Risk Analysis

CDF Run IIb Silicon Detector Upgrade

(based on schedule DALE'S_SVX2b_Aug02_v3.mpp, Aug 01,2002)

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Methodology

The general method for Risk Assessment is outlined in the Project Management Plan for the Run IIb CDF Detector Project, Version 2.3, Section 9.4. Tasks are assigned an impact factor and a risk probability, the product of which is called the risk factor. This is done for each of four project objectives; cost, schedule, scope and technical. The following table is the guide for impact factors.

Evaluating Impact of a Risk on Major Project Objectives					
Project Objective	**Very low 0.05**	**Low 0.1**	**Moderate 0.2**	**High 0.4**	**Very high 0.8**
Cost	Insignificant cost increase	< 5% Cost increase	5-10% Cost increase	10-20% Cost increase	> 20% Cost increase
Schedule	Insignificant schedule slippage	Schedule slippage < 5%	Overall Project slippage 5-10%	Overall Project slippage 10-20%	Overall Project slippage > 20%
Scope	Scope decrease barely noticeable	Minor areas of scope affected	Major areas of scope affected	Project scope reduction unacceptable for physics objectives	Scope of project effectively useless for mission
Technical	Technical degradation of project barely noticeable	Technical performance of final product minimally affected	Technical performance of final product moderately affected	Degradation of technical performance unacceptable for physics objectives	Technical performance of end item effectively useless for mission

This table is applied in the current analysis in the following way.

- The four project objectives are considered for appropriate intermediate level roll-ups.
- Individual tasks are chosen to be analyzed, based on their proximity to being cost or schedule drivers, or believed to be the most technically challenging.
- The total cost of the project is of order $10M. This sets the ranges for the cost impact. Similarly, the total duration of the project is about three years, which defines the ranges for the schedule impact.
- For this project it is foreseen that scope reductions would only be imposed as mitigation for catastrophic overruns of cost or schedule. Impact factors are therefore not estimated for scope.
- The categories for technical impact are simplified. Tasks at risk of failing to meet the technical specifications are considered in two categories; the failure would result in compromised but acceptable performance, or the result could be unacceptable in the performance of the final detector.

The simplified table used for this analysis becomes:

Evaluating Impact of a Risk on Major Project Objectives					
Project Objective	**Very low 0.05**	**Low 0.1**	**Moderate 0.2**	**High 0.4**	**Very high 0.8**
Cost		$100K - $200K increase	$200K- $500K increase	$500K - $1M increase	> $1M increase
Schedule		slippage 1 - 2 months	slippage 2-4 months	slippage 4-8 months	slippage > 8 months
Technical			technical performance affected but still acceptable	degradation of technical performance unacceptable for physics objectives	

In general cost risk is mitigated in the project plan by attaching cost contingency to specific tasks. This contingency is rolled up separately from the planned costs. Schedule risk is mitigated by adding contingency lag time for key milestones. In this way the schedule contingency is account for separately from the project plan itself. These cost and schedule contingencies are referenced in the analysis.

Risk Analysis by WBS

1.1 Run 2b Silicon Project

1.1.1 DAQ

1.1.1.1 SVX4 Chips [critical path]

Risk Analysis

1.1.1.1.2 Prototype chips

Two submissions are scheduled. Estimate 20% probability that one design + submission cycle fails and a third is needed. This could require a redesign, or just rerun of fabrication. Estimate the impact to be somewhere in the range $100-200K and 2-4 months delay. With multiple submission cycles, there is also schedule risk if the chip designer and testing resources are not dedicated to this project, so increase the probability to 40%.

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.1.1.2	0.2	0.1	0.4	0.2		

1.1.1.1.3 Production chips

Production submission will be batched, so the schedule risk is only 1-2 months. The main uncertainty is the wafer yield. 50% is assumed. A 33% yield would add 50% to the cost of this task, a $100-200K overrun. Estimate the probability of this to be 20%. The chip specifications, in terms of noise performance and bandwidth are critical to the performance of the final detector. A higher S/N ratio allows the design to weather unforeseen noise contributions in the final installed system. After this sequence of prototype submissions and the production submission, it is unlikely that the technical performance will be unacceptable, but there is, say 10% risk that the performance is significantly compromised.

