-07	C	AN_ADM	Hrs	448		49,191		49,191	0%	-	
1	04	01	01	01		Lead Mechanical Technician (CNST)	1-Aug-06	2-Apr-07	C	AN_MFA	Hrs	895		57,697		57,697	0%	-	
1	04	01	01	01		Mechanical Engineer (CNST)	1-Aug-06	2-Apr-07	C	AN_ME1	Hrs	895		98,272		98,272	0%	-	
1	04	01	01	01		Mechanical Technician (CNST)	1-Aug-06	2-Apr-07	C	AN_MFA	Hrs	895		57,697		57,697	0%	-	
1	04	01	01	01		Design/Drafter (CNST)	1-Aug-06	2-Apr-07	C	AN_MDD	Hrs	895		57,697		57,697	0%	-	
1	04	01	01	01		Oversee Engineering and Integration ETC (CNST)	1-Aug-06	2-Apr-07	C	AN_PM1	Hrs	895		98,272		98,272	0%	-	
1	04	01	01	01		Controls System Engineering Oversight ETC (CNST)	1-Aug-06	2-Apr-07	C	AN_PM1	Hrs	448		49,191		49,191	0%	-	
1	04	01	01	01		Und Magnet & Support Engr Oversight ETC (CNST)	1-Aug-06	2-Apr-07	C	AN_PM1	Hrs	895		98,272		98,272	0%	-	
1	04	01	01	01		Vacuum Engineering Oversight ETC (CNST)	1-Aug-06	2-Apr-07	C	AN_PM1	Hrs	448		49,191		49,191	0%	-	
1	04	01	01	01		Diagnostics Engineering Oversight ETC (CNST)	1-Aug-06	2-Apr-07	C	AN_PM1	Hrs	256		28,109		28,109	0%	-	
1	04	01	01	01		Oversee Quality Assurance ETC (CNST)	1-Aug-06	2-Apr-07	C	AN_ADM	Hrs	448		49,191		49,191	0%	-	
1	04	01	01	01		Undulator Designer @ SLAC - ETC (CNST)	1-Aug-06	28-Sep-07	C	SL_MDD	Hrs	1,651		137,739		137,739	0%	-	
1	04	01	01	01		Undulator Document Control @ SLAC(600 hrs/yr)	3-Oct-06	30-Sep-08	C	SL_MDD	Hrs	1,079		91,526		91,526	0%	-	
1	04	01	01	01		Undulator POC/AM @ SLAC (1500 hrs/yr)	3-Oct-06	30-Sep-08	C	SL_MES	Hrs	2,701		219,697		219,697	0%	-	
1	04	01	01	01		SLAC Travel (30 trips@\$1250/trip)	3-Oct-06	5-Mar-08	C	SL_MST	\$\$		37,500		46,531		46,531	0%	-
1	04	01	01	01		Undulator Mgmt/Engr @ SLAC - ETC (CNST)	1-Aug-06	28-Sep-07	C	SL_ME1	Hrs	1,651		164,282		164,282	0%	-	
1	04	01	01	02		ANL Project Support						1,407	190,722	154,548	195,944	350,492		-	
1	04	01	01	02		Monitor Budget, Schedule and Contracts ETC(CNST)	1-Aug-06	2-Apr-07	C	AN_ADM	Hrs	895		98,272		98,272	0%	-	
1	04	01	01	02		ANL Division - Website Support ETC (CNST)	1-Aug-06	29-Sep-06	C	AN_ADM	Hrs	36		3,856		3,856	0%	-	
1	04	01	01	02		ANL Division - PMCS Support ETC (CNST)	1-Aug-06	2-Apr-07	C	AN_ADM	Hrs	256		28,109		28,109	0%	-	
1	04	01	01	02		ANL Division - Website Support (CNST)	2-Oct-06	2-Apr-07	C	AN_ADM	Hrs	220		24,310		24,310	0%	-	
1	04	01	01	02		ANL Indirect Cost Allocation - ETC (CNST)	1-Aug-06	29-Sep-06	C	AN_MSX	\$\$		8,772		8,772		8,772	0%	-
1	04	01	01	02		SLAC Indirect Tax - ETC (CNST)	1-Aug-06	29-Sep-06	C	SL_MSX	\$\$		13,950		13,950		13,950	0%	-
1	04	01	01	02		ANL Indirect Cost Allocation - FY07 (CNST)	2-Oct-06	1-Oct-07	C	AN_MSX	\$\$		106,000		108,756		108,756	0%	-
1	04	01	01	02		SLAC Indirect Tax - FY07 (CNST)	2-Oct-06	28-Sep-07	C	SL_MSX	\$\$		30,000		30,780		30,780	0%	-
1	04	01	01	02		ANL Indirect Cost Allocation - FY08 (CNST)	2-Oct-07	1-Oct-08	C	AN_MSX	\$\$		2,000		2,105		2,105	0%	-
1	04	01	01	02		SLAC Indirect Tax - FY08 (CNST)	1-Oct-07	30-Sep-08	C	SL_MSX	\$\$		30,000		31,580		31,580	0%	-
1	04	01	02			Undulator System Materials & Supplies						-	78,464	-	129,902	129,902		7,039	
1	04	01	02	01		Undulator System M&S - General						-	37,988	-	59,508	59,508		-	
1	04	01	02	01		Office Supplies and Misc Materials ETC (CNST)	1-Aug-06	2-Apr-07	C	AN_MSC	\$\$		2,222		2,265		2,265	0%	-
1	04	01	02	01		Tele/Video Conferencing ETC (CNST)	1-Aug-06	2-Apr-07	C	AN_MSE	\$\$		895		912		912	0%	-
1	04	01	02	01		CPUs and Software ETC(CNST)	1-Aug-06	2-Apr-07	C	AN_MSE	\$\$		6,670		6,800		6,800	0%	-
1	04	01	02	01		Shipping and Storage ETC (CNST)	1-Aug-06	13-Feb-08	C	AN_MST	\$\$		28,200		49,530		49,530	0%	-
1	04	01	02	02		Undulator System Travel						-	40,476	-	70,394	70,394		7,039	
1	04	01	02	02		Domestic Travel ETC (CNST)	1-Aug-06	2-Apr-07	C	AN_MST	\$\$		33,471		58,211		58,211	10%	5,821
1	04	01	02	02		Foreign Travel ETC (CNST)	1-Aug-06	2-Apr-07	C	AN_MST	\$\$		5,003		8,701		8,701	10%	870
1	04	01	02	02		EOU Development Travel	1-Aug-06	2-Apr-07	C	AN_MST	\$\$		2,002		3,482		3,482	10%	348
1	04	01	03			Undulator System Reviews and Workshops						-	28,140	-	28,959	28,959		-	
1	04	01	03			Review and Workshop Costs	1-Aug-06	1-Feb-08	C	AN_MSC	\$\$		28,140		28,959		28,959	0%	-
1	04	02				Controls						4,160	1,750,315	417,858	1,823,026	2,240,884		614,017	
1	04	03				Undulator Magnet & Support						33,382	9,690,526	2,989,214	10,006,889	12,996,103		2,461,211	
1	04	03	01			UND Magnet & Support - Mgmt and Integration						767	-	84,325	-	84,325		-	
1	04	03	01			Undulator Systems Integration ETC	1-Aug-06	2-Apr-07	C	AN_ME1	Hrs	256		28,109		28,109	0%	-	
1	04	03	01			Dev/Coord Instl/Checkout/Verif/Interface,etc	1-Aug-06	30-Mar-07	C	AN_ME1	Hrs	256		28,107		28,107	0%	-	
1	04	03	01			Survey & Alignment Support	1-Aug-06	2-Apr-07	C	AN_MES	Hrs	256		28,109		28,109	0%	-	
1	04	03	02			First Prototype Undulator & Mfg Plan													
1	04	03	03			1st Article Undulators & Long Lead Procurements						3,243	1,149,293	321,901	1,159,172	1,481,074		114,608	

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1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	03	03	01		Ti Strongback (LLP)						171	299,192	18,800	299,429	318,229		15,911
1	04	03	03	01		RCV: Ti S/B Article 19 - Dial	1-Aug-06	31-Aug-06	L	AN_MSS	\$\$		32,304		32,304	32,304	5%	1,615
1	04	03	03	01		RCV: Ti S/B Article 21 - Dial	1-Aug-06	31-Aug-06	L	AN_MSS	\$\$		32,304		32,304	32,304	5%	1,615
1	04	03	03	01		RCV: Ti S/B Article 33 - Dial	9-May-07	9-May-07	L	AN_MSS	\$\$		31,125		31,125	31,125	5%	1,556
1	04	03	03	01		RCV: Ti S/B Article 13 - Dial ETC	1-Aug-06	30-Aug-06	L	AN_MSS	\$\$		-		-	-	5%	-
1	04	03	03	01		RCV: Ti S/B Article 15 - Dial ETC	1-Aug-06	30-Aug-06	L	AN_MSS	\$\$		-		-	-	5%	-
1	04	03	03	01		RCV: Ti S/B Article 17 - Dial ETC	1-Aug-06	30-Aug-06	L	AN_MSS	\$\$		-		-	-	5%	-
1	04	03	03	01		RCV: Ti S/B Article 25 - Dial ETC	1-Aug-06	30-Aug-06	L	AN_MSS	\$\$		48,017		48,017	48,017	5%	2,401
1	04	03	03	01		RCV: Ti S/B Article 27 - Dial ETC	1-Aug-06	30-Aug-06	L	AN_MSS	\$\$		48,017		48,017	48,017	5%	2,401
1	04	03	03	01		RCV: Ti S/B Article 29 - Dial ETC	1-Aug-06	30-Aug-06	L	AN_MSS	\$\$		48,017		48,017	48,017	5%	2,401
1	04	03	03	01		RCV: Ti S/B Article 31 - Dial ETC	1-Aug-06	30-Aug-06	L	AN_MSS	\$\$		48,017		48,017	48,017	5%	2,401
1	04	03	03	01		RCV: Ti S/B Article 30 - Metalex	1-Aug-06	1-Aug-06	L	AN_MSS	\$\$		-		-	-	5%	-
1	04	03	03	01		Ti Strongback Vendor Oversight ETC	1-Aug-06	1-Jun-07	L	AN_MSE	\$\$		11,392		11,629	11,629	5%	581
1	04	03	03	01		Ti Strongback Vendor Oversight ETC	1-Aug-06	1-Jun-07	L	AN_ME1	Hrs	171		18,800		18,800	5%	940
1	04	03	03	02		Magnet Blocks (LLP)						2	270,090	162	270,090	270,252		13,513
1	04	03	03	02		RCV: From Vendor 12.92% Magnet Blocks	1-Aug-06	1-Aug-06	C	AN_MSS	\$\$		48,960		48,960	48,960	5%	2,448
1	04	03	03	02		RCV: From Vendor 12.92% Magnet Blocks	29-Sep-06	29-Sep-06	C	AN_MSS	\$\$		122,400		122,400	122,400	5%	6,120
1	04	03	03	02		RCV: From Vendor 10.34% Magnet Blocks	31-Oct-06	31-Oct-06	C	AN_MSS	\$\$		97,920		97,920	97,920	5%	4,896
1	04	03	03	02		Vendor Fab/Assy - Rem of Magnet Blocks ETC	1-Aug-06	30-Aug-06	C	AN_MSE	\$\$		810		810	810	5%	41
1	04	03	03	02		Vendor Fab/Assy - Rem of Magnet Blocks ETC	1-Aug-06	30-Aug-06	C	AN_ME1	Hrs	2		162		162	5%	8
1	04	03	03	02		RCV: From Vendor 12.91% Magnet Blocks ETC	1-Aug-06	31-Oct-06	C	AN_MSS	\$\$		-		-	-	5%	-
1	04	03	03	03		Magnet Poles (LLP)						-	192,421	-	192,421	192,421		-
1	04	03	03	03		PP: Progress Payment - 41 Weeks ETC	1-Aug-06	29-Aug-06	C	AN_MSS	\$\$		192,421		192,421	192,421	0%	-
1	04	03	03	04		Magnet Assembly & Supports - 1st Articles						1,096	260,000	109,278	266,552	375,830		56,375
1	04	03	03	04		Survey & Align ETC	1-Aug-06	2-Apr-07	C	AN_MES	Hrs	250		27,450		27,450	15%	4,118
1	04	03	03	04		Prepare for Acceptance Measurements ETC	1-Aug-06	29-Aug-06	C	AN_MSE	\$\$		2,000		2,000	2,000	15%	300
1	04	03	03	04	01	Magnet Assembly 1st Article - Vendor A												
1	04	03	03	04	02	Magnet Assembly 1st Article - Vendor B												
1	04	03	03	04	03	Support/Mover System - Articles 1 & 2						846	258,000	81,828	264,552	346,380		51,957
1	04	03	03	04	03	Prototype Supt/Mover Sys w/Final Rqmts ETC	1-Aug-06	30-Aug-06	C	AN_MSE	\$\$		2,400		2,400	2,400	15%	360
1	04	03	03	04	03	Prototype Supt/Mover Sys w/Final Rqmts ETC	1-Aug-06	30-Aug-06	C	AN_MFA	Hrs	8		506		506	15%	76
1	04	03	03	04	03	Prototype Supt/Mover Sys w/Final Rqmts ETC	1-Aug-06	30-Aug-06	C	AN_ME1	Hrs	9		969		969	15%	145
1	04	03	03	04	03	Prototype Supt/Mover Sys w/Final Rqmts ETC	1-Aug-06	30-Aug-06	C	AN_MDD	Hrs	2		126		126	15%	19
1	04	03	03	04	03	FDR - Supt/Mover System	22-Nov-06	27-Nov-06	C	AN_PHS	Hrs	16		1,768		1,768	15%	265
1	04	03	03	04	03	FDR - Supt/Mover System	22-Nov-06	27-Nov-06	C	AN_ME1	Hrs	24		2,652		2,652	15%	398
1	04	03	03	04	03	FDR - Supt/Mover System	22-Nov-06	27-Nov-06	C	AN_CE1	Hrs	16		1,768		1,768	15%	265
1	04	03	03	04	03	Prep Bid Package - Support/Mover System	2-Oct-06	13-Oct-06	C	AN_ME1	Hrs	16		1,768		1,768	15%	265
1	04	03	03	04	03	Evaluate Bids - Support/Mover System	5-Jan-07	11-Jan-07	C	AN_PHS	Hrs	24		2,652		2,652	15%	398
1	04	03	03	04	03	Evaluate Bids - Support/Mover System	5-Jan-07	11-Jan-07	C	AN_ME1	Hrs	24		2,652		2,652	15%	398
1	04	03	03	04	03	Evaluate Bids - Support/Mover System	5-Jan-07	11-Jan-07	C	AN_CE1	Hrs	24		2,652		2,652	15%	398
1	04	03	03	04	03	Vendor Prep & Documentation-Support/Mover System	15-Jan-07	29-Jan-07	C	AN_ME1	Hrs	16		1,768		1,768	15%	265
1	04	03	03	04	03	Vendor Prep & Documentation-Support/Mover System	15-Jan-07	29-Jan-07	C	AN_CE1	Hrs	16		1,768		1,768	15%	265
1	04	03	03	04	03	Construction 1st Two Articles - Suppt/Mover Sys	30-Jan-07	26-Mar-07	C	AN_ME1	Hrs	80		8,840		8,840	15%	1,326
1	04	03	03	04	03	Construction 1st Two Articles - Suppt/Mover Sys	30-Jan-07	26-Mar-07	C	AN_CE1	Hrs	80		8,840		8,840	15%	1,326
1	04	03	03	04	03	Factory Accept Testing - Support/Mover System	27-Mar-07	2-Apr-07	C	AN_PHS	Hrs	24		2,652		2,652	15%	398
1	04	03	03	04	03	Factory Accept Testing - Support/Mover System	27-Mar-07	2-Apr-07	C	AN_ME1	Hrs	24		2,652		2,652	15%	398
1	04	03	03	04	03	Factory Accept Testing - Support/Mover System	27-Mar-07	2-Apr-07	C	AN_CE1	Hrs	24		2,652		2,652	15%	398
1	04	03	03	04	03	REC: 1st 2 Articles Support/Mover System at ANL	10-Apr-07	10-Apr-07	C	AA_MSS	\$\$		190,000		194,940	194,940	15%	29,241
1	04	03	03	04	03	Prep for FDR - Supt/Mover Sys,Incl Ctrlis Pkg ETC	1-Aug-06	13-Sep-06	C	AN_PHS	Hrs	2		162		162	15%	24
1	04	03	03	04	03	Prep for FDR - Supt/Mover Sys,Incl Ctrlis Pkg ETC	1-Aug-06	13-Sep-06	C	AN_ME1	Hrs	4		377		377	15%	57
1	04	03	03	04	03	Prep for FDR - Supt/Mover Sys,Incl Ctrlis Pkg ETC	1-Aug-06	13-Sep-06	C	AN_CE1	Hrs	4		377		377	15%	57
1	04	03	03	04	03	Produce SOW - Support/Mover System ETC	1-Aug-06	29-Sep-06	C	AN_ME1	Hrs	67		7,238		7,238	15%	1,086

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1	2	3	4	5	6							Hours	\$	Labor	M&S	Total					
1	04	03	03	04	03	Produce SOW - Support/Mover System ETC	1-Aug-06	29-Sep-06	C	AN_MDD	Hrs	94		5,969		5,969	15%	895			
1	04	03	03	04	03	Prepare S/M Engineering Specification ETC	1-Aug-06	29-Aug-06	C	AN_PHS	Hrs	2		215		215	15%	32			
1	04	03	03	04	03	Prepare S/M Engineering Specification ETC	1-Aug-06	29-Aug-06	C	AN_ME1	Hrs	20		2,154		2,154	15%	323			
1	04	03	03	04	03	Controls/vacuum sys integ w/supp mover sys ETC	1-Aug-06	30-Aug-06	C	AN_MVE	Hrs	2		242		242	15%	36			
1	04	03	03	04	03	Controls/vacuum sys integ w/supp mover sys ETC	1-Aug-06	30-Aug-06	C	AN_ME1	Hrs	2		242		242	15%	36			
1	04	03	03	04	03	Controls/vacuum sys integ w/supp mover sys ETC	1-Aug-06	30-Aug-06	C	AN_CE1	Hrs	2		242		242	15%	36			
1	04	03	03	04	03	Evaluate 1st 2 Articles Support/Mover	11-Apr-07	9-May-07	C	AN_MFA	Hrs	80		5,190		5,190	15%	779			
1	04	03	03	04	03	Evaluate 1st 2 Articles Support/Mover	11-Apr-07	9-May-07	C	AN_ME1	Hrs	60		6,630		6,630	15%	995			
1	04	03	03	04	03	Evaluate 1st 2 Articles Support/Mover	11-Apr-07	9-May-07	C	AN_CT1	Hrs	60		3,893		3,893	15%	584			
1	04	03	03	04	03	Evaluate 1st 2 Articles Support/Mover	11-Apr-07	9-May-07	C	AN_CE1	Hrs	20		2,210		2,210	15%	332			
1	04	03	03	04	03	Evaluate 1st 2 Articles Support/Mover	11-Apr-07	9-May-07	C	AA_MSS	\$\$		60,000		61,560		61,560	15%	9,234		
1	04	03	03	04	03	Ship 1st 2 Articles to SLAC	10-May-07	23-May-07	C	AN_MSE	\$\$			2,000		2,052		2,052	15%	308	
1	04	03	03	04	03	Components for Support/Mover Prototype ETC	1-Aug-06	30-Aug-06	C	AN_MSE	\$\$			3,600		3,600		3,600	15%	540	
1	04	03	03	05		Magnetic Measurement (ANL)						449	32,500	39,731	32,763	72,494		3,625			
1	04	03	03	05	01	Magnetic Measurement (ANL) - Vendor A Und #1						449	32,500	39,731	32,763	72,494		3,625			
1	04	03	03	05	01	Ship Hi-Tech Und Article 01 (1st Art) to SLAC	10-Jun-08	16-Jun-08	C	AN_MSC	\$\$			5,000		5,263		5,263	5%	263	
1	04	03	03	05	01	Disassemble/pack Undulator Hi-Tech Article 01	3-Jun-08	9-Jun-08	C	AN_MFA	Hrs	80		5,325		5,325		5,325	5%	266	
1	04	03	03	05	01	Remeasure Hi-Tech Und Article 01	1-Aug-06	14-Aug-06	C	AN_PHS	Hrs	120		12,924		12,924		12,924	5%	646	
1	04	03	03	05	01	Remeasure Hi-Tech Und Article 01	1-Aug-06	14-Aug-06	C	AN_MSE	\$\$		20,000		20,000		20,000	5%	1,000		
1	04	03	03	05	01	Remeasure Hi-Tech Und Article 01	1-Aug-06	14-Aug-06	C	AN_MFA	Hrs	120		7,588		7,588		7,588	5%	379	
1	04	03	03	05	01	Commissioning Support - MMF	1-Aug-06	29-Sep-06	C	AN_PHS	Hrs	129		13,893		13,893		13,893	5%	695	
1	04	03	03	05	01	Commissioning Support - MMF	1-Aug-06	29-Sep-06	C	AN_MSE	\$\$			7,500		7,500		7,500	5%	375	
1	04	03	03	05	02	Magnetic Measurement (ANL) - Vendor B Und #2															
1	04	03	03	06		Integrated Single-Undulator Module Test						1,526	95,090	153,931	97,917	251,848		25,185			
1	04	03	03	06		Long-Term Stability Single Und Test-FY 06	22-Nov-06	1-Dec-06	C	AN_MSE	\$\$			50,000		51,300		51,300	10%	5,130	
1	04	03	03	06		Long-Term Stability Single Und Test-FY 06	22-Nov-06	1-Dec-06	C	AN_MFA	Hrs	184		11,937		11,937		11,937	10%	1,194	
1	04	03	03	06		Long-Term Stability Single Und Test-FY 06	22-Nov-06	1-Dec-06	C	AN_ME1	Hrs	368		40,665		40,665		40,665	10%	4,066	
1	04	03	03	06		Long-Term Stability Single Und Test-FY07-08	4-Dec-06	30-May-08	C	AN_MSE	\$\$		30,000		31,137		31,137	10%	3,114		
1	04	03	03	06		Long-Term Stability Single Und Test-FY07-08	4-Dec-06	30-May-08	C	AN_MFA	Hrs	92		6,038		6,038		6,038	10%	604	
1	04	03	03	06		Long-Term Stability Single Und Test-FY07-08	4-Dec-06	30-May-08	C	AN_ME1	Hrs	184		20,568		20,568		20,568	10%	2,057	
1	04	03	03	06		Move SUT to Long-Term Test Area	22-Nov-06	7-Dec-06	C	AN_MFA	Hrs	40		2,595		2,595		2,595	10%	260	
1	04	03	03	06		Move SUT to Long-Term Test Area	22-Nov-06	7-Dec-06	C	AN_ME1	Hrs	80		8,840		8,840		8,840	10%	884	
1	04	03	03	06		Carry out Short-Term Single Undulator Test	4-Oct-06	7-Nov-06	C	AN_PHS	Hrs	100		11,050		11,050		11,050	10%	1,105	
1	04	03	03	06		Carry out Short-Term Single Undulator Test	4-Oct-06	7-Nov-06	C	AN_ME1	Hrs	240		26,520		26,520		26,520	10%	2,652	
1	04	03	03	06		Carry out Short-Term Single Undulator Test	4-Oct-06	7-Nov-06	C	AN_CP1	Hrs	80		8,840		8,840		8,840	10%	884	
1	04	03	03	06		Carry out Short-Term Single Undulator Test	4-Oct-06	7-Nov-06	C	AN_CE1	Hrs	80		8,840		8,840		8,840	10%	884	
1	04	03	03	06		Write Report: Short Term Test Results	8-Nov-06	21-Nov-06	C	AN_PHS	Hrs	20		2,210		2,210		2,210	10%	221	
1	04	03	03	06		Write Report: Short Term Test Results	8-Nov-06	21-Nov-06	C	AN_ME1	Hrs	40		4,420		4,420		4,420	10%	442	
1	04	03	03	06		MM1 SUT Cleanup	8-Nov-06	21-Nov-06	C	AN_MSP	\$\$			15,000		15,390		15,390	10%	1,539	
1	04	03	03	06		Develop Plan & Base Design for Single Und Test	1-Aug-06	30-Aug-06	C	AN_PHS	Hrs	-		-		-		-	10%	-	
1	04	03	03	06		Develop Plan & Base Design for Single Und Test	1-Aug-06	30-Aug-06	C	AN_ME1	Hrs	-		-		-		-	10%	-	
1	04	03	03	06		Assemble Module Components on Stand/Connect ETC	31-Aug-06	3-Oct-06	C	AN_MSE	\$\$		90		90		90		90	10%	9
1	04	03	03	06		Assemble Module Components on Stand/Connect ETC	31-Aug-06	3-Oct-06	C	AN_MFA	Hrs	12		760		760		760	10%	76	
1	04	03	03	06		Assemble Module Components on Stand/Connect ETC	31-Aug-06	3-Oct-06	C	AN_ME1	Hrs	6		647		647		647	10%	65	
1	04	03	03	07		System Test - Two Undulators															
1	04	03	04			Production Undulator Magnet Assembly & Supports						1,330	5,491,018	147,176	5,642,164	5,789,340		928,809			
1	04	03	04	01		Production Undulator Assembly - Vendor A						410	1,081,818	45,278	1,109,221	1,154,499		57,725			
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 07	1-Aug-06	21-Aug-06	C	AN_MSS	\$\$			-		-		-	5%	-	
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 07	1-Aug-06	21-Aug-06	C	AN_ME1	Hrs	-		-		-		-	5%	-	
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 09	1-Aug-06	31-Aug-06	C	AN_MSS	\$\$		30		30		30		30	5%	2
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 09	1-Aug-06	31-Aug-06	C	AN_ME1	Hrs	10		1,077		1,077		1,077	5%	54	
1	04	03	04	01		Misc. Assembly and Tuning Items	1-Aug-06	27-Oct-06	C	AN_MSE	\$\$			38,250		38,547		38,547	5%	1,927	

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	03	04	01		RCV: From Hi-Tech - Magnet Assy Article 09	30-Oct-06	30-Oct-06	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 11	31-Oct-06	13-Nov-06	C	AN_MSS	\$\$		-		-	-	5%	-
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 11	31-Oct-06	13-Nov-06	C	AN_ME1	Hrs	-	-	-	-	-	5%	-
1	04	03	04	01		RCV: From Hi-Tech - Magnet Assy Article 11	14-Nov-06	14-Nov-06	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 13	15-Nov-06	30-Nov-06	C	AN_MSS	\$\$		-		-	-	5%	-
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 13	15-Nov-06	30-Nov-06	C	AN_ME1	Hrs	-	-	-	-	-	5%	-
1	04	03	04	01		RCV: From Hi-Tech - Magnet Assy Article 13	1-Dec-06	1-Dec-06	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 15	4-Dec-06	15-Dec-06	C	AN_MSS	\$\$		160		164	164	5%	8
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 15	4-Dec-06	15-Dec-06	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	01		RCV: From Hi-Tech - Magnet Assy Article 15	18-Dec-06	18-Dec-06	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 17	19-Dec-06	10-Jan-07	C	AN_MSS	\$\$		120		123	123	5%	6
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 17	19-Dec-06	10-Jan-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	01		RCV: From Hi-Tech - Magnet Assy Article 17	11-Jan-07	11-Jan-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 19	12-Jan-07	25-Jan-07	C	AN_MSS	\$\$		160		164	164	5%	8
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 19	12-Jan-07	25-Jan-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	01		RCV: From Hi-Tech - Magnet Assy Article 19	2-Feb-07	2-Feb-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 21	20-Feb-07	5-Mar-07	C	AN_MSS	\$\$		120		123	123	5%	6
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 21	20-Feb-07	5-Mar-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	01		RCV: From Hi-Tech - Magnet Assy Article 21	6-Mar-07	6-Mar-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 23	7-Mar-07	20-Mar-07	C	AN_MSS	\$\$		160		164	164	5%	8
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 23	7-Mar-07	20-Mar-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	01		RCV: From Hi-Tech - Magnet Assy Article 23	21-Mar-07	21-Mar-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 25	22-Mar-07	4-Apr-07	C	AN_MSS	\$\$		120		123	123	5%	6
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 25	22-Mar-07	4-Apr-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	01		RCV: From Hi-Tech - Magnet Assy Article 25	5-Apr-07	5-Apr-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 27	6-Apr-07	19-Apr-07	C	AN_MSS	\$\$		160		164	164	5%	8
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 27	6-Apr-07	19-Apr-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	01		RCV: From Hi-Tech - Magnet Assy Article 27	20-Apr-07	20-Apr-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 29	23-Apr-07	4-May-07	C	AN_MSS	\$\$		120		123	123	5%	6
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 29	23-Apr-07	4-May-07	C	AN_MSE	\$\$		1,160		1,190	1,190	5%	60
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 29	23-Apr-07	4-May-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	01		RCV: From Hi-Tech - Magnet Assy Article 29	7-May-07	7-May-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 31	8-May-07	21-May-07	C	AN_MSS	\$\$		160		164	164	5%	8
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 31	8-May-07	21-May-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	01		RCV: From Hi-Tech - Magnet Assy Article 31	22-May-07	22-May-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 33	23-May-07	6-Jun-07	C	AN_MSS	\$\$		120		123	123	5%	6
1	04	03	04	01		Hi-Tech Fab/Assy - Magnet Assy Article 33	23-May-07	6-Jun-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	01		RCV: From Hi-Tech - Magnet Assy Article 33	7-Jun-07	7-Jun-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	01		Acceptance Measmt and Verif of Und Assy ETC	1-Aug-06	30-Aug-06	C	AN_MSE	\$\$		978		978	978	5%	49
1	04	03	04	02		Production Undulator Assembly - Vendor B						560	1,249,200	61,881	1,278,779	1,340,660		67,033
1	04	03	04	02		Misc. Tuning and Assembly Items	1-Aug-06	27-Oct-06	C	AN_MSE	\$\$		45,000		45,350	45,350	5%	2,267
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 04	1-Aug-06	12-Sep-06	C	AN_MSS	\$\$		-		-	-	5%	-
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 04	1-Aug-06	12-Sep-06	C	AN_MSE	\$\$		-		-	-	5%	-
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 04	1-Aug-06	12-Sep-06	C	AN_ME1	Hrs	-	-	-	-	-	5%	-
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 04	13-Sep-06	13-Sep-06	C	AN_MSS	\$\$		80,000		80,000	80,000	5%	4,000
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 06	14-Sep-06	12-Oct-06	C	AN_MSS	\$\$		-		-	-	5%	-
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 06	14-Sep-06	12-Oct-06	C	AN_ME1	Hrs	-	-	-	-	-	5%	-
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 06	13-Oct-06	13-Oct-06	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 08	16-Oct-06	3-Nov-06	C	AN_MSS	\$\$		160		164	164	5%	8
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 08	16-Oct-06	3-Nov-06	C	AN_ME1	Hrs	80		8,840		8,840	5%	442
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 08	6-Nov-06	6-Nov-06	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 10	7-Nov-06	20-Nov-06	C	AN_MSS	\$\$		160		164	164	5%	8

