NCSX Project
Contingency Analysis
July 2007

Introduction

This document describes the process and approach used to develop the cost and schedule contingency estimates included in the proposed baseline for the National Compact Stellarator Experiment (NCSX) Project. The contingency estimate is based on inputs of all key members of the project team using a structured process based on established DOE and industry methodologies. The contingency estimates are intended to reflect the inherent uncertainty associated with the current NCSX estimates-to-complete (ETC) and the currently identified project risks.

Overview of Methodology and Approach

The NCSX Project Team employed a structured process developed and implemented with the support of a consultant with extensive DOE and industry experience. The objective of this process was to assess and analyze all areas of risk and uncertainty that might affect the cost and schedule estimates for the project. Probabilistic Risk Analysis Techniques (Monte Carlo Analysis) were used to derive recommended contingency allowances that provide 90% confidence that the proposed baseline estimate will not be exceeded.

Separate models were constructed to account for inherent uncertainty of the cost and schedule estimates as well as the potential residual impact of identified project risks. Each of these models is described in the following sections of this document.

Cost Estimate Uncertainty Model

Both cost estimates and schedule durations have inherent levels of uncertainty. In general, the level of such uncertainty is a direct result of the degree of design maturity and the complexity of the elements involved – in effect, how much definition exists to provide a basis for the estimates. For this reason, standard cost estimating practice describes uncertainty levels in terms of ranges around the point estimates which, in the case of NCSX, were developed by Job Managers and the Project Management team.

The NCSX Project relied on standard industry and DOE cost estimate classifications to describe the expected range of individual job estimates. In particular, a combination of design maturity and complexity was used to equate each job estimate to a particular cost estimate classification level which could then be used to assign an expected estimate range to each estimate.

Each job estimate was assigned a design maturity and complexity rating based on the definitions shown in Tables 1 and 2.

Table 1
Design Maturity Definition

High	Final design available. All design features/requirements well known. No further design development or evolution expected that will impact estimate.
Medium	Preliminary design available. Some additional design evolution likely. Further developments can be somewhat expected or anticipated and reflected in estimate.
Low	No better than conceptual design basis currently available. Design details, procedures, etc. still need much development and evolution of requirements beyond estimate basis is likely and expected.

Table 2
Design Complexity Definition

Low	Work is fairly well understood -- either standard construction or repetition of activities performed in past. Little likelihood of estimate not being well understood and requirements not being well defined.
Medium	More complex work requirements that have potential to impact cost and schedule estimates. Limited experience performing similar tasks, so ability to estimate accurately is somewhat suspect
High	Extremely challenging tasks and/or requirements. Unique or first-of-a-kind assembly or work tasks. No good basis for estimating work exists so there is a high degree of estimate uncertainty.

Based on standard industry and DOE estimate classifications (Per AACEI Recommended Practice 18R-97, *Cost Estimate Classification System – As Applied to Engineering, Procurement, and Construction in the Process Industries*), the NCSX estimates were equated to the appropriate class of estimate based on the design maturity and complexity ratings, as shown in Table 3. The standard industry estimate ranges were then used as a basis to describe the expected range of each NCSX job estimate, using the maturity and complexity ratings, as shown in Table 4.

Table 3
NCSX Estimate Classification

Estimate Class	Level of Definition	Accuracy Range	NCSX Definition
5 - ROM DOE CD-0	0 - 2%	Low: -20 % to -50% High:+30% to +100%	L Maturity H Complexity
4 - Conceptual DOE CD-1	1 - 15%	Low: -15% to -30% High:+20% to +50%	MH and LM
3 - Preliminary DOE CD-2	10 - 40%	Low: -10% to -20% High:+10% to +30%	LL, MM, and HH
2 DOE CD-2 or 3	30 - 70%	Low: -5% to -15% High:+5% to +20%	ML and HM
1 - Definitive DOE CD-3	50 - 100%	Low: -3% to -10% High:+3% to +15%	H Maturity L Complexity

Table 4
NCSX Estimate Ranges

		Design Complexity					
		Low		**Medium**		**High**	
Design Maturity	**Low**	-15%	+25%	-20%	+40%	-30%	+60%
	Medium	-10%	+15%	-15%	+25%	-20%	+40%
	High	-5%	+10%	-10%	+15%	-15%	+25%

The distribution of the NCSX Estimates to Complete by uncertainty level is shown in Table 5. As can be seen in Table 5, at this time, approximately 31% of the remaining NCSX project costs are based on a level of definition that does not meet the expectations of DOE O 413.3A for establishing a baseline (i.e., CD-2).