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.1.1.3	0.2	0.1	0.1	0.1	0.1	0.2

Mitigation

The costs contingency for these tasks is already set to appropriate levels (including 50% contingency on the production submission). Initial prototype submissions should suffice for prototyping hybrids and modules, so the risk of schedule slippage is borne principally by the lag in milestone 1.1.11.9.1 "Production chip Submission – Reporting" and 1.1.11.9.8 "Go ahead for DAQ Production". The technical risk is mitigated via adequate testing and redesign in the prototype stages.

1.1.1.2 Transceiver Chips [near critical path]

Risk Analysis

1.1.1.2.1 Prototype and 1.1.1.2.2 Production chips

The schedule includes one prototype followed by one production run. There is an estimated 10% probability that a third round will be needed, resulting in a delay of 2-4 months. At least the initial DAQ testing can proceed without these chips. There is little technical risk. For the production submission, the wafers are shared with the SVX4 chips, so no cost is included. This coupling may not work out if there is a schedule slip for one of these chips. Estimate a 10% probability that a separate submission will be required, at a cost of $100-200K.

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.1.2.2	0.1	0.1	0.1	0.2		

Mitigation

Cost contingency should be added in case this chip submission has to be separated from the SVX4 submission. The schedule risk should be borne in 1.1.11.9.8 "Go ahead for DAQ Production".

1.1.1.3 Hybrids

1.1.1.3.1 Outer layers [critical path]

Risk Analysis

1.1.1.1.3.1.1and 1.1.1.3.1.2 Prototype and preproduction hybrids

Two prototype submissions are scheduled, followed by a preproduction submission. This is assumed to be a small quantity submission of production grade parts. The most likely risk is that the turn-around at the vendor is slow and/or the yield is low. Each manufacturing run is allowed 3 months in the schedule. Estimate a 40% probability that this sequence is stretched 2-4 months. (See also discussion for mini port card below.)

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.1.3.1.2			0.4	0.2		

1.1.1.1.3.1.3 Production hybrids

The time allotted to manufacturing, five months, is reasonable. The highest risk is delay in manufacture and/or testing due to a low yield and the need for reworking parts. In the past incentives have been applied to encourage additional effort at vendors to address yield concerns. Estimate a 40% probability that the cost increases by $100-$200K. Since hybrid production and module assembly are batched, estimate a 20% probability that the schedule is stretched by 1-2 months. There is some technical risk associated with the production hybrids. If production is not uniform, operational issues may emerge in production which are not found in the prototypes. Estimate a 20% risk for a moderate impact on the final performance.

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.1.3.1.3	0.4	0.1	0.2	0.2	0.2	0.2

Mitigation
50% cost contingencies are included for the hybrid manufacture to allow for incentives if needed. Schedule contingency is borne by milestone 1.1.11.9.8 “Go ahead for DAQ Production” and 1.1.11.9.10 “Production Staves Available”. The technical risk can only be mitigated with appropriate quality control, working closely with the vendor.

1.1.1.3.2 L0 Hybrids

Risk Analysis
1.1.1.3.2.1 prototype and 1.1.1.3.2.2 production
The schedule provides for one prototype and one production run. Quantities are small, and the technology is the same as for the outer hybrids, so to a large extent the risk is covered above. Production will be at the same vendor, and overlaps significantly with the outer hybrids contributing to the risk of delays. Estimate a 40% probability that for a 1-2 month delay in both the prototyping and production tasks. Since the number of hybrids is smaller for L0, the technical risk of production variations is reduced. No additional risk factors are needed.

Risk and impact factors are shared with the outer hybrids.

Mitigation
Again, 50% cost contingency is appropriate to allow for incentives if necessary.