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 10	7-Nov-06	20-Nov-06	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 10	21-Nov-06	21-Nov-06	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 12	22-Nov-06	7-Dec-06	C	AN_MSS	\$\$		160		164	164	5%	8
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 12	22-Nov-06	7-Dec-06	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 12	8-Dec-06	8-Dec-06	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 14	11-Dec-06	2-Jan-07	C	AN_MSS	\$\$		120		123	123	5%	6
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 14	11-Dec-06	2-Jan-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 14	3-Jan-07	3-Jan-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 16	4-Jan-07	17-Jan-07	C	AN_MSS	\$\$		160		164	164	5%	8
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 16	4-Jan-07	17-Jan-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 16	18-Jan-07	18-Jan-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 18	19-Jan-07	1-Feb-07	C	AN_MSS	\$\$		120		123	123	5%	6
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 18	19-Jan-07	1-Feb-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 18	2-Feb-07	2-Feb-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 20	5-Feb-07	16-Feb-07	C	AN_MSS	\$\$		160		164	164	5%	8
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 20	5-Feb-07	16-Feb-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 20	19-Feb-07	19-Feb-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 22	20-Feb-07	5-Mar-07	C	AN_MSS	\$\$		120		123	123	5%	6
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 22	20-Feb-07	5-Mar-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 22	6-Mar-07	6-Mar-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 24	7-Mar-07	20-Mar-07	C	AN_MSS	\$\$		160		164	164	5%	8
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 24	7-Mar-07	20-Mar-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 24	21-Mar-07	21-Mar-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 26	22-Mar-07	4-Apr-07	C	AN_MSS	\$\$		120		123	123	5%	6
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 26	22-Mar-07	4-Apr-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 26	5-Apr-07	5-Apr-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 28	6-Apr-07	19-Apr-07	C	AN_MSS	\$\$		160		164	164	5%	8
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 28	6-Apr-07	19-Apr-07	C	AN_MSE	\$\$		1,160		1,190	1,190	5%	60
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 28	6-Apr-07	19-Apr-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 28	20-Apr-07	20-Apr-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 30	23-Apr-07	4-May-07	C	AN_MSS	\$\$		120		123	123	5%	6
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 30	23-Apr-07	4-May-07	C	AN_MSE	\$\$		1,160		1,190	1,190	5%	60
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 30	23-Apr-07	4-May-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 30	7-May-07	7-May-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 32	8-May-07	21-May-07	C	AN_MSS	\$\$		160		164	164	5%	8
1	04	03	04	02		Metalex Fab/Assy - Magnet Assy Article 32	8-May-07	21-May-07	C	AN_ME1	Hrs	40		4,420		4,420	5%	221
1	04	03	04	02		RCV: From Metalex - Magnet Assy Article 32	22-May-07	22-May-07	C	AN_MSS	\$\$		80,000		82,080	82,080	5%	4,104
1	04	03	04	03		Production Support/Mover Fabrication/Assembly						360	2,970,000	40,017	3,059,224	3,099,242		774,810
1	04	03	04	03		Vendor Fab Support/Mover Production Units	19-Apr-07	19-Nov-07	C	AN_PHS	Hrs	30		3,335		3,335	25%	834
1	04	03	04	03		Vendor Fab Support/Mover Production Units	19-Apr-07	19-Nov-07	C	AN_ME1	Hrs	270		30,013		30,013	25%	7,503
1	04	03	04	03		Vendor Fab Support/Mover Production Units	19-Apr-07	19-Nov-07	C	AN_CE1	Hrs	60		6,670		6,670	25%	1,667
1	04	03	04	03		RCV: Support/Mover Lot 1 (9 units)	22-Jun-07	22-Jun-07	C	AA_MSS	\$\$		810,000		831,060	831,060	25%	207,765
1	04	03	04	03		RCV: Support/Mover Lot 2 (10 units)	23-Jul-07	23-Jul-07	C	AA_MSS	\$\$		900,000		923,400	923,400	25%	230,850
1	04	03	04	03		RCV: Support/Mover Lot 3 (4 units)	20-Aug-07	20-Aug-07	C	AA_MSS	\$\$		360,000		369,360	369,360	25%	92,340
1	04	03	04	03		RCV: Support/Mover Lot 4 (3 units)	18-Sep-07	18-Sep-07	C	AA_MSS	\$\$		270,000		277,020	277,020	25%	69,255
1	04	03	04	03		RCV: Support/Mover Lot 6 (3 units)	9-Oct-07	9-Oct-07	C	AA_MSS	\$\$		270,000		284,223	284,223	25%	71,056
1	04	03	04	03		RCV: Support/Mover Lot 7 (2 units)	30-Oct-07	30-Oct-07	C	AA_MSS	\$\$		180,000		189,482	189,482	25%	47,370
1	04	03	04	03		RCV: Support/Mover Lot 5 (2 units)	19-Sep-07	19-Sep-07	C	AA_MSS	\$\$		180,000		184,680	184,680	25%	46,170
1	04	03	04	04		Mu Metal Shield						-	190,000	-	194,940	194,940		29,241
1	04	03	04	04		Prepare RFP	1-Aug-06	21-Aug-06	C	AN_PHS	Hrs	-		-		-	15%	-
1	04	03	04	04		Prepare RFP	1-Aug-06	21-Aug-06	C	AN_MVE	Hrs	-		-		-	15%	-
1	04	03	04	04		ANL Bid Review	22-Aug-06	28-Aug-06	C	AN_PHS	Hrs	-		-		-	15%	-

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	03	04	04		ANL Bid Review	22-Aug-06	28-Aug-06	C	AN_MVE	Hrs	-		-		-	15%	-
1	04	03	04	04		REC: 1st mu metal shield shipped	10-Nov-06	10-Nov-06	C	AA_MSE	\$\$		5,000		5,130	5,130	15%	770
1	04	03	04	04		REC: 10 mu metal shields shipped	5-Jan-07	5-Jan-07	C	AA_MSE	\$\$		50,000		51,300	51,300	15%	7,695
1	04	03	04	04		REC: 27 mu metal shields shipped	19-Feb-07	19-Feb-07	C	AA_MSE	\$\$		135,000		138,510	138,510	15%	20,777
1	04	03	05			Quadrupole Focusing Magnets						730	776,000	78,200	798,050	876,250		144,840
1	04	03	05	01		Quadrupole Magnets						514	538,000	54,332	553,862	608,194		91,229
1	04	03	05	01		Evaluate Proposal - Quadrupole Magnets	1-Sep-06	15-Sep-06	C	AN_PHS	Hrs	-		-		-	15%	-
1	04	03	05	01		Evaluate Proposal - Quadrupole Magnets	1-Sep-06	15-Sep-06	C	AN_ME1	Hrs	-		-		-	15%	-
1	04	03	05	01		Vendor Fab/Assy - Quad Magnet 1st Article	19-Sep-06	23-Feb-07	C	AA_MSS	\$\$		15,000		15,360	15,360	15%	2,304
1	04	03	05	01		Measure Magnet - Quad Magnet 1st Article	6-Mar-07	12-Mar-07	C	AN_PHS	Hrs	5		553		553	15%	83
1	04	03	05	01		Measure Magnet - Quad Magnet 1st Article	6-Mar-07	12-Mar-07	C	AN_MFA	Hrs	5		324		324	15%	49
1	04	03	05	01		Vendor Fab/Assy - Quad Mag 1st lot (18)	14-Mar-07	19-Jul-07	C	AN_ME1	Hrs	240		26,520		26,520	15%	3,978
1	04	03	05	01		Vendor Fab/Assy - Quad Mag 1st lot (18)	14-Mar-07	19-Jul-07	C	AA_MSS	\$\$		270,000		277,020	277,020	15%	41,553
1	04	03	05	01		Review Travelers - Quadrupole Magnet 1st lot	20-Jul-07	26-Jul-07	C	AN_PHS	Hrs	40		4,420		4,420	15%	663
1	04	03	05	01		Vendor Fab/Assy - Quad Mag 2nd lot (15)	20-Jul-07	27-Nov-07	C	AA_MSS	\$\$		225,000		233,482	233,482	15%	35,022
1	04	03	05	01		Review Travelers - Quadrupole Magnet 1st article	20-Feb-07	26-Feb-07	C	AN_PHS	Hrs	30		3,315		3,315	15%	497
1	04	03	05	01		Review Travelers - Quadrupole Magnet 1st article	20-Feb-07	26-Feb-07	C	AN_ME1	Hrs	30		3,315		3,315	15%	497
1	04	03	05	01		Prototype Quadrupole Section ETC	1-Aug-06	29-Aug-06	C	AN_PHS	Hrs	60		6,462		6,462	15%	969
1	04	03	05	01		Prototype Quadrupole Section ETC	1-Aug-06	29-Aug-06	C	AN_MSE	\$\$		28,000		28,000	28,000	15%	4,200
1	04	03	05	01		Prototype Quadrupole Section ETC	1-Aug-06	29-Aug-06	C	AN_MFA	Hrs	40		2,529		2,529	15%	379
1	04	03	05	01		Verify Quad Section Performance ETC	1-Aug-06	30-Aug-06	C	AN_PHS	Hrs	32		3,446		3,446	15%	517
1	04	03	05	01		Verify Quad Section Performance ETC	1-Aug-06	30-Aug-06	C	AN_EE1	Hrs	32		3,446		3,446	15%	517
1	04	03	05	02		Quadrupole Power Supplies												
1	04	03	05	03		Quadrupole Stages & Stands						216	238,000	23,868	244,188	268,056		53,611
1	04	03	05	03		Prepare Bid Package - Stages, Stands, etc.	5-Jan-07	18-Jan-07	C	AN_ME1	Hrs	60		6,630		6,630	20%	1,326
1	04	03	05	03		Evaluate Proposal - Stages, Stands, etc.	19-Feb-07	23-Feb-07	C	AN_ME1	Hrs	32		3,536		3,536	20%	707
1	04	03	05	03		Vendor Fab/Assy - Stages, Stands, etc.	27-Feb-07	23-Aug-07	C	AA_MSS	\$\$		238,000		244,188	244,188	20%	48,838
1	04	03	05	03		Write SOW for Stages, Stands, etc.	28-Nov-06	4-Jan-07	C	AN_ME1	Hrs	84		9,282		9,282	20%	1,856
1	04	03	05	03		Write SOW for Stages, Stands, etc.	28-Nov-06	4-Jan-07	C	AN_EE1	Hrs	40		4,420		4,420	20%	884
1	04	03	05	04		Quadrupole Cables												
1	04	03	06			Undulator Magnetic Measurement Facility (SLAC)						26,766	1,561,965	2,302,913	1,677,234	3,980,147		1,155,358
1	04	03	06	01		Undulator MMF Setup						2,845	108,890	239,711	117,050	356,760		82,326
1	04	03	06	01	01	Undulator Test Stand Prototype												
1	04	03	06	01	04	Undulator Test Stand												
1	04	03	06	01	04	Develop System Software ETC	1-Aug-06	30-Aug-06	C	SL_PHS	Hrs	-		-		-	35%	-
1	04	03	06	01	04	Develop System Software ETC	1-Aug-06	30-Aug-06	C	SL_EE1	Hrs	-		-		-	35%	-
1	04	03	06	01	04	Install and Test Undulator Test Stand ETC	1-Aug-06	30-Aug-06	C	SL_PHS	Hrs	-		-		-	20%	-
1	04	03	06	01	04	Install and Test Undulator Test Stand ETC	1-Aug-06	30-Aug-06	C	SL_MFA	Hrs	-		-		-	20%	-
1	04	03	06	01	04	Install and Test Undulator Test Stand ETC	1-Aug-06	30-Aug-06	C	SL_MES	Hrs	-		-		-	20%	-
1	04	03	06	01	05	Undulator Fiducialization												
1	04	03	06	01	06	Quad Strength and Field Quality						238	4,750	18,640	5,073	23,713		7,016
1	04	03	06	01	06	Commission Quad Strength and Field System	1-Sep-06	10-Jan-07	C	SL_PHS	Hrs	108		7,853		7,853	35%	2,749
1	04	03	06	01	06	Commission Quad Strength and Field System	1-Sep-06	10-Jan-07	C	SL_MFA	Hrs	72		6,169		6,169	35%	2,159
1	04	03	06	01	06	Procure Hardware for Electro Magnets ETC	1-Aug-06	30-Aug-06	C	SL_PHS	Hrs	4		257		257	15%	38
1	04	03	06	01	06	Fabricate Hardware ETC	1-Aug-06	30-Aug-06	C	SL_MFA	Hrs	18		1,512		1,512	30%	454
1	04	03	06	01	06	Install & Test Quad Strength & Field Quality ETC	1-Aug-06	9-Jan-07	C	SL_PHS	Hrs	11		797		797	30%	239
1	04	03	06	01	06	Install & Test Quad Strength & Field Quality ETC	1-Aug-06	9-Jan-07	C	SL_MFA	Hrs	11		939		939	30%	282
1	04	03	06	01	06	Install & Test Quad Strength & Field Quality ETC	1-Aug-06	9-Jan-07	C	SL_MES	Hrs	14		1,113		1,113	30%	334
1	04	03	06	01	06	RCV: Hardware for Electro Magnets	31-Aug-06	31-Aug-06	C	SL_MSE	\$\$		1,250		1,310	1,310	15%	197
1	04	03	06	01	06	RCV: Stage 4 Electromagnet	15-Nov-06	15-Nov-06	C	SL_MSE	\$\$		3,500		3,763	3,763	15%	565
1	04	03	06	01	07	Quad Fiducialization System						207	-	16,024	-	16,024		5,608
1	04	03	06	01	07	Commission Quad Fiducialization System	1-Sep-06	10-Jan-07	C	SL_PHS	Hrs	120		8,726		8,726	35%	3,054

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	03	06	01	07	Commission Quad Fiducialization System	1-Sep-06	10-Jan-07	C	SL_MFA	Hrs	60		5,141		5,141	35%	1,799
1	04	03	06	01	07	Install and Test Quad Fiducialization System ETC	1-Aug-06	9-Jan-07	C	SL_PHS	Hrs	6		435		435	35%	152
1	04	03	06	01	07	Install and Test Quad Fiducialization System ETC	1-Aug-06	9-Jan-07	C	SL_MFA	Hrs	9		768		768	35%	269
1	04	03	06	01	07	Install and Test Quad Fiducialization System ETC	1-Aug-06	9-Jan-07	C	SL_MES	Hrs	12		954		954	35%	334
1	04	03	06	01	08	Hall Probe Calibration System						-	-	-	-	-		-
1	04	03	06	01	08	Commission Hall Probe Calibration System	1-Aug-06	29-Sep-06	C	SL_MES	Hrs	-		-		-	15%	-
1	04	03	06	01	08	Install and Test Hall Probe Calibration Sys ETC	1-Aug-06	28-Aug-06	C	SL_PHS	Hrs	-		-		-	15%	-
1	04	03	06	01	08	Install and Test Hall Probe Calibration Sys ETC	1-Aug-06	28-Aug-06	C	SL_MFA	Hrs	-		-		-	15%	-
1	04	03	06	01	08	Install and Test Hall Probe Calibration Sys ETC	1-Aug-06	28-Aug-06	C	SL_MES	Hrs	-		-		-	15%	-
1	04	03	06	01	09	Undulator Handling						2,400	104,140	205,047	111,976	317,023		69,702
1	04	03	06	01	09	Install and Test Undulator Handling	22-Jan-07	30-Apr-07	C	SL_PHS	Hrs	80		5,851		5,851	10%	585
1	04	03	06	01	09	Install and Test Undulator Handling	22-Jan-07	30-Apr-07	C	SL_MFA	Hrs	1,880		162,026		162,026	10%	16,203
1	04	03	06	01	09	Install and Test Undulator Handling	22-Jan-07	30-Apr-07	C	SL_MES	Hrs	280		22,482		22,482	10%	2,248
1	04	03	06	01	09	Design Undulator Handling ETC	1-Aug-06	28-Sep-06	C	SL_PHS	Hrs	-		-		-	40%	-
1	04	03	06	01	09	Design Undulator Handling ETC	1-Aug-06	28-Sep-06	C	SL_MFA	Hrs	-		-		-	40%	-
1	04	03	06	01	09	Design Undulator Handling ETC	1-Aug-06	28-Sep-06	C	SL_ME1	Hrs	-		-		-	40%	-
1	04	03	06	01	09	Design Undulator Handling ETC	1-Aug-06	28-Sep-06	C	SL_MDD	Hrs	-		-		-	40%	-
1	04	03	06	01	09	Adapt Design for Cradle Concept ETC	2-Oct-06	30-Nov-06	C	SL_ME1	Hrs	80		7,990		7,990	40%	3,196
1	04	03	06	01	09	Adapt Design for Cradle Concept ETC	2-Oct-06	30-Nov-06	C	SL_MDD	Hrs	80		6,699		6,699	40%	2,679
1	04	03	06	01	09	RCV: Girder Assy & Install Equip	19-Jan-07	19-Jan-07	C	SL_MSE	\$\$		76,140			81,869	40%	32,748
1	04	03	06	01	09	RCV: Undulator Magnet Handling	29-Nov-06	29-Nov-06	C	SL_MSE	\$\$		14,000			15,053	40%	6,021
1	04	03	06	01	09	RCV: Forklift	25-Oct-06	25-Oct-06	C	SL_MSE	\$\$		14,000			15,053	40%	6,021
1	04	03	06	02		Fiducialization and Magnetic Measurements (F/MM)						16,821	147,600	1,444,019	157,935	1,601,954		625,955
1	04	03	06	02		Beam Loss Monitor Arrive at SLAC	10-Jul-07	23-Jul-07	C	SL_MFA	Hrs	16		1,379		1,379	45%	621
1	04	03	06	02		Beam Loss Monitor Arrive at SLAC	10-Jul-07	23-Jul-07	C	AN_SEE	Hrs	8		884		884	45%	398
1	04	03	06	02		Beam Loss Monitor Arrive at SLAC	10-Jul-07	23-Jul-07	C	AN_ME1	Hrs	8		884		884	45%	398
1	04	03	06	02		Beam Loss Monitor Arrive at SLAC	10-Jul-07	23-Jul-07	C	AN_EE1	Hrs	4		442		442	45%	199
1	04	03	06	02		Supplemental Shielding Arrive at SLAC	20-Jun-07	5-Jul-07	C	SL_MFA	Hrs	16		1,379		1,379	25%	345
1	04	03	06	02		Supplemental Shielding Arrive at SLAC	20-Jun-07	5-Jul-07	C	AN_SEE	Hrs	8		884		884	25%	221
1	04	03	06	02		Supplemental Shielding Arrive at SLAC	20-Jun-07	5-Jul-07	C	AN_ME1	Hrs	8		884		884	25%	221
1	04	03	06	02		Install Supplemental Shielding	6-Jul-07	3-Aug-07	C	SL_MFA	Hrs	64		5,516		5,516	45%	2,482
1	04	03	06	02		Install Supplemental Shielding	6-Jul-07	3-Aug-07	C	AN_SEE	Hrs	24		2,652		2,652	45%	1,193
1	04	03	06	02		Inspect Supplemental Shielding Placement and S	6-Aug-07	13-Aug-07	C	SL_SEE	Hrs	16		1,699		1,699	25%	425
1	04	03	06	02		Inspect Supplemental Shielding Placement and S	6-Aug-07	13-Aug-07	C	AN_SEE	Hrs	16		1,768		1,768	25%	442
1	04	03	06	02	01	F/MM Undulator Magnet Sections						14,763	-	1,267,731	-	1,267,731		533,713
1	04	03	06	02	01	Undulator Material Handling and Storage	1-Aug-06	2-May-08	C	SL_MFA	Hrs	243		21,074		21,074	45%	9,483
1	04	03	06	02	01	Tune Undulator - 01	2-Oct-06	3-Nov-06	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 01	6-Nov-06	12-Dec-06	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 01	6-Nov-06	12-Dec-06	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 01	6-Nov-06	12-Dec-06	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 01	31-Aug-07	7-Sep-07	C	SL_SEE	Hrs	8		850		850	45%	382
1	04	03	06	02	01	Pre-assemble Girder - 01	31-Aug-07	7-Sep-07	C	SL_MFA	Hrs	80		6,895		6,895	45%	3,103
1	04	03	06	02	01	Pre-assemble Girder - 01	31-Aug-07	7-Sep-07	C	SL_MES	Hrs	36		2,891		2,891	45%	1,301
1	04	03	06	02	01	Assemble Girder - 01	10-Sep-07	14-Sep-07	C	SL_MFA	Hrs	22		1,896		1,896	45%	853
1	04	03	06	02	01	Assemble Girder - 01	10-Sep-07	14-Sep-07	C	SL_MES	Hrs	34		2,730		2,730	45%	1,228
1	04	03	06	02	01	Tune Undulator - 02	6-Nov-06	12-Dec-06	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 02	13-Dec-06	10-Jan-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 02	13-Dec-06	10-Jan-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 02	13-Dec-06	10-Jan-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 02	31-Aug-07	7-Sep-07	C	SL_SEE	Hrs	8		850		850	45%	382
1	04	03	06	02	01	Pre-assemble Girder - 02	31-Aug-07	7-Sep-07	C	SL_MFA	Hrs	80		6,895		6,895	45%	3,103
1	04	03	06	02	01	Pre-assemble Girder - 02	31-Aug-07	7-Sep-07	C	SL_MES	Hrs	36		2,891		2,891	45%	1,301

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	03	06	02	01	Assemble Girder - 02	10-Sep-07	14-Sep-07	C	SL_MFA	Hrs	22		1,896		1,896	45%	853
1	04	03	06	02	01	Assemble Girder - 02	10-Sep-07	14-Sep-07	C	SL_MES	Hrs	34		2,730		2,730	45%	1,228
1	04	03	06	02	01	Tune Undulator - 03	15-Dec-06	12-Jan-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 03	16-Jan-07	18-Jan-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 03	16-Jan-07	18-Jan-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 03	16-Jan-07	18-Jan-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 03	31-Aug-07	7-Sep-07	C	SL_SEE	Hrs	8		850		850	45%	382
1	04	03	06	02	01	Pre-assemble Girder - 03	31-Aug-07	7-Sep-07	C	SL_MFA	Hrs	80		6,895		6,895	45%	3,103
1	04	03	06	02	01	Pre-assemble Girder - 03	31-Aug-07	7-Sep-07	C	SL_MES	Hrs	36		2,891		2,891	45%	1,301
1	04	03	06	02	01	Assemble Girder - 03	10-Sep-07	14-Sep-07	C	SL_MFA	Hrs	22		1,896		1,896	45%	853
1	04	03	06	02	01	Assemble Girder - 03	10-Sep-07	14-Sep-07	C	SL_MES	Hrs	34		2,730		2,730	45%	1,228
1	04	03	06	02	01	Tune Undulator - 04	8-Jan-07	22-Jan-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 04	23-Jan-07	25-Jan-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 04	23-Jan-07	25-Jan-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 04	23-Jan-07	25-Jan-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 04	31-Aug-07	7-Sep-07	C	SL_SEE	Hrs	8		850		850	45%	382
1	04	03	06	02	01	Pre-assemble Girder - 04	31-Aug-07	7-Sep-07	C	SL_MFA	Hrs	80		6,895		6,895	45%	3,103
1	04	03	06	02	01	Pre-assemble Girder - 04	31-Aug-07	7-Sep-07	C	SL_MES	Hrs	36		2,891		2,891	45%	1,301
1	04	03	06	02	01	Assemble Girder - 04	10-Sep-07	14-Sep-07	C	SL_MFA	Hrs	22		1,896		1,896	45%	853
1	04	03	06	02	01	Assemble Girder - 04	10-Sep-07	14-Sep-07	C	SL_MES	Hrs	34		2,730		2,730	45%	1,228
1	04	03	06	02	01	Tune Undulator - 05	16-Jan-07	29-Jan-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 05	30-Jan-07	1-Feb-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 05	30-Jan-07	1-Feb-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 05	30-Jan-07	1-Feb-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 05	31-Aug-07	7-Sep-07	C	SL_SEE	Hrs	8		850		850	45%	382
1	04	03	06	02	01	Pre-assemble Girder - 05	31-Aug-07	7-Sep-07	C	SL_MFA	Hrs	80		6,895		6,895	45%	3,103
1	04	03	06	02	01	Pre-assemble Girder - 05	31-Aug-07	7-Sep-07	C	SL_MES	Hrs	36		2,891		2,891	45%	1,301
1	04	03	06	02	01	Assemble Girder - 05	10-Sep-07	14-Sep-07	C	SL_MFA	Hrs	22		1,896		1,896	45%	853
1	04	03	06	02	01	Assemble Girder - 05	10-Sep-07	14-Sep-07	C	SL_MES	Hrs	34		2,730		2,730	45%	1,228
1	04	03	06	02	01	Tune Undulator - 06	23-Jan-07	5-Feb-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 06	6-Feb-07	8-Feb-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 06	6-Feb-07	8-Feb-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 06	6-Feb-07	8-Feb-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 06	31-Aug-07	7-Sep-07	C	SL_SEE	Hrs	8		850		850	45%	382
1	04	03	06	02	01	Pre-assemble Girder - 06	31-Aug-07	7-Sep-07	C	SL_MFA	Hrs	80		6,895		6,895	45%	3,103
1	04	03	06	02	01	Pre-assemble Girder - 06	31-Aug-07	7-Sep-07	C	SL_MES	Hrs	36		2,891		2,891	45%	1,301
1	04	03	06	02	01	Assemble Girder - 06	10-Sep-07	14-Sep-07	C	SL_MFA	Hrs	22		1,896		1,896	45%	853
1	04	03	06	02	01	Assemble Girder - 06	10-Sep-07	14-Sep-07	C	SL_MES	Hrs	34		2,730		2,730	45%	1,228
1	04	03	06	02	01	Tune Undulator - 07	30-Jan-07	12-Feb-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 07	13-Feb-07	15-Feb-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 07	13-Feb-07	15-Feb-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 07	13-Feb-07	15-Feb-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 07	4-Sep-07	10-Sep-07	C	SL_SEE	Hrs	8		850		850	45%	382
1	04	03	06	02	01	Pre-assemble Girder - 07	4-Sep-07	10-Sep-07	C	SL_MFA	Hrs	80		6,895		6,895	45%	3,103
1	04	03	06	02	01	Pre-assemble Girder - 07	4-Sep-07	10-Sep-07	C	SL_MES	Hrs	36		2,891		2,891	45%	1,301
1	04	03	06	02	01	Assemble Girder - 07	11-Sep-07	17-Sep-07	C	SL_MFA	Hrs	22		1,896		1,896	45%	853
1	04	03	06	02	01	Assemble Girder - 07	11-Sep-07	17-Sep-07	C	SL_MES	Hrs	34		2,730		2,730	45%	1,228
1	04	03	06	02	01	Tune Undulator - 08	6-Feb-07	20-Feb-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 08	21-Feb-07	23-Feb-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 08	21-Feb-07	23-Feb-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 08	21-Feb-07	23-Feb-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 08	7-Sep-07	13-Sep-07	C	SL_SEE	Hrs	8		850		850	45%	382