Table 5
NCSX Estimate to Complete by Design Maturity and Complexity Rating

				Design Maturity/Complexity				
WBS	**Description**	**ETC**	**Frozen**	**HL**	**ML & HM**	**MM,LL,HH**	**MH & LM**	**LH**
Assumed Estimate Accuracy Range				*-5 to +10%*	*-10 to +15%*	*-15 to +25%*	*-20 to +40%*	*-30 to +60%*
12	Vacuum Vessel	156	-252	408				
13	Conventional Coils	3,460	-32	337	1,111	2,044		
14	Modular Coils	6,241	-116		501	3,901	1,955	
15	Structures	1,262			1,262			
16	Coil Services	862		862				
17	Cryostat & Base Support Structure	785		325	253		207	
18	Field Period Assembly	10,105			5,727	515	1,548	2,315
19	Stellarator Core Mgmt & Integr	1,620		1,620				
2	Auxiliary Systems	240			172	68		
3	Diagnostics	717		454		263		
4	Electrical Power Systems	2,425	-104	1,445	1,084			
5	I&C Systems	1,136		69	640	205	222	
6	Facility Systems	1,379				151	1,228	
7	Test Cell Prep & Machine Assy	7,952	-249			617	7,584	
8	Project Oversight & Support	12,508	174	9,176		2,562		597
	Total	**50,849**	**-580**	**14,696**	**10,751**	**10,326**	**12,744**	**2,912**
	% of Total	**100%**	**-1%**	**29%**	**21%**	**20%**	**25%**	**6%**

The ranges shown in Table 4 were then used with the job manager's point estimate to describe a probability profile for each estimate as an input to a Monte Carlo analysis using Crystal Ball® and Microsoft Excel software. Each job estimate was treated as an independent variable (except for a few job estimates which were correlated to each other) with cost outcomes described as a triangular distribution where the base estimate is the most likely value, the low end of the range is the minimum value, and the high end of the range is the 80% confidence level value (there is a 20% chance the actual costs could exceed this value). Appendix A shows each job point estimate, the rating of design maturity and complexity, and the resultant ranges used as the inputs to the Monte Carlo probabilistic analysis. Information on individual estimate probability profiles, correlation factors, etc. can be found in the Crystal Ball® Report included as Appendix H (these are called "assumptions" in Crystal Ball®.)

In addition, as a check of the above standard estimate ranges, the NCSX Project also solicited Job Manager opinions regarding the expected range around each of their estimates (+ or – some % of the estimate). It was found that the results of both approaches yielded similar results using the Monte Carlo analysis model, but the standard ranges were selected for the final model so as to introduce consistency into the uncertainty ranges of all job estimates, without the effect of individual job manager biases.

Schedule Uncertainty Model
The inherent uncertainty of the schedule duration estimates were evaluated in a similar manner as was the cost estimate uncertainty. For the schedule, a model that focused only on critical and near critical path activities was used. For each activity identified and included in this model, a duration range was established using the same maturity and complexity ratings and resultant estimate uncertainty ranges as were used for costs.

As with the cost uncertainty model, Monte Carlo analysis was used to determine the overall project schedule probability profile. Each critical path (or near critical path) activity was treated as an independent variable, however when appropriate, the schedule and cost estimate uncertainty of individual jobs were correlated (that is, if the costs went up, the schedule duration would likely increase, and vice versa). Triangular distributions were assumed with the base duration estimate being the most likely value, the low end of the range representing the minimum duration, and the high end of the range having a 90% confidence level (higher than for costs since schedule workarounds are more often possible). In addition, the model capped or limited the durations for some activities that could be worked on a second shift to minimize the upper end of potential durations. However when this is necessary, the model added a cost allowance for shift supervision, support and shift differential costs.

The inputs for the schedule uncertainty model are included as Appendix B of this document.

Risk Model
In addition to the models used to assess and quantify cost and schedule estimate uncertainty, a separate model was used to assess the level of contingency needed to accommodate residual risk impacts. The basis for this model is the NCSX Risk Register and the estimated likelihood of occurrence of risks and risk impact estimates included therein. The process used to identify risks and to manage identified risks is described elsewhere. The model used to estimate risk related cost and schedule contingency allowances is described below.

The Risk Model assumes each identified risk has a chance of occurring based on the “likelihood” assessments determined for each risk, as described in Table 6.

Table 6
Likelihood of Risk Occurrence

Probability of Occurrence		**Criteria**
Qualitative	**Quantitative**	
Very Unlikely	<0.1	Will not likely occur anytime in the project life cycle, or the probability of the occurrence is judged to be less than 10%.
Unlikely	>0.1 but <0.4	Unlikely to occur in the project life cycle, or the probability of the occurrence is judged to be greater than 10% but less than 40%.
Likely	>0.4 but <0.8	Will likely occur sometime during the project life cycle of the project or its facilities, or the probability of the occurrence is judged to be greater than 40% but less than 80%.
Very Likely	>0.8	Very likely to occur sometime during the project life cycle or the probability of occurrence is judged to be 80% or greater.

Within the Monte Carlo analysis model, each likelihood description (likely, unlikely, etc,) is represented by a uniform probability profile (e.g., if "likely", then there is an equal chance of from 40% to 80% of the time that risk event will occur). If an event does occur, then the estimated cost and schedule impact ranges will be realized with another uniform probability profile for the impact range (that is, there is an equal chance any value from the low estimate to the high estimate will be realized). These probability profiles were used as the input variables for the Monte Carlo analysis using Crystal Ball® and Microsoft Excel software. The Risk Model inputs are shown in Appendix C of this document.