1.1.1.4 Bus Cables

Risk Analysis
1.1.1.4.1 prototype 1.1.1.4.2 pre production and production
The schedule provides for one prototype, one preproduction, and one production run. These cables are not technically challenging to design or fabricate. Prototype stave testing using the initial cables, should discover any specific shielding and grounding needs for the second round of the design. If there are significant problems, a second prototype round may be needed – estimate the probability at 20%. Float in the prototype schedule 1.1.1.4.1 would allow for this, so there is no effect on the schedule, and additional cost is minimal.

1.1.1.5 Mini Port Card [near critical path]

Risk Analysis

1.1.1.5.1 prototype 1.1.1.5.2 pre production

This component is similar in technology to the hybrids, and again the schedule allows two prototype rounds, one preproduction and then production. The second prototype round is noted as "contingency" in the schedule. It is planned to use the same vendor as for hybrid production, and the institution responsible for testing is the same. The overlap with hybrid production risks schedule slippage. Estimate 40% probability of 2-4 month delay. This is concurrent with the same delay in the hybrid prototyping

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.1.5.2			0.4	0.2		

1.1.1.5.3 production

Similarly a 20% probability for a 1-2 month delay, concurrent with hybrid delay There is some technical risk, again mostly associated with uniformity of production. Estimate a 10% probability for a moderate impact on detector performance.

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.1.5.3	0.4	0.1	0.2	0.2	0.1	0.2

Mitigation

As for the hybrids a 50% contingency on the manufacturing costs is appropriate. Incentives may be needed, or in the worst case a switch to a second vendor for part of the hybrid + mini-portcard orders. It may well be advisable to spend contingency to validate a second vendor early in the project. No additional schedule mitigation is needed.

1.1.1.6 Junction Port Cards

Risk Analysis

1.1.1.6.1 prototype 1.1.1.6.2 pre production, and 1.1.1.6.3 production

Two prototype rounds are allowed in the schedule (the second is noted as "contingency"). This part is not technically challenging. There is little risk of a significant schedule or cost overrun.

1.1.1.7 Cables

Risk Analysis

While there are several sets of cables here, it is unlikely that there is serious technical, cost or schedule risk in the cables themselves. The main concern is probably "packaging" the new cabling plant into the limited space in the existing detector. There is a 20% probability that this might compromise the choice of cable and thus the DAQ performance. Additionally the cabling in the vicinity of the Junction Port Cards can add unwanted additional material. (Not sure which tasks to actually hang this risk on.)

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.1.7.1.2.4 1.1.1.7.2.2.4					0.2	0.2

Mitigation
The only mitigation is to investigate this packaging issue early.

1.1.1.8 Fiber Transition Module Replacements

Risk Analysis
This is a modification to the existing design, so no significant technical or cost risk. However, orders for small quantities of complicated electronics boards often get into schedule difficulty at the vendor. Estimate a 40% probability for a 2-4 months delay at both the prototype and production stages.

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.1.8.3.3			0.4	0.2		

Mitigation
There is sufficient float in the schedule to accommodate this slippage.

1.1.1.9 DAQ Testing & Readiness

Risk Analysis
1.1.1.9.1 maintenance and necessary changes to existing DAQ
As described in the notes, these tasks are place-holders to allow for unforeseen work on the existing DAQ. The costs included in the schedule are reasonable. The most significant change to the DAQ presently under consideration is an SRC replacement. This would be included in the costs allocated here and would not impact the project schedule. No specific risks are foreseen.
1.1.1.9.2 prototype and 1.1.1.9.3 production DAQ testing
These tests are critical junctions in the project. The time allocated for the testing allows for a reasonable level of problems, but there is still some schedule and technical risk that system performance issues are uncovered which take additional time to correct. For each stage, prototyping and production, estimate a 20% probability that the schedule will slip by 1-2 months.

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.1.9.2 1.1.1.9.3			0.2	0.1		

Mitigation
This risk of slippage is principally borne by milestone 1.1.11.9.8 “Go ahead for DAQ Production”.