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	03	06	02	01	Pre-assemble Girder - 08	7-Sep-07	13-Sep-07	C	SL_MFA	Hrs	80		6,895		6,895	45%	3,103
1	04	03	06	02	01	Pre-assemble Girder - 08	7-Sep-07	13-Sep-07	C	SL_MES	Hrs	36		2,891		2,891	45%	1,301
1	04	03	06	02	01	Assemble Girder - 08	14-Sep-07	20-Sep-07	C	SL_MFA	Hrs	22		1,896		1,896	45%	853
1	04	03	06	02	01	Assemble Girder - 08	14-Sep-07	20-Sep-07	C	SL_MES	Hrs	34		2,730		2,730	45%	1,228
1	04	03	06	02	01	Tune Undulator - 09	13-Feb-07	27-Feb-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 09	28-Feb-07	2-Mar-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 09	28-Feb-07	2-Mar-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 09	28-Feb-07	2-Mar-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 09	12-Sep-07	18-Sep-07	C	SL_SEE	Hrs	8		850		850	45%	382
1	04	03	06	02	01	Pre-assemble Girder - 09	12-Sep-07	18-Sep-07	C	SL_MFA	Hrs	80		6,895		6,895	45%	3,103
1	04	03	06	02	01	Pre-assemble Girder - 09	12-Sep-07	18-Sep-07	C	SL_MES	Hrs	36		2,891		2,891	45%	1,301
1	04	03	06	02	01	Assemble Girder - 09	19-Sep-07	25-Sep-07	C	SL_MFA	Hrs	22		1,896		1,896	45%	853
1	04	03	06	02	01	Assemble Girder - 09	19-Sep-07	25-Sep-07	C	SL_MES	Hrs	34		2,730		2,730	45%	1,228
1	04	03	06	02	01	Tune Undulator - 10	21-Feb-07	6-Mar-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 10	7-Mar-07	9-Mar-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 10	7-Mar-07	9-Mar-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 10	7-Mar-07	9-Mar-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 10	14-Sep-07	20-Sep-07	C	SL_SEE	Hrs	8		850		850	45%	382
1	04	03	06	02	01	Pre-assemble Girder - 10	14-Sep-07	20-Sep-07	C	SL_MFA	Hrs	80		6,895		6,895	45%	3,103
1	04	03	06	02	01	Pre-assemble Girder - 10	14-Sep-07	20-Sep-07	C	SL_MES	Hrs	36		2,891		2,891	45%	1,301
1	04	03	06	02	01	Assemble Girder - 10	21-Sep-07	27-Sep-07	C	SL_MFA	Hrs	22		1,896		1,896	45%	853
1	04	03	06	02	01	Assemble Girder - 10	21-Sep-07	27-Sep-07	C	SL_MES	Hrs	34		2,730		2,730	45%	1,228
1	04	03	06	02	01	Tune Undulator - 11	28-Feb-07	13-Mar-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 11	14-Mar-07	16-Mar-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 11	14-Mar-07	16-Mar-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 11	14-Mar-07	16-Mar-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 11	18-Sep-07	24-Sep-07	C	SL_SEE	Hrs	8		850		850	45%	382
1	04	03	06	02	01	Pre-assemble Girder - 11	18-Sep-07	24-Sep-07	C	SL_MFA	Hrs	80		6,895		6,895	45%	3,103
1	04	03	06	02	01	Pre-assemble Girder - 11	18-Sep-07	24-Sep-07	C	SL_MES	Hrs	36		2,891		2,891	45%	1,301
1	04	03	06	02	01	Assemble Girder - 11	25-Sep-07	1-Oct-07	C	SL_MFA	Hrs	22		1,896		1,896	45%	853
1	04	03	06	02	01	Assemble Girder - 11	25-Sep-07	1-Oct-07	C	SL_MES	Hrs	34		2,730		2,730	45%	1,228
1	04	03	06	02	01	Tune Undulator - 12	7-Mar-07	20-Mar-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 12	21-Mar-07	23-Mar-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 12	21-Mar-07	23-Mar-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 12	21-Mar-07	23-Mar-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 12	20-Sep-07	26-Sep-07	C	SL_SEE	Hrs	8		850		850	45%	382
1	04	03	06	02	01	Pre-assemble Girder - 12	20-Sep-07	26-Sep-07	C	SL_MFA	Hrs	80		6,895		6,895	45%	3,103
1	04	03	06	02	01	Pre-assemble Girder - 12	20-Sep-07	26-Sep-07	C	SL_MES	Hrs	36		2,891		2,891	45%	1,301
1	04	03	06	02	01	Assemble Girder - 12	27-Sep-07	3-Oct-07	C	SL_MFA	Hrs	22		1,912		1,912	45%	861
1	04	03	06	02	01	Assemble Girder - 12	27-Sep-07	3-Oct-07	C	SL_MES	Hrs	34		2,754		2,754	45%	1,239
1	04	03	06	02	01	Tune Undulator - 13	14-Mar-07	27-Mar-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 13	28-Mar-07	30-Mar-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 13	28-Mar-07	30-Mar-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 13	28-Mar-07	30-Mar-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 13	24-Sep-07	28-Sep-07	C	SL_SEE	Hrs	8		850		850	45%	382
1	04	03	06	02	01	Pre-assemble Girder - 13	24-Sep-07	28-Sep-07	C	SL_MFA	Hrs	80		6,895		6,895	45%	3,103
1	04	03	06	02	01	Pre-assemble Girder - 13	24-Sep-07	28-Sep-07	C	SL_MES	Hrs	36		2,891		2,891	45%	1,301
1	04	03	06	02	01	Assemble Girder - 13	1-Oct-07	5-Oct-07	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 13	1-Oct-07	5-Oct-07	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 14	21-Mar-07	3-Apr-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 14	4-Apr-07	6-Apr-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 14	4-Apr-07	6-Apr-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	03	06	02	01	Fiducialize Undulator - 14	4-Apr-07	6-Apr-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 14	26-Sep-07	2-Oct-07	C	SL_SEE	Hrs	8		853		853	45%	384
1	04	03	06	02	01	Pre-assemble Girder - 14	26-Sep-07	2-Oct-07	C	SL_MFA	Hrs	80		6,925		6,925	45%	3,116
1	04	03	06	02	01	Pre-assemble Girder - 14	26-Sep-07	2-Oct-07	C	SL_MES	Hrs	36		2,903		2,903	45%	1,306
1	04	03	06	02	01	Assemble Girder - 14	3-Oct-07	9-Oct-07	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 14	3-Oct-07	9-Oct-07	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 15	28-Mar-07	10-Apr-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 15	11-Apr-07	13-Apr-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 15	11-Apr-07	13-Apr-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 15	11-Apr-07	13-Apr-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 15	28-Sep-07	4-Oct-07	C	SL_SEE	Hrs	8		861		861	45%	387
1	04	03	06	02	01	Pre-assemble Girder - 15	28-Sep-07	4-Oct-07	C	SL_MFA	Hrs	80		6,984		6,984	45%	3,143
1	04	03	06	02	01	Pre-assemble Girder - 15	28-Sep-07	4-Oct-07	C	SL_MES	Hrs	36		2,928		2,928	45%	1,318
1	04	03	06	02	01	Assemble Girder - 15	5-Oct-07	11-Oct-07	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 15	5-Oct-07	11-Oct-07	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 16	4-Apr-07	17-Apr-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 16	18-Apr-07	20-Apr-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 16	18-Apr-07	20-Apr-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 16	18-Apr-07	20-Apr-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 16	2-Oct-07	8-Oct-07	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 16	2-Oct-07	8-Oct-07	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 16	2-Oct-07	8-Oct-07	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 16	9-Oct-07	15-Oct-07	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 16	9-Oct-07	15-Oct-07	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 17	11-Apr-07	24-Apr-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 17	25-Apr-07	27-Apr-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 17	25-Apr-07	27-Apr-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 17	25-Apr-07	27-Apr-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 17	4-Oct-07	10-Oct-07	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 17	4-Oct-07	10-Oct-07	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 17	4-Oct-07	10-Oct-07	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 17	11-Oct-07	17-Oct-07	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 17	11-Oct-07	17-Oct-07	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 18	25-Apr-07	8-May-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 18	9-May-07	11-May-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 18	9-May-07	11-May-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 18	9-May-07	11-May-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 18	8-Oct-07	12-Oct-07	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 18	8-Oct-07	12-Oct-07	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 18	8-Oct-07	12-Oct-07	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 18	15-Oct-07	19-Oct-07	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 18	15-Oct-07	19-Oct-07	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 19	2-May-07	15-May-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 19	16-May-07	18-May-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 19	16-May-07	18-May-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 19	16-May-07	18-May-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 19	9-Oct-07	15-Oct-07	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 19	9-Oct-07	15-Oct-07	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 19	9-Oct-07	15-Oct-07	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 19	16-Oct-07	22-Oct-07	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 19	16-Oct-07	22-Oct-07	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 20	9-May-07	22-May-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	03	06	02	01	Fiducialize Undulator - 20	23-May-07	25-May-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 20	23-May-07	25-May-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 20	23-May-07	25-May-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 20	13-Dec-07	4-Jan-08	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 20	13-Dec-07	4-Jan-08	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 20	13-Dec-07	4-Jan-08	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 20	7-Jan-08	11-Jan-08	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 20	7-Jan-08	11-Jan-08	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 21	16-May-07	30-May-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 21	31-May-07	4-Jun-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 21	31-May-07	4-Jun-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 21	31-May-07	4-Jun-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 21	14-Dec-07	7-Jan-08	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 21	14-Dec-07	7-Jan-08	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 21	14-Dec-07	7-Jan-08	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 21	8-Jan-08	14-Jan-08	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 21	8-Jan-08	14-Jan-08	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 22	23-May-07	6-Jun-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 22	7-Jun-07	11-Jun-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 22	7-Jun-07	11-Jun-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 22	7-Jun-07	11-Jun-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 22	2-Jan-08	8-Jan-08	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 22	2-Jan-08	8-Jan-08	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 22	2-Jan-08	8-Jan-08	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 22	9-Jan-08	15-Jan-08	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 22	9-Jan-08	15-Jan-08	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 23	31-May-07	13-Jun-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 23	14-Jun-07	18-Jun-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 23	14-Jun-07	18-Jun-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 23	14-Jun-07	18-Jun-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 23	3-Jan-08	9-Jan-08	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 23	3-Jan-08	9-Jan-08	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 23	3-Jan-08	9-Jan-08	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 23	10-Jan-08	16-Jan-08	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 23	10-Jan-08	16-Jan-08	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 24	7-Jun-07	20-Jun-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 24	21-Jun-07	25-Jun-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 24	21-Jun-07	25-Jun-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 24	21-Jun-07	25-Jun-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 24	4-Jan-08	10-Jan-08	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 24	4-Jan-08	10-Jan-08	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 24	4-Jan-08	10-Jan-08	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 24	11-Jan-08	17-Jan-08	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 24	11-Jan-08	17-Jan-08	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 25	14-Jun-07	27-Jun-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 25	28-Jun-07	2-Jul-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 25	28-Jun-07	2-Jul-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 25	28-Jun-07	2-Jul-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 25	7-Jan-08	11-Jan-08	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 25	7-Jan-08	11-Jan-08	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 25	7-Jan-08	11-Jan-08	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 25	14-Jan-08	18-Jan-08	C	SL_MFA	Hrs	22		1,945		1,945	45%	875

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	03	06	02	01	Assemble Girder - 25	14-Jan-08	18-Jan-08	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 26	21-Jun-07	5-Jul-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 26	6-Jul-07	10-Jul-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 26	6-Jul-07	10-Jul-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 26	6-Jul-07	10-Jul-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 26	8-Jan-08	14-Jan-08	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 26	8-Jan-08	14-Jan-08	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 26	8-Jan-08	14-Jan-08	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 26	15-Jan-08	22-Jan-08	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 26	15-Jan-08	22-Jan-08	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 27	28-Jun-07	12-Jul-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 27	13-Jul-07	17-Jul-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 27	13-Jul-07	17-Jul-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 27	13-Jul-07	17-Jul-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 27	9-Jan-08	15-Jan-08	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 27	9-Jan-08	15-Jan-08	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 27	9-Jan-08	15-Jan-08	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 27	16-Jan-08	23-Jan-08	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 27	16-Jan-08	23-Jan-08	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 28	6-Jul-07	19-Jul-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 28	20-Jul-07	24-Jul-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 28	20-Jul-07	24-Jul-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 28	20-Jul-07	24-Jul-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 28	10-Jan-08	16-Jan-08	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 28	10-Jan-08	16-Jan-08	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 28	10-Jan-08	16-Jan-08	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 28	17-Jan-08	24-Jan-08	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 28	17-Jan-08	24-Jan-08	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 29	13-Jul-07	26-Jul-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 29	27-Jul-07	31-Jul-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 29	27-Jul-07	31-Jul-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 29	27-Jul-07	31-Jul-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 29	11-Jan-08	17-Jan-08	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 29	11-Jan-08	17-Jan-08	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 29	11-Jan-08	17-Jan-08	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 29	18-Jan-08	25-Jan-08	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 29	18-Jan-08	25-Jan-08	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 30	20-Jul-07	2-Aug-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 30	3-Aug-07	7-Aug-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 30	3-Aug-07	7-Aug-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 30	3-Aug-07	7-Aug-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 30	14-Jan-08	18-Jan-08	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 30	14-Jan-08	18-Jan-08	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 30	14-Jan-08	18-Jan-08	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 30	22-Jan-08	28-Jan-08	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 30	22-Jan-08	28-Jan-08	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 31	27-Jul-07	9-Aug-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 31	10-Aug-07	14-Aug-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 31	10-Aug-07	14-Aug-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 31	10-Aug-07	14-Aug-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 31	15-Jan-08	22-Jan-08	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 31	15-Jan-08	22-Jan-08	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	03	06	02	01	Pre-assemble Girder - 31	15-Jan-08	22-Jan-08	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 31	23-Jan-08	29-Jan-08	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 31	23-Jan-08	29-Jan-08	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 32	3-Aug-07	16-Aug-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 32	17-Aug-07	21-Aug-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 32	17-Aug-07	21-Aug-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 32	17-Aug-07	21-Aug-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 32	16-Jan-08	23-Jan-08	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 32	16-Jan-08	23-Jan-08	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 32	16-Jan-08	23-Jan-08	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 32	24-Jan-08	30-Jan-08	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 32	24-Jan-08	30-Jan-08	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	01	Tune Undulator - 33	10-Aug-07	23-Aug-07	C	SL_MFA	Hrs	180		15,513		15,513	40%	6,205
1	04	03	06	02	01	Fiducialize Undulator - 33	24-Aug-07	28-Aug-07	C	SL_PHS	Hrs	16		1,489		1,489	40%	596
1	04	03	06	02	01	Fiducialize Undulator - 33	24-Aug-07	28-Aug-07	C	SL_MFA	Hrs	24		2,068		2,068	40%	827
1	04	03	06	02	01	Fiducialize Undulator - 33	24-Aug-07	28-Aug-07	C	SL_MES	Hrs	40		3,212		3,212	40%	1,285
1	04	03	06	02	01	Pre-assemble Girder - 33	17-Jan-08	24-Jan-08	C	SL_SEE	Hrs	8		872		872	45%	392
1	04	03	06	02	01	Pre-assemble Girder - 33	17-Jan-08	24-Jan-08	C	SL_MFA	Hrs	80		7,074		7,074	45%	3,183
1	04	03	06	02	01	Pre-assemble Girder - 33	17-Jan-08	24-Jan-08	C	SL_MES	Hrs	36		2,966		2,966	45%	1,335
1	04	03	06	02	01	Assemble Girder - 33	25-Jan-08	31-Jan-08	C	SL_MFA	Hrs	22		1,945		1,945	45%	875
1	04	03	06	02	01	Assemble Girder - 33	25-Jan-08	31-Jan-08	C	SL_MES	Hrs	34		2,801		2,801	45%	1,260
1	04	03	06	02	02	F/MM Quadrupoles						1,508	-	126,718	-	126,718		44,351
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 01	3-Aug-07	7-Aug-07	C	SL_PHS	Hrs	84		7,819		7,819	35%	2,737
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 01	3-Aug-07	7-Aug-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 01	3-Aug-07	7-Aug-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 01	3-Aug-07	7-Aug-07	C	SL_MES	Hrs	84		6,745		6,745	35%	2,361
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 01	3-Aug-07	7-Aug-07	C	AN_PHS	Hrs	80		8,840		8,840	35%	3,094
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 01	3-Aug-07	7-Aug-07	C	AN_ME1	Hrs	80		8,840		8,840	35%	3,094
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 02	8-Aug-07	10-Aug-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 02	8-Aug-07	10-Aug-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 02	8-Aug-07	10-Aug-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 02	8-Aug-07	10-Aug-07	C	SL_MES	Hrs	4		321		321	35%	112
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 03	13-Aug-07	15-Aug-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 03	13-Aug-07	15-Aug-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 03	13-Aug-07	15-Aug-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 03	13-Aug-07	15-Aug-07	C	SL_MES	Hrs	4		321		321	35%	112
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 04	16-Aug-07	20-Aug-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 04	16-Aug-07	20-Aug-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 04	16-Aug-07	20-Aug-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 04	16-Aug-07	20-Aug-07	C	SL_MES	Hrs	4		321		321	35%	112
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 05	21-Aug-07	23-Aug-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 05	21-Aug-07	23-Aug-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 05	21-Aug-07	23-Aug-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 05	21-Aug-07	23-Aug-07	C	SL_MES	Hrs	4		321		321	35%	112
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 06	24-Aug-07	28-Aug-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 06	24-Aug-07	28-Aug-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 06	24-Aug-07	28-Aug-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 06	24-Aug-07	28-Aug-07	C	SL_MES	Hrs	4		321		321	35%	112
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 07	29-Aug-07	31-Aug-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 07	29-Aug-07	31-Aug-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 07	29-Aug-07	31-Aug-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 07	29-Aug-07	31-Aug-07	C	SL_MES	Hrs	4		321		321	35%	112

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 08	4-Sep-07	6-Sep-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 08	4-Sep-07	6-Sep-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 08	4-Sep-07	6-Sep-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 08	4-Sep-07	6-Sep-07	C	SL_MES	Hrs	4		321		321	35%	112
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 09	7-Sep-07	11-Sep-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 09	7-Sep-07	11-Sep-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 09	7-Sep-07	11-Sep-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 09	7-Sep-07	11-Sep-07	C	SL_MES	Hrs	4		321		321	35%	112
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 10	12-Sep-07	13-Sep-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 10	12-Sep-07	13-Sep-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 10	12-Sep-07	13-Sep-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 10	12-Sep-07	13-Sep-07	C	SL_MES	Hrs	4		321		321	35%	112
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 11	14-Sep-07	17-Sep-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 11	14-Sep-07	17-Sep-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 11	14-Sep-07	17-Sep-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 11	14-Sep-07	17-Sep-07	C	SL_MES	Hrs	4		321		321	35%	112
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 12	18-Sep-07	19-Sep-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 12	18-Sep-07	19-Sep-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 12	18-Sep-07	19-Sep-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 12	18-Sep-07	19-Sep-07	C	SL_MES	Hrs	4		321		321	35%	112
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 13	20-Sep-07	21-Sep-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 13	20-Sep-07	21-Sep-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 13	20-Sep-07	21-Sep-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 13	20-Sep-07	21-Sep-07	C	SL_MES	Hrs	4		321		321	35%	112
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 14	24-Sep-07	25-Sep-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 14	24-Sep-07	25-Sep-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 14	24-Sep-07	25-Sep-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 14	24-Sep-07	25-Sep-07	C	SL_MES	Hrs	4		321		321	35%	112
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 15	26-Sep-07	27-Sep-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 15	26-Sep-07	27-Sep-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 15	26-Sep-07	27-Sep-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 15	26-Sep-07	27-Sep-07	C	SL_MES	Hrs	4		321		321	35%	112
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 16	28-Sep-07	1-Oct-07	C	SL_PHS	Hrs	4		372		372	35%	130
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 16	28-Sep-07	1-Oct-07	C	SL_PHS	Hrs	20		1,463		1,463	35%	512
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 16	28-Sep-07	1-Oct-07	C	SL_MFA	Hrs	8		689		689	35%	241
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 16	28-Sep-07	1-Oct-07	C	SL_MES	Hrs	4		321		321	35%	112
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 17	2-Oct-07	3-Oct-07	C	SL_PHS	Hrs	4		382		382	35%	134
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 17	2-Oct-07	3-Oct-07	C	SL_PHS	Hrs	20		1,501		1,501	35%	525
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 17	2-Oct-07	3-Oct-07	C	SL_MFA	Hrs	8		707		707	35%	248
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 17	2-Oct-07	3-Oct-07	C	SL_MES	Hrs	4		330		330	35%	115
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 18	4-Oct-07	5-Oct-07	C	SL_PHS	Hrs	4		382		382	35%	134
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 18	4-Oct-07	5-Oct-07	C	SL_PHS	Hrs	20		1,501		1,501	35%	525
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 18	4-Oct-07	5-Oct-07	C	SL_MFA	Hrs	8		707		707	35%	248
1	04	03	06	02	02	Measure and Fiducialize Quadrupole - 18	4-Oct-07	5-Oct-07	C	SL_MES	Hrs	4		330		330	35%	115
1	04	03	06	02	02	Magnetic Measure and Fiducialize Quadrupole - 19	8-Oct-07	8-Oct-07	C	SL_PHS	Hrs	4		382		382	35%	134
1	04	03	06	02	02	Magnetic Measure and Fiducialize Quadrupole - 19	8-Oct-07	8-Oct-07	C	SL_PHS	Hrs	20		1,501		1,501	35%	525
1	04	03	06	02	02	Magnetic Measure and Fiducialize Quadrupole - 19	8-Oct-07	8-Oct-07	C	SL_MFA	Hrs	8		707		707	35%	248
1	04	03	06	02	02	Magnetic Measure and Fiducialize Quadrupole - 19	8-Oct-07	8-Oct-07	C	SL_MES	Hrs	4		330		330	35%	115
1	04	03	06	02	02	Magnetic Measure and Fiducialize Quadrupole - 20	12-Dec-07	12-Dec-07	C	SL_PHS	Hrs	4		382		382	35%	134
1	04	03	06	02	02	Magnetic Measure and Fiducialize Quadrupole - 20	12-Dec-07	12-Dec-07	C	SL_PHS	Hrs	20		1,501		1,501	35%	525
1	04	03	06	02	02	Magnetic Measure and Fiducialize Quadrupole - 20	12-Dec-07	12-Dec-07	C	SL_MFA	Hrs	8		707		707	35%	248
1	04	03	06	02	02	Magnetic Measure and Fiducialize Quadrupole - 20	12-Dec-07	12-Dec-07	C	SL_MES	Hrs	4		330		330	35%	115

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	03	06	02	03	F/MM BPMs						-	147,600	-	157,935	157,935		31,587
1	04	03	06	02	03	Procure Fiducialization and Mag Meas Hardware	1-Aug-06	15-Jun-07	C	SL_MSE	\$\$		147,600		157,935	157,935	20%	31,587
1	04	03	06	02	04	F/MM Correctors												
1	04	03	06	02	05	F/MM Vacuum Chamber												
1	04	03	06	02	06	F/MM Photon Diagnostics Components						362	-	31,199	-	31,199		9,360
1	04	03	06	02	06	CAM Mover Assembly & Fiducialization	2-Oct-06	6-Apr-07	C	SL_MFA	Hrs	362		31,199		31,199	30%	9,360
1	04	03	06	03		Undulator Monitoring						7,101	1,305,475	619,184	1,402,250	2,021,433		447,077
1	04	03	06	03	01	Stretched Wire System						4,245	391,100	381,432	419,085	800,518		242,038
1	04	03	06	03	01	Revise Electronics ETC	1-Dec-06	31-Jan-07	C	SL_EE1	Hrs	96		8,949		8,949	25%	2,237
1	04	03	06	03	01	Design & Specs Wire Test Facility ETC	3-Oct-06	2-Apr-07	C	SL_MES	Hrs	144		11,562		11,562	25%	2,891
1	04	03	06	03	01	Develop Data Acquisition Software	2-May-07	31-Aug-07	C	SL_CE1	Hrs	480		54,255		54,255	25%	13,564
1	04	03	06	03	01	Develop Local Control Program	1-Jun-07	30-Nov-07	C	SL_CE1	Hrs	320		36,480		36,480	25%	9,120
1	04	03	06	03	01	Specs of WPM Installation at U-Hall	2-Jul-07	29-Feb-08	C	SL_MES	Hrs	120		9,791		9,791	25%	2,448
1	04	03	06	03	01	Control of WPM Installation at U-Hall	31-Jan-08	27-Feb-08	C	SL_MES	Hrs	80		6,590		6,590	25%	1,648
1	04	03	06	03	01	Commissioning of WPM at U-Hall	1-Apr-08	30-Jun-08	C	SL_MES	Hrs	120		9,886		9,886	25%	2,471
1	04	03	06	03	01	Revise Mechanics ETC	1-Sep-06	31-Oct-06	C	SL_ME1	Hrs	-		-		-	10%	-
1	04	03	06	03	01	System Assembly at Test Facility	1-Feb-07	31-May-07	C	SL_EE1	Hrs	160		14,915		14,915	25%	3,729
1	04	03	06	03	01	System Measurements at Test Facility	2-Jul-07	14-Dec-07	C	SL_EE1	Hrs	240		22,634		22,634	25%	5,658
1	04	03	06	03	01	Wire Monitor Calibration	4-Sep-07	29-Feb-08	C	SL_EE1	Hrs	200		19,055		19,055	25%	4,764
1	04	03	06	03	01	Design & Specs Electronics ETC	2-Jan-07	28-Feb-07	C	SL_EE1	Hrs	135		12,585		12,585	25%	3,146
1	04	03	06	03	01	RCV: Wire Monitors	2-Mar-07	2-Mar-07	C	SL_MSE	\$\$		68,800		73,977	73,977	35%	25,892
1	04	03	06	03	01	RCV: Wire Monitor Supports	2-Mar-07	2-Mar-07	C	SL_MSE	\$\$		1,800		1,935	1,935	35%	677
1	04	03	06	03	01	RCV: Wire Tubes	2-Mar-07	2-Mar-07	C	SL_MSE	\$\$		73,000		78,493	78,493	35%	27,473
1	04	03	06	03	01	RCV: Wire Tube Supports	2-Mar-07	2-Mar-07	C	SL_MSE	\$\$		15,500		16,666	16,666	35%	5,833
1	04	03	06	03	01	RCV: Demodulation Modules	1-Aug-06	1-Aug-06	C	SL_MSE	\$\$		53,000		55,544	55,544	35%	19,440
1	04	03	06	03	01	RCV: Quad ADC	1-Mar-07	1-Mar-07	C	SL_MSE	\$\$		44,000		47,311	47,311	35%	16,559
1	04	03	06	03	01	RCV: RF Signal Processing	2-Jul-07	2-Jul-07	C	SL_MSE	\$\$		19,000		20,430	20,430	35%	7,150
1	04	03	06	03	01	RCV: RF Signal Distribution	2-Jul-07	2-Jul-07	C	SL_MSE	\$\$		20,000		21,505	21,505	35%	7,527
1	04	03	06	03	01	RCV: RF Power Amplifier	2-Jul-07	2-Jul-07	C	SL_MSE	\$\$		8,000		8,602	8,602	35%	3,011
1	04	03	06	03	01	RCV: Cables	2-Jul-07	2-Jul-07	C	SL_MSE	\$\$		25,000		26,881	26,881	35%	9,408
1	04	03	06	03	01	RCV: Crates	2-Jul-07	2-Jul-07	C	SL_MSE	\$\$		23,000		24,731	24,731	35%	8,656
1	04	03	06	03	01	RCV: Data Acquisition System	3-Jul-07	3-Jul-07	C	SL_MSE	\$\$		40,000		43,010	43,010	35%	15,053
1	04	03	06	03	01	WPM Systems Engineering (CNST) ETC	1-Aug-06	29-Sep-08	C	SL_MES	Hrs	2,015		163,411		163,411	25%	40,853
1	04	03	06	03	01	Drawings and Documentation ETC	1-Aug-06	31-Jul-08	C	SL_MDD	Hrs	134		11,318		11,318	25%	2,830
1	04	03	06	03	02	Hydrostatic Level System						2,260	442,625	190,203	475,916	666,119		126,520
1	04	03	06	03	02	Develop Control System Connection	2-Oct-06	29-Aug-07	C	SL_CE1	Hrs	144		16,277		16,277	20%	3,255
1	04	03	06	03	02	Detail and Layout Drawings	1-Aug-06	21-Nov-06	C	SL_MDD	Hrs	144		11,891		11,891	20%	2,378
1	04	03	06	03	02	Test Bench Install & Setup	8-Aug-06	30-May-07	C	SL_MSE	\$\$		3,125		3,345	3,345	20%	669
1	04	03	06	03	02	HLS Systems Engineering (CNST) ETC	1-Aug-06	29-Sep-08	C	SL_MES	Hrs	1,771		143,623		143,623	35%	50,268
1	04	03	06	03	02	Engineer Support System ETC	1-Aug-06	27-Oct-06	C	SL_ME1	Hrs	-		-		-	5%	-
1	04	03	06	03	02	Design Support System ETC	1-Aug-06	27-Oct-06	C	SL_MDD	Hrs	80		6,580		6,580	15%	987
1	04	03	06	03	02	Design Data Acquisition System ETC	1-Aug-06	30-Aug-06	C	SL_EE1	Hrs	48		4,361		4,361	15%	654
1	04	03	06	03	02	DAS Drafting & Doc ETC	1-Aug-06	29-Sep-06	C	SL_MDD	Hrs	20		1,632		1,632	15%	245
1	04	03	06	03	02	Specify Components ETC	1-Aug-06	29-Aug-06	C	SL_ME1	Hrs	-		-		-	10%	-
1	04	03	06	03	02	Specify Support System ETC	30-Oct-06	13-Feb-07	C	SL_ME1	Hrs	-		-		-	10%	-
1	04	03	06	03	02	Develop Data Acquisition S/W ETC	1-Aug-06	29-Sep-06	C	SL_CE1	Hrs	53		5,839		5,839	35%	2,044
1	04	03	06	03	02	PP: Capacitive/Acoustic Sensors	21-Sep-07	21-Sep-07	C	SL_MSE	\$\$		51,000		54,838	54,838	10%	5,484
1	04	03	06	03	02	PP: Capacitive/Acoustic Sensors	1-Nov-06	1-Nov-06	C	SL_MSE	\$\$		36,000		38,709	38,709	10%	3,871
1	04	03	06	03	02	PP: Capacitive/Acoustic Sensors	30-Nov-06	30-Nov-06	C	SL_MSE	\$\$		46,000		49,461	49,461	10%	4,946
1	04	03	06	03	02	PP: Capacitive/Acoustic Sensors	17-May-07	17-May-07	C	SL_MSE	\$\$		111,000		119,353	119,353	10%	11,935
1	04	03	06	03	02	PP: Capacitive/Acoustic Sensors	23-Jul-07	23-Jul-07	C	SL_MSE	\$\$		56,000		60,214	60,214	10%	6,021
1	04	03	06	03	02	PP: Capacitive/Acoustic Sensors	22-Aug-07	22-Aug-07	C	SL_MSE	\$\$		56,000		60,214	60,214	10%	6,021

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	03	06	03	02	RCV: Support System	14-Jun-07	14-Jun-07	C	SL_MSE	\$\$		34,000		36,558	36,558	30%	10,968
1	04	03	06	03	02	RCV: Re-Fill Station	4-Sep-07	4-Sep-07	C	SL_MSE	\$\$		15,000		16,129	16,129	35%	5,645
1	04	03	06	03	02	RCV: Piping	1-Jun-07	1-Jun-07	C	SL_MSE	\$\$		9,000		9,677	9,677	30%	2,903
1	04	03	06	03	02	RCV: Data Acquisition System	1-Jun-07	1-Jun-07	C	SL_MSE	\$\$		19,000		20,430	20,430	30%	6,129
1	04	03	06	03	02	RCV: Cables	4-Sep-07	4-Sep-07	C	SL_MSE	\$\$		6,500		6,989	6,989	30%	2,097
1	04	03	06	03	03	F/MM BPMs						596	471,750	47,548	507,248	554,797		78,519
1	04	03	06	03	03	Alignment Hardware/Software Acceptance Testing	7-Feb-07	4-Apr-07	C	SL_MES	Hrs	320		25,694		25,694	25%	6,423
1	04	03	06	03	03	AEG Support and Data Evaluation	1-Aug-06	21-Nov-06	C	SL_MES	Hrs	276		21,855		21,855	100%	21,855
1	04	03	06	03	03	RCV: Laser Trackers (2)	6-Feb-07	6-Feb-07	C	SL_MSE	\$\$		240,000		258,060	258,060	0%	-
1	04	03	06	03	03	RCV: Retro Reflectors	3-Nov-06	3-Nov-06	C	SL_MSE	\$\$		60,000		64,515	64,515	10%	6,451
1	04	03	06	03	03	RCV: Reference Points	3-Nov-06	3-Nov-06	C	SL_MSE	\$\$		24,000		25,806	25,806	20%	5,161
1	04	03	06	03	03	RCV: Wire Reference Fiducials	3-Oct-06	3-Oct-06	C	SL_MSE	\$\$		13,500		14,516	14,516	30%	4,355
1	04	03	06	03	03	RCV: Digital Level	3-Oct-06	3-Oct-06	C	SL_MSE	\$\$		14,000		15,053	15,053	20%	3,011
1	04	03	06	03	03	RCV: Absolute Wire Finder	3-Oct-06	3-Oct-06	C	SL_MSE	\$\$		30,000		32,257	32,257	30%	9,677
1	04	03	06	03	03	RCV: Portable HLS	14-Nov-06	14-Nov-06	C	SL_MSE	\$\$		20,250		21,774	21,774	30%	6,532
1	04	03	06	03	03	RCV: Misc Tools	25-Oct-06	25-Oct-06	C	SL_MSE	\$\$		20,000		21,505	21,505	20%	4,301
1	04	03	06	03	03	RCV: Fixturing	25-Oct-06	25-Oct-06	C	SL_MSE	\$\$		50,000		53,762	53,762	20%	10,752
1	04	03	08			Fixed Supports						545	712,250	54,699	730,268	784,967		117,596
1	04	03	08	01		Fixed Sppt Mgmt & Integration						295	-	32,175	-	32,175	-	-
1	04	03	08	01		Procurement/Acceptance/Vendor Mgmt	13-Dec-06	26-Apr-07	C	AN_ME1	Hrs	144		15,912		15,912	0%	-
1	04	03	08	01		Mechanical Engineering Fixed Supports	1-Aug-06	29-Sep-06	C	AN_ME1	Hrs	151		16,263		16,263	0%	-
1	04	03	08	02		Fixed Support Design						202	626,250	17,220	642,032	659,252		98,888
1	04	03	08	02		Write Report	31-Aug-06	27-Sep-06	C	AN_MDD	Hrs	14		911		911	15%	137
1	04	03	08	02		Write Report	31-Aug-06	27-Sep-06	C	AN_EE1	Hrs	29		3,102		3,102	15%	465
1	04	03	08	02		Final Design Review (Integrated with Supt/Mover)	22-Nov-06	27-Nov-06	C	AN_ME1	Hrs	32		3,536		3,536	15%	530
1	04	03	08	02		Final Design Review (Integrated with Supt/Mover)	22-Nov-06	27-Nov-06	C	AN_EE1	Hrs	8		884		884	15%	133
1	04	03	08	02		Incorporate Comments from FDR	28-Nov-06	11-Dec-06	C	AN_MDD	Hrs	24		1,557		1,557	15%	234
1	04	03	08	02		Evaluate Prop. for Pillar/Plates/Insulation	12-Jan-07	25-Jan-07	C	AN_ME1	Hrs	8		884		884	15%	133
1	04	03	08	02		RCV: Fixed Supports	27-Apr-07	27-Apr-07	C	AA_MSS	\$\$		607,000		622,782	622,782	15%	93,417
1	04	03	08	02		Define Interfaces w/Conventional Facilities ETC	1-Aug-06	30-Aug-06	C	AN_ME1	Hrs	1		54		54	15%	8
1	04	03	08	02		Define Interfaces w/Survey Alignment ETC	1-Aug-06	30-Aug-06	C	AN_MES	Hrs	2		162		162	15%	24
1	04	03	08	02		Define Interfaces w/Controls/Monitor ETC	1-Aug-06	30-Aug-06	C	AN_CE1	Hrs	2		162		162	15%	24
1	04	03	08	02		Thermal and Vibration Testing ETC	1-Aug-06	30-Aug-06	C	AN_MSE	\$\$		1,250		1,250	1,250	15%	188
1	04	03	08	02		Thermal and Vibration Testing ETC	1-Aug-06	30-Aug-06	C	AN_EE1	Hrs	10		1,023		1,023	15%	153
1	04	03	08	02		Perform Vibration Analysis ETC	1-Aug-06	30-Aug-06	C	AN_MSE	\$\$		18,000		18,000	18,000	15%	2,700
1	04	03	08	02		Perform Vibration Analysis ETC	1-Aug-06	30-Aug-06	C	AN_MFA	Hrs	56		3,541		3,541	15%	531
1	04	03	08	02		Analyze Prototype Test Results ETC	1-Aug-06	29-Aug-06	C	AN_EE1	Hrs	6		646		646	15%	97
1	04	03	08	02		Prepare for FDR ETC	1-Aug-06	30-Aug-06	C	AN_MDD	Hrs	12		759		759	15%	114
1	04	03	08	03		Stabilized Girder Assemblies												
1	04	03	08	04		Thermal Intercept System												
1	04	03	08	05		Thermometry						32	62,000	3,536	63,612	67,148		13,430
1	04	03	08	05		Procure Thermistors	4-Dec-06	9-Jan-07	C	AN_MSE	\$\$		30,000		30,780	30,780	20%	6,156
1	04	03	08	05		Procure Thermistors	4-Dec-06	9-Jan-07	C	AN_ME1	Hrs	8		884		884	20%	177
1	04	03	08	05		Procure Cabling	4-Dec-06	9-Jan-07	C	AN_MSE	\$\$		2,000		2,052	2,052	20%	410
1	04	03	08	05		Procure Cabling	4-Dec-06	9-Jan-07	C	AN_ME1	Hrs	8		884		884	20%	177
1	04	03	08	05		Procure Readout Electronics	4-Dec-06	6-Feb-07	C	AN_MSE	\$\$		30,000		30,780	30,780	20%	6,156
1	04	03	08	05		Procure Readout Electronics	4-Dec-06	6-Feb-07	C	AN_ME1	Hrs	16		1,768		1,768	20%	354
1	04	03	08	06		Kinematic Girder Support												
1	04	03	08	07		Earthquake Bracing						16	24,000	1,768	24,624	26,392		5,278
1	04	03	08	07		Procure Earthquake Bracing	4-Dec-06	6-Feb-07	C	AN_MSE	\$\$		24,000		24,624	24,624	20%	4,925
1	04	03	08	07		Procure Earthquake Bracing	4-Dec-06	6-Feb-07	C	AN_ME1	Hrs	16		1,768		1,768	20%	354
1	04	03	08	08		Controls and Software												