Summary of Results

The result of the NCSX uncertainty and risk models is displayed in the figure below (the detailed probability profile of each uncertainty and risk element can be found in Appendix D and E, respectively). The contingency allowances needed to attain a 90% confidence the proposed ETC will not be exceeded are summarized in Table 7. The ETC for the NCSX Project at the 90% level of confidence is approximately $63 million.

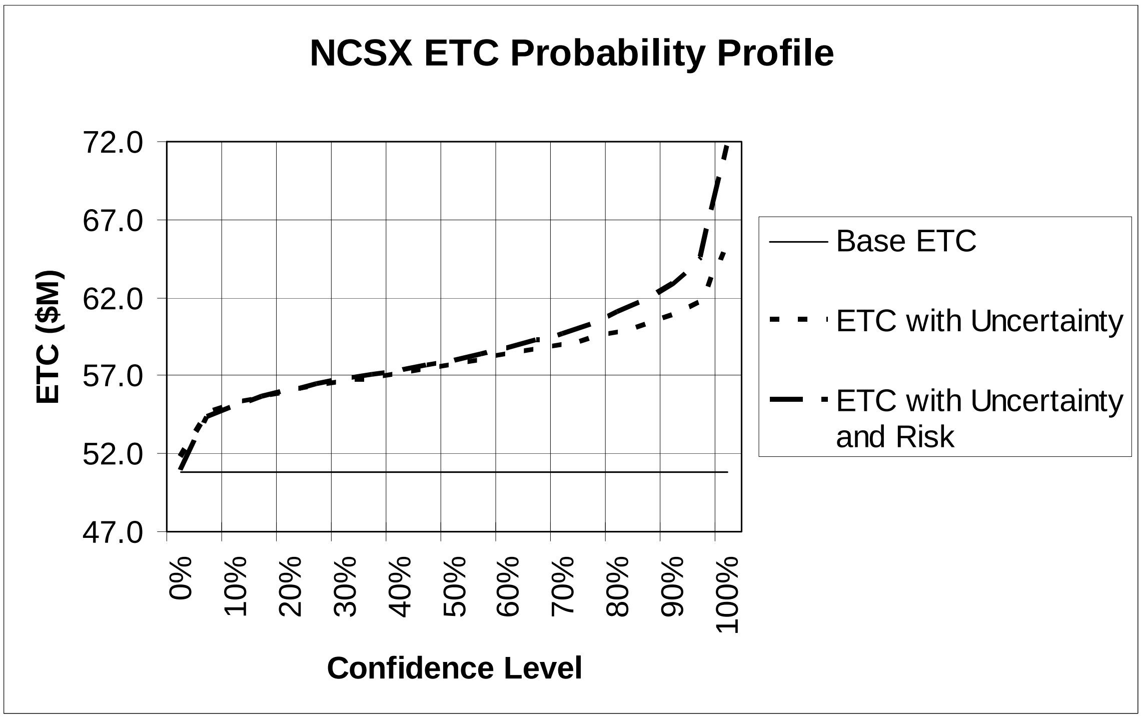


Table 7
Contingency Analysis Results

Base Schedule		**45.25**	months
Schedule Uncertainty Contingency at 90%		7.88	
Risk Schedule Contingency at 90%		3.76	
Total Schedule Contingency (90%)		**11.63**	**months**
Base ETC		**50,849**	
Contingency at 90% (Std Uncertainty)		8,036	16%
Cost of Schedule Uncertainty Contingency		1,589	3%
Cost of Schedule Risk Mitigation		355	1%
Total Uncertainty Contingency - 90% Confidence		9,981	20%
Risk Cost Contingency (from Risk Model) at 90%		1,282	3%
Risk Schedule Contingency (cost of stretch) - 90%		758	1%
Total Risk Contingency - 90% Confidence		2,040	4%
Total Cost Contingency (90%)		**12,021**	**24%**
ETC with Contingency (@90%)		***62,869***	
Contingency Spread by Year			**$M**
	2008	20%	2.40
	2009	25%	3.01
	2010	30%	3.61
	2011	25%	3.01

Table 7 summarizes the months of schedule contingency needed to achieve 90% confidence in the schedule end date (CD-4) as a result of both schedule estimate uncertainty (as it impacts the project critical path), and the potential residual impacts of project risk events.

Also shown in Table 7 are the cost contingency allowances necessary to attain a 90% level of confidence in the Estimate to Complete for the NCSX Project. The cost contingency is comprised of the following elements:

- Standard estimate uncertainty allowance
- Cost associated with the schedule uncertainty (project costs that would be incurred as the project schedule is stretched – see Appendix F)
- Cost of Schedule Risk Mitigation representing the added costs to be incurred if and when second shift operations are needed to maintain the project schedule (or limit the amount of schedule stretch) as a result of schedule uncertainty – see Appendix F
- Risk Contingency which includes both cost impacts and the cost that is incurred as a result of schedule impacts of risk events

Table 7 also depicts the proposed spread of contingency dollars by fiscal year, the basis for which can be found in Appendix G.