1.1.1.10 Power Supply system

Risk Analysis
1.1.1.10.1 prototype and 1.1.1.10.2 production
Delivery of the power supplies was significantly delayed in the previous upgrade due to competition with other orders. There is significant float in this schedule for the production power supply delivery, and 30% cost contingency, based on an existing design and vendor quote. Seems adequate.

1.1.2 Sensors

1.1.2.1 Outer layers

Risk Analysis

1.1.1.10.1 Outer Sensors Prototypes (FNAL) , 1.1.2.1.2 Outer Sensors Production (FNAL), and 1.1.2.1.3 Outer Sensors (Japan)

The 30% cost contingency for sensor purchases is adequate. The vendor pricing is unlikely to change and acceptance criteria ensure that the vendor will cover any yield problems. There is however some schedule risk. The yields may be lower than anticipated by the vendor, and there may be competition with other orders. There is little technical risk with this design. The tasks are spaced in the project to allow funding over two fiscal years, with he final deliveries being almost two years after the order is placed. It appears that the schedule already allows some stretch in the expected deliveries (~5 months), and any low risk of further slippage overlaps with the risk of hybrid delays. No additional mitigation is needed.

1.1.2.2 layer L0

Risk Analysis

The L0 sensors are identical to the Run IIa L00 sensors, so no prototyping is required, and the production yield is already understood. The quantity is small, and there is sufficient float that there is no cost and little schedule risk.

1.1.2.3 layer L00 left over

1.1.3 "Construction of Modules, Staves and L0"

1.1.3.1 Beginning of Mechanical Project

1.1.3.2 L0 Construction

1.1.3.2.1 L0 analog signal cables

Risk Analysis

1.1.3.2.1.1 prototype (FNAL), 1.1.3.2.1.2 production (FNAL), and 1.1.3.2.1.3 production (Japan)

There is some risk that a second prototype round is needed to meet the shielding/grounding needs and packaging restrictions.

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.3.2.1.1.5	0.1	0.1	0.1	0.2	0.1	0.1

Mitigation

There is sufficient float in the schedule. Cost contingency should be added to cover another prototype run if needed.

1.1.3.2.2 L0 modules

Risk Analysis

1.1.3.2.2.1 prototype, and 1.1.3.2.2.2 production

Concerns are similar to outer module assembly, but the small quantity and large float in the schedule mitigate the need to additional risk factors.

1.1.3.3 Outer layer modules [critical path]

Risk Analysis

1.1.3.3.1 prototype, 1.1.3.3.2 preproduction and 1.1.3.3.3 production

The schedule provides for prototype, preproduction and production module assembly. The main cost risk results from the potential for needing more labor resources to recoup schedule slippage upstream in the project. The schedule includes 50% contingency on the labor estimate. Until experience is gained in the prototype assembly, there is some risk that the production assembly will take longer than expected, adding to the labor cost. It is also quite likely that the delivery of production grade parts (sensors, hybrids etc) will dominate the assembly rate. Estimate a 40% probability for a one-two month stretch in the schedule, which likely overlaps with any slippage in hybrid deliveries. There is some technical risk that the assembly techniques and fixturing fail to meet the alignment specifications. Estimate a 10% probability that the detector performance is compromised.

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.3.3.3	0.4	0.1	0.4	0.2	0.1	0.2

Mitigation

The labor cost contingency is adequate. The schedule risk is borne by the lag in milestone 1.1.11.9.13 “Stave Installation Complete”.

1.1.3.4 Outer layer Staves [critical path]

Risk Analysis

1.1.3.4.1 prototype, 1.1.3.4.2 preproduction and 1.1.3.4.3 production

The schedule provides for prototype, preproduction and production stave assembly. Similar concerns exist here as for module assembly. Any slippage likely overlaps.

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.3.4.3			0.1	0.1	0.1	0.2

Mitigation

The labor cost contingency is adequate. The schedule risk is borne by the lag in milestone 1.1.11.9.13 “Stave Installation Complete”.

1.1.4 Beampipe

1.1.4.1 Beampipe available

1.1.4.2 Beampipe Supports

50% cost contingency and plenty of float in the schedule. Little risk.