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	04				Vacuum System						6,665	1,671,492	613,155	1,715,114	2,328,270		451,609
1	04	04	02			Undulator Vacuum Chamber Assembly						3,539	1,358,525	318,856	1,394,081	1,712,937		342,587
1	04	04	02	01		Prototype Chamber Weldment												
1	04	04	02	02		Production Chamber Weldment						2,569	1,215,000	228,517	1,249,198	1,477,715		295,543
1	04	04	02	02		Prepare for Design Review - Chamber and Supports	21-Nov-06	13-Dec-06	C	AN_PHS	Hrs	36		3,978		3,978	20%	796
1	04	04	02	02		Prepare for Design Review - Chamber and Supports	21-Nov-06	13-Dec-06	C	AN_MVE	Hrs	95		10,442		10,442	20%	2,088
1	04	04	02	02		Prepare for Design Review - Chamber and Supports	21-Nov-06	13-Dec-06	C	AN_MDD	Hrs	266		17,283		17,283	20%	3,457
1	04	04	02	02		Award Effort - Chamber and Supports	14-Dec-06	5-Feb-07	C	AN_MVE	Hrs	137		15,117		15,117	20%	3,023
1	04	04	02	02		Oversee Construction of Vacuum Chamber	6-Feb-07	3-Oct-07	C	AN_MVE	Hrs	272		30,063		30,063	20%	6,013
1	04	04	02	02		Oversee Construction of Vacuum Chamber	6-Feb-07	3-Oct-07	C	AN_MFM	Hrs	328		33,456		33,456	20%	6,691
1	04	04	02	02		Oversee Construction of Vacuum Chamber	6-Feb-07	3-Oct-07	C	AN_MFA	Hrs	128		8,306		8,306	20%	1,661
1	04	04	02	02		Oversee Construction of Vacuum Chamber	6-Feb-07	3-Oct-07	C	AN_ME1	Hrs	40		4,421		4,421	20%	884
1	04	04	02	02		REC: Production Group 1 (7)	6-Apr-07	6-Apr-07	C	AA_MSS	\$\$		113,456		116,406	116,406	20%	23,281
1	04	04	02	02		Bake, Leak Test, RGA, Coat (7)	9-Apr-07	20-Apr-07	C	AN_MVE	Hrs	46		5,083		5,083	20%	1,017
1	04	04	02	02		Bake, Leak Test, RGA, Coat (7)	9-Apr-07	20-Apr-07	C	AN_MFA	Hrs	102		6,617		6,617	20%	1,323
1	04	04	02	02		Package for Shipment (7)	23-Apr-07	24-Apr-07	C	AN_MVE	Hrs	22		2,431		2,431	20%	486
1	04	04	02	02		Package for Shipment (7)	23-Apr-07	24-Apr-07	C	AN_MFA	Hrs	39		2,530		2,530	20%	506
1	04	04	02	02		Ship First Lot of Chamber to SLAC (7)	25-Apr-07	2-May-07	C	AN_MSE	\$\$		3,000		3,078	3,078	20%	616
1	04	04	02	02		REC: Production Group 2 (7)	16-May-07	16-May-07	C	AA_MSS	\$\$		110,544		113,418	113,418	20%	22,684
1	04	04	02	02		Bake, Leak Test, RGA, Coat (7)	17-May-07	31-May-07	C	AN_MVE	Hrs	46		5,083		5,083	20%	1,017
1	04	04	02	02		Bake, Leak Test, RGA, Coat (7)	17-May-07	31-May-07	C	AN_MFA	Hrs	102		6,617		6,617	20%	1,323
1	04	04	02	02		Package for Shipment (7)	1-Jun-07	4-Jun-07	C	AN_MVE	Hrs	22		2,431		2,431	20%	486
1	04	04	02	02		Package for Shipment (7)	1-Jun-07	4-Jun-07	C	AN_MFA	Hrs	39		2,530		2,530	20%	506
1	04	04	02	02		Ship Second Lot of Chamber to SLAC (7)	5-Jun-07	12-Jun-07	C	AN_MSE	\$\$		3,000		3,078	3,078	20%	616
1	04	04	02	02		REC: Production Group 3 (7)	3-Jul-07	3-Jul-07	C	AA_MSS	\$\$		114,496		117,473	117,473	20%	23,495
1	04	04	02	02		Bake, Leak Test, RGA, Coat (7)	5-Jul-07	17-Jul-07	C	AN_MVE	Hrs	46		5,083		5,083	20%	1,017
1	04	04	02	02		Bake, Leak Test, RGA, Coat (7)	5-Jul-07	17-Jul-07	C	AN_MFA	Hrs	102		6,617		6,617	20%	1,323
1	04	04	02	02		Package for Shipment (7)	18-Jul-07	19-Jul-07	C	AN_MVE	Hrs	22		2,431		2,431	20%	486
1	04	04	02	02		Package for Shipment (7)	18-Jul-07	19-Jul-07	C	AN_MFA	Hrs	39		2,530		2,530	20%	506
1	04	04	02	02		Ship Third Lot of Chamber to SLAC (7)	20-Jul-07	27-Jul-07	C	AN_MSE	\$\$		3,000		3,078	3,078	20%	616
1	04	04	02	02		REC: Production Group 4 (6)	17-Aug-07	17-Aug-07	C	AA_MSS	\$\$		94,752		97,216	97,216	20%	19,443
1	04	04	02	02		Bake, Leak Test, RGA, Coat (6)	20-Aug-07	30-Aug-07	C	AN_MVE	Hrs	37		4,089		4,089	20%	818
1	04	04	02	02		Bake, Leak Test, RGA, Coat (6)	20-Aug-07	30-Aug-07	C	AN_MFA	Hrs	102		6,617		6,617	20%	1,323
1	04	04	02	02		Package for Shipment (6)	31-Aug-07	4-Sep-07	C	AN_MVE	Hrs	19		2,100		2,100	20%	420
1	04	04	02	02		Package for Shipment (6)	31-Aug-07	4-Sep-07	C	AN_MFA	Hrs	34		2,206		2,206	20%	441
1	04	04	02	02		Ship Fourth Lot of Chamber to SLAC (6)	5-Sep-07	12-Sep-07	C	AN_MSE	\$\$		3,000		3,078	3,078	20%	616
1	04	04	02	02		REC: Production Group 5 (6)	3-Oct-07	3-Oct-07	C	AA_MSS	\$\$		94,752		99,743	99,743	20%	19,949
1	04	04	02	02		Bake, Leak Test, RGA, Coat (6)	4-Oct-07	17-Oct-07	C	AN_MVE	Hrs	37		4,195		4,195	20%	839
1	04	04	02	02		Bake, Leak Test, RGA, Coat (6)	4-Oct-07	17-Oct-07	C	AN_MFA	Hrs	102		6,790		6,790	20%	1,358
1	04	04	02	02		Package for Shipment (6)	18-Oct-07	19-Oct-07	C	AN_MVE	Hrs	19		2,154		2,154	20%	431
1	04	04	02	02		Package for Shipment (6)	18-Oct-07	19-Oct-07	C	AN_MFA	Hrs	34		2,263		2,263	20%	453
1	04	04	02	02		Ship Fifth Lot of Chamber to SLAC (6)	22-Oct-07	26-Oct-07	C	AN_MSE	\$\$		3,000		3,158	3,158	20%	632
1	04	04	02	02		Oversee Construction of Chamber Supports	6-Feb-07	30-Apr-07	C	AN_MVE	Hrs	40		4,420		4,420	20%	884
1	04	04	02	02		Oversee Construction of Chamber Supports	6-Feb-07	30-Apr-07	C	AN_MFM	Hrs	40		4,079		4,079	20%	816
1	04	04	02	02		REC: Chamber Supports (33)	1-May-07	1-May-07	C	AN_MVE	Hrs	24		2,652		2,652	20%	530
1	04	04	02	02		REC: Chamber Supports (33)	1-May-07	1-May-07	C	AA_MSS	\$\$		660,000		677,160	677,160	20%	135,432
1	04	04	02	02		Inspect Chamber Supports (33 + 7 spares)	27-Jun-07	13-Jul-07	C	AN_MVE	Hrs	16		1,768		1,768	20%	354
1	04	04	02	02		Inspect Chamber Supports (33 + 7 spares)	27-Jun-07	13-Jul-07	C	AN_MFM	Hrs	40		4,079		4,079	20%	816
1	04	04	02	02		Package Chamber Supports for Shipment (33+7)	16-Jul-07	20-Jul-07	C	AN_MVE	Hrs	24		2,652		2,652	20%	530
1	04	04	02	02		Package Chamber Supports for Shipment (33+7)	16-Jul-07	20-Jul-07	C	AN_MFA	Hrs	40		2,595		2,595	20%	519
1	04	04	02	02		Ship Chamber Supports to SLAC (33 + 7)	23-Jul-07	27-Jul-07	C	AN_MSE	\$\$		12,000		12,312	12,312	20%	2,462
1	04	04	02	02		Transmit Prd Un Chamber Design/Drawings to SLAC	3-May-07	9-May-07	C	AN_ME1	Hrs	16		1,768		1,768	20%	354

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	04	02	02		Transmit Prd Un Chamber Design/Drawings to SLAC	3-May-07	9-May-07	C	AN_MDD	Hrs	16		1,038		1,038	20%	208
1	04	04	02	03		Prototype Aluminum Chamber						970	143,525	90,339	144,884	235,223		47,045
1	04	04	02	03		Procure Prototype undulator chamber (2) ETC	1-Aug-06	30-Aug-06	C	AN_MVE	Hrs	0		43		43	20%	9
1	04	04	02	03		Procure Prototype undulator chamber (2) ETC	1-Aug-06	30-Aug-06	C	AN_MSE	\$\$		2,700		2,700	2,700	20%	540
1	04	04	02	03		Fabricate surface measuring equipment ETC	1-Aug-06	30-Aug-06	C	AN_MVE	Hrs	1		108		108	20%	22
1	04	04	02	03		Fabricate surface measuring equipment ETC	1-Aug-06	30-Aug-06	C	AN_MSE	\$\$		150		150	150	20%	30
1	04	04	02	03		Fabricate surface measuring equipment ETC	1-Aug-06	30-Aug-06	C	AN_MFM	Hrs	3		298		298	20%	60
1	04	04	02	03		Design weld tooling ETC	1-Aug-06	30-Aug-06	C	AN_MVE	Hrs	7		700		700	20%	140
1	04	04	02	03		Design weld tooling ETC	1-Aug-06	30-Aug-06	C	AN_MDD	Hrs	8		493		493	20%	99
1	04	04	02	03		Final determ of metal surface finish meas	29-Aug-06	21-Nov-06	C	AN_MVE	Hrs	94		10,284		10,284	20%	2,057
1	04	04	02	03		Final determ of metal surface finish meas	29-Aug-06	21-Nov-06	C	AN_MDD	Hrs	14		899		899	20%	180
1	04	04	02	03		Procure Prototype UN chamber tooling	31-Aug-06	5-Sep-06	C	AN_MVE	Hrs	4		420		420	20%	84
1	04	04	02	03		Procure Prototype UN chamber tooling	31-Aug-06	5-Sep-06	C	AN_MSE	\$\$		11,050		11,050	11,050	20%	2,210
1	04	04	02	03		QA Proto A UN chamber parts	8-Sep-06	18-Sep-06	C	AN_MVE	Hrs	10		1,077		1,077	20%	215
1	04	04	02	03		QA Proto A UN chamber parts	8-Sep-06	18-Sep-06	C	AN_MFM	Hrs	16		1,590		1,590	20%	318
1	04	04	02	03		Polish parts	31-Aug-06	28-Sep-06	C	AN_MVE	Hrs	16		1,723		1,723	20%	345
1	04	04	02	03		Polish parts	31-Aug-06	28-Sep-06	C	AN_MSE	\$\$		8,000		8,000	8,000	20%	1,600
1	04	04	02	03		QA Proto B UN chamber parts	22-Sep-06	2-Oct-06	C	AN_MVE	Hrs	10		1,080		1,080	20%	216
1	04	04	02	03		QA Proto B UN chamber parts	22-Sep-06	2-Oct-06	C	AN_MFM	Hrs	16		1,594		1,594	20%	319
1	04	04	02	03		Purchase and Fab Coating Equipment	1-Aug-06	24-Oct-06	C	AN_MVE	Hrs	19		2,061		2,061	20%	412
1	04	04	02	03		Purchase and Fab Coating Equipment	1-Aug-06	24-Oct-06	C	AN_MSE	\$\$		48,000		48,342	48,342	20%	9,668
1	04	04	02	03		Purchase and Fab Coating Equipment	1-Aug-06	24-Oct-06	C	AN_MFM	Hrs	32		3,203		3,203	20%	641
1	04	04	02	03		Assemble Coating Equipment	25-Oct-06	7-Nov-06	C	AN_MVE	Hrs	40		4,420		4,420	20%	884
1	04	04	02	03		Assemble Coating Equipment	25-Oct-06	7-Nov-06	C	AN_MFA	Hrs	80		5,190		5,190	20%	1,038
1	04	04	02	03		Test confirmation of surface measurement	1-Aug-06	28-Aug-06	C	AN_PHS	Hrs	3		280		280	20%	56
1	04	04	02	03		Test confirmation of surface measurement	1-Aug-06	28-Aug-06	C	AN_MVE	Hrs	21		2,240		2,240	20%	448
1	04	04	02	03		Test confirmation of surface measurement	1-Aug-06	28-Aug-06	C	AN_MFA	Hrs	16		986		986	20%	197
1	04	04	02	03		Machine Strongback - Proto A	31-Aug-06	21-Sep-06	C	AN_MVE	Hrs	14		1,465		1,465	20%	293
1	04	04	02	03		Machine Strongback - Proto A	31-Aug-06	21-Sep-06	C	AN_MSE	\$\$		17,213		17,213	17,213	20%	3,443
1	04	04	02	03		Proto A-Fab Sheet and End Piece	31-Aug-06	21-Sep-06	C	AN_MVE	Hrs	3		366		366	20%	73
1	04	04	02	03		Proto A-Fab Sheet and End Piece	31-Aug-06	21-Sep-06	C	AN_MSE	\$\$		2,550		2,550	2,550	20%	510
1	04	04	02	03		Final determination of metal polishing	1-Aug-06	26-Sep-06	C	AN_MVE	Hrs	26		2,800		2,800	20%	560
1	04	04	02	03		Final determination of metal polishing	1-Aug-06	26-Sep-06	C	AN_MDD	Hrs	8		506		506	20%	101
1	04	04	02	03		Proto A-Laser Seam Weld	29-Sep-06	26-Oct-06	C	AN_MVE	Hrs	16		1,765		1,765	20%	353
1	04	04	02	03		Proto A-Laser Seam Weld	29-Sep-06	26-Oct-06	C	AN_MSE	\$\$		5,000		5,120	5,120	20%	1,024
1	04	04	02	03		Proto A-Weld Flanges to Chamber	27-Oct-06	31-Oct-06	C	AN_MVE	Hrs	8		884		884	20%	177
1	04	04	02	03		Proto A-Weld Flanges to Chamber	27-Oct-06	31-Oct-06	C	AN_MSE	\$\$		2,000		2,052	2,052	20%	410
1	04	04	02	03		Proto A-Weld Flanges to Chamber	27-Oct-06	31-Oct-06	C	AN_MFM	Hrs	16		1,632		1,632	20%	326
1	04	04	02	03		Proto A-Post Welding Machining	1-Nov-06	8-Nov-06	C	AN_MVE	Hrs	32		3,536		3,536	20%	707
1	04	04	02	03		Proto A-Post Welding Machining	1-Nov-06	8-Nov-06	C	AN_MSE	\$\$		5,000		5,130	5,130	20%	1,026
1	04	04	02	03		Proto A-Post Welding Machining	1-Nov-06	8-Nov-06	C	AN_MDD	Hrs	24		1,557		1,557	20%	311
1	04	04	02	03		Proto A-Leak Check, Clean, Bake & Coat	9-Nov-06	20-Nov-06	C	AN_MVE	Hrs	32		3,536		3,536	20%	707
1	04	04	02	03		Proto A-Leak Check, Clean, Bake & Coat	9-Nov-06	20-Nov-06	C	AN_MSE	\$\$		7,000		7,182	7,182	20%	1,436
1	04	04	02	03		Proto A-Leak Check, Clean, Bake & Coat	9-Nov-06	20-Nov-06	C	AN_MFA	Hrs	40		2,595		2,595	20%	519
1	04	04	02	03		Proto A-Testing	21-Nov-06	13-Dec-06	C	AN_MVE	Hrs	40		4,420		4,420	20%	884
1	04	04	02	03		Proto A-Testing	21-Nov-06	13-Dec-06	C	AN_MFA	Hrs	40		2,595		2,595	20%	519
1	04	04	02	03		Proto B-Fab Sheet and End Piece	31-Aug-06	21-Sep-06	C	AN_MVE	Hrs	4		388		388	20%	78
1	04	04	02	03		Proto B-Fab Sheet and End Piece	31-Aug-06	21-Sep-06	C	AN_MSE	\$\$		2,700		2,700	2,700	20%	540
1	04	04	02	03		Proto B-Laser Seam Weld	3-Oct-06	24-Oct-06	C	AN_MVE	Hrs	16		1,768		1,768	20%	354
1	04	04	02	03		Proto B-Laser Seam Weld	3-Oct-06	24-Oct-06	C	AN_MSE	\$\$		5,000		5,130	5,130	20%	1,026
1	04	04	02	03		Proto B-Weld Flanges to Chamber	25-Oct-06	31-Oct-06	C	AN_MVE	Hrs	8		884		884	20%	177
1	04	04	02	03		Proto B-Weld Flanges to Chamber	25-Oct-06	31-Oct-06	C	AN_MSE	\$\$		2,000		2,052	2,052	20%	410

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	04	02	03		Proto B-Weld Flanges to Chamber	25-Oct-06	31-Oct-06	C	AN_MFM	Hrs	16		1,632		1,632	20%	326
1	04	04	02	03		Proto B-Post Welding Machining	1-Nov-06	7-Nov-06	C	AN_MVE	Hrs	32		3,536		3,536	20%	707
1	04	04	02	03		Proto B-Post Welding Machining	1-Nov-06	7-Nov-06	C	AN_MSE	\$\$		5,000		5,130	20%	1,026	
1	04	04	02	03		Proto B-Post Welding Machining	1-Nov-06	7-Nov-06	C	AN_MDD	Hrs	24		1,557		1,557	20%	311
1	04	04	02	03		Proto B-Leak Check, Clean, Bake & Coat	8-Nov-06	15-Nov-06	C	AN_MVE	Hrs	32		3,536		3,536	20%	707
1	04	04	02	03		Proto B-Leak Check, Clean, Bake & Coat	8-Nov-06	15-Nov-06	C	AN_MSE	\$\$		7,000		7,182	20%	1,436	
1	04	04	02	03		Proto B-Leak Check, Clean, Bake & Coat	8-Nov-06	15-Nov-06	C	AN_MFA	Hrs	40		2,595		2,595	20%	519
1	04	04	02	03		Proto B-Testing	16-Nov-06	8-Dec-06	C	AN_MVE	Hrs	40		4,420		4,420	20%	884
1	04	04	02	03		Proto B-Testing	16-Nov-06	8-Dec-06	C	AN_MFA	Hrs	40		2,595		2,595	20%	519
1	04	04	02	03		Machine Strongback-Proto B	31-Aug-06	5-Oct-06	C	AN_MVE	Hrs	10		1,080		1,080	20%	216
1	04	04	02	03		Machine Strongback-Proto B	31-Aug-06	5-Oct-06	C	AN_MSE	\$\$		13,163		13,201	20%	2,640	
1	04	04	03			Beam-line Bellows Module Assembly						774	172,318	65,061	176,727	241,788		47,584
1	04	04	03	01		Prototype Bellows Module						150	2,746	12,734	2,746	15,480		2,322
1	04	04	03	01		Procure Rh Plated Stub Prtp Bel Mod ETC	1-Aug-06	30-Aug-06	C	AN_MVE	Hrs	1		140		140	15%	21
1	04	04	03	01		Procure Rh Plated Stub Prtp Bel Mod ETC	1-Aug-06	30-Aug-06	C	AN_MSE	\$\$		146		146	15%	22	
1	04	04	03	01		RCV: Bellows Prtp Bel Mod	29-Sep-06	9-Nov-06	C	AN_MVE	Hrs	4		441		441	15%	66
1	04	04	03	01		Quality Assurance Prtp Bel Mod	1-Aug-06	7-Aug-06	C	AN_MVE	Hrs	2		215		215	15%	32
1	04	04	03	01		Quality Assurance Prtp Bel Mod	1-Aug-06	7-Aug-06	C	AN_MFM	Hrs	4		398		398	15%	60
1	04	04	03	01		Test Equipment Fab & Assy ETC	1-Aug-06	30-Aug-06	C	AN_MVE	Hrs	2		162		162	15%	24
1	04	04	03	01		Test Equipment Fab & Assy ETC	1-Aug-06	30-Aug-06	C	AN_MSE	\$\$		200		200	15%	30	
1	04	04	03	01		Test Equipment Fab & Assy ETC	1-Aug-06	30-Aug-06	C	AN_MFM	Hrs	1		99		99	15%	15
1	04	04	03	01		Test Equipment Fab & Assy ETC	1-Aug-06	30-Aug-06	C	AN_MFA	Hrs	2		95		95	15%	14
1	04	04	03	01		Assemble Prtp Bel Mod	8-Aug-06	21-Aug-06	C	AN_MVE	Hrs	32		3,446		3,446	15%	517
1	04	04	03	01		Assemble Prtp Bel Mod	8-Aug-06	21-Aug-06	C	AN_MSE	\$\$		2,400		2,400	15%	360	
1	04	04	03	01		Assemble Prtp Bel Mod	8-Aug-06	21-Aug-06	C	AN_MFA	Hrs	51		3,238		3,238	15%	486
1	04	04	03	01		Measurement and Test Prtp Bel Mod	1-Aug-06	14-Aug-06	C	AN_MVE	Hrs	9		948		948	15%	142
1	04	04	03	01		Measurement and Test Prtp Bel Mod	1-Aug-06	14-Aug-06	C	AN_MFM	Hrs	4		437		437	15%	66
1	04	04	03	01		Measurement and Test Prtp Bel Mod	1-Aug-06	14-Aug-06	C	AN_MFA	Hrs	22		1,391		1,391	15%	209
1	04	04	03	01		Review and Report Prtp Bel Mod	15-Aug-06	21-Aug-06	C	AN_PHS	Hrs	4		431		431	15%	65
1	04	04	03	01		Review and Report Prtp Bel Mod	15-Aug-06	21-Aug-06	C	AN_MVE	Hrs	8		862		862	15%	129
1	04	04	03	01		Review and Report Prtp Bel Mod	15-Aug-06	21-Aug-06	C	AN_ME1	Hrs	4		431		431	15%	65
1	04	04	03	02		Production Bellows Module						624	169,572	52,327	173,981	226,308		45,262
1	04	04	03	02		Prelim Standard Bellows Design	22-Aug-06	12-Sep-06	C	AN_PHS	Hrs	7		775		775	20%	155
1	04	04	03	02		Prelim Standard Bellows Design	22-Aug-06	12-Sep-06	C	AN_MVE	Hrs	14		1,551		1,551	20%	310
1	04	04	03	02		Prelim Standard Bellows Design	22-Aug-06	12-Sep-06	C	AN_MDD	Hrs	50		3,187		3,187	20%	637
1	04	04	03	02		Bellows Physics Review	13-Sep-06	14-Sep-06	C	SL_PHS	Hrs	8		570		570	20%	114
1	04	04	03	02		Bellows Physics Review	13-Sep-06	14-Sep-06	C	AN_MVE	Hrs	8		862		862	20%	172
1	04	04	03	02		Bellows Physics Review	13-Sep-06	14-Sep-06	C	AN_MDD	Hrs	8		506		506	20%	101
1	04	04	03	02		Final Standard Bellows Design	15-Sep-06	21-Sep-06	C	AN_MVE	Hrs	8		862		862	20%	172
1	04	04	03	02		Final Standard Bellows Design	15-Sep-06	21-Sep-06	C	AN_MDD	Hrs	40		2,529		2,529	20%	506
1	04	04	03	02		Final Design Review Std Bel Mod	22-Sep-06	25-Sep-06	C	AN_PHS	Hrs	8		862		862	20%	172
1	04	04	03	02		Final Design Review Std Bel Mod	22-Sep-06	25-Sep-06	C	AN_MVE	Hrs	16		1,723		1,723	20%	345
1	04	04	03	02		Final Design Review Std Bel Mod	22-Sep-06	25-Sep-06	C	AN_MDD	Hrs	16		1,012		1,012	20%	202
1	04	04	03	02		Bid Package-Standard Bellows Module	26-Sep-06	28-Sep-06	C	AN_MVE	Hrs	8		862		862	20%	172
1	04	04	03	02		Bid Process Std Bel Mod	29-Sep-06	2-Nov-06	C	AN_MVE	Hrs	16		1,765		1,765	20%	353
1	04	04	03	02		Evaluate Bid Std Bel Mod	3-Nov-06	6-Nov-06	C	AN_MVE	Hrs	8		884		884	20%	177
1	04	04	03	02		Standard Bellows Module (47) Support	7-Nov-06	8-Nov-06	C	AN_MVE	Hrs	8		884		884	20%	177
1	04	04	03	02		REC: First Lot Standard Bellows Module (4)	9-Nov-06	16-Jan-07	C	AN_MVE	Hrs	8		884		884	20%	177
1	04	04	03	02		REC: First Lot Standard Bellows Module (4)	9-Nov-06	16-Jan-07	C	AN_MFA	Hrs	8		519		519	20%	104
1	04	04	03	02		REC: First Lot Standard Bellows Module (4)	9-Nov-06	16-Jan-07	C	AA_MSS	\$\$		14,304		14,676	20%	2,935	
1	04	04	03	02		QA First Lot Std Bel Mod	17-Jan-07	26-Jan-07	C	AN_MVE	Hrs	8		884		884	20%	177
1	04	04	03	02		QA First Lot Std Bel Mod	17-Jan-07	26-Jan-07	C	AN_MFM	Hrs	8		816		816	20%	163