At the request of DOE HQ, the calculated contingency allowance was subsequently allocated to individual WBS elements. Although the contingency will not be managed in this way, this portrayal is useful for assessing to what degree the various WBS elements contribute to the uncertainty and risks for the NCSX Project. The results of this allocation are shown in Table 8. The following methodologies were used to derive this contingency allocation:

- Uncertainty was distributed by forecasting the Monte Carlo analysis results for each WBS and determining the percentage each WBS element contributed to a sum of the 90% confidence points for each WBS element.
- Schedule cost contingency was allocated to the WBS elements for which those costs will be required – the "standing army" costs associated with schedule stretch that are primarily project management related elements.
- The schedule mitigation cost was assigned to the WBS element that would require additional shift work if the schedule uncertainty is realized.
- The risk contingency was allocated on the basis of WBS elements assigned for each identified risk. In the case of risks such as labor rate or escalation changes, the risk contingency was spread proportionally across all potentially impacted WBS elements.

Appendices

A. Estimate Uncertainty Ranges
B. Schedule Uncertainty Ranges
C. Risk Model Inputs
D. Uncertainty Model Results
E. Risk Model Results
F. Schedule Contingency Costing Bases
G. Basis for Spread of Contingency by Fiscal Year
H. Crystal Ball® Report

Table 8
Contingency Allocation by WBS

WBS			Allocation of Contingency Allowances						
		ETC	Uncertainty	Schedule	Sched Mitig	Risk	Total	% of ETC	% of Conting.
12	Vacuum Vessel	156	30			10	40	26%	0.3%
13	Conventional Coils	3,460	527			175	702	20%	5.8%
14	Modular Coils	6,241	1,002			406	1,408	23%	11.7%
15	Structures	1,262	173			8	181	14%	1.5%
16	Coil Services	862	67			225	292	34%	2.4%
17	Cryostat & Base Support Structure	785	112			5	117	15%	1.0%
18	Field Period Assembly	10,105	1,645		355	127	2,128	21%	17.7%
19	Stellarator Core Mgmt & Integr	1,620	127	179		10	317	20%	2.6%
2	Auxiliary Systems	240	34			2	36	15%	0.3%
3	Diagnostics	717	84			5	88	12%	0.7%
4	Electrical Power Systems	2,425	182			53	235	10%	2.0%
5	I&C Systems	1,136	156			7	163	14%	1.4%
6	Facility Systems	1,379	372			9	381	28%	3.2%
7	Test Cell Prep & Machine Assy	7,952	2,375			162	2,536	32%	21.1%
8	Project Oversight & Support	12,508	1,150	2,168		79	3,397	27%	28.3%
	Total	**50,849**	**8,036**	**2,347**	**355**	**1,282**	**12,021**	**24%**	**100.0%**