1.1.5 Support Mechanics

1.1.5.1 Silicon Support Structures [near critical path]

Risk Analysis

Various bulkheads, screens, barrel mounts, and fixtures

There is a 40% probability that there will be a 2-4 months slippage in this series of overlapping tasks. Estimate 20% probability that something here will end up delaying the overall project by 1-2 months. Probably the most challenging components here are the bulkheads and the spacetube, There is some technical risk, since these items must meet the tight alignment specifications. Estimate a 10% probability that the detector performance is compromised.

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.5.1.1.2 1.1.5.1.9.2			0.2	0.1	0.1	0.2

Mitigation

There is a lot of design work here, are there enough engineers and designers? The M&S and labor contingencies of 50% are adequate to cover additional labor if needed. The schedule contingency is provided in contingency task 1.1.11.19.15 “Outer Detector Complete”.

1.1.5.2 Transportation Fixtures

The serious technical (or is it scope?) risk in transporting the completed detector, or major parts of it, will undoubtedly be mitigated via procedures, reviews and Job Hazard Analyses.

1.1.5.3 Positioning system (inchworms)

50% cost contingency and plenty of float. Very little risk.

1.1.5.4 Installation of SVXIIb into ISL

Same comments. Similar to fixturing used for inserting SVXIIa into ISL.

1.1.6 Cooling and Monitoring

1.1.6.1 Cooling system Sidet

While these tasks can take longer than expected, there is little risk in cost or schedule.

1.1.6.2 Cooling Manifolds and chiller components

1.1.6.3 Interlocks

1.1.6.4 Position Monitoring

In general this work is similar to tasks on the SVXIIa and ISL projects. None of these tasks present significant cost, schedule or technical risks.

1.1.7 Final Assembly (Installation and Integration)

1.1.7.1 Stave Installation (Outer) [near critical path]

1.1.7.1.1 Stave Installation Fixture Prototype and 1.1.7.1.2 fixture production

Again, this design work should not be near the critical path (which is traditionally held by the readout chip, hybrids and sensors). Additional engineering and design labor may be required to meet the schedule. This task follows directly the bulkhead design. With sufficient engineers and designers/detailers these tasks can probably be done in parallel. Estimate 20% probability that additional resources will be needed for this design work to meet schedule. Again, this fixturing is critical to meet the alignment tolerances. Estimate a 10% technical risk.

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.7.1.1	0.2	0.1			0.1	0.2

Mitigation
Evaluate the need for engineering and drafting to assure that the design work does not become a bottleneck.

1.1.7.1.3 Stave Installation **[critical path]**
There is some risk that system-level issues (electrical grounding…) might appear first during the electrical testing in the final installation. Estimate a 10% probability for a 1-2 month slip.

WBS	Cost Risk	Cost Impact	Sched Risk	Schd Impact	Tech Risk	Tech Impact
1.1.7.1.3			0.1	0.1		

Mitigation
Lag in milestone 1.1.11.9.15 “Outer Detector Complete”.

1.1.7.2 L0 Installation (Inner)
1.1.7.2.1 fixture prototype, 1.1.7.2.2 fixture production, 1.1.7.2.3 L0 installation
The concerns are similar to Stave Installation. The schedule risk may be reduced because L0 is a small part of the project, but the small clearances make the fixturing more difficult. See mitigation for 1.1.7.1

1.1.7.3 Integration
Integration fixturing for installing the beampipe in the inner detector in the outer detector. Similar fixturing existed for the Run IIa detector. This is unlikely to present a cost or schedule risk. The technical or scope risk will be handled with written procedures. Again, with the concern over the amount of fixture designing late in the project, see mitigation for 1.1.7.1.

Mitigation Discussion/Findings

Cost
In general the risk of cost overrun task by task is covered adequately with the contingency allocated.

Schedule
Schedule contingency is incorporated by including a lag for each of the major project milestones. The results of this risk analysis can be compared to this lag for six of these milestones, those which are at the most critical junctures in the project. In the table below the contingency estimates are allocated to the milestones and the cumulative contingency

compared to the milestone lag (which by it's nature is cumulative). The cumulative contingency attempts to allow some overlap of slippage in different tasks.