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$	
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total			
1	04	04	03	02		Assembly Test 1st Lot Std Bel Mod	29-Jan-07	30-Jan-07	C	AN_MVE	Hrs	8		884		884	20%	177	
1	04	04	03	02		Assembly Test 1st Lot Std Bel Mod	29-Jan-07	30-Jan-07	C	AN_MFA	Hrs	8		519		519	20%	104	
1	04	04	03	02		Clean 1st Lot Std Bel Mod	31-Jan-07	31-Jan-07	C	AN_MVE	Hrs	8		884		884	20%	177	
1	04	04	03	02		Clean 1st Lot Std Bel Mod	31-Jan-07	31-Jan-07	C	AN_MFA	Hrs	8		519		519	20%	104	
1	04	04	03	02		Bake 1st Lot Std Bel Mod	27-Feb-07	5-Mar-07	C	AN_MVE	Hrs	8		884		884	20%	177	
1	04	04	03	02		Bake 1st Lot Std Bel Mod	27-Feb-07	5-Mar-07	C	AN_MFA	Hrs	24		1,557		1,557	20%	311	
1	04	04	03	02		Prepare 1st Lot Std Bellows for Shipment	6-Mar-07	6-Mar-07	C	AN_MVE	Hrs	4		442		442	20%	88	
1	04	04	03	02		Prepare 1st Lot Std Bellows for Shipment	6-Mar-07	6-Mar-07	C	AN_MFA	Hrs	4		260		260	20%	52	
1	04	04	03	02		Pack 1st Lot Std Bellows for Shipping	7-Mar-07	7-Mar-07	C	AN_MVE	Hrs	4		442		442	20%	88	
1	04	04	03	02		Pack 1st Lot Std Bellows for Shipping	7-Mar-07	7-Mar-07	C	AN_MFA	Hrs	4		260		260	20%	52	
1	04	04	03	02		Ship 1st Lot (4) Std Bel Mod to SLAC	8-Mar-07	14-Mar-07	C	AN_MSE	\$\$		500		513		513	20%	103
1	04	04	03	02		Approve Continuation of Production Std Bel Mod	29-Jan-07	30-Jan-07	C	AN_MVE	Hrs	8		884		884	20%	177	
1	04	04	03	02		REC: 2nd Prod Lot Std Bellows Module (21)	31-Jan-07	27-Mar-07	C	AN_MVE	Hrs	4		442		442	20%	88	
1	04	04	03	02		REC: 2nd Prod Lot Std Bellows Module (21)	31-Jan-07	27-Mar-07	C	AN_MFA	Hrs	8		519		519	20%	104	
1	04	04	03	02		REC: 2nd Prod Lot Std Bellows Module (21)	31-Jan-07	27-Mar-07	C	AA_MSS	\$\$		75,096		77,048		77,048	20%	15,410
1	04	04	03	02		QA Production 2nd Lot Std Bel Mod	28-Mar-07	5-Apr-07	C	AN_MVE	Hrs	4		442		442	20%	88	
1	04	04	03	02		QA Production 2nd Lot Std Bel Mod	28-Mar-07	5-Apr-07	C	AN_MFM	Hrs	12		1,224		1,224	20%	245	
1	04	04	03	02		Assembly Test 2nd Lot Std Bel Mod	6-Apr-07	12-Apr-07	C	AN_MVE	Hrs	8		884		884	20%	177	
1	04	04	03	02		Assembly Test 2nd Lot Std Bel Mod	6-Apr-07	12-Apr-07	C	AN_MFA	Hrs	16		1,038		1,038	20%	208	
1	04	04	03	02		Clean 2nd Lot Std Bel Mod	13-Apr-07	18-Apr-07	C	AN_MVE	Hrs	4		442		442	20%	88	
1	04	04	03	02		Clean 2nd Lot Std Bel Mod	13-Apr-07	18-Apr-07	C	AN_MFA	Hrs	12		779		779	20%	156	
1	04	04	03	02		Bake 2nd Lot Std Bel Mod	19-Apr-07	25-Apr-07	C	AN_MVE	Hrs	8		884		884	20%	177	
1	04	04	03	02		Bake 2nd Lot Std Bel Mod	19-Apr-07	25-Apr-07	C	AN_MFA	Hrs	24		1,557		1,557	20%	311	
1	04	04	03	02		Prepare 2nd Lot Std Bellows for Shipment	26-Apr-07	27-Apr-07	C	AN_MVE	Hrs	4		442		442	20%	88	
1	04	04	03	02		Prepare 2nd Lot Std Bellows for Shipment	26-Apr-07	27-Apr-07	C	AN_MFA	Hrs	8		519		519	20%	104	
1	04	04	03	02		Pack 2nd Lot Std Bellows for Shipping	30-Apr-07	1-May-07	C	AN_MVE	Hrs	4		442		442	20%	88	
1	04	04	03	02		Pack 2nd Lot Std Bellows for Shipping	30-Apr-07	1-May-07	C	AN_MFA	Hrs	8		519		519	20%	104	
1	04	04	03	02		Ship 2nd Lot (21) Std Bel Mod to SLAC	2-May-07	8-May-07	C	AN_MSE	\$\$		500		513		513	20%	103
1	04	04	03	02		REC: Remain Prod Lot Std Bellows Module (22)	28-Mar-07	22-May-07	C	AN_MVE	Hrs	4		442		442	20%	88	
1	04	04	03	02		REC: Remain Prod Lot Std Bellows Module (22)	28-Mar-07	22-May-07	C	AN_MFA	Hrs	8		519		519	20%	104	
1	04	04	03	02		REC: Remain Prod Lot Std Bellows Module (22)	28-Mar-07	22-May-07	C	AA_MSS	\$\$		78,672		80,717		80,717	20%	16,143
1	04	04	03	02		QA Production Rem Lot Std Bel Mod	23-May-07	4-Jun-07	C	AN_MVE	Hrs	4		442		442	20%	88	
1	04	04	03	02		QA Production Rem Lot Std Bel Mod	23-May-07	4-Jun-07	C	AN_MFM	Hrs	12		1,224		1,224	20%	245	
1	04	04	03	02		Assembly Test Rem Std Bel Mod	5-Jun-07	11-Jun-07	C	AN_MVE	Hrs	8		884		884	20%	177	
1	04	04	03	02		Assembly Test Rem Std Bel Mod	5-Jun-07	11-Jun-07	C	AN_MFA	Hrs	16		1,038		1,038	20%	208	
1	04	04	03	02		Clean Rem Std Bel Mod	12-Jun-07	15-Jun-07	C	AN_MVE	Hrs	4		442		442	20%	88	
1	04	04	03	02		Clean Rem Std Bel Mod	12-Jun-07	15-Jun-07	C	AN_MFA	Hrs	12		779		779	20%	156	
1	04	04	03	02		Bake Rem Std Bel Mod	18-Jun-07	22-Jun-07	C	AN_MVE	Hrs	8		884		884	20%	177	
1	04	04	03	02		Bake Rem Std Bel Mod	18-Jun-07	22-Jun-07	C	AN_MFA	Hrs	24		1,557		1,557	20%	311	
1	04	04	03	02		Prepare Rem Std Bellows for Shipment	25-Jun-07	26-Jun-07	C	AN_MVE	Hrs	4		442		442	20%	88	
1	04	04	03	02		Prepare Rem Std Bellows for Shipment	25-Jun-07	26-Jun-07	C	AN_MFA	Hrs	8		519		519	20%	104	
1	04	04	03	02		Pack Rem Std Bellows for Shipping	27-Jun-07	28-Jun-07	C	AN_MVE	Hrs	4		442		442	20%	88	
1	04	04	03	02		Pack Rem Std Bellows for Shipping	27-Jun-07	28-Jun-07	C	AN_MFA	Hrs	8		519		519	20%	104	
1	04	04	03	02		Ship Rem 22 Std Bel Mod to SLAC	29-Jun-07	6-Jul-07	C	AN_MSE	\$\$		500		513		513	20%	103
1	04	04	03	02		Transmit Std Bel Mod Design & Drawings to SLA	15-Mar-07	21-Mar-07	C	SL_MDD	Hrs	8		670		670	20%	134	
1	04	04	03	02		Transmit Std Bel Mod Design & Drawings to SLA	15-Mar-07	21-Mar-07	C	AN_ME1	Hrs	8		884		884	20%	177	
1	04	04	03	02		Transmit Std Bel Mod Design & Drawings to SLA	15-Mar-07	21-Mar-07	C	AN_MDD	Hrs	16		1,038		1,038	20%	208	
1	04	04	04			Single Undulator Test (SUT) Vacuum						218	-	24,089	-	24,089		2,409	
1	04	04	04			Support SUT Long Term Test FY06	22-Nov-06	1-Dec-06	C	AN_MVE	Hrs	200		22,100		22,100	10%	2,210	
1	04	04	04			Support SUT Long Term Test FY07	4-Dec-06	1-Jun-07	C	AN_MVE	Hrs	18		1,989		1,989	10%	199	
1	04	04	05			Short Diagnostic Break (SDB) Assembly						464	43,682	47,985	44,818	92,802		13,920	
1	04	04	05			Mechanical Analysis SDB Vac Cham & Integration	1-Aug-06	9-Aug-06	C	AN_MVE	Hrs	5		560		560	15%	84	

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$	
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total			
1	04	04	05			Mechanical Analysis SDB Vac Cham & Integration	1-Aug-06	9-Aug-06	C	AN_ME1	Hrs	10		1,120		1,120	15%	168	
1	04	04	05			SDB Calculation Verification	18-Sep-06	27-Oct-06	C	LL_ME1	Hrs	80		14,372		14,372	15%	2,156	
1	04	04	05			Final SDB Vac Cham & Integration Design	18-Sep-06	29-Sep-06	C	AN_MVE	Hrs	24		2,585		2,585	15%	388	
1	04	04	05			Final SDB Vac Cham & Integration Design	18-Sep-06	29-Sep-06	C	AN_MDD	Hrs	40		2,529		2,529	15%	379	
1	04	04	05			Final SDB Vac Cham & Integration Design Review	2-Oct-06	6-Oct-06	C	AN_PHS	Hrs	8		884		884	15%	133	
1	04	04	05			Final SDB Vac Cham & Integration Design Review	2-Oct-06	6-Oct-06	C	AN_MVE	Hrs	16		1,768		1,768	15%	265	
1	04	04	05			Final SDB Vac Cham & Integration Design Review	2-Oct-06	6-Oct-06	C	AN_MDD	Hrs	16		1,038		1,038	15%	156	
1	04	04	05			Pump Support Bid Package	9-Oct-06	13-Oct-06	C	AN_MVE	Hrs	16		1,768		1,768	15%	265	
1	04	04	05			Pump Manifold (23) Award Effort	30-Oct-06	31-Oct-06	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	05			Pump Support (23) Award Effort	9-Oct-06	11-Oct-06	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	05			SDB Ion Pump Support Award Effort	1-Nov-06	2-Nov-06	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	05			REC: SDB Pump Manifold (23)	3-Nov-06	10-Jan-07	C	AA_MSS	\$\$		10,068		10,330		10,330	15%	1,549
1	04	04	05			REC: SDB Ion Pump Support (23)	3-Nov-06	10-Jan-07	C	AA_MSS	\$\$		32,614		33,462		33,462	15%	5,019
1	04	04	05			QA Production Lot SDB	11-Jan-07	24-Jan-07	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	05			QA Production Lot SDB	11-Jan-07	24-Jan-07	C	AN_MFM	Hrs	24		2,447		2,447	15%	367	
1	04	04	05			Approve Production Lot SDB	25-Jan-07	29-Jan-07	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	05			Clean SDB	30-Jan-07	5-Feb-07	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	05			Clean SDB	30-Jan-07	5-Feb-07	C	AN_MFA	Hrs	32		2,076		2,076	15%	311	
1	04	04	05			Bake SDB	27-Feb-07	5-Mar-07	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	05			Bake SDB	27-Feb-07	5-Mar-07	C	AN_MFA	Hrs	32		2,076		2,076	15%	311	
1	04	04	05			Prepare Short Diagnostic Break for Shipment	6-Mar-07	12-Mar-07	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	05			Prepare Short Diagnostic Break for Shipment	6-Mar-07	12-Mar-07	C	AN_MFA	Hrs	24		1,557		1,557	15%	234	
1	04	04	05			Pack Short Diagnostic Break for Shipping	13-Mar-07	19-Mar-07	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	05			Pack Short Diagnostic Break for Shipping	13-Mar-07	19-Mar-07	C	AN_MFA	Hrs	24		1,557		1,557	15%	234	
1	04	04	05			Ship to SLAC SDB	20-Mar-07	26-Mar-07	C	AN_MSE	\$\$		1,000		1,026		1,026	15%	154
1	04	04	05			Transmit SDB Design & Drawings to SLAC	27-Mar-07	2-Apr-07	C	AN_ME1	Hrs	8		884		884	15%	133	
1	04	04	05			Transmit SDB Design & Drawings to SLAC	27-Mar-07	2-Apr-07	C	AN_MDD	Hrs	16		1,038		1,038	15%	156	
1	04	04	05			Pump Manifold Bid Package	9-Oct-06	13-Oct-06	C	AN_MVE	Hrs	16		1,768		1,768	15%	265	
1	04	04	06			Long Diagnostic Break (LDB) Assembly						492	40,827	44,643	41,889	86,531		12,980	
1	04	04	06			Chamber Support Bid Package	6-Dec-06	12-Dec-06	C	AN_MVE	Hrs	16		1,768		1,768	15%	265	
1	04	04	06			Pump Support Bid Package	6-Dec-06	12-Dec-06	C	AN_MVE	Hrs	16		1,768		1,768	15%	265	
1	04	04	06			LDB Vac Chamber & Integration Design ETC	1-Aug-06	27-Oct-06	C	SL_PHS	Hrs	4		287		287	15%	43	
1	04	04	06			LDB Vac Chamber & Integration Design ETC	1-Aug-06	27-Oct-06	C	AN_MVE	Hrs	3		326		326	15%	49	
1	04	04	06			LDB Vac Chamber & Integration Design ETC	1-Aug-06	27-Oct-06	C	AN_MDD	Hrs	5		319		319	15%	48	
1	04	04	06			Mechanical Analysis LDB Vac Cham & Integration	30-Oct-06	10-Nov-06	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	06			Mechanical Analysis LDB Vac Cham & Integration	30-Oct-06	10-Nov-06	C	AN_ME1	Hrs	16		1,768		1,768	15%	265	
1	04	04	06			LDB Vac Cham & Integration Final Design	13-Nov-06	28-Nov-06	C	AN_PHS	Hrs	8		884		884	15%	133	
1	04	04	06			LDB Vac Cham & Integration Final Design	13-Nov-06	28-Nov-06	C	AN_MVE	Hrs	24		2,652		2,652	15%	398	
1	04	04	06			LDB Vac Cham & Integration Final Design	13-Nov-06	28-Nov-06	C	AN_MDD	Hrs	40		2,595		2,595	15%	389	
1	04	04	06			Final LDB Vac Cham & Integration Design Review	29-Nov-06	5-Dec-06	C	AN_PHS	Hrs	8		884		884	15%	133	
1	04	04	06			Final LDB Vac Cham & Integration Design Review	29-Nov-06	5-Dec-06	C	AN_MVE	Hrs	16		1,768		1,768	15%	265	
1	04	04	06			Final LDB Vac Cham & Integration Design Review	29-Nov-06	5-Dec-06	C	AN_MDD	Hrs	16		1,038		1,038	15%	156	
1	04	04	06			Bid Process LDB	13-Dec-06	25-Jan-07	C	AN_MVE	Hrs	16		1,768		1,768	15%	265	
1	04	04	06			Evaluate Bid LDB	26-Jan-07	29-Jan-07	C	AN_MVE	Hrs	24		2,652		2,652	15%	398	
1	04	04	06			LDB Valve (11) Award Effort	30-Jan-07	31-Jan-07	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	06			LDB Chamber Weldment Assembly Award Effort	30-Jan-07	31-Jan-07	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	06			LDB Ion Pump Sppt Award Effort	30-Jan-07	31-Jan-07	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	06			LDB Chamber Support Award Effort	30-Jan-07	31-Jan-07	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	06			LDB Ion Pump Support Award Effort	30-Jan-07	31-Jan-07	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	06			REC: LDB Valve (11)	1-Feb-07	28-Mar-07	C	AA_MSS	\$\$		23,000		23,598		23,598	15%	3,540
1	04	04	06			REC: LDB Chamber Weldment Assembly	1-Feb-07	28-Mar-07	C	AN_MVE	Hrs	8		884		884	15%	133	
1	04	04	06			REC: LDB Chamber Weldment Assembly	1-Feb-07	28-Mar-07	C	AN_MFA	Hrs	16		1,038		1,038	15%	156	

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	04	06			REC: LDB Chamber Weldment Assembly	1-Feb-07	28-Mar-07	C	AA_MSS	\$\$		5,327		5,466	5,466	15%	820
1	04	04	06			REC: LDB Chamber Support (11)	1-Feb-07	28-Mar-07	C	AA_MSS	\$\$		8,250		8,465	8,465	15%	1,270
1	04	04	06			REC: LDB Ion Pump Support (11)	1-Feb-07	28-Mar-07	C	AA_MSS	\$\$		3,250		3,335	3,335	15%	500
1	04	04	06			QA Production Lot LDB	29-Mar-07	11-Apr-07	C	AN_MVE	Hrs	8		884		884	15%	133
1	04	04	06			QA Production Lot LDB	29-Mar-07	11-Apr-07	C	AN_MFM	Hrs	24		2,447		2,447	15%	367
1	04	04	06			Approve Production Lot LDB	12-Apr-07	16-Apr-07	C	AN_MVE	Hrs	8		884		884	15%	133
1	04	04	06			Clean LDB	17-Apr-07	26-Apr-07	C	AN_MVE	Hrs	8		884		884	15%	133
1	04	04	06			Clean LDB	17-Apr-07	26-Apr-07	C	AN_MFA	Hrs	32		2,076		2,076	15%	311
1	04	04	06			Bake LDB	27-Apr-07	3-May-07	C	AN_MVE	Hrs	8		884		884	15%	133
1	04	04	06			Bake LDB	27-Apr-07	3-May-07	C	AN_MFA	Hrs	32		2,076		2,076	15%	311
1	04	04	06			Prepare Long Diagnostic Break for Shipment	4-May-07	10-May-07	C	AN_MVE	Hrs	8		884		884	15%	133
1	04	04	06			Prepare Long Diagnostic Break for Shipment	4-May-07	10-May-07	C	AN_MFA	Hrs	24		1,557		1,557	15%	234
1	04	04	06			Pack Long Diagnostic Break for Shipping	11-May-07	17-May-07	C	AN_MVE	Hrs	8		884		884	15%	133
1	04	04	06			Pack Long Diagnostic Break for Shipping	11-May-07	17-May-07	C	AN_MFA	Hrs	24		1,557		1,557	15%	234
1	04	04	06			Ship to SLAC LDB	18-May-07	24-May-07	C	AN_MSE	\$\$		1,000		1,026	1,026	15%	154
1	04	04	06			Transmit Design and Drawings to SLAC	25-May-07	1-Jun-07	C	AN_ME1	Hrs	8		884		884	15%	133
1	04	04	06			Transmit Design and Drawings to SLAC	25-May-07	1-Jun-07	C	AN_MDD	Hrs	16		1,038		1,038	15%	156
1	04	04	07			Entrance Section Assembly						40	-	4,308	-	4,308		-
1	04	04	07			Specification Ent Sec	13-Sep-06	26-Sep-06	C	AN_PHS	Hrs	8		862		862	0%	-
1	04	04	07			Specification Ent Sec	13-Sep-06	26-Sep-06	C	AN_MVE	Hrs	32		3,446		3,446	0%	-
1	04	04	08			Exit Section Assembly						48	-	5,170	-	5,170		-
1	04	04	08			Specification Exit Sec	13-Sep-06	26-Sep-06	C	AN_PHS	Hrs	8		862		862	0%	-
1	04	04	08			Specification Exit Sec	13-Sep-06	26-Sep-06	C	AN_MVE	Hrs	40		4,308		4,308	0%	-
1	04	04	09			Baking System						1,091	56,140	103,044	57,600	160,643		32,129
1	04	04	09			Specification of Baking Station (System)	1-Aug-06	14-Aug-06	C	AN_MVE	Hrs	45		4,825		4,825	20%	965
1	04	04	09			Prelim Design of Baking Station	15-Aug-06	5-Sep-06	C	AN_PHS	Hrs	6		689		689	20%	138
1	04	04	09			Prelim Design of Baking Station	15-Aug-06	5-Sep-06	C	AN_MVE	Hrs	64		6,893		6,893	20%	1,379
1	04	04	09			Prelim Design of Baking Station	15-Aug-06	5-Sep-06	C	AN_MDD	Hrs	96		6,070		6,070	20%	1,214
1	04	04	09			Prelim Baking Station Internal Design Review	6-Sep-06	7-Sep-06	C	AN_PHS	Hrs	8		862		862	20%	172
1	04	04	09			Prelim Baking Station Internal Design Review	6-Sep-06	7-Sep-06	C	AN_MVE	Hrs	40		4,308		4,308	20%	862
1	04	04	09			Prelim Baking Station Internal Design Review	6-Sep-06	7-Sep-06	C	AN_MDD	Hrs	16		1,012		1,012	20%	202
1	04	04	09			Final Design of Baking Station	8-Sep-06	14-Sep-06	C	AN_MVE	Hrs	56		6,031		6,031	20%	1,206
1	04	04	09			Final Design of Baking Station	8-Sep-06	14-Sep-06	C	AN_MDD	Hrs	80		5,059		5,059	20%	1,012
1	04	04	09			Bid Package-Baking Station	15-Sep-06	19-Sep-06	C	AN_MVE	Hrs	8		862		862	20%	172
1	04	04	09			Bid Package-Heater	15-Sep-06	19-Sep-06	C	AN_MVE	Hrs	8		862		862	20%	172
1	04	04	09			Bid Package-Thermal Insulation	15-Sep-06	19-Sep-06	C	AN_MVE	Hrs	16		1,723		1,723	20%	345
1	04	04	09			Bid Pkg: Turbo Pump Baking Station	15-Sep-06	21-Sep-06	C	AN_MVE	Hrs	24		2,585		2,585	20%	517
1	04	04	09			Bid Pkg: Roughing Pump Baking Station	15-Sep-06	19-Sep-06	C	AN_MVE	Hrs	8		862		862	20%	172
1	04	04	09			Bid Package-Valves Baking Station	15-Sep-06	19-Sep-06	C	AN_MVE	Hrs	8		862		862	20%	172
1	04	04	09			Bid Pkg: Vacuum Gauge Baking Station	15-Sep-06	19-Sep-06	C	AN_MVE	Hrs	8		862		862	20%	172
1	04	04	09			Bid Pkg: RGA Baking Station	15-Sep-06	21-Sep-06	C	AN_MVE	Hrs	16		1,723		1,723	20%	345
1	04	04	09			Bid Process Baking Station	22-Sep-06	6-Nov-06	C	AN_MVE	Hrs	16		1,759		1,759	20%	352
1	04	04	09			Evaluate Bids: Baking Station	7-Nov-06	9-Nov-06	C	AN_MVE	Hrs	24		2,652		2,652	20%	530
1	04	04	09			Baking Station Award Effort	10-Nov-06	14-Nov-06	C	AN_MVE	Hrs	8		884		884	20%	177
1	04	04	09			Heater Award Effort	10-Nov-06	14-Nov-06	C	AN_MVE	Hrs	8		884		884	20%	177
1	04	04	09			Thermal Insulation Aard Effort	10-Nov-06	14-Nov-06	C	AN_MVE	Hrs	8		884		884	20%	177
1	04	04	09			Turbo Pump Award Effort	10-Nov-06	14-Nov-06	C	AN_MVE	Hrs	8		884		884	20%	177
1	04	04	09			Roughing Pump Award Effort	10-Nov-06	14-Nov-06	C	AN_MVE	Hrs	8		884		884	20%	177
1	04	04	09			Valves Award Effort	10-Nov-06	14-Nov-06	C	AN_MVE	Hrs	8		884		884	20%	177
1	04	04	09			Vacuum Gauge Award Effort	10-Nov-06	14-Nov-06	C	AN_MVE	Hrs	8		884		884	20%	177
1	04	04	09			RGA Award Support	10-Nov-06	14-Nov-06	C	AN_MVE	Hrs	8		884		884	20%	177
1	04	04	09			Fabrication of Baking Components	15-Nov-06	14-Dec-06	C	AN_MVE	Hrs	64		7,072		7,072	20%	1,414

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$	
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total			
1	04	04	09			Fabrication of Baking Components	15-Nov-06	14-Dec-06	C	AN_MFM	Hrs	120		12,237		12,237	20%	2,447	
1	04	04	09			REC: Baking Components	15-Dec-06	15-Jan-07	C	AN_MVE	Hrs	8		884		884	20%	177	
1	04	04	09			REC: Baking Components	15-Dec-06	15-Jan-07	C	AN_MFA	Hrs	24		1,557		1,557	20%	311	
1	04	04	09			REC: Baking Components	15-Dec-06	15-Jan-07	C	AA_MSE	\$\$		56,140		57,600		57,600	20%	11,520
1	04	04	09			QA of Baking Components	16-Jan-07	22-Jan-07	C	AN_MVE	Hrs	24		2,652		2,652	20%	530	
1	04	04	09			QA of Baking Components	16-Jan-07	22-Jan-07	C	AN_MFM	Hrs	40		4,079		4,079	20%	816	
1	04	04	09			Assemble Baking System	23-Jan-07	12-Feb-07	C	AN_MVE	Hrs	56		6,188		6,188	20%	1,238	
1	04	04	09			Assemble Baking System	23-Jan-07	12-Feb-07	C	AN_MFA	Hrs	80		5,190		5,190	20%	1,038	
1	04	04	09			Perform Bake System Testing	13-Feb-07	19-Feb-07	C	AN_MVE	Hrs	24		2,652		2,652	20%	530	
1	04	04	09			Perform Bake System Testing	13-Feb-07	19-Feb-07	C	AN_MFA	Hrs	16		1,038		1,038	20%	208	
1	04	04	09			Transmit Baking Sys Design & Drawings to SLAC	20-Feb-07	26-Feb-07	C	AN_ME1	Hrs	8		884		884	20%	177	
1	04	04	09			Transmit Baking Sys Design & Drawings to SLAC	20-Feb-07	26-Feb-07	C	AN_MDD	Hrs	16		1,038		1,038	20%	208	
1	04	05				Diagnostics						5,875	1,554,963	531,670	1,593,269	2,124,939		443,836	
1	04	05	02			Undulator Line Diagnostics (ULD)													
1	04	05	02	01		ULD Test Station													
1	04	05	02	02		ULD Vacuum Chamber													
1	04	05	02	03		Positioning Mechanism													
1	04	05	02	04		Scanning wire assembly (ULD-SWA)													
1	04	05	02	05		Optical transition radiation imaging assembly													
1	04	05	02	09		ULD Design & Integration													
1	04	05	04			End-of-Undulator(EOU) X-ray and Profile diagnost													
1	04	05	04	01		Prototype Construction and Testing													
1	04	05	04	02		Bunch Length Monitor-Streak Camera (BLM)													
1	04	05	04	03		Upstream corrector / separator													
1	04	05	04	04		Optical Diffraction radiation imaging assembly (
1	04	05	04	05		X-ray High Resolution monochromator assembly (EO													
1	04	05	04	06		X-ray Imaging High Resolution detector assembly													
1	04	05	04	07		EOU Design and Integration													
1	04	05	05			RFBPM						2,651	1,015,702	240,487	1,039,987	1,280,474		256,095	
1	04	05	05	01		X-Band Cavity BPM Development						857	65,040	80,565	65,118	145,683		29,137	
1	04	05	05	01		Incorporate Comments into Design	2-Aug-06	8-Aug-06	C	AN_EE1	Hrs	8		862		862	20%	172	
1	04	05	05	01		Machine Three Bodies	9-Aug-06	20-Sep-06	C	AN_MSE	\$\$		52,000		52,000		52,000	20%	10,400
1	04	05	05	01		Machine Three Bodies	9-Aug-06	20-Sep-06	C	AN_ME1	Hrs	16		1,723		1,723	20%	345	
1	04	05	05	01		Machine Three Bodies	9-Aug-06	20-Sep-06	C	AN_EE1	Hrs	8		862		862	20%	172	
1	04	05	05	01		Cold Test Three Cavity Bodies	21-Sep-06	27-Sep-06	C	AN_ME1	Hrs	12		1,292		1,292	20%	258	
1	04	05	05	01		Cold Test Three Cavity Bodies	21-Sep-06	27-Sep-06	C	AN_EE1	Hrs	20		2,154		2,154	20%	431	
1	04	05	05	01		Cold Test Three Cavity Bodies	21-Sep-06	27-Sep-06	C	AN_CT1	Hrs	20		1,265		1,265	20%	253	
1	04	05	05	01		Braze Three Bodies	28-Sep-06	4-Oct-06	C	AN_MSE	\$\$		6,000		6,078		6,078	20%	1,216
1	04	05	05	01		Braze Three Bodies	28-Sep-06	4-Oct-06	C	AN_MFM	Hrs	32		3,222		3,222	20%	644	
1	04	05	05	01		Braze Three Bodies	28-Sep-06	4-Oct-06	C	AN_MFA	Hrs	8		512		512	20%	102	
1	04	05	05	01		Braze Three Bodies	28-Sep-06	4-Oct-06	C	AN_ME1	Hrs	8		873		873	20%	175	
1	04	05	05	01		Cold Test Three Brazed Bodies	5-Oct-06	11-Oct-06	C	AN_ME1	Hrs	12		1,326		1,326	20%	265	
1	04	05	05	01		Cold Test Three Brazed Bodies	5-Oct-06	11-Oct-06	C	AN_EE1	Hrs	20		2,210		2,210	20%	442	
1	04	05	05	01		Cold Test Three Brazed Bodies	5-Oct-06	11-Oct-06	C	AN_CT1	Hrs	20		1,298		1,298	20%	260	
1	04	05	05	01		ITS Test First Unit ETC	1-Aug-06	29-Sep-06	C	AN_PHS	Hrs	6		646		646	20%	129	
1	04	05	05	01		ITS Test First Unit ETC	1-Aug-06	29-Sep-06	C	AN_EE1	Hrs	12		1,292		1,292	20%	258	
1	04	05	05	01		ITS Test First Unit ETC	1-Aug-06	29-Sep-06	C	AN_CE1	Hrs	6		646		646	20%	129	
1	04	05	05	01		Design Spools & Support Frame ETC	1-Aug-06	30-Aug-06	C	AN_ME1	Hrs	20		2,111		2,111	20%	422	
1	04	05	05	01		Design Spools & Support Frame ETC	1-Aug-06	30-Aug-06	C	AN_MDD	Hrs	29		1,859		1,859	20%	372	
1	04	05	05	01		Design Spools & Support Frame ETC	1-Aug-06	30-Aug-06	C	AN_EE1	Hrs	2		226		226	20%	45	
1	04	05	05	01		Procure and Fab Linac Equipment ETC	1-Aug-06	30-Aug-06	C	AN_MSE	\$\$		7,040		7,040		7,040	20%	1,408
1	04	05	05	01		Procure and Fab Linac Equipment ETC	1-Aug-06	30-Aug-06	C	AN_MFM	Hrs	28		2,783		2,783	20%	557	