APPENDIX A

COST ESTIMATE UNCERTAINTY RANGES

WBS2	Job	WBS4	Maturity	Complexity	*updated* TOTAL	Estimate Uncertainty Range Low	High
12	1204 - Job: 1204 - VV Sys Procurements (nonVVSA)-DUDEK	124P - VV Personnel Access Port & Lateral sprts	H	L	84	80	92
	1204 - Job: 1204 - VV Sys Procurements (nonVVSA)-DUDEK	125 - VV Local I&C	H	L	34	33	38
	1204 - Job: 1204 - VV Sys Procurements (nonVVSA)-DUDEK	122 - Thermal Insulation	H	L	220	209	242
	1204 - Job: 1204 - VV Sys Procurements (nonVVSA)-DUDEK	124T - Heater Tape for Port Stub	H	L	20	19	22
	1204 - Job: 1204 - VV Sys Procurements (nonVVSA)-DUDEK	124U - T/C and Heater Tape Leads	H	L	37	35	41
	1204 - Job: 1204 - VV Sys Procurements (nonVVSA)-DUDEK	124V - Flux loop junction boxes and spacer templates	H	L	12	12	14
	1250 - Job: 1250 - Vacuum Vessel Fabrication**CLOSED**		FROZEN		(252)	-252	-252
13	1302 - Job: 1302 - PF Design -KALISH	RBLX - FY07 Rebaseline Exercise	FROZEN		5	5	5
	1302 - Job: 1302 - PF Design -KALISH	-	L	L	253	215	316
	1352 - Job: 1352 - PF Coil Procurement-KALISH	13P - PF Coil Fabrication	L	L	1,630	1,385	2,037
	1353 - Job: 1353 - CS Structure Procurement-DAHLGREN	132A - CS Support Structure	H	L	337	320	371
	1354 - Job: 1354 - Trim Coil Design &Procurement-KALISH	133 - Trim Coils	L	L	162	138	202
	1355 - Job: 1355 - WBS 13 I&C Proc and Coil Assy-KALISH	134 - TF/PF Loacl I&C	M	L	72	65	83
	1361 - Job: 1361 - TF Fabrication-KALISH	130 - TF Title III and Fabrication Oversight	H	M	213	191	245
	1361 - Job: 1361 - TF Fabrication-KALISH	13Y - TF Fabrication Contract	H	M	826	744	950
	1361 - Job: 1361 - TF Fabrication-KALISH	RBLX - FY07 Rebaseline Exercise	FROZEN		1	1	1
	1361 - Job: 1361 - TF Fabrication-KALISH	-	FROZEN		(38)	-38	-38
14	1404 - Job: 1404 - MCWF R&D 1st Prod Casting**CLOSED**	-	FROZEN		(36)	-36	-36
	1408 - Job: 1408 - MC Winding Supplies-CHRZANOWSKI	-	L	M	350	280	489
	1411 - Job: 1411 - MCWF Fabr. S005242-HEITZENROEDER	-	FROZEN		(80)	-80	-80
	1416 - Job: 1416 - Mod Coil Type AB Fnl Dsn-WILLIAMSON	MCDB - Clamp hardware modifications	L	M	8	6	11
	1416 - Job: 1416 - Mod Coil Type AB Fnl Dsn-WILLIAMSON	MCDC - Blanket thermal insulation	L	M	23	19	33
	1416 - Job: 1416 - Mod Coil Type AB Fnl Dsn-WILLIAMSON	MCDE - Top level assy models/drawings	L	M	76	61	107
	1416 - Job: 1416 - Mod Coil Type AB Fnl Dsn-WILLIAMSON	MCDF - Analysis and closeout documentation	L	M	165	132	231
	1416 - Job: 1416 - Mod Coil Type AB Fnl Dsn-WILLIAMSON	TCCO - Type C Design Closeout	L	M	7	6	10
	1421 - Job: 1421 - Mod Coil Interface Design-WILLIAMSON	142A - Outboard Interface	L	M	25	20	35
	1421 - Job: 1421 - Mod Coil Interface Design-WILLIAMSON	-	L	M	273	218	382
	1421 - Job: 1421 - Mod Coil Interface Design-WILLIAMSON	142B - Outboard Interface-Bolted Joint Tests-Tension	L	M	72	58	101
	1421 - Job: 1421 - Mod Coil Interface Design-WILLIAMSON	142C - Outboard Interface-Bolted Joint Tests-Shear	L	M	89	71	124
	1429 - Job: 1429 - MC Interface R&D-GETTELFINGER	142D - Outboard Interface-Friction	L	M	118	95	165
	1421 - Job: 1421 - Mod Coil Interface Design-WILLIAMSON	142E - Inboard Interface-Design	L	M	173	138	242
	1421 - Job: 1421 - Mod Coil Interface Design-WILLIAMSON	142F - Inboard Interface-AB/BC/AA	L	M	94	75	131
	1421 - Job: 1421 - Mod Coil Interface Design-WILLIAMSON	142G - Inboard Interface-CC	L	M	237	190	332
	1421 - Job: 1421 - Mod Coil Interface Design-WILLIAMSON	142H - Weld Access test	L	M	104	83	146
	1421 - Job: 1421 - Mod Coil Interface Design-WILLIAMSON	142J - Overall MC Interface	L	M	140	112	196
	1431 - Job: 1431 - Mod. Coil Interface Hardware-DUDEK	TECH - Misc Tech Shop Support	M	M	77	65	96
	1431 - Job: 1431 - Mod. Coil Interface Hardware-DUDEK	BLAD - Bladders	M	M	16	14	21
	1431 - Job: 1431 - Mod. Coil Interface Hardware-DUDEK	BUSH - Bushings	M	M	54	46	68
	1431 - Job: 1431 - Mod. Coil Interface Hardware-DUDEK	SHMS - Shims-Outboard	M	M	139	118	173
	1431 - Job: 1431 - Mod. Coil Interface Hardware-DUDEK	SHMT - Shims-Inboard	M	M	19	16	24
	1431 - Job: 1431 - Mod. Coil Interface Hardware-DUDEK	SHMU - Shims- C-C Joint	M	M	17	15	22
	1431 - Job: 1431 - Mod. Coil Interface Hardware-DUDEK	STUD - Studs Washers Nuts	M	M	717	609	896
	1451 - Job: 1451 - Mod Coil Winding-CHRZANOWSKI	1A - Station 1a/4 Casting Prep	H	H	248	211	310
	1451 - Job: 1451 - Mod Coil Winding-CHRZANOWSKI	2 - Station 2-Winding Instl Chill Plates Tubing Bag	H	H	578	491	723
	1451 - Job: 1451 - Mod Coil Winding-CHRZANOWSKI	3 - Station 4-Winding Instl Chill Plates Tubing Bag	H	H	646	549	807
	1451 - Job: 1451 - Mod Coil Winding-CHRZANOWSKI	5 - Station 5-VPI	H	H	327	278	408
	1451 - Job: 1451 - Mod Coil Winding-CHRZANOWSKI	1 - Station 1 Post VPI	H	H	203	173	254
	1451 - Job: 1451 - Mod Coil Winding-CHRZANOWSKI	LABR - LOE Oversight & Supervision	H	H	860	731	1,075
	1459 - Job: 1459 - Mod Coil Fabr.Punch List-CHRZANOWSKI	PLTS - Punchlist Tech shop/RESA	M	L	176	158	202