WBS	**Milestone**	**Need determined in this Analysis by WBS**	**Est Sched Impact (wks)**	**Est Sched Risk**	**Cumulative contingency needed (wks)**	**Milestone Lag (wks)**
1.1.11.9.1	Production chip Submission - Reporting	1.1.1.1.2, 1.1.1.3	8-16	0.4	12	7
1.1.11.9.8	Go ahead for DAQ Production	1.1.1.2.2 1.1.1.3.1.2, 1.1.1.5.2 1.1.1.9.2, 1.1.1.9.3	8-16 8-16 4-8	0.1 0.4 0.2	24	15
1.1.11.9.10	Production Staves Available	1.1.1.3.1.3, 1.1.1.5.3	4-8	0.2	30	19
1.1.11.9.13	Stave installation complete	1.1.3.3.3, 1.1.3.4.3	4-8	0.4	34	26
1.1.11.9.15	Outer Detector Complete	1.1.5.1.1.2,1.1.5.1.9.2 1.1.7.1.3	4-8 4-8	0.2 0.2	38	30
1.1.11.9.16	SVX2b Ready for Installation into ISL				38	34

The lag on the reporting milestones results in a date for the last milestone of 12/23/05. This analysis suggests that the milestone lags should be more forward weighted in the project. The difference between 34 and 38 weeks may or may not be significant.

Technical

This is a challenging project so inevitably there is moderate technical risk. The main areas of concern are in the chip noise performance and DAQ bandwidth, and in the mechanical alignment of the final detector. While the final performance of the detector could be compromised if problems are encountered in these areas, with the extensive prototyping and testing planned in this schedule it is unlikely that the performance degradation would be severe enough to seriously impact the physics capabilities of CDF.

Addendum by the Run IIb Silicon project managers Nicola Bacchetta and Brenna Flaugher August 7, 2002

The Risk Analysis presented above was performed by Jeff Spalding on a particular version of the schedule (DALE'S_SVX2b_Aug02_v3.mpp). The contingency in that schedule on the reportable milestones was set to be 25% of the time from now until that milestone. This is what is listed in the last column of his concluding table. We (Nicola and Brenna) have gone back through the schedule and reconsidered the contingency on the reportable milestones based on our understanding of the risks, and how slippage in these milestones accumulates over the course of the project. The results of this analysis are similar to the 25% estimates listed above. The revised table is given below. The base schedule is unchanged, only the contingency on the milestones was adjusted.

The total estimated needed contingency is approximately the same in both analyses, and gives us confidence in the total contingency estimates. The main difference between the recommendations from Jeff's risk analysis and our own is the distribution of the contingency over the duration of the project. We believe the contingency need on the chip submission and DAQ production go-ahead is small due to the recent very favorable results from the prototype chip testing.

WBS	**Milestone**	**Need determined in this Analysis by WBS**	**Est Sched Impact (wks)**	**Est Sched Risk**	**Cumulative contingency needed (wks)**	**Milestone Lag (wks)**
1.1.11.9.1	Production chip Submission - Reporting	1.1.1.1.2, 1.1.1.3	8-16	0.4	12	8
1.1.11.9.8	Go ahead for DAQ Production	1.1.1.2.2 1.1.1.3.1.2, 1.1.1.5.2 1.1.1.9.2, 1.1.1.9.3	8-16 8-16 4-8	0.1 0.4 0.2	24	12
1.1.11.9.10	Production Staves Available	1.1.1.3.1.3, 1.1.1.5.3	4-8	0.2	30	20
1.1.11.9.13	Stave installation complete	1.1.3.3.3, 1.1.3.4.3	4-8	0.4	34	28
1.1.11.9.15	Outer Detector Complete	1.1.5.1.1.2,1.1.5.1.9.2 1.1.7.1.3	4-8 4-8	0.2 0.2	38	32
1.1.11.9.16	SVX2b Ready for Installation into ISL				38	34