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$	
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total			
1	04	05	05	01		Procure and Fab Linac Equipment ETC	1-Aug-06	30-Aug-06	C	AN_ME1	Hrs	14		1,551		1,551	20%	310	
1	04	05	05	01		Procure and Fab Linac Equipment ETC	1-Aug-06	30-Aug-06	C	AN_EE1	Hrs	3		345		345	20%	69	
1	04	05	05	01		Assemble Linac Equipment	10-Oct-06	30-Oct-06	C	AN_MFA	Hrs	64		4,152		4,152	20%	830	
1	04	05	05	01		Assemble Linac Equipment	10-Oct-06	30-Oct-06	C	AN_ME1	Hrs	40		4,420		4,420	20%	884	
1	04	05	05	01		Assemble Linac Equipment	10-Oct-06	30-Oct-06	C	AN_EE1	Hrs	40		4,420		4,420	20%	884	
1	04	05	05	01		Assemble Linac Equipment	10-Oct-06	30-Oct-06	C	AN_CT1	Hrs	40		2,595		2,595	20%	519	
1	04	05	05	01		Controls Integration in the Linac	31-Oct-06	13-Nov-06	C	AN_EE1	Hrs	40		4,420		4,420	20%	884	
1	04	05	05	01		Controls Integration in the Linac	31-Oct-06	13-Nov-06	C	AN_CT1	Hrs	104		6,747		6,747	20%	1,349	
1	04	05	05	01		Controls Integration in the Linac	31-Oct-06	13-Nov-06	C	AN_CE1	Hrs	64		7,072		7,072	20%	1,414	
1	04	05	05	01		Linac Test Three Units	14-Nov-06	24-Jan-07	C	AN_PHS	Hrs	40		4,420		4,420	20%	884	
1	04	05	05	01		Linac Test Three Units	14-Nov-06	24-Jan-07	C	AN_EE1	Hrs	80		8,840		8,840	20%	1,768	
1	04	05	05	01		Linac Test Three Units	14-Nov-06	24-Jan-07	C	AN_CE1	Hrs	40		4,420		4,420	20%	884	
1	04	05	05	02		X-Band Receiver Development						130	19,602	11,016	19,602	30,618		6,124	
1	04	05	05	02		Controls Development ETC	1-Aug-06	30-Aug-06	C	AN_EE1	Hrs	2		162		162	20%	32	
1	04	05	05	02		Controls Development ETC	1-Aug-06	30-Aug-06	C	AN_CT1	Hrs	3		190		190	20%	38	
1	04	05	05	02		Controls Development ETC	1-Aug-06	30-Aug-06	C	AN_CE1	Hrs	2		242		242	20%	48	
1	04	05	05	02		Review ITS Results	25-Sep-06	29-Sep-06	C	AN_EE1	Hrs	16		1,723		1,723	20%	345	
1	04	05	05	02		Update Down Converter and LO Spec ETC	1-Aug-06	30-Aug-06	C	AN_EE1	Hrs	3		345		345	20%	69	
1	04	05	05	02		Procure Prototype Down Converter and LO(3) ETC	1-Aug-06	17-Aug-06	C	AN_MSE	\$\$		19,602		19,602		19,602	20%	3,920
1	04	05	05	02		Procure Prototype Down Converter and LO(3) ETC	1-Aug-06	17-Aug-06	C	AN_EE1	Hrs	8		862		862	20%	172	
1	04	05	05	02		Bench Test & Tune (3) DC and LO	18-Aug-06	8-Sep-06	C	AN_EE1	Hrs	32		3,446		3,446	20%	689	
1	04	05	05	02		Bench Test & Tune (3) DC and LO	18-Aug-06	8-Sep-06	C	AN_CT1	Hrs	64		4,047		4,047	20%	809	
1	04	05	05	03		X-Band BPM Production						1,664	931,060	148,905	955,268	1,104,173		220,835	
1	04	05	05	03		RFBPM Preliminary Prod Design	12-Oct-06	1-Nov-06	C	AN_ME1	Hrs	32		3,536		3,536	20%	707	
1	04	05	05	03		RFBPM Preliminary Prod Design	12-Oct-06	1-Nov-06	C	AN_MDD	Hrs	80		5,190		5,190	20%	1,038	
1	04	05	05	03		RFBPM Preliminary Prod Design	12-Oct-06	1-Nov-06	C	AN_EE1	Hrs	32		3,536		3,536	20%	707	
1	04	05	05	03		LTU BPM Preliminary Prod Design	19-Oct-06	1-Nov-06	C	AN_ME1	Hrs	24		2,652		2,652	20%	530	
1	04	05	05	03		LTU BPM Preliminary Prod Design	19-Oct-06	1-Nov-06	C	AN_MDD	Hrs	40		2,595		2,595	20%	519	
1	04	05	05	03		LTU BPM Preliminary Prod Design	19-Oct-06	1-Nov-06	C	AN_EE1	Hrs	24		2,652		2,652	20%	530	
1	04	05	05	03		Waveguide Preliminary Prod Design	19-Oct-06	1-Nov-06	C	AN_ME1	Hrs	24		2,652		2,652	20%	530	
1	04	05	05	03		Waveguide Preliminary Prod Design	19-Oct-06	1-Nov-06	C	AN_MDD	Hrs	40		2,595		2,595	20%	519	
1	04	05	05	03		Waveguide Preliminary Prod Design	19-Oct-06	1-Nov-06	C	AN_EE1	Hrs	24		2,652		2,652	20%	530	
1	04	05	05	03		RFBPM Prod Design Review	2-Nov-06	8-Nov-06	C	AN_PHS	Hrs	16		1,768		1,768	20%	354	
1	04	05	05	03		RFBPM Prod Design Review	2-Nov-06	8-Nov-06	C	AN_ME1	Hrs	16		1,768		1,768	20%	354	
1	04	05	05	03		RFBPM Prod Design Review	2-Nov-06	8-Nov-06	C	AN_EE1	Hrs	16		1,768		1,768	20%	354	
1	04	05	05	03		RFBPM Prod Final Design	9-Nov-06	22-Nov-06	C	AN_ME1	Hrs	32		3,536		3,536	20%	707	
1	04	05	05	03		RFBPM Prod Final Design	9-Nov-06	22-Nov-06	C	AN_MDD	Hrs	40		2,595		2,595	20%	519	
1	04	05	05	03		RFBPM Prod Final Design	9-Nov-06	22-Nov-06	C	AN_EE1	Hrs	16		1,768		1,768	20%	354	
1	04	05	05	03		LTU BPM Final Design	27-Nov-06	8-Dec-06	C	AN_ME1	Hrs	24		2,652		2,652	20%	530	
1	04	05	05	03		LTU BPM Final Design	27-Nov-06	8-Dec-06	C	AN_MDD	Hrs	40		2,595		2,595	20%	519	
1	04	05	05	03		LTU BPM Final Design	27-Nov-06	8-Dec-06	C	AN_EE1	Hrs	24		2,652		2,652	20%	530	
1	04	05	05	03		Waveguide Final Design	27-Nov-06	8-Dec-06	C	AN_ME1	Hrs	24		2,652		2,652	20%	530	
1	04	05	05	03		Waveguide Final Design	27-Nov-06	8-Dec-06	C	AN_MDD	Hrs	40		2,595		2,595	20%	519	
1	04	05	05	03		Waveguide Final Design	27-Nov-06	8-Dec-06	C	AN_EE1	Hrs	24		2,652		2,652	20%	530	
1	04	05	05	03		Prepare Bid of RF Cabling	11-Dec-06	12-Dec-06	C	AN_EE1	Hrs	16		1,768		1,768	20%	354	
1	04	05	05	03		Prepare Bid Waveguide	11-Dec-06	15-Dec-06	C	AN_ME1	Hrs	8		884		884	20%	177	
1	04	05	05	03		Prepare Bid Waveguide	11-Dec-06	15-Dec-06	C	AN_EE1	Hrs	8		884		884	20%	177	
1	04	05	05	03		Prepare Bid Down Converter & LO	11-Dec-06	15-Dec-06	C	AN_ME1	Hrs	8		884		884	20%	177	
1	04	05	05	03		Prepare Bid Down Converter & LO	11-Dec-06	15-Dec-06	C	AN_EE1	Hrs	8		884		884	20%	177	
1	04	05	05	03		Prepare Bid of Copper Body Brazement	11-Dec-06	15-Dec-06	C	AN_ME1	Hrs	16		1,768		1,768	20%	354	
1	04	05	05	03		Prepare Bid of Copper Body Brazement	11-Dec-06	15-Dec-06	C	AN_EE1	Hrs	16		1,768		1,768	20%	354	
1	04	05	05	03		Prepare Bid of Support & Alignment Mechanism	11-Dec-06	2-Jan-07	C	AN_ME1	Hrs	16		1,768		1,768	20%	354	

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$		
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total				
1	04	05	05	03		Bid Process - RFBPM	3-Jan-07	4-Jan-07	C	AN_ME1	Hrs	8		884		884	20%	177		
1	04	05	05	03		Bid Process - RFBPM	3-Jan-07	4-Jan-07	C	AN_EE1	Hrs	8		884		884	20%	177		
1	04	05	05	03		Evaluate Bids - RFBPM	5-Jan-07	9-Jan-07	C	AN_ME1	Hrs	8		884		884	20%	177		
1	04	05	05	03		Copper Body Brazement (35) Award Effort	10-Jan-07	12-Jan-07	C	AN_ME1	Hrs	8		884		884	20%	177		
1	04	05	05	03		Copper Body Brazement (35) Award Effort	10-Jan-07	12-Jan-07	C	AN_EE1	Hrs	8		884		884	20%	177		
1	04	05	05	03		REC: LTU BPM Brazements (2)	20-Feb-07	30-Apr-07	C	AN_ME1	Hrs	8		884		884	20%	177		
1	04	05	05	03		REC: LTU BPM Brazements (2)	20-Feb-07	30-Apr-07	C	AN_EE1	Hrs	8		884		884	20%	177		
1	04	05	05	03		REC: LTU BPM Brazements (2)	20-Feb-07	30-Apr-07	C	AA_MSE	\$\$		16,000		16,416		16,416	20%	3,283	
1	04	05	05	03		REC: LTU BPM Supports (2)	15-Jan-07	16-Feb-07	C	AN_ME1	Hrs	4		442		442		442	20%	88
1	04	05	05	03		REC: LTU BPM Supports (2)	15-Jan-07	16-Feb-07	C	AN_EE1	Hrs	4		442		442		442	20%	88
1	04	05	05	03		REC: LTU BPM Supports (2)	15-Jan-07	16-Feb-07	C	AA_MSE	\$\$		5,000		5,130		5,130	20%	1,026	
1	04	05	05	03		Support & Alignment Mechanism (36) Award Effort	10-Jan-07	12-Jan-07	C	AN_ME1	Hrs	8		884		884		884	20%	177
1	04	05	05	03		REC: Undulator Down Converter (37)	15-Jan-07	17-Jan-07	C	AN_ME1	Hrs	8		884		884		884	20%	177
1	04	05	05	03		REC: Undulator Down Converter (37)	15-Jan-07	17-Jan-07	C	AN_EE1	Hrs	8		884		884		884	20%	177
1	04	05	05	03		REC: Undulator Down Converter (37)	15-Jan-07	17-Jan-07	C	AA_MSE	\$\$		295,260		302,937		302,937	20%	60,587	
1	04	05	05	03		REC: Undulator Local Oscillator (37)	15-Jan-07	17-Jan-07	C	AN_ME1	Hrs	8		884		884		884	20%	177
1	04	05	05	03		REC: Undulator Local Oscillator (37)	15-Jan-07	17-Jan-07	C	AN_EE1	Hrs	8		884		884		884	20%	177
1	04	05	05	03		REC: Undulator Local Oscillator (37)	15-Jan-07	17-Jan-07	C	AA_MSE	\$\$		55,000		56,430		56,430	20%	11,286	
1	04	05	05	03		RF Cabling (37) Award Effort	10-Jan-07	12-Jan-07	C	AN_EE1	Hrs	8		884		884		884	20%	177
1	04	05	05	03		REC: 1st Art.Support & Alignment Mechanism	15-Jan-07	16-Feb-07	C	AN_ME1	Hrs	8		884		884		884	20%	177
1	04	05	05	03		REC: 1st Art.Support & Alignment Mechanism	15-Jan-07	16-Feb-07	C	AA_MSE	\$\$		2,500		2,565		2,565	20%	513	
1	04	05	05	03		REC: Support & Alignment Mechanism (36)	15-Jan-07	23-Mar-07	C	AA_MSE	\$\$		90,000		92,340		92,340	20%	18,468	
1	04	05	05	03		REC: RF Cabling (36)	15-Jan-07	23-Mar-07	C	AA_MSE	\$\$		54,000		55,404		55,404	20%	11,081	
1	04	05	05	03		REC: 1st Article Copper Body Brazement	15-Jan-07	23-Mar-07	C	AN_ME1	Hrs	16		1,768		1,768		1,768	20%	354
1	04	05	05	03		REC: 1st Article Copper Body Brazement	15-Jan-07	23-Mar-07	C	AA_MSE	\$\$		8,000		8,208		8,208	20%	1,642	
1	04	05	05	03		QA: LTU & 1st Copper Body Brazement & Supports	1-May-07	2-May-07	C	AN_MFM	Hrs	16		1,632		1,632		1,632	20%	326
1	04	05	05	03		QA: LTU & 1st Copper Body Brazement & Supports	1-May-07	2-May-07	C	AN_ME1	Hrs	8		884		884		884	20%	177
1	04	05	05	03		QA: LTU & 1st Copper Body Brazement & Supports	1-May-07	2-May-07	C	AN_EE1	Hrs	4		442		442		442	20%	88
1	04	05	05	03		Cold Test 1st Article	3-May-07	7-May-07	C	AN_MFA	Hrs	16		1,038		1,038		1,038	20%	208
1	04	05	05	03		Cold Test 1st Article	3-May-07	7-May-07	C	AN_EE1	Hrs	8		884		884		884	20%	177
1	04	05	05	03		Approve: 1st Copper Body Brazement & Supports	8-May-07	9-May-07	C	AN_ME1	Hrs	8		884		884		884	20%	177
1	04	05	05	03		Approve: 1st Copper Body Brazement & Supports	8-May-07	9-May-07	C	AN_EE1	Hrs	4		442		442		442	20%	88
1	04	05	05	03		REC: Copper Body Brazement (34)	10-May-07	8-Aug-07	C	AN_ME1	Hrs	16		1,768		1,768		1,768	20%	354
1	04	05	05	03		REC: Copper Body Brazement (34)	10-May-07	8-Aug-07	C	AA_MSE	\$\$		272,000		279,072		279,072	20%	55,814	
1	04	05	05	03		QA Production Lot	11-Jun-07	15-Aug-07	C	AN_MFM	Hrs	40		4,079		4,079		4,079	20%	816
1	04	05	05	03		QA Production Lot	11-Jun-07	15-Aug-07	C	AN_ME1	Hrs	16		1,768		1,768		1,768	20%	354
1	04	05	05	03		QA Production Lot	11-Jun-07	15-Aug-07	C	AN_EE1	Hrs	16		1,768		1,768		1,768	20%	354
1	04	05	05	03		QA Production Lot	11-Jun-07	15-Aug-07	C	AN_CT1	Hrs	16		1,038		1,038		1,038	20%	208
1	04	05	05	03		REC: LTU BPMs (2) - Effort Support	15-Jan-07	23-Mar-07	C	AN_MFA	Hrs	4		260		260		260	20%	52
1	04	05	05	03		REC: LTU BPMs (2) - Effort Support	15-Jan-07	23-Mar-07	C	AN_EE1	Hrs	4		442		442		442	20%	88
1	04	05	05	03		REC: Waveguide, Undulator & LTU (37) - Effort	15-Jan-07	13-Mar-07	C	AN_MFA	Hrs	8		519		519		519	20%	104
1	04	05	05	03		REC: Waveguide, Undulator & LTU (37) - Effort	15-Jan-07	13-Mar-07	C	AN_EE1	Hrs	8		884		884		884	20%	177
1	04	05	05	03		REC: Undulator Waveguide (35)	15-Jan-07	19-Mar-07	C	AA_MSE	\$\$		120,600		123,736		123,736	20%	24,747	
1	04	05	05	03		Assemble/Test LTU BPM	18-Jun-07	27-Jun-07	C	AN_MFA	Hrs	48		3,114		3,114		3,114	20%	623
1	04	05	05	03		Assemble/Test LTU BPM	18-Jun-07	27-Jun-07	C	AN_EE1	Hrs	64		7,072		7,072		7,072	20%	1,414
1	04	05	05	03		Assemble/Test Undulator BPM	28-Jun-07	27-Aug-07	C	AN_MFA	Hrs	280		18,166		18,166		18,166	20%	3,633
1	04	05	05	03		Assemble/Test Undulator BPM	28-Jun-07	27-Aug-07	C	AN_EE1	Hrs	64		7,072		7,072		7,072	20%	1,414
1	04	05	05	03		Pack/Ship 1st Lot (11)Undulator RFBPM to SLAC	20-Jul-07	26-Jul-07	C	AN_MSE	\$\$		2,000		2,052		2,052	20%	410	
1	04	05	05	03		Pack/Ship 1st Lot (11)Undulator RFBPM to SLAC	20-Jul-07	26-Jul-07	C	AN_MFA	Hrs	24		1,557		1,557		1,557	20%	311
1	04	05	05	03		Pack/Ship 1st Lot (11)Undulator RFBPM to SLAC	20-Jul-07	26-Jul-07	C	AN_ME1	Hrs	8		884		884		884	20%	177
1	04	05	05	03		Pack/Ship LTU RFBPM to SLAC	28-Jun-07	5-Jul-07	C	AN_MFA	Hrs	24		1,557		1,557		1,557	20%	311
1	04	05	05	03		Pack/Ship LTU RFBPM to SLAC	28-Jun-07	5-Jul-07	C	AN_ME1	Hrs	8		884		884		884	20%	177

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	05	05	03		Pack/Ship 2nd Lot(11)Undulator RFBPM to SLAC	10-Aug-07	16-Aug-07	C	AN_MSE	\$\$		2,000		2,052	2,052	20%	410
1	04	05	05	03		Pack/Ship 2nd Lot(11)Undulator RFBPM to SLAC	10-Aug-07	16-Aug-07	C	AN_MFA	Hrs	24		1,557		1,557	20%	311
1	04	05	05	03		Pack/Ship 2nd Lot(11)Undulator RFBPM to SLAC	10-Aug-07	16-Aug-07	C	AN_ME1	Hrs	8		884		884	20%	177
1	04	05	05	03		Pack/Ship 3rd Lot(12)Undulator RFBPM to SLAC	31-Aug-07	7-Sep-07	C	AN_MSE	\$\$		2,000		2,052	2,052	20%	410
1	04	05	05	03		Pack/Ship 3rd Lot(12)Undulator RFBPM to SLAC	31-Aug-07	7-Sep-07	C	AN_MFA	Hrs	24		1,557		1,557	20%	311
1	04	05	05	03		Pack/Ship 3rd Lot(12)Undulator RFBPM to SLAC	31-Aug-07	7-Sep-07	C	AN_ME1	Hrs	8		884		884	20%	177
1	04	05	05	03		Write Shipping Paper Work-RFBPM	6-Jul-07	9-Jul-07	C	AN_ME1	Hrs	8		884		884	20%	177
1	04	05	05	03		Transmit Engineering Data to SLAC-RFBPM	10-Sep-07	14-Sep-07	C	AN_ME1	Hrs	8		884		884	20%	177
1	04	05	05	03		Transmit Engineering Data to SLAC-RFBPM	10-Sep-07	14-Sep-07	C	AN_MDD	Hrs	8		519		519	20%	104
1	04	05	05	03		REC: LTU BPM Waveguide (2)	15-Jan-07	17-Jan-07	C	AA_MSE	\$\$		6,700		6,874	6,874	20%	1,375
1	04	05	06			Beam Finder Wire						939	337,261	80,336	346,030	426,366		63,955
1	04	05	06			Fixture and Tooling Design ETC	1-Aug-06	17-Aug-06	C	AN_ME1	Hrs	16		1,723		1,723	15%	258
1	04	05	06			Fixture and Tooling Design ETC	1-Aug-06	17-Aug-06	C	AN_MDD	Hrs	16		1,012		1,012	15%	152
1	04	05	06			Prepare Final Design Drawings & Specs	1-Aug-06	31-Aug-06	C	AN_ME1	Hrs	-		-		-	15%	-
1	04	05	06			Prepare Final Design Drawings & Specs	1-Aug-06	31-Aug-06	C	AN_MDD	Hrs	-		-		-	15%	-
1	04	05	06			Prepare Assembly Procedure	1-Aug-06	31-Aug-06	C	AN_ME1	Hrs	-		-		-	15%	-
1	04	05	06			Prepare Acceptance Criteria List	1-Aug-06	28-Aug-06	C	AN_ME1	Hrs	11		1,206		1,206	15%	181
1	04	05	06			Final Design Review - Beam Finder Wire	1-Sep-06	1-Sep-06	C	AN_PHS	Hrs	8		862		862	15%	129
1	04	05	06			Final Design Review - Beam Finder Wire	1-Sep-06	1-Sep-06	C	AN_ME1	Hrs	8		862		862	15%	129
1	04	05	06			Final Design Review - Beam Finder Wire	1-Sep-06	1-Sep-06	C	AN_MDD	Hrs	8		506		506	15%	76
1	04	05	06			Incorporate Design Review Comments	5-Sep-06	18-Sep-06	C	AN_ME1	Hrs	8		862		862	15%	129
1	04	05	06			Incorporate Design Review Comments	5-Sep-06	18-Sep-06	C	AN_MDD	Hrs	12		759		759	15%	114
1	04	05	06			Prepare Bid Pkg - Beam Finder Wire Components	5-Sep-06	11-Sep-06	C	AN_ME1	Hrs	24		2,585		2,585	15%	388
1	04	05	06			Evaluate Bids - Beam Finder Wire Top Components	10-Oct-06	16-Oct-06	C	AN_ME1	Hrs	16		1,768		1,768	15%	265
1	04	05	06			REC: Beam Finder Wire Tooling	18-Oct-06	18-Oct-06	C	AN_MSE	\$\$		10,000		10,260	10,260	15%	1,539
1	04	05	06			REC: Beam Finder Wire Tooling	18-Oct-06	18-Oct-06	C	AN_ME1	Hrs	8		884		884	15%	133
1	04	05	06			REC: Machine Components (3)	18-Oct-06	13-Dec-06	C	AA_MSE	\$\$		28,731		29,478	29,478	15%	4,422
1	04	05	06			Beam Finder Wire Production Effort	18-Oct-06	17-Aug-07	C	AN_MFA	Hrs	440		28,546		28,546	15%	4,282
1	04	05	06			Beam Finder Wire Production Effort	18-Oct-06	17-Aug-07	C	AN_MES	Hrs	104		11,492		11,492	15%	1,724
1	04	05	06			Beam Finder Wire Production Effort	18-Oct-06	17-Aug-07	C	AN_ME1	Hrs	220		24,310		24,310	15%	3,647
1	04	05	06			Beam Finder Wire Production Effort	18-Oct-06	17-Aug-07	C	AN_MDD	Hrs	16		1,038		1,038	15%	156
1	04	05	06			Ship First Lot of Chamber to SLAC (3)	4-Apr-07	11-Apr-07	C	AN_MSE	\$\$		1,020		1,047	1,047	15%	157
1	04	05	06			REC: Machine Components (10)	20-Dec-06	14-Feb-07	C	AA_MSE	\$\$		95,770		98,260	98,260	15%	14,739
1	04	05	06			Ship Second Lot of Chamber to SLAC (10)	7-Jun-07	14-Jun-07	C	AN_MSE	\$\$		3,400		3,488	3,488	15%	523
1	04	05	06			REC: Machine Components (10)	22-Feb-07	4-Apr-07	C	AA_MSE	\$\$		95,770		98,260	98,260	15%	14,739
1	04	05	06			Send Beam Finder Wire Documents to SLAC	20-Aug-07	24-Aug-07	C	AN_ME1	Hrs	8		884		884	15%	133
1	04	05	06			Send Beam Finder Wire Documents to SLAC	20-Aug-07	24-Aug-07	C	AN_MDD	Hrs	16		1,038		1,038	15%	156
1	04	05	06			Ship Third Lot of Chamber to SLAC (10)	22-Jun-07	29-Jun-07	C	AN_MSE	\$\$		3,400		3,488	3,488	15%	523
1	04	05	06			REC: Machine Components (10)	12-Apr-07	23-May-07	C	AA_MSE	\$\$		95,770		98,260	98,260	15%	14,739
1	04	05	06			Ship Fourth Lot of Chamber to SLAC (10)	10-Aug-07	17-Aug-07	C	AN_MSE	\$\$		3,400		3,488	3,488	15%	523
1	04	05	07			Charge Monitor (CM)						32	-	2,735	-	2,735		-
1	04	05	07			Review SLAC Design	5-Sep-06	25-Sep-06	C	AN_MDD	Hrs	16		1,012		1,012	0%	-
1	04	05	07			Review SLAC Design	5-Sep-06	25-Sep-06	C	AN_EE1	Hrs	16		1,723		1,723	0%	-
1	04	05	08			Beam Loss Monitoring						1,828	202,000	169,150	207,252	376,402		112,921
1	04	05	08			Preliminary Design - Beam Loss Mon ETC	1-Aug-06	30-Aug-06	C	AN_PHS	Hrs	14		1,551		1,551	30%	465
1	04	05	08			Preliminary Design - Beam Loss Mon ETC	1-Aug-06	30-Aug-06	C	AN_ME1	Hrs	23		2,520		2,520	30%	756
1	04	05	08			Preliminary Design - Beam Loss Mon ETC	1-Aug-06	30-Aug-06	C	AN_MDD	Hrs	29		1,821		1,821	30%	546
1	04	05	08			Preliminary Design - Beam Loss Mon ETC	1-Aug-06	30-Aug-06	C	AN_EE1	Hrs	23		2,520		2,520	30%	756
1	04	05	08			Initial Studies, Conceptual Design, Research	19-Sep-06	13-Nov-06	C	AN_PHS	Hrs	128		14,066		14,066	30%	4,220
1	04	05	08			Detail Design of System	16-Oct-06	18-Jan-07	C	AN_PHS	Hrs	120		13,260		13,260	30%	3,978
1	04	05	08			Detail Design of System	16-Oct-06	18-Jan-07	C	AN_MDD	Hrs	192		12,456		12,456	30%	3,737
1	04	05	08			Detail Design of System	16-Oct-06	18-Jan-07	C	AN_EE1	Hrs	240		26,520		26,520	30%	7,956

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	05	08			Simulations Effort BLM	31-Aug-06	3-Jan-07	C	AN_PHS	Hrs	304		33,381		33,381	30%	10,014
1	04	05	08			Final Design Review	19-Jan-07	19-Jan-07	C	AN_MSE	\$\$		2,000		2,052	2,052	30%	616
1	04	05	08			Put Procurement Packages Together	22-Jan-07	9-Feb-07	C	AN_EE1	Hrs	113		12,487		12,487	30%	3,746
1	04	05	08			REC: PMT Components Arrive (34)	9-Apr-07	9-Apr-07	C	AA_MSE	\$\$		90,000		92,340	92,340	30%	27,702
1	04	05	08			Inspect PMT Components	10-Apr-07	23-Apr-07	C	AN_MFA	Hrs	54		3,503		3,503	30%	1,051
1	04	05	08			Inspect PMT Components	10-Apr-07	23-Apr-07	C	AN_EE1	Hrs	14		1,547		1,547	30%	464
1	04	05	08			Assemble PMT Components	24-Apr-07	21-May-07	C	AN_MFA	Hrs	107		6,942		6,942	30%	2,083
1	04	05	08			Assemble PMT Components	24-Apr-07	21-May-07	C	AN_EE1	Hrs	27		2,984		2,984	30%	895
1	04	05	08			REC: Cerenkov Fiber Components Arrive (34)	9-Apr-07	9-Apr-07	C	AA_MSE	\$\$		50,000		51,300	51,300	30%	15,390
1	04	05	08			Inspect Cerenkov Fiber Components	10-Apr-07	23-Apr-07	C	AN_MFA	Hrs	54		3,503		3,503	30%	1,051
1	04	05	08			Inspect Cerenkov Fiber Components	10-Apr-07	23-Apr-07	C	AN_EE1	Hrs	14		1,547		1,547	30%	464
1	04	05	08			Assemble Cerenkov Fiber Components	24-Apr-07	21-May-07	C	AN_MFA	Hrs	107		6,942		6,942	30%	2,083
1	04	05	08			Assemble Cerenkov Fiber Components	24-Apr-07	21-May-07	C	AN_EE1	Hrs	27		2,984		2,984	30%	895
1	04	05	08			REC: Integrating Fiber Components Arrive (34)	9-Apr-07	9-Apr-07	C	AA_MSE	\$\$		50,000		51,300	51,300	30%	15,390
1	04	05	08			Inspect Integrating Fiber	10-Apr-07	23-Apr-07	C	AN_MFA	Hrs	54		3,503		3,503	30%	1,051
1	04	05	08			Inspect Integrating Fiber	10-Apr-07	23-Apr-07	C	AN_EE1	Hrs	14		1,547		1,547	30%	464
1	04	05	08			Assemble Integrating Fiber	24-Apr-07	21-May-07	C	AN_MFA	Hrs	107		6,942		6,942	30%	2,083
1	04	05	08			Assemble Integrating Fiber	24-Apr-07	21-May-07	C	AN_EE1	Hrs	27		2,984		2,984	30%	895
1	04	05	08			Ship to SLAC	22-May-07	12-Jun-07	C	AN_MSE	\$\$		10,000		10,260	10,260	30%	3,078
1	04	05	08			Ship to SLAC	22-May-07	12-Jun-07	C	AN_MFA	Hrs	5		324		324	30%	97
1	04	05	08			Ship to SLAC	22-May-07	12-Jun-07	C	AN_EE1	Hrs	30		3,315		3,315	30%	995
1	04	05	09			Radiation Detection Monitor (RDM)												
1	04	05	10			Single Undulator Test (SUT) Diagnostics						25	-	2,743	-	2,743		-
1	04	05	10			Support SUT Test FY06	1-Aug-06	29-Sep-06	C	AN_ME1	Hrs	7		754		754	0%	-
1	04	05	10			Support SUT Test FY07	2-Oct-06	2-Apr-07	C	AN_ME1	Hrs	18		1,989		1,989	0%	-
1	04	05	11			Supplemental Shielding						400	-	36,219	-	36,219		10,866
1	04	05	11			Review Needs for Supplemental Shielding	2-Jan-07	20-Mar-07	C	AN_ME1	Hrs	80		8,840		8,840	30%	2,652
1	04	05	11			Design Supplemental Shielding	21-Mar-07	17-May-07	C	AN_ME1	Hrs	40		4,420		4,420	30%	1,326
1	04	05	11			Design Supplemental Shielding	21-Mar-07	17-May-07	C	AN_MDD	Hrs	160		10,380		10,380	30%	3,114
1	04	05	11			Build Supplemental Shielding in Shops	18-May-07	19-Jun-07	C	AN_MFM	Hrs	80		8,158		8,158	30%	2,447
1	04	05	11			Build Supplemental Shielding in Shops	18-May-07	19-Jun-07	C	AN_ME1	Hrs	40		4,420		4,420	30%	1,326
1	04	06				Undulator System Installation and Alignment						12,022	-	1,027,627	-	1,027,627		318,761
1	04	06	01			Undulator System Installation and Alignment Inte						8,232	-	682,786	-	682,786		222,764
1	04	06	01	01		Undulator System						8,232	-	682,786	-	682,786		222,764
1	04	06	01	01		Pedestal Mover Set up: 1-6	25-Jun-07	27-Jun-07	C	SL_MFA	Hrs	40		3,447		3,447	35%	1,207
1	04	06	01	01		HLS Pipe Installation & Welding	9-Jan-08	9-Jan-08	C	SL_TMU	Hrs	24		1,868		1,868	35%	654
1	04	06	01	01		Pedestal Align: 61-66	14-Jan-08	15-Jan-08	C	SL_MES	Hrs	40		3,295		3,295	35%	1,153
1	04	06	01	01		Pedestal Insulate: 61-66	16-Jan-08	16-Jan-08	C	SL_MFA	Hrs	16		1,415		1,415	35%	495
1	04	06	01	01		Pedestal Mover Set Up: 7-12	26-Jun-07	26-Jun-07	C	SL_MFA	Hrs	40		3,447		3,447	35%	1,207
1	04	06	01	01		HLS Pipe Installation & Welding	10-Jan-08	10-Jan-08	C	SL_TMU	Hrs	24		1,868		1,868	35%	654
1	04	06	01	01		Pedestal Align: 55-60	14-Jan-08	15-Jan-08	C	SL_MES	Hrs	40		3,295		3,295	35%	1,153
1	04	06	01	01		Pedestal Insulate: 55-60	16-Jan-08	16-Jan-08	C	SL_MFA	Hrs	16		1,415		1,415	35%	495
1	04	06	01	01		Pedestal Mover Set Up: 13-18	25-Jun-07	25-Jun-07	C	SL_MFA	Hrs	40		3,447		3,447	35%	1,207
1	04	06	01	01		HLS Pipe Installation & Welding	11-Jan-08	11-Jan-08	C	SL_TMU	Hrs	24		1,868		1,868	35%	654
1	04	06	01	01		Pedestal Align: 49-54	11-Jan-08	14-Jan-08	C	SL_MES	Hrs	40		3,295		3,295	35%	1,153
1	04	06	01	01		Pedestal Insulate: 49-54	15-Jan-08	15-Jan-08	C	SL_MFA	Hrs	16		1,415		1,415	35%	495
1	04	06	01	01		Pedestal Mover Set Up: 19-24	24-Jul-07	24-Jul-07	C	SL_MFA	Hrs	16		1,379		1,379	35%	483
1	04	06	01	01		HLS Pipe Installation & Welding	11-Jan-08	11-Jan-08	C	SL_TMU	Hrs	24		1,868		1,868	35%	654
1	04	06	01	01		Pedestal Align: 43-48	11-Jan-08	14-Jan-08	C	SL_MES	Hrs	40		3,295		3,295	35%	1,153
1	04	06	01	01		Pedestal Insulate: 43-48	15-Jan-08	15-Jan-08	C	SL_MFA	Hrs	16		1,415		1,415	35%	495
1	04	06	01	01		Pedestal Mover Set Up: 25-30	24-Jul-07	24-Jul-07	C	SL_MFA	Hrs	16		1,379		1,379	35%	483
1	04	06	01	01		HLS Pipe Installation & Welding	14-Jan-08	14-Jan-08	C	SL_TMU	Hrs	24		1,868		1,868	35%	654