WBS2	Job	WBS4	Maturity	Complexity	TOTAL	Low	High
	1459 - Job: 1459 - Mod Coil Fabr.Punch List-CHRZANOWSKI	PLCT - Punchlist- Coil Technicians	M	L	325	293	374
15	1501 - Job: 1501 - Coil Structures Design-DAHLGREN	-	M	L	187	168	215
	1550 - Job: 1550 - Coil Struct. Procurement -DAHLGREN	-	M	L	1,076	968	1,237
16	1601 - Job: 1601 - Coil Services Design-GORANSON	RBLX - FY07 Rebaseline Exercise	H	L	6	6	7
	1601 - Job: 1601 - Coil Services Design-GORANSON	161 - 161 - LN2 Distribution	H	L	339	322	373
	1601 - Job: 1601 - Coil Services Design-GORANSON	162 - 162 - Electrical Leads	H	L	479	455	527
	1601 - Job: 1601 - Coil Services Design-GORANSON	163 - 163 - Coil Protection System	H	L	38	36	42
17	1701 - Job: 1701 - Cryostat Design-GETTLEFINGER	-	L	M	207	166	290
	1702 - Job: 1702 - Base Support Struct Design-DAHLGREN	-	M	L	163	147	188
	1751 - Job: 1751 - Cryostat Procurement-GETTLEFINGER	-	H	L	325	309	357
	1752 - Job: 1752 - Base Support Proc-DAHLGREN	172 - 172 - Base Support Structure	M	L	90	81	103
18	1802 - Job: 1802 - FP Assy Oversight&Support-VIOLA	A - Oversight and Supervision	H	M	1,988	1,789	2,286
	1803 - Job: 1803/1805- FPA Tooling/Constr-BROWN/DUDEK	2.00 - Station 2-Modular Coil Sub- Assembly	L	L	-	0	0
	1803 - Job: 1803/1805- FPA Tooling/Constr-BROWN/DUDEK	3.00 - Station 3-Modular Coil to VVSA Assembly	M	L	122	110	140
	1803 - Job: 1803/1805- FPA Tooling/Constr-BROWN/DUDEK	5.00 - Station 5-Final Field Period Assembly	M	L	186	168	214
	1803 - Job: 1803/1805- FPA Tooling/Constr-BROWN/DUDEK	6.00 - 6.00-Final Machine Assembly	L	M	214	171	299
	1806 - Job: 1806 - FP Assembly specs and drawings-COLE	1.00 - 1.00-VV Prep Station	M	M	17	14	21
	1806 - Job: 1806 - FP Assembly specs and drawings-COLE	2.00 - Station 2-Modular Coil Sub- Assembly	M	M	26	22	32
	1806 - Job: 1806 - FP Assembly specs and drawings-COLE	3.00 - Station 3-Modular Coil to VVSA Assembly	M	M	52	44	64
	1806 - Job: 1806 - FP Assembly specs and drawings-COLE	5.00 - Station 5-Final Field Period Assembly	M	M	113	96	141
	1806 - Job: 1806 - FP Assembly specs and drawings-COLE	6.00 - 6.00-Final Machine Assembly	M	M	132	112	164
	1806 - Job: 1806 - FP Assembly specs and drawings-COLE	-	M	M	176	150	221
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S0P0 - General Assy Support	H	M	2,922	2,630	3,361
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S1P1 - Station 1-VV Prep (hard surface components) FP#1	H	M	132	118	151
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S1P2 - Station 1- VV Prep (hrd surf cmpntsFP#2	H	M	136	122	156
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S1P3 - Station 1- VV Prep (hrd surf cmpntsFP#3	H	M	210	189	241
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S1SP - Station 1-Spool pieces (3) (spacers)	H	M	31	28	36
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S2PR - Station 2 Trials & Development	L	H	533	373	853
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S2PX - Setup	L	H	100	70	161
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S2PM - Pre-Measuring and fitup checks	L	H	169	119	271
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S2P1 - Station 2-MC Sub Assy A1-B1-C1	L	H	160	112	256
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S2PZ - Station 2 MC Sub Assy A2-B2-C2	L	H	95	67	153
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S2P2 - Station 2-Modular Coil Subassembly-FP#2	L	H	280	196	448
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S2P3 - Station 2-Modular Coil Subassembly-FP#3	L	H	285	200	456
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S3P0 - Station 3 Setup/Preparations/General	L	H	181	127	290
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S3P1 - Station 3-Assemble Mod Coils and VVSA-FP#1	L	H	167	117	267
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S3P2 - Station 3-Assemble Mod Coils and VVSA-FP#2	L	H	171	120	274
	1810 - Job:1810-Field Period Assy -Station 1 2 3 VIOLA	S3P3 - Station 3-Assemble Mod Coils and VVSA-FP#3	L	H	173	121	276
	1815 - Job: 1815 - Field Period Assy -Station 5-VIOLA	S4P0 - Setup/Preparations/General	L	M	223	179	312
	1815 - Job: 1815 - Field Period Assy -Station 5-VIOLA	S4P1 - Station 5- Final FP Assy -FP#1 (in NCSX TC)	L	M	363	290	508
	1815 - Job: 1815 - Field Period Assy -Station 5-VIOLA	S4P2 - Station 5- Final FP Assy -FP#2 (in NCSX TC)	L	M	373	298	522
	1815 - Job: 1815 - Field Period Assy -Station 5-VIOLA	S4P3 - Station 5- Final FP Assy -FP#3 (in NCSX TC)	L	M	376	300	526
19	1901 - Job: 1901 - Stellarator Core Mngtt&Integr-COLE	191 - 191 - Stellarator Core Management & Oversight	H	L	831	790	914
	1901 - Job: 1901 - Stellarator Core Mngtt&Integr-COLE	192 - 192 - Stellarator Core Integration & Analysis	H	L	788	749	867
21	2101 - Job: 2101 - Fueling Systems-BLANCHARD	-	L	L	68	58	86
22	2201 - Job: 2201 - Vacuum Pumping Systems-BLANCHARD	-	M	L	172	155	198
31	3101 - Job: 3101 - Magnetic Diagnostics-STRATTON	MD3 - Rogowski Coils	H	L	98	93	107
	3101 - Job: 3101 - Magnetic Diagnostics-STRATTON	MD4 - TF and PF Co-wound Loops	H	L	75	71	82
	3101 - Job: 3101 - Magnetic Diagnostics-STRATTON	124U - T/C and Heater Tape Leads	H	L	47	45	52
	3101 - Job: 3101 - Magnetic Diagnostics-STRATTON	124V - Flux loop junction boxes and spacer templates	H	L	57	54	62
	3101 - Job: 3101 - Magnetic Diagnostics-STRATTON	VLPB - Voltage Loops & Protective Boxes	H	L	14	14	16
36	3601 - Job: 3601 - Edge Divertor Diagnostics-STRATTON	-	H	L	31	29	34

WBS2	Job	WBS4	Maturity	Complexity	TOTAL	Low	High
38	3801 - Job: 3801 - Electron Beam Mapping-STRATTON	-	M	M	263	224	329
39	3901 - Job: 3901 - Diagnostics sys Integration-STRATTON	-	H	L	133	126	146
41	4101 - Job: 4101 - AC Power-RAMAKRISHNAN	-	FROZEN		(104)	-104	-104
	4101 - Job: 4101 - AC Power-RAMAKRISHNAN	411 - 411 - Auxiliary AC Power Systems	H	L	124	118	136
	4101 - Job: 4101 - AC Power-RAMAKRISHNAN	412 - 412 - Experimental AC Power Systems	H	L	35	33	38
	4301 - Job: 4301 - DC Systems-RAMAKRISHNAN	431 - 431 - C-Site DC Systems	H	L	603	573	663
44	4401 - Job: 4401 - Control & Protection-RAMAKRISHNAN	441 - 441 - Electrical Interlocks	M	L	482	434	554
	4401 - Job: 4401 - Control & Protection-RAMAKRISHNAN	442 - 442 - Kirk Key Interlocks	M	L	85	77	98
	4401 - Job: 4401 - Control & Protection-RAMAKRISHNAN	443 - 443 - Real Time Control Systems	M	L	15	13	17
	4401 - Job: 4401 - Control & Protection-RAMAKRISHNAN	444 - 444 - Instrument Systems	M	L	220	198	253
	4401 - Job: 4401 - Control & Protection-RAMAKRISHNAN	445 - 445 - Coil Protection Systems	M	L	283	254	325
45	4501 - Job: 4501 - Power Sys Dsn & Integr-RAMAKRISHNAN	451 - 451 - System Design & Interfaces	H	L	215	204	237
	4501 - Job: 4501 - Power Sys Dsn & Integr-RAMAKRISHNAN	452 - 452 - Electrical Systems Support	H	L	199	189	219
	4501 - Job: 4501 - Power Sys Dsn & Integr-RAMAKRISHNAN	453 - 453 - System Testing (PTP's)	H	L	269	255	296
51	5101 - Job: 5101 - Network and Fiber Infrastruct-SICHTA	-	M	L	151	136	173
52	5201 - Job: 5201 - I&C Systems-SICHTA	-	M	L	197	177	226
53	5301 - Job: 5301 - Data Acquisition-SICHTA	-	M	L	164	148	189
54	5401 - Job: 5401 - Facility Timing & Synchron.-SICHTA	-	M	M	205	174	256
55	5501 - Job: 5501 - Real Time Control System-SICHTA	-	M	L	129	116	148
56	5601 - Job: 5601 - Central Safety &Interlock Sys-SICHTA	-	L	M	222	178	311
58	5801 - Job: 5801 - Central I&C Integr& Oversight-SICHTA	-	H	L	69	66	76
61	6101 - Job: 6101 - Water Systems-DUDEK	613 - 613 - Vacuum Pumping System	L	L	46	39	58
62	6201 - Job: 6201 - Cryogenic Syst-GETTELFINGER	621 - 621 - LN2-LHe Supply System	L	M	88	70	123
	6201 - Job: 6201 - Cryogenic Syst-GETTELFINGER	622 - 622 - LN2 Coil Cooling Supply	L	M	88	71	123
	6201 - Job: 6201 - Cryogenic Syst-GETTELFINGER	623 - 623 - GN2 Cryostat Cooling System	L	M	479	383	670
63	6301 - Job: 6301 - Utility Systems-DUDEK	-	L	L	105	89	131
64	6401 - Job: 6401 - PFC/VV Htng/Cooling(bakeout)- KALISH	-	L	M	573	459	803
73	7301 - Job: 7301 - Platform Design & Fab-PERRY	-	L	L	204	174	255
74	7401 - Job: 7401 - TC Prep & Mach Assy Planning-PERRY	A - Oversight and Supervision	L	M	1,666	1,333	2,332
	7401 - Job: 7401 - TC Prep & Mach Assy Planning-PERRY	-	FROZEN		(249)	-249	-249
75	7501 - Job: 7501 - Construction Support Crew-PERRY	S0P0 - General Assy Support	L	M	1,407	1,125	1,969
	7503 - Job: 7503 - Machine Assembly (station 6)-PERRY	-	L	M	4,512	3,609	6,317
76	7601 - Job: 7601 - Tooling Design & Fabrication-PERRY	-	L	L	413	351	516
81	8101 - Job: 8101 - Project Management & Control-NEILSON	RBLX - FY07 Rebaseline Exercise	FROZEN		4	4	4
	8101 - Job: 8101 - Project Management & Control-NEILSON	-	H	L	3,839	3,647	4,223
	8102 - Job: 8102 - NCSX MIE Management ORNL-LYON	-	H	L	499	474	549
82	8202 - Job: 8202 - Engr Mgmt & Sys Eng Support-REIERSEN	RBLX - FY07 Rebaseline Exercise	FROZEN		30	30	30
	8202 - Job: 8202 - Engr Mgmt & Sys Eng Support-REIERSEN	-	H	L	2,619	2,488	2,881
	8203 - Job: 8203 - Design Integration-BROWN	-	M	M	1,408	1,196	1,760
	8204 - Job: 8204 - Systems Analysis-BROOKS	-	M	M	1,154	981	1,442
	8205 - Job: 8205 - Dimensional Control Coordin-ELLIS	-	L	H	597	418	955
	8210 - Job: 8210 - FY07 Rebaseling tasks	RBLX - FY07 Rebaseline Exercise	FROZEN		19	19	19
	8215 - Job: 8215 Plant Design	RBLX - FY07 Rebaseline Exercise	FROZEN		121	121	121
85	8501 - Job: 8501 - Integrated Systems Testing-GENTILE	-	H	L	419	398	461
	8501 - Job: 8501 - Integrated Systems Testing-GENTILE	PROC - Startup Documentation	H	L	346	329	381
89	8998 - Job: 8998 - Allocations-STRYKOWSKY	-	H	L	1,454	1,381	1,599
				ETC=	50,849	44,067	63,357
				Cost thru 4/30/07=	67,306	-13%	25%
				EAC=	118,155		