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	06	01	01		Pedestal Align: 37-42	10-Jan-08	11-Jan-08	C	SL_MES	Hrs	40		3,295		3,295	35%	1,153
1	04	06	01	01		Pedestal Insulate: 37-42	14-Jan-08	14-Jan-08	C	SL_MFA	Hrs	16		1,415		1,415	35%	495
1	04	06	01	01		Pedestal Mover Set Up: 31-36	24-Jul-07	24-Jul-07	C	SL_MFA	Hrs	16		1,379		1,379	35%	483
1	04	06	01	01		HLS Pipe Installation & Welding	15-Jan-08	15-Jan-08	C	SL_TMU	Hrs	24		1,868		1,868	35%	654
1	04	06	01	01		Pedestal Align: 31-36	9-Jan-08	10-Jan-08	C	SL_MES	Hrs	40		3,295		3,295	35%	1,153
1	04	06	01	01		Pedestal Insulate: 31-36	11-Jan-08	11-Jan-08	C	SL_MFA	Hrs	16		1,415		1,415	35%	495
1	04	06	01	01		Pedestal Mover Set Up: 37-42	21-Aug-07	21-Aug-07	C	SL_MFA	Hrs	16		1,379		1,379	35%	483
1	04	06	01	01		HLS Pipe Installation & Welding	16-Jan-08	16-Jan-08	C	SL_TMU	Hrs	24		1,868		1,868	35%	654
1	04	06	01	01		Pedestal Align: 25-30	8-Jan-08	9-Jan-08	C	SL_MES	Hrs	40		3,295		3,295	35%	1,153
1	04	06	01	01		Pedestal Insulate: 25-30	10-Jan-08	10-Jan-08	C	SL_MFA	Hrs	16		1,415		1,415	35%	495
1	04	06	01	01		Pedestal Mover Set Up: 43-48	19-Sep-07	19-Sep-07	C	SL_MFA	Hrs	16		1,379		1,379	35%	483
1	04	06	01	01		HLS Pipe Installation & Welding	22-Jan-08	22-Jan-08	C	SL_TMU	Hrs	24		1,868		1,868	35%	654
1	04	06	01	01		Pedestal Align: 19-24	7-Jan-08	8-Jan-08	C	SL_MES	Hrs	40		3,295		3,295	35%	1,153
1	04	06	01	01		Pedestal Insulate: 19-24	9-Jan-08	9-Jan-08	C	SL_MFA	Hrs	16		1,415		1,415	35%	495
1	04	06	01	01		Pedestal Mover Set Up: 49-54	20-Sep-07	20-Sep-07	C	SL_MFA	Hrs	16		1,379		1,379	35%	483
1	04	06	01	01		HLS Pipe Installation & Welding	25-Jan-08	25-Jan-08	C	SL_TMU	Hrs	24		1,868		1,868	35%	654
1	04	06	01	01		Pedestal Align: 13-18	7-Jan-08	8-Jan-08	C	SL_MES	Hrs	40		3,295		3,295	35%	1,153
1	04	06	01	01		Pedestal Insulate: 13-18	9-Jan-08	9-Jan-08	C	SL_MFA	Hrs	16		1,415		1,415	35%	495
1	04	06	01	01		Pedestal Mover Set Up: 55-60	10-Oct-07	10-Oct-07	C	SL_MFA	Hrs	16		1,415		1,415	35%	495
1	04	06	01	01		HLS Pipe Installation & Welding	30-Jan-08	30-Jan-08	C	SL_TMU	Hrs	24		1,868		1,868	35%	654
1	04	06	01	01		Pedestal Align: 7-12	4-Jan-08	7-Jan-08	C	SL_MES	Hrs	40		3,295		3,295	35%	1,153
1	04	06	01	01		Pedestal Insulate: 7-12	8-Jan-08	8-Jan-08	C	SL_MFA	Hrs	16		1,415		1,415	35%	495
1	04	06	01	01		Pedestal Mover Set Up: 61-66	31-Oct-07	31-Oct-07	C	SL_MFA	Hrs	16		1,415		1,415	35%	495
1	04	06	01	01		HLS Pipe Installation & Welding	4-Feb-08	4-Feb-08	C	SL_TMU	Hrs	24		1,868		1,868	35%	654
1	04	06	01	01		Pedestal Align: 1-6	3-Jan-08	4-Jan-08	C	SL_MES	Hrs	40		3,295		3,295	35%	1,153
1	04	06	01	01		Pedestal Insulate: 1-6	7-Jan-08	7-Jan-08	C	SL_MFA	Hrs	16		1,415		1,415	35%	495
1	04	06	01	01		Vertical Monitoring of Tunnel Floor	2-Nov-07	7-Nov-07	C	SL_MES	Hrs	96		7,908		7,908	25%	1,977
1	04	06	01	01		Vertical Monitoring of Tunnel Floor	8-Nov-07	13-Nov-07	C	SL_MES	Hrs	96		7,908		7,908	25%	1,977
1	04	06	01	01		Vertical Monitoring of Tunnel Floor	14-Nov-07	19-Nov-07	C	SL_MES	Hrs	96		7,908		7,908	25%	1,977
1	04	06	01	01		Vertical Monitoring of Tunnel Floor	14-Nov-07	19-Nov-07	C	SL_MES	Hrs	96		7,908		7,908	25%	1,977
1	04	06	01	01		Vertical Monitoring of Tunnel Floor	20-Nov-07	27-Nov-07	C	SL_MES	Hrs	96		7,908		7,908	25%	1,977
1	04	06	01	01		Design Network	22-Nov-06	12-Jan-07	C	SL_MES	Hrs	80		6,423		6,423	25%	1,606
1	04	06	01	01		Computation of Layout Parameters	16-Jan-07	22-Jan-07	C	SL_MES	Hrs	40		3,212		3,212	25%	803
1	04	06	01	01		Quality Control	23-Jan-07	24-Jan-07	C	SL_MES	Hrs	16		1,285		1,285	25%	321
1	04	06	01	01		Layout Network Points	2-Nov-07	5-Nov-07	C	SL_MES	Hrs	32		2,636		2,636	25%	659
1	04	06	01	01		Network Installation	2-Nov-07	8-Nov-07	C	SL_TMU	Hrs	80		6,513		6,513	25%	1,628
1	04	06	01	01		Measurements(Laser Tracker,Level,Total Station)	9-Nov-07	15-Nov-07	C	SL_MES	Hrs	320		26,362		26,362	25%	6,590
1	04	06	01	01		Data Evaluation	13-Nov-07	15-Nov-07	C	SL_MES	Hrs	120		9,886		9,886	25%	2,471
1	04	06	01	01		Quality Control	16-Nov-07	16-Nov-07	C	SL_MES	Hrs	56		4,613		4,613	25%	1,153
1	04	06	01	01		Mark Support Bolts on Floor	19-Nov-07	20-Nov-07	C	SL_MES	Hrs	80		6,590		6,590	35%	2,307
1	04	06	01	01		Quality Control	20-Nov-07	20-Nov-07	C	SL_MES	Hrs	16		1,318		1,318	25%	330
1	04	06	01	01		Drill Holes	21-Nov-07	26-Nov-07	C	SL_TMU	Hrs	160		12,454		12,454	35%	4,359
1	04	06	01	01		Set Studs	21-Nov-07	26-Nov-07	C	SL_TMU	Hrs	80		6,227		6,227	35%	2,179
1	04	06	01	01		Install Plates, Pre-Set Height	21-Nov-07	26-Nov-07	C	SL_TMU	Hrs	32		2,491		2,491	35%	872
1	04	06	01	01		Prealign Plates to 0.5mm	26-Nov-07	4-Dec-07	C	SL_MES	Hrs	160		13,181		13,181	35%	4,613
1	04	06	01	01		Quality Control: Map Plate Positions	27-Nov-07	28-Nov-07	C	SL_MES	Hrs	32		2,636		2,636	25%	659
1	04	06	01	01		Quality Control: Data Evaluation	29-Nov-07	29-Nov-07	C	SL_MES	Hrs	8		659		659	25%	165
1	04	06	01	01		Grout Plates	30-Nov-07	4-Dec-07	C	SL_TMU	Hrs	120		9,341		9,341	35%	3,269
1	04	06	01	01		Quality Control: Map Plate Positions	5-Dec-07	6-Dec-07	C	SL_MES	Hrs	32		2,636		2,636	25%	659
1	04	06	01	01		Quality Control: Data Evaluation	7-Dec-07	7-Dec-07	C	SL_MES	Hrs	8		659		659	25%	165
1	04	06	01	01		Grout Plates	10-Dec-07	12-Dec-07	C	SL_TMU	Hrs	120		9,341		9,341	35%	3,269
1	04	06	01	01		Clean Tunnel	12-Dec-07	13-Dec-07	C	SL_TMU	Hrs	32		2,491		2,491	25%	623

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	06	01	01		Pedestal Transport & Install: 1-6	14-Dec-07	2-Jan-08	C	SL_TMU	Hrs	96		7,816		7,816	35%	2,736
1	04	06	01	01		Pedestal Transport & Install: 7-12	3-Jan-08	3-Jan-08	C	SL_TMU	Hrs	32		2,605		2,605	35%	912
1	04	06	01	01		Pedestal Transport & Install: 13-18	4-Jan-08	4-Jan-08	C	SL_TMU	Hrs	32		2,605		2,605	35%	912
1	04	06	01	01		Pedestal Transport & Install: 19-24	4-Jan-08	4-Jan-08	C	SL_TMU	Hrs	32		2,605		2,605	35%	912
1	04	06	01	01		Pedestal Transport & Install: 25-30	7-Jan-08	7-Jan-08	C	SL_TMU	Hrs	32		2,605		2,605	35%	912
1	04	06	01	01		Pedestal Transport & Install: 31-36	8-Jan-08	8-Jan-08	C	SL_TMU	Hrs	32		2,605		2,605	35%	912
1	04	06	01	01		Pedestal Transport & Install: 37-42	9-Jan-08	9-Jan-08	C	SL_TMU	Hrs	32		2,605		2,605	35%	912
1	04	06	01	01		Pedestal Transport & Install: 43-48	10-Jan-08	10-Jan-08	C	SL_TMU	Hrs	32		2,605		2,605	35%	912
1	04	06	01	01		Pedestal Transport & Install: 49-54	10-Jan-08	10-Jan-08	C	SL_TMU	Hrs	32		2,605		2,605	35%	912
1	04	06	01	01		Pedestal Transport & Install: 55-60	11-Jan-08	11-Jan-08	C	SL_TMU	Hrs	32		2,605		2,605	35%	912
1	04	06	01	01		Pedestal Transport & Install: 61-66	11-Jan-08	11-Jan-08	C	SL_TMU	Hrs	32		2,605		2,605	35%	912
1	04	06	01	01		Measurements(Laser Tracker,Level,Total Station)	1-Aug-06	4-Aug-06	C	SL_MES	Hrs	160		12,521		12,521	25%	3,130
1	04	06	01	01		WPM Measurements	1-Aug-06	4-Aug-06	C	SL_MES	Hrs	80		6,261		6,261	25%	1,565
1	04	06	01	01		Data Evaluation	1-Aug-06	4-Aug-06	C	SL_MES	Hrs	80		6,261		6,261	25%	1,565
1	04	06	01	01		Quality Control	7-Aug-06	11-Aug-06	C	SL_MES	Hrs	40		3,130		3,130	25%	783
1	04	06	01	01		Align Mech Undulator Supports to 250 Micron	14-Aug-06	24-Aug-06	C	SL_MES	Hrs	224		17,530		17,530	35%	6,135
1	04	06	01	01		Align Mech Undulator Supports to 250 Micron	14-Aug-06	25-Aug-06	C	SL_MES	Hrs	224		17,530		17,530	35%	6,135
1	04	06	01	01		Install Girder - 01	8-Jan-08	8-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 01	9-Jan-08	9-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 02	8-Jan-08	8-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 02	9-Jan-08	9-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 03	8-Jan-08	8-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 03	9-Jan-08	9-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 04	9-Jan-08	9-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 04	10-Jan-08	10-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 05	9-Jan-08	9-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 05	10-Jan-08	10-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 06	9-Jan-08	9-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 06	10-Jan-08	10-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 07	10-Jan-08	10-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 07	11-Jan-08	11-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 08	10-Jan-08	10-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 08	11-Jan-08	11-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 09	10-Jan-08	10-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 09	11-Jan-08	11-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 10	10-Jan-08	10-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 10	11-Jan-08	11-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 11	10-Jan-08	10-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 11	11-Jan-08	11-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 12	10-Jan-08	10-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 12	11-Jan-08	11-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 13	11-Jan-08	11-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 13	14-Jan-08	14-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 14	11-Jan-08	11-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 14	14-Jan-08	14-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 15	11-Jan-08	11-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 15	14-Jan-08	14-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 16	14-Jan-08	14-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 16	15-Jan-08	15-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 17	14-Jan-08	14-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 17	15-Jan-08	15-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 18	14-Jan-08	14-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	06	01	01		Align Girder - 18	15-Jan-08	15-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 19	15-Jan-08	15-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 19	16-Jan-08	16-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 20	15-Jan-08	15-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 20	16-Jan-08	16-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 21	15-Jan-08	15-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 21	16-Jan-08	16-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 22	16-Jan-08	16-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 22	17-Jan-08	17-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 23	17-Jan-08	17-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 23	18-Jan-08	18-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 24	18-Jan-08	18-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 24	22-Jan-08	22-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 25	22-Jan-08	22-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 25	23-Jan-08	23-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 26	23-Jan-08	23-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 26	24-Jan-08	24-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 27	24-Jan-08	24-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 27	25-Jan-08	25-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 28	25-Jan-08	25-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 28	28-Jan-08	28-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 29	28-Jan-08	28-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 29	29-Jan-08	29-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 30	29-Jan-08	29-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 30	30-Jan-08	30-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 31	30-Jan-08	30-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 31	31-Jan-08	31-Jan-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 32	31-Jan-08	31-Jan-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 32	1-Feb-08	1-Feb-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		Install Girder - 33	1-Feb-08	1-Feb-08	C	SL_TMU	Hrs	16		1,303		1,303	35%	456
1	04	06	01	01		Align Girder - 33	4-Feb-08	4-Feb-08	C	SL_MES	Hrs	16		1,318		1,318	35%	461
1	04	06	01	01		HLS Sensor Installation	5-Feb-08	11-Feb-08	C	SL_MFA	Hrs	64		5,659		5,659	35%	1,981
1	04	06	01	01		Pipe Interconnections w/Flexible Tubing	5-Feb-08	11-Feb-08	C	SL_MFA	Hrs	160		14,148		14,148	35%	4,952
1	04	06	01	01		HLS Install Refill Station	4-Feb-08	8-Feb-08	C	SL_MFA	Hrs	40		3,537		3,537	35%	1,238
1	04	06	01	01		HLS Fill and Leak Testing	12-Feb-08	13-Feb-08	C	SL_MFA	Hrs	32		2,830		2,830	35%	990
1	04	06	01	01		HLS Cable Connections	12-Feb-08	13-Feb-08	C	SL_MFA	Hrs	32		2,830		2,830	35%	990
1	04	06	01	01		HLS System Testing	14-Feb-08	28-Feb-08	C	SL_MES	Hrs	80		6,590		6,590	35%	2,307
1	04	06	01	01		HLS System Testing	14-Feb-08	28-Feb-08	C	SL_EE1	Hrs	80		7,652		7,652	35%	2,678
1	04	06	01	01		HLS Mechanical Tuning	22-Feb-08	28-Feb-08	C	SL_MFA	Hrs	40		3,537		3,537	35%	1,238
1	04	06	01	01		HLS Electrical Tuning	22-Feb-08	28-Feb-08	C	SL_EE1	Hrs	40		3,826		3,826	35%	1,339
1	04	06	01	01		HLS Software Changes	14-Feb-08	13-Mar-08	C	SL_MES	Hrs	160		13,181		13,181	35%	4,613
1	04	06	01	01		WPM Sensor Installation	2-May-07	3-May-07	C	SL_MFA	Hrs	48		4,137		4,137	35%	1,448
1	04	06	01	01		WPM Wire Tube Installation	4-May-07	8-May-07	C	SL_MFA	Hrs	72		6,205		6,205	35%	2,172
1	04	06	01	01		WPM Electronics Installation	2-Jan-08	7-Jan-08	C	SL_MFA	Hrs	32		2,830		2,830	35%	990
1	04	06	01	01		WPM Electronics Installation	2-Jan-08	7-Jan-08	C	SL_EE1	Hrs	32		3,061		3,061	35%	1,071
1	04	06	01	01		WPM Cable Termination	8-Jan-08	22-Jan-08	C	SL_MFA	Hrs	240		21,222		21,222	35%	7,428
1	04	06	01	01		WPM Cable Termination	8-Jan-08	22-Jan-08	C	SL_EE1	Hrs	80		7,652		7,652	35%	2,678
1	04	06	01	01		WPM System Testing	23-Jan-08	5-Feb-08	C	SL_MES	Hrs	160		13,181		13,181	35%	4,613
1	04	06	01	01		WPM System Testing	23-Jan-08	5-Feb-08	C	SL_EE1	Hrs	80		7,652		7,652	35%	2,678
1	04	06	01	01		WPM Mechanical Tuning	30-Jan-08	5-Feb-08	C	SL_MFA	Hrs	40		3,537		3,537	35%	1,238
1	04	06	01	01		WPM Electrical Tuning	30-Jan-08	12-Feb-08	C	SL_EE1	Hrs	160		15,303		15,303	35%	5,356
1	04	06	01	01		WPM Software Changes	23-Jan-08	19-Mar-08	C	SL_MES	Hrs	320		26,362		26,362	35%	9,227

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	06	01	01		Remeasurement(Laser Tracker,Level,Total Station)	4-Apr-08	10-Apr-08	C	SL_MES	Hrs	160		13,181		13,181	35%	4,613
1	04	06	01	01		ADS Measurements	20-Mar-08	26-Mar-08	C	SL_MES	Hrs	160		13,181		13,181	35%	4,613
1	04	06	01	01		Data Evaluation	4-Apr-08	10-Apr-08	C	SL_MES	Hrs	120		9,886		9,886	25%	2,471
1	04	06	01	01		Quality Control	11-Apr-08	17-Apr-08	C	SL_MES	Hrs	80		6,590		6,590	25%	1,648
1	04	06	01	01		Set Cradle X,Y Mechanical Adjustments	18-Apr-08	23-Apr-08	C	SL_MES	Hrs	128		10,545		10,545	35%	3,691
1	04	06	01	01		Quality Control	22-Apr-08	28-Apr-08	C	SL_MES	Hrs	80		6,590		6,590	25%	1,648
1	04	06	02			Control System Installation and Alignment						2,272	-	214,412	-	214,412		53,603
1	04	06	02			Install Racks in Alcoves/End Stations	2-Nov-07	8-Nov-07	C	SL_TMU	Hrs	480		47,289		47,289	25%	11,822
1	04	06	02			Install Cables from Racks to Tunnel Locations	9-Nov-07	15-Nov-07	C	SL_TMU	Hrs	480		47,289		47,289	25%	11,822
1	04	06	02			Terminate Cables	16-Nov-07	3-Dec-07	C	SL_TMU	Hrs	160		15,763		15,763	25%	3,941
1	04	06	02			Install Rack Mount Equipment	9-Nov-07	15-Nov-07	C	SL_TMU	Hrs	80		7,881		7,881	25%	1,970
1	04	06	02			Connect Devices @ Undulator #33	5-Feb-08	5-Feb-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #33	5-Feb-08	5-Feb-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #33	6-Feb-08	6-Feb-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #33	6-Feb-08	6-Feb-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #32	4-Feb-08	4-Feb-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #32	4-Feb-08	4-Feb-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #32	5-Feb-08	5-Feb-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #32	5-Feb-08	5-Feb-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #31	1-Feb-08	1-Feb-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #31	1-Feb-08	1-Feb-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #31	4-Feb-08	4-Feb-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #31	4-Feb-08	4-Feb-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #30	31-Jan-08	31-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #30	31-Jan-08	31-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #30	1-Feb-08	1-Feb-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #30	1-Feb-08	1-Feb-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #29	30-Jan-08	30-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #29	30-Jan-08	30-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #29	31-Jan-08	31-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #29	31-Jan-08	31-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #28	29-Jan-08	29-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #28	29-Jan-08	29-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #28	30-Jan-08	30-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #28	30-Jan-08	30-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #27	28-Jan-08	28-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #27	28-Jan-08	28-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #27	29-Jan-08	29-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #27	29-Jan-08	29-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #26	25-Jan-08	25-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #26	25-Jan-08	25-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #26	28-Jan-08	28-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #26	28-Jan-08	28-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #25	24-Jan-08	24-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #25	24-Jan-08	24-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #25	25-Jan-08	25-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #25	25-Jan-08	25-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #24	23-Jan-08	23-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #24	23-Jan-08	23-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #24	24-Jan-08	24-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #24	24-Jan-08	24-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #23	22-Jan-08	22-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	06	02			Connect Devices @ Undulator #23	22-Jan-08	22-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #23	23-Jan-08	23-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #23	23-Jan-08	23-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #22	18-Jan-08	18-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #22	18-Jan-08	18-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #22	22-Jan-08	22-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #22	22-Jan-08	22-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #21	17-Jan-08	17-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #21	17-Jan-08	17-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #21	18-Jan-08	18-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #21	18-Jan-08	18-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #20	17-Jan-08	17-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #20	17-Jan-08	17-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #20	18-Jan-08	18-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #20	18-Jan-08	18-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #19	17-Jan-08	17-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #19	17-Jan-08	17-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #19	18-Jan-08	18-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #19	18-Jan-08	18-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #18	16-Jan-08	16-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #18	16-Jan-08	16-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #18	17-Jan-08	17-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #18	17-Jan-08	17-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #17	16-Jan-08	16-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #17	16-Jan-08	16-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #17	17-Jan-08	17-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #17	17-Jan-08	17-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #16	16-Jan-08	16-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #16	16-Jan-08	16-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #16	17-Jan-08	17-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #16	17-Jan-08	17-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #15	15-Jan-08	15-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #15	15-Jan-08	15-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #15	16-Jan-08	16-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #15	16-Jan-08	16-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #14	15-Jan-08	15-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #14	15-Jan-08	15-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #14	16-Jan-08	16-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #14	16-Jan-08	16-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #13	15-Jan-08	15-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #13	15-Jan-08	15-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #13	16-Jan-08	16-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #13	16-Jan-08	16-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #12	14-Jan-08	14-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #12	14-Jan-08	14-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #12	15-Jan-08	15-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #12	15-Jan-08	15-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #11	14-Jan-08	14-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #11	14-Jan-08	14-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #11	15-Jan-08	15-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #11	15-Jan-08	15-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #10	14-Jan-08	14-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
1	04	06	02			Connect Devices @ Undulator #10	14-Jan-08	14-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #10	15-Jan-08	15-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #10	15-Jan-08	15-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #9	14-Jan-08	14-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #9	14-Jan-08	14-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #9	15-Jan-08	15-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #9	15-Jan-08	15-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #8	14-Jan-08	14-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #8	14-Jan-08	14-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #8	15-Jan-08	15-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #8	15-Jan-08	15-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #7	14-Jan-08	14-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #7	14-Jan-08	14-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #7	15-Jan-08	15-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #7	15-Jan-08	15-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #6	11-Jan-08	11-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #6	11-Jan-08	11-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #6	14-Jan-08	14-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #6	14-Jan-08	14-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #5	11-Jan-08	11-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #5	11-Jan-08	11-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #5	14-Jan-08	14-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #5	14-Jan-08	14-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #4	11-Jan-08	11-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #4	11-Jan-08	11-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #4	14-Jan-08	14-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #4	14-Jan-08	14-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #3	10-Jan-08	10-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #3	10-Jan-08	10-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #3	11-Jan-08	11-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #3	11-Jan-08	11-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #2	10-Jan-08	10-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #2	10-Jan-08	10-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #2	11-Jan-08	11-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #2	11-Jan-08	11-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Connect Devices @ Undulator #1	10-Jan-08	10-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Connect Devices @ Undulator #1	10-Jan-08	10-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices @ Undulator #1	11-Jan-08	11-Jan-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices @ Undulator #1	11-Jan-08	11-Jan-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	02			Test Devices Under Vacuum	7-Mar-08	7-Mar-08	C	SL_CT1	Hrs	8		508		508	25%	127
1	04	06	02			Test Devices Under Vacuum	7-Mar-08	7-Mar-08	C	SL_CE1	Hrs	8		928		928	25%	232
1	04	06	04			Vacuum System Installation and Alignment						1,518	-	130,428	-	130,428		42,394
1	04	06	04			1st Lot Std Bellows Arrive at SLAC	15-Mar-07	28-Mar-07	C	SL_MFA	Hrs	10		862		862	25%	215
1	04	06	04			1st Lot Std Bellows Arrive at SLAC	15-Mar-07	28-Mar-07	C	AN_SEE	Hrs	4		442		442	25%	111
1	04	06	04			1st Lot Std Bellows Arrive at SLAC	15-Mar-07	28-Mar-07	C	AN_MVE	Hrs	4		442		442	25%	111
1	04	06	04			2nd Lot Std Bellows Arrive at SLAC	9-May-07	22-May-07	C	SL_MFA	Hrs	20		1,724		1,724	25%	431
1	04	06	04			2nd Lot Std Bellows Arrive at SLAC	9-May-07	22-May-07	C	AN_SEE	Hrs	8		884		884	25%	221
1	04	06	04			2nd Lot Std Bellows Arrive at SLAC	9-May-07	22-May-07	C	AN_MVE	Hrs	8		884		884	25%	221
1	04	06	04			Rem Std Bellows Arrive at SLAC	9-Jul-07	20-Jul-07	C	SL_MFA	Hrs	20		1,724		1,724	25%	431
1	04	06	04			Rem Std Bellows Arrive at SLAC	9-Jul-07	20-Jul-07	C	AN_SEE	Hrs	8		884		884	25%	221
1	04	06	04			Rem Std Bellows Arrive at SLAC	9-Jul-07	20-Jul-07	C	AN_MVE	Hrs	8		884		884	25%	221
1	04	06	04			System Layout Clean-up	10-May-07	21-Jun-07	C	AN_MVE	Hrs	16		1,768		1,768	25%	442

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$	
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total			
1	04	06	04			System Layout Clean-up	10-May-07	21-Jun-07	C	AN_MDD	Hrs	40		2,595		2,595	25%	649	
1	04	06	04			Update Movers	19-Apr-07	9-May-07	C	AN_MDD	Hrs	24		1,557		1,557	25%	389	
1	04	06	04			Install Pumps	31-Jan-08	6-Feb-08	C	SL_SEE	Hrs	8		872		872	25%	218	
1	04	06	04			Install Pumps	31-Jan-08	6-Feb-08	C	SL_MVE	Hrs	8		872		872	25%	218	
1	04	06	04			Install Pumps	31-Jan-08	6-Feb-08	C	SL_MFA	Hrs	24		2,122		2,122	25%	531	
1	04	06	04			Make Up Vacuum	16-Jan-08	30-Jan-08	C	SL_SEE	Hrs	16		1,743		1,743	25%	436	
1	04	06	04			Make Up Vacuum	16-Jan-08	30-Jan-08	C	SL_MVE	Hrs	16		1,743		1,743	25%	436	
1	04	06	04			Make Up Vacuum	16-Jan-08	30-Jan-08	C	SL_MFA	Hrs	40		3,537		3,537	25%	884	
1	04	06	04			Make Up Vacuum	31-Jan-08	13-Feb-08	C	SL_SEE	Hrs	16		1,743		1,743	25%	436	
1	04	06	04			Make Up Vacuum	31-Jan-08	13-Feb-08	C	SL_MVE	Hrs	16		1,743		1,743	25%	436	
1	04	06	04			Make Up Vacuum	31-Jan-08	13-Feb-08	C	SL_MFA	Hrs	40		3,537		3,537	25%	884	
1	04	06	04			Pump Down	14-Feb-08	28-Feb-08	C	SL_SEE	Hrs	8		872		872	35%	305	
1	04	06	04			Pump Down	14-Feb-08	28-Feb-08	C	SL_MVE	Hrs	16		1,743		1,743	35%	610	
1	04	06	04			Pump Down	14-Feb-08	28-Feb-08	C	SL_MFA	Hrs	24		2,122		2,122	35%	743	
1	04	06	04			Leak Test	29-Feb-08	6-Mar-08	C	SL_SEE	Hrs	16		1,743		1,743	35%	610	
1	04	06	04			Leak Test	29-Feb-08	6-Mar-08	C	SL_MVE	Hrs	24		2,615		2,615	35%	915	
1	04	06	04			Leak Test	29-Feb-08	6-Mar-08	C	SL_MFA	Hrs	24		2,122		2,122	35%	743	
1	04	06	04			Controls System Checkout	7-Mar-08	20-Mar-08	C	SL_SEE	Hrs	20		2,179		2,179	35%	763	
1	04	06	04			Controls System Checkout	7-Mar-08	20-Mar-08	C	SL_MFA	Hrs	40		3,537		3,537	35%	1,238	
1	04	06	04			Controls System Checkout	7-Mar-08	20-Mar-08	C	SL_CT1	Hrs	160		10,158		10,158	35%	3,555	
1	04	06	04			Controls System Checkout	7-Mar-08	20-Mar-08	C	SL_CE1	Hrs	40		4,639		4,639	35%	1,624	
1	04	06	04			Controls System Checkout	7-Mar-08	20-Mar-08	C	AN_SEE	Hrs	40		4,535		4,535	35%	1,587	
1	04	06	04			Controls System Checkout	7-Mar-08	20-Mar-08	C	AN_CE1	Hrs	40		4,535		4,535	35%	1,587	
1	04	06	04			System Checkout	21-Mar-08	3-Apr-08	C	SL_SEE	Hrs	40		4,358		4,358	35%	1,525	
1	04	06	04			System Checkout	21-Mar-08	3-Apr-08	C	SL_MFA	Hrs	160		14,148		14,148	35%	4,952	
1	04	06	04			System Checkout	21-Mar-08	3-Apr-08	C	SL_CT1	Hrs	160		10,158		10,158	35%	3,555	
1	04	06	04			System Checkout	21-Mar-08	3-Apr-08	C	AN_SEE	Hrs	40		4,535		4,535	35%	1,587	
1	04	06	04			System Checkout	21-Mar-08	3-Apr-08	C	AN_CE1	Hrs	80		9,070		9,070	35%	3,174	
1	04	06	04			Update Vacuum Chamber	1-Aug-06	21-Aug-06	C	AN_MDD	Hrs	32		2,023		2,023	35%	708	
1	04	06	04			Update Bellows	22-Sep-06	12-Oct-06	C	AN_MDD	Hrs	24		1,539		1,539	35%	539	
1	04	06	04			Update LDB	29-Nov-06	3-Jan-07	C	AN_MDD	Hrs	24		1,557		1,557	35%	545	
1	04	06	04			Update Entrance Section	1-Aug-06	14-Aug-06	C	AN_MDD	Hrs	16		1,012		1,012	35%	354	
1	04	06	04			Update Exit Section	1-Aug-06	14-Aug-06	C	AN_MDD	Hrs	16		1,012		1,012	35%	354	
1	04	06	04			Update EOU	1-Aug-06	21-Aug-06	C	AN_MDD	Hrs	24		1,518		1,518	35%	531	
1	04	06	04			Update RFBPM	27-Nov-06	15-Dec-06	C	AN_MDD	Hrs	16		1,038		1,038	35%	363	
1	04	06	04			Update Charge Monitor	1-Aug-06	14-Aug-06	C	AN_MDD	Hrs	16		1,012		1,012	35%	354	
1	04	06	04			Update Beam Loss Monitor	1-Aug-06	21-Aug-06	C	AN_MDD	Hrs	24		1,518		1,518	35%	531	
1	04	06	04			Update RDM	1-Aug-06	14-Aug-06	C	AN_MDD	Hrs	16		1,012		1,012	35%	354	
1	04	06	04			Update SDB	2-Oct-06	20-Oct-06	C	AN_MDD	Hrs	24		1,557		1,557	35%	545	
1	04	06	05			Diagnostics System Installation and Alignment													
2	04					UNDULATOR SYSTEM (OPC)						27,797	2,456,566	2,944,171	2,717,130	5,661,300		-	
2	04	01				Undulator System Management & Integration						16,202	217,281	1,702,351	264,050	1,966,401		-	
2	04	01	01			Undulator System Mgmt & Integration						16,202	217,281	1,702,351	264,050	1,966,401		-	
2	04	01	01			SLAC Indirect Tax - FY07 (SPRs)	2-Oct-06	28-Sep-07	S	SL_MSX	\$\$		30,000			30,780	30,780		
2	04	01	01			SLAC Indirect Tax - FY08 (SPRs)	1-Oct-07	30-Sep-08	S	SL_MSX	\$\$		30,000			31,580	31,580		
2	04	01	01			SLAC Indirect Tax - ETC (PreOps)	1-Aug-06	29-Sep-06	X	SL_MSX	\$\$		30,000			30,000	30,000		
2	04	01	01			SLAC Indirect Tax - FY07 (PreOps)	2-Oct-06	28-Sep-07	X	SL_MSX	\$\$		30,000			30,780	30,780		
2	04	01	01			SLAC Indirect Tax - FY08 (PreOps)	1-Oct-07	30-Sep-08	X	SL_MSX	\$\$		30,000			31,580	31,580		
2	04	01	01			Project Management	3-Apr-07	15-Feb-08	X	AN_PM1	Hrs	1,367		157,154		157,154			
2	04	01	01			Oversee Engineering and Integration	3-Apr-07	15-Feb-08	X	AN_PM1	Hrs	1,367		157,154		157,154			
2	04	01	01			Controls System Engineering Oversight	3-Apr-07	15-Feb-08	X	AN_PM1	Hrs	684		78,634		78,634			
2	04	01	01			Und Magnet & Support Engr Oversight	3-Apr-07	15-Feb-08	X	AN_PM1	Hrs	1,367		157,154		157,154			

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
2	04	01	01			Vacuum Engineering Oversight	3-Apr-07	15-Feb-08	X	AN_PM1	Hrs	684		78,634		78,634		
2	04	01	01			Diagnostics Engineering Oversight	3-Apr-07	15-Feb-08	X	AN_PM1	Hrs	391		44,950		44,950		
2	04	01	01			Oversee Quality Assurance	3-Apr-07	15-Feb-08	X	AN_ADM	Hrs	684		78,634		78,634		
2	04	01	01			Lead Mechanical Technical	3-Apr-07	1-Oct-07	X	AN_MFA	Hrs	800		53,399		53,399		
2	04	01	01			Administrative Assistant	3-Apr-07	15-Feb-08	X	AN_ADM	Hrs	684		78,634		78,634		
2	04	01	01			Mechanical Engineer	3-Apr-07	1-Oct-07	X	AN_ME1	Hrs	800		90,951		90,951		
2	04	01	01			Mechanical Technical	3-Apr-07	1-Oct-07	X	AN_MFA	Hrs	800		53,399		53,399		
2	04	01	01			Monitor Budget, Schedule and Contracts	3-Apr-07	15-Feb-08	X	AN_ADM	Hrs	1,367		157,154		157,154		
2	04	01	01			ANL Division - PMCS Support	3-Apr-07	15-Feb-08	X	AN_ADM	Hrs	391		44,950		44,950		
2	04	01	01			Undulator Mgr/Eng @ SLAC	1-Oct-07	31-Mar-09	X	SL_ME1	Hrs	2,281		271,097		271,097		
2	04	01	01			Designer/Drafter (FY07)	3-Apr-07	1-Oct-07	X	AN_MDD	Hrs	800		53,399		53,399		
2	04	01	01			Designer/Drafter (FY08)	2-Oct-07	2-Oct-08	X	AN_MDD	Hrs	791		54,175		54,175		
2	04	01	01			Office Supplies and Misc Materials	3-Apr-07	19-Feb-08	X	AN_MSC	\$\$		3,425			3,884	3,884	
2	04	01	01			Tele/Video Conferencing	3-Apr-07	19-Feb-08	X	AN_MSE	\$\$		1,647			1,868	1,868	
2	04	01	01			CPUs and Software	3-Apr-07	19-Feb-08	X	AN_MSE	\$\$		10,282			11,659	11,659	
2	04	01	01			Domestic Travel	3-Apr-07	19-Feb-08	X	AN_MST	\$\$		41,128			72,804	72,804	
2	04	01	01			Foreign Travel	3-Apr-07	19-Feb-08	X	AN_MST	\$\$		7,713			13,653	13,653	
2	04	01	01			EOU Development Travel	3-Apr-07	19-Feb-08	X	AN_MST	\$\$		3,086			5,463	5,463	
2	04	01	01			Undulator Document Control @ SLAC FY08-09	1-Oct-08	30-Mar-09	X	SL_MDD	Hrs	269		27,267		27,267		
2	04	01	01			Undulator POC/AM @ SLAC FY08-09	1-Oct-08	30-Mar-09	X	SL_MES	Hrs	675		65,610		65,610		
2	04	02				Controls												
2	04	02	01			Controls Management and Integration												
2	04	02	04			Video												
2	04	02	07			Machine Protection												
2	04	03				Undulator Magnet & Support						4,601	1,832,372	480,576	1,999,629	2,480,205		-
2	04	03	01			Undulator Magnets & Support-Mgmt & Integration						810	-	92,088	-	92,088		-
2	04	03	01			Undulator Systems Integration	3-Apr-07	1-Oct-07	X	AN_ME1	Hrs	239		27,172		27,172		
2	04	03	01			Survey and Alignment Support	3-Apr-07	1-Oct-07	X	AN_MES	Hrs	193		21,942		21,942		
2	04	03	01			Dev/Coord Instl/Checkout/Verif/Interface,etc.	2-Apr-07	28-Sep-07	X	AN_ME1	Hrs	378		42,974		42,974		
2	04	03	02			First Prototype Undulator & Mfg Plan												
2	04	03	03			1st Article Undulators & Long Lead Procurements						191	-	21,715	-	21,715		-
2	04	03	03			Survey & Align	3-Apr-07	1-Oct-07	X	AN_MES	Hrs	191		21,715		21,715		
2	04	03	04			Production Undulator						312	1,737,572	35,471	1,893,345	1,928,816		-
2	04	03	04			RCV: Ti S/B Article 34 - Metalex ETC	3-Oct-06	1-Nov-06	S	AN_MSS	\$\$		48,017		49,313	49,313		
2	04	03	04			RCV: Ti S/B Article 36 - Metalex ETC	3-Oct-06	1-Nov-06	S	AN_MSS	\$\$		48,017		49,313	49,313		
2	04	03	04			RCV: Ti S/B Article 38 - Metalex ETC	2-Nov-06	5-Dec-06	S	AN_MSS	\$\$		48,017		49,313	49,313		
2	04	03	04			RCV: From Vendor 18.09% Magnet Blocks	3-Oct-06	3-Oct-06	S	AN_MSS	\$\$		171,360		175,987	175,987		
2	04	03	04			PP: Progress Payment - 51 Weeks	3-Oct-06	3-Oct-06	S	AN_MSS	\$\$		51,469		52,859	52,859		
2	04	03	04			RCV: Ti S/B Article 35 - Dial	11-Jun-07	11-Jun-07	S	AN_MSS	\$\$		31,126		31,966	31,966		
2	04	03	04			RCV: Ti S/B Article 37 - Dial	11-Jul-07	11-Jul-07	S	AN_MSS	\$\$		31,126		31,966	31,966		
2	04	03	04			RCV: Ti S/B Article 39 - Dial	9-Aug-07	9-Aug-07	S	AN_MSS	\$\$		31,126		31,966	31,966		
2	04	03	04			PP: 3 more raws - Dial	2-Apr-07	2-Apr-07	S	AN_MSS	\$\$		226,751		232,873	232,873		
2	04	03	04			RCV: Ti S/B Article 40 - Metalex ETC	31-Oct-06	1-Dec-06	S	AN_MSS	\$\$		120,043		123,284	123,284		
2	04	03	04			Ti Strongback Vendor Oversight	3-Oct-06	8-Jan-07	S	AN_MSE	\$\$		9,600		10,763	10,763		
2	04	03	04			Ti Strongback Vendor Oversight	3-Oct-06	8-Jan-07	S	AN_ME1	Hrs	32		3,638		3,638		
2	04	03	04			Hi-Tech Fab/Assy - Magnet Assy Article 35	19-Jun-07	2-Jul-07	S	AN_MSS	\$\$		120		135	135		
2	04	03	04			Hi-Tech Fab/Assy - Magnet Assy Article 35	19-Jun-07	2-Jul-07	S	AN_ME1	Hrs	40		4,548		4,548		
2	04	03	04			RCV: From Hi-Tech - Magnet Assy Article 35	3-Jul-07	3-Jul-07	S	AA_MSS	\$\$		80,000		89,691	89,691		
2	04	03	04			Hi-Tech Fab/Assy - Magnet Assy Article 37	20-Jul-07	2-Aug-07	S	AN_MSS	\$\$		160		179	179		
2	04	03	04			Hi-Tech Fab/Assy - Magnet Assy Article 37	20-Jul-07	2-Aug-07	S	AN_ME1	Hrs	40		4,548		4,548		
2	04	03	04			RCV: From Hi-Tech - Magnet Assy Article 37	3-Aug-07	3-Aug-07	S	AA_MSS	\$\$		80,000		89,691	89,691		
2	04	03	04			Hi-Tech Fab/Assy - Magnet Assy Article 39	14-Aug-07	27-Aug-07	S	AN_MSS	\$\$		120		135	135		

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
2	04	03	04			Hi-Tech Fab/Assy - Magnet Assy Article 39	14-Aug-07	27-Aug-07	S	AN_ME1	Hrs	40		4,548		4,548		
2	04	03	04			RCV: From Hi-Tech - Magnet Assy Article 39	28-Aug-07	28-Aug-07	S	AA_MSS	\$\$		80,000		89,691	89,691		
2	04	03	04			Metalex Fab/Assy - Magnet Assy Article 34	23-May-07	6-Jun-07	S	AN_MSS	\$\$		120		135	135		
2	04	03	04			Metalex Fab/Assy - Magnet Assy Article 34	23-May-07	6-Jun-07	S	AN_ME1	Hrs	40		4,548		4,548		
2	04	03	04			RCV: From Metalex - Magnet Assy Article 34	7-Jun-07	7-Jun-07	S	AA_MSS	\$\$		80,000		89,691	89,691		
2	04	03	04			Metalex Fab/Assy - Magnet Assy Article 36	8-Jun-07	21-Jun-07	S	AN_MSS	\$\$		120		135	135		
2	04	03	04			Metalex Fab/Assy - Magnet Assy Article 36	8-Jun-07	21-Jun-07	S	AN_ME1	Hrs	40		4,548		4,548		
2	04	03	04			RCV: From Metalex - Magnet Assy Article 36	22-Jun-07	22-Jun-07	S	AA_MSS	\$\$		80,000		89,691	89,691		
2	04	03	04			Metalex Fab/Assy - Magnet Assy Article 38	25-Jun-07	9-Jul-07	S	AN_MSS	\$\$		160		179	179		
2	04	03	04			Metalex Fab/Assy - Magnet Assy Article 38	25-Jun-07	9-Jul-07	S	AN_ME1	Hrs	40		4,548		4,548		
2	04	03	04			RCV: From Metalex - Magnet Assy Article 38	10-Jul-07	10-Jul-07	S	AA_MSS	\$\$		80,000		89,691	89,691		
2	04	03	04			Metalex Fab/Assy - Magnet Assy Article 40	11-Jul-07	24-Jul-07	S	AN_MSS	\$\$		120		135	135		
2	04	03	04			Metalex Fab/Assy - Magnet Assy Article 40	11-Jul-07	24-Jul-07	S	AN_ME1	Hrs	40		4,548		4,548		
2	04	03	04			RCV: From Metalex - Magnet Assy Article 40	25-Jul-07	25-Jul-07	S	AA_MSS	\$\$		80,000		89,691	89,691		
2	04	03	04			RCV: Support/Mover Lot 4 (4 units)	1-Oct-08	1-Oct-08	S	AA_MSS	\$\$		360,000		424,871	424,871		
2	04	03	05			Focusing Magnets						-	58,000	-	65,026	65,026		-
2	04	03	05			Vendor Fab/Assy - Quads Spares (2-mag)	23-Jul-07	3-Aug-07	S	AA_MSS	\$\$		30,000		33,634	33,634		
2	04	03	05			Vendor Fab/Assy - Quad Stages, Stands, etc. (2)	28-Feb-07	13-Mar-07	S	AA_MSS	\$\$		28,000		31,392	31,392		
2	04	03	06			Undulator Magnetic Measurement Facility (SLAC)						3,288	-	331,302	-	331,302		-
2	04	03	06			Tune Undulator - 34	17-Aug-07	30-Aug-07	S	SL_MFA	Hrs	180		17,840		17,840		
2	04	03	06			Fiducialize Undulator - 34	31-Aug-07	5-Sep-07	S	SL_PHS	Hrs	16		1,713		1,713		
2	04	03	06			Fiducialize Undulator - 34	31-Aug-07	5-Sep-07	S	SL_MFA	Hrs	24		2,379		2,379		
2	04	03	06			Fiducialize Undulator - 34	31-Aug-07	5-Sep-07	S	SL_MES	Hrs	40		3,693		3,693		
2	04	03	06			Pre-assemble Girder - 34	3-Oct-08	9-Oct-08	S	SL_SEE1	Hrs	8		1,028		1,028		
2	04	03	06			Pre-assemble Girder - 34	3-Oct-08	9-Oct-08	S	SL_MFA	Hrs	80		8,347		8,347		
2	04	03	06			Pre-assemble Girder - 34	3-Oct-08	9-Oct-08	S	SL_MES	Hrs	36		3,499		3,499		
2	04	03	06			Assemble Girder - 34	10-Oct-08	16-Oct-08	S	SL_MFA	Hrs	22		2,295		2,295		
2	04	03	06			Assemble Girder - 34	10-Oct-08	16-Oct-08	S	SL_MES	Hrs	34		3,305		3,305		
2	04	03	06			Tune Undulator - 35	24-Aug-07	7-Sep-07	S	SL_MFA	Hrs	180		17,840		17,840		
2	04	03	06			Fiducialize Undulator - 35	10-Sep-07	12-Sep-07	S	SL_PHS	Hrs	16		1,713		1,713		
2	04	03	06			Fiducialize Undulator - 35	10-Sep-07	12-Sep-07	S	SL_MFA	Hrs	24		2,379		2,379		
2	04	03	06			Fiducialize Undulator - 35	10-Sep-07	12-Sep-07	S	SL_MES	Hrs	40		3,693		3,693		
2	04	03	06			Tune Undulator - 36	31-Aug-07	14-Sep-07	S	SL_MFA	Hrs	180		17,840		17,840		
2	04	03	06			Fiducialize Undulator - 36	17-Sep-07	19-Sep-07	S	SL_PHS	Hrs	16		1,713		1,713		
2	04	03	06			Fiducialize Undulator - 36	17-Sep-07	19-Sep-07	S	SL_MFA	Hrs	24		2,379		2,379		
2	04	03	06			Fiducialize Undulator - 36	17-Sep-07	19-Sep-07	S	SL_MES	Hrs	40		3,693		3,693		
2	04	03	06			Tune Undulator - 37	10-Sep-07	21-Sep-07	S	SL_MFA	Hrs	180		17,840		17,840		
2	04	03	06			Fiducialize Undulator - 37	24-Sep-07	26-Sep-07	S	SL_PHS	Hrs	16		1,713		1,713		
2	04	03	06			Fiducialize Undulator - 37	24-Sep-07	26-Sep-07	S	SL_MFA	Hrs	24		2,379		2,379		
2	04	03	06			Fiducialize Undulator - 37	24-Sep-07	26-Sep-07	S	SL_MES	Hrs	40		3,693		3,693		
2	04	03	06			Tune Undulator - 38	17-Sep-07	28-Sep-07	S	SL_MFA	Hrs	180		17,840		17,840		
2	04	03	06			Fiducialize Undulator - 38	1-Oct-08	3-Oct-08	S	SL_PHS	Hrs	16		1,803		1,803		
2	04	03	06			Fiducialize Undulator - 38	1-Oct-08	3-Oct-08	S	SL_MFA	Hrs	24		2,504		2,504		
2	04	03	06			Fiducialize Undulator - 38	1-Oct-08	3-Oct-08	S	SL_MES	Hrs	40		3,888		3,888		
2	04	03	06			Tune Undulator - 39	24-Sep-07	5-Oct-07	S	SL_MFA	Hrs	180		18,009		18,009		
2	04	03	06			Fiducialize Undulator - 39	1-Oct-08	3-Oct-08	S	SL_PHS	Hrs	16		1,803		1,803		
2	04	03	06			Fiducialize Undulator - 39	1-Oct-08	3-Oct-08	S	SL_MFA	Hrs	24		2,504		2,504		
2	04	03	06			Fiducialize Undulator - 39	1-Oct-08	3-Oct-08	S	SL_MES	Hrs	40		3,888		3,888		
2	04	03	06			Tune Undulator - 40	1-Oct-08	14-Oct-08	S	SL_MFA	Hrs	180		18,780		18,780		
2	04	03	06			Fiducialize Undulator - 40	15-Oct-08	17-Oct-08	S	SL_PHS	Hrs	16		1,803		1,803		
2	04	03	06			Fiducialize Undulator - 40	15-Oct-08	17-Oct-08	S	SL_MFA	Hrs	24		2,504		2,504		
2	04	03	06			Fiducialize Undulator - 40	15-Oct-08	17-Oct-08	S	SL_MES	Hrs	40		3,888		3,888		

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$		
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total				
2	04	03	06			Master Master Undulator (after #4)	23-Jan-07	24-Jan-07	S	SL_PHS	Hrs	16		1,713		1,713				
2	04	03	06			Master Master Undulator (after #4)	23-Jan-07	24-Jan-07	S	SL_MFA	Hrs	16		1,586		1,586				
2	04	03	06			Master Master Undulator (after #8)	21-Feb-07	22-Feb-07	S	SL_PHS	Hrs	16		1,713		1,713				
2	04	03	06			Master Master Undulator (after #8)	21-Feb-07	22-Feb-07	S	SL_MFA	Hrs	16		1,586		1,586				
2	04	03	06			Master Master Undulator (after #12)	21-Mar-07	22-Mar-07	S	SL_PHS	Hrs	16		1,713		1,713				
2	04	03	06			Master Master Undulator (after #12)	21-Mar-07	22-Mar-07	S	SL_MFA	Hrs	16		1,586		1,586				
2	04	03	06			Master Master Undulator (after #16)	18-Apr-07	19-Apr-07	S	SL_PHS	Hrs	16		1,713		1,713				
2	04	03	06			Master Master Undulator (after #16)	18-Apr-07	19-Apr-07	S	SL_MFA	Hrs	16		1,586		1,586				
2	04	03	06			Master Master Undulator (after #20)	23-May-07	24-May-07	S	SL_PHS	Hrs	16		1,713		1,713				
2	04	03	06			Master Master Undulator (after #20)	23-May-07	24-May-07	S	SL_MFA	Hrs	16		1,586		1,586				
2	04	03	06			Master Master Undulator (after #24)	21-Jun-07	22-Jun-07	S	SL_PHS	Hrs	16		1,713		1,713				
2	04	03	06			Master Master Undulator (after #24)	21-Jun-07	22-Jun-07	S	SL_MFA	Hrs	16		1,586		1,586				
2	04	03	06			Master Master Undulator (after #28)	20-Jul-07	23-Jul-07	S	SL_PHS	Hrs	16		1,713		1,713				
2	04	03	06			Master Master Undulator (after #28)	20-Jul-07	23-Jul-07	S	SL_MFA	Hrs	16		1,586		1,586				
2	04	03	06			Master Master Undulator (after #32)	17-Aug-07	20-Aug-07	S	SL_PHS	Hrs	16		1,713		1,713				
2	04	03	06			Master Master Undulator (after #32)	17-Aug-07	20-Aug-07	S	SL_MFA	Hrs	16		1,586		1,586				
2	04	03	06			Master Master Undulator (after #36)	17-Sep-07	18-Sep-07	S	SL_PHS	Hrs	16		1,713		1,713				
2	04	03	06			Master Master Undulator (after #36)	17-Sep-07	18-Sep-07	S	SL_MFA	Hrs	16		1,586		1,586				
2	04	03	06			Master Master Undulator (after #40)	15-Oct-08	16-Oct-08	S	SL_PHS	Hrs	16		1,803		1,803				
2	04	03	06			Master Master Undulator (after #40)	15-Oct-08	16-Oct-08	S	SL_MFA	Hrs	16		1,669		1,669				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 34	1-Oct-08	2-Oct-08	S	SL_PHS	Hrs	4		451		451				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 34	1-Oct-08	2-Oct-08	S	SL_PHS	Hrs	20		1,771		1,771				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 34	1-Oct-08	2-Oct-08	S	SL_MFA	Hrs	8		835		835				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 34	1-Oct-08	2-Oct-08	S	SL_MES	Hrs	4		389		389				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 35	1-Oct-08	2-Oct-08	S	SL_PHS	Hrs	4		451		451				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 35	1-Oct-08	2-Oct-08	S	SL_PHS	Hrs	20		1,771		1,771				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 35	1-Oct-08	2-Oct-08	S	SL_MFA	Hrs	8		835		835				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 35	1-Oct-08	2-Oct-08	S	SL_MES	Hrs	4		389		389				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 36	3-Oct-08	6-Oct-08	S	SL_PHS	Hrs	4		451		451				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 36	3-Oct-08	6-Oct-08	S	SL_PHS	Hrs	20		1,771		1,771				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 36	3-Oct-08	6-Oct-08	S	SL_MFA	Hrs	8		835		835				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 36	3-Oct-08	6-Oct-08	S	SL_MES	Hrs	4		389		389				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 37	7-Oct-08	8-Oct-08	S	SL_PHS	Hrs	4		451		451				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 37	7-Oct-08	8-Oct-08	S	SL_PHS	Hrs	20		1,771		1,771				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 37	7-Oct-08	8-Oct-08	S	SL_MFA	Hrs	8		835		835				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 37	7-Oct-08	8-Oct-08	S	SL_MES	Hrs	4		389		389				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 38	9-Oct-08	10-Oct-08	S	SL_PHS	Hrs	4		451		451				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 38	9-Oct-08	10-Oct-08	S	SL_PHS	Hrs	20		1,771		1,771				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 38	9-Oct-08	10-Oct-08	S	SL_MFA	Hrs	8		835		835				
2	04	03	06			Magnetic Measure and Fiducialize Quadrupole - 38	9-Oct-08	10-Oct-08	S	SL_MES	Hrs	4		389		389				
2	04	03	06			Material Handling & Storage	13-Oct-08	30-Mar-09	S	SL_MFA	Hrs	580		60,513		60,513				
2	04	03	06			Material Handling & Storage	13-Oct-08	30-Mar-09	S	SL_MES	Hrs	208		20,218		20,218				
2	04	03	08			Fixed Supports						-		36,800		41,258		41,258		-
2	04	03	08			RCV: Fixed Support Spares	26-Apr-07	26-Apr-07	S	AN_MSE	\$\$			36,800		41,258		41,258		
2	04	04				Vacuum System						37		167,001	4,280	189,147		193,427		-
2	04	04	02			Undulator Vacuum Chamber Assembly						-		145,715	-	165,282		165,282		-
2	04	04	02			REC: Spares Lot Undulator Chamb (4)	16-Nov-07	6-Feb-08	S	AA_MSE	\$\$			64,000		73,618		73,618		
2	04	04	02			Ship Spares Lot Chambers to SLAC (4)	7-Feb-08	7-Feb-08	S	AN_MSE	\$\$			1,715		1,973		1,973		
2	04	04	02			RCV: Chamber Supports (4)	1-May-07	26-Jun-07	S	AA_MSE	\$\$			80,000		89,691		89,691		
2	04	04	02	01		Surface Roughness Minimization														
2	04	04	02	03		Materials Study for AC Conductivity														
2	04	04	03			Beam-line Bellows Module Assembly						-		14,304	-	16,037		16,037		-

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
2	04	04	03			REC: Standard Bellows Module (4)	28-Mar-07	22-May-07	S	AA_MSE	\$\$		14,304		16,037	16,037		
2	04	04	04			Single Undulator Test (SUV) Vacuum						37	-	4,280	-	4,280		-
2	04	04	04			Support SUT Long Term Test (FY07-08)	4-Jun-07	2-Jun-08	X	AN_ME1	Hrs	37		4,280		4,280		
2	04	04	05			Short Diagnostic Break (SDB) Assembly						-	1,215	-	1,362	1,362		-
2	04	04	05			REC: SDB Pump Manifold (1)	3-Nov-06	18-Dec-06	S	AA_MSE	\$\$		915		1,026	1,026		
2	04	04	05			REC: SDB Pump Supports (1)	12-Oct-06	22-Nov-06	S	AA_MSE	\$\$		300		336	336		
2	04	04	06			Long Diagnostic Break (LDB) Assembly						-	5,767	-	6,466	6,466		-
2	04	04	06			REC: LDB Valve (2)	1-Feb-07	28-Mar-07	S	AA_MSE	\$\$		4,182		4,689	4,689		
2	04	04	06			REC: LDB Chamber Weldment Assembly (1)	1-Feb-07	28-Mar-07	S	AA_MSE	\$\$		485		544	544		
2	04	04	06			REC: LDB Chamber Support (1)	5-Feb-07	30-Mar-07	S	AA_MSE	\$\$		750		841	841		
2	04	04	06			REC: LDB Ion Pump Support (1)	1-Feb-07	28-Mar-07	S	AA_MSE	\$\$		350		392	392		
2	04	04	07			Entrance Section Assembly												
2	04	04	08			Exit Section Assembly												
2	04	04	09			Baking System												
2	04	05				Undulator System Diagnostics [OPC]						1,138	152,468	128,851	171,429	300,280		-
2	04	05	02			Undulator Line Diagnostics												
2	04	05	03			High-Power X-Ray and Profile Diagnostics (HPD)												
2	04	05	04			End-of-Undulator(EOU) X-ray and Profile diagnost						1,053	36,000	120,235	40,537	160,772		-
2	04	05	04			End-of-Undulator (EOU) Development	1-Aug-06	6-Mar-08	X	AN_PHS	Hrs	752		85,866		85,866		
2	04	05	04			End-of-Undulator (EOU) Development	1-Aug-06	6-Mar-08	X	AN_MSE	\$\$		36,000		40,537	40,537		
2	04	05	04			End-of-Undulator (EOU) Development	1-Aug-06	6-Mar-08	X	AN_ADM	Hrs	301		34,369		34,369		
2	04	05	05			RFBPM						32	70,620	2,511	79,175	81,686		-
2	04	05	05			REC: Support & Alignment Mechanism (2)	15-Jan-07	23-Mar-07	S	AA_MSE	\$\$		5,000		5,606	5,606		
2	04	05	05			REC: RF Cabling (4)	15-Jan-07	23-Mar-07	S	AA_MSE	\$\$		3,000		3,363	3,363		
2	04	05	05			REC: Copper Body Brazement (2)	10-May-07	8-Aug-07	S	AA_MSE	\$\$		16,000		17,938	17,938		
2	04	05	05			REC: Undulator Waveguide (2)	15-Jan-07	19-Mar-07	S	AA_MSE	\$\$		6,700		7,512	7,512		
2	04	05	05			REC: Down Converter (4)	15-Jan-07	17-Jan-07	S	AA_MSE	\$\$		31,920		35,787	35,787		
2	04	05	05			REC: Local Oscillator (4)	15-Jan-07	17-Jan-07	S	AA_MSE	\$\$		6,000		6,727	6,727		
2	04	05	05			Pack/Ship Spares Lot (4) Undulator RFBPM to SLAC	24-Sep-07	24-Sep-07	S	AN_MSE	\$\$		2,000		2,242	2,242		
2	04	05	05			Pack/Ship Spares Lot (4) Undulator RFBPM to SLAC	24-Sep-07	24-Sep-07	S	AN_MFA	Hrs	24		1,602		1,602		
2	04	05	05			Pack/Ship Spares Lot (4) Undulator RFBPM to SLAC	24-Sep-07	24-Sep-07	S	AN_ME1	Hrs	8		910		910		
2	04	05	06			Beam Finder Wire						16	29,974	1,843	33,920	35,763		-
2	04	05	06			Machine Components (2)	1-Jun-07	13-Jul-07	S	AN_ME1	Hrs	8		910		910		
2	04	05	06			Machine Components (2)	1-Jun-07	13-Jul-07	S	AA_MSE	\$\$		19,154		21,474	21,474		
2	04	05	06			Weld Components (2)	17-Oct-07	30-Oct-07	S	AN_MSE	\$\$		9,120		10,491	10,491		
2	04	05	06			Weld Components (2)	17-Oct-07	30-Oct-07	S	AN_ME1	Hrs	8		933		933		
2	04	05	06			Ship Fifth Lot of Chamber to SLAC (2)	7-Jan-08	14-Jan-08	S	AN_MSE	\$\$		1,700		1,955	1,955		
2	04	05	07			Charge Monitor (CM)												
2	04	05	08			Beam Loss Monitoring						-	15,874	-	17,797	17,797		-
2	04	05	08			REC: PMT (2)	9-Apr-07	9-Apr-07	S	AA_MSE	\$\$		6,462		7,245	7,245		
2	04	05	08			REC: Beam Loss Monitor Fiber (2)	9-Apr-07	9-Apr-07	S	AA_MSE	\$\$		4,706		5,276	5,276		
2	04	05	08			REC: Integrating Fiber (2)	9-Apr-07	9-Apr-07	S	AA_MSE	\$\$		4,706		5,276	5,276		
2	04	05	09			Radiation Detection Monitor (RDM)												
2	04	05	10			Single Undulator Test (SUT) Diagnostics						37	-	4,261	-	4,261		-
2	04	05	10			Support SUT Test (FY07-08)	3-Apr-07	1-Apr-08	X	AN_MVE	Hrs	37		4,261		4,261		
2	04	06				Undulator System Commissioning						5,819	-	628,112	-	628,112		-
2	04	06	01			Undulator System Commissioning						5,819	-	628,112	-	628,112		-
2	04	06	01			Commission WPM System Complete	1-Jul-08	29-Jul-08	X	SL_MFA	Hrs	91		9,254		9,254		
2	04	06	01			Commission WPM System Complete	1-Jul-08	29-Jul-08	X	SL_MES	Hrs	363		34,390		34,390		
2	04	06	01			Commission WPM System Complete	1-Jul-08	29-Jul-08	X	SL_EE1	Hrs	181		19,908		19,908		
2	04	06	01			Commission WPM System Complete	1-Jul-08	29-Jul-08	X	SL_CP1	Hrs	181		17,600		17,600		
2	04	06	01			Commission Hydrostatic Level System	14-Mar-08	10-Apr-08	X	SL_MFA	Hrs	91		9,254		9,254		

Detailed Cost Estimate
UNDULATOR SYSTEM

WBS Level						LCLA DCE Aug-2006 Description	Early Start	Early Finish	Fund Type	Res Code	Units	Work Rem. Bud. Qty		Work Rem. Full Burd and Escltd Cost			Contngcy %	Contingency \$
1	2	3	4	5	6							Hours	\$	Labor	M&S	Total		
2	04	06	01			Commission Hydrostatic Level System	14-Mar-08	10-Apr-08	X	SL_MES	Hrs	363		34,390		34,390		
2	04	06	01			Commission Hydrostatic Level System	14-Mar-08	10-Apr-08	X	SL_EE1	Hrs	91		10,009		10,009		
2	04	06	01			Commission Hydrostatic Level System	14-Mar-08	10-Apr-08	X	SL_CP1	Hrs	181		17,600		17,600		
2	04	06	01			Support Commissioning - ANL	2-Oct-07	1-Oct-08	X	AN_CE1	Hrs	875		102,064		102,064		
2	04	06	01			Support Commissioning - SLAC	2-Oct-07	1-Oct-08	X	SL_PHS	Hrs	1,701		146,789		146,789		
2	04	06	01			Support Commissioning - SLAC	2-Oct-07	1-Oct-08	X	SL_CE1	Hrs	1,701		226,855		226,855		