APPENDIX B

SCHEDULE UNCERTAINTY RANGES

NCSX Schedule Uncertainty Model

Schedule Activity	Base Duration (mos) on Critical Path	Estimate Uncertainty	Duration Range Low	Duration Range High	Adjusted High
CP and Near CP Activities					
Job 1421 - Modular Coil Interface Design	4.4	LM	3.54	6.20	6.20
Jobs 1806/1802-Field Period Assy station 2 specs, dwgs,procedures,training,prep.	1.4	HM	1.28	1.63	1.63
Job -1810 Field Period Assembly Stations 1,2,3					
Station 2 MC Sub-assy A1/B1/C1 and A2/B2/C2 (in parallel)	6.8	LH	4.73	10.82	6.80
Station 3 Assemble Mod Coils and VVSA FP#1	4.5	LH	3.15	7.20	4.50
Job - 1815 Field Period Assembly Station 5					
Station 5 Final Assembly FP#3	8.7	LM	6.93	12.12	8.70
Job 7503 Final Machine Assembly (Station 6)	18.5	LM	14.78	25.87	25.87
Job 8501 - Integrated System Testing	1.0	HL	0.95	1.10	1.10
	45.25		35.37	64.95	54.81

APPENDIX C

RISK MODEL INPUTS

NCSX Risk Register

No.	Job	Risk Description	Likelihood of Occurrence [a]	Cost Impact ($k) Low CI	Cost Impact ($k) High CI	Schedule Impact (mos) Low SI	Schedule Impact (mos) High SI
1	1354 7503	Additional trim coils may be required to suppress field errors from n>1 modes	U	+ $200	+ $400	+ 0.00	+ 0.00
2	1361	TF vendor produces a non-compliant coil requiring fabrication of an additional coil	VU	+ $15	+ $35	+ 0.00	+ 0.00
3	1352	PF vendor produces a non-compliant coil requiring fabrication of an additional coil	VU	+ $15	+ $35	+ 0.00	+ 0.00
4	1421	Modular coil interface design needs to change significantly from the baseline for unforeseen technical reasons	VU	($100)	+ $600	+ 1.00	+ 2.00
5	1421	As a result of the development trials for weld distortion, the welding time increases significantly above present allowance	U	+ $0	+ $600	+ 0.00	+ 2.00
6	1451	Damage or loss of modular coil during VPI or testing requiring the conductor to be stripped off and re-wound	U	+ $400	+ $450	+ 0.00	+ 2.00
7	1451	Failure of major piece of winding equipment (e.g., motor, gear box, etc.) resulting in extended downtime in a winding station	U	+ $10	+ $30	+ 0.00	+ 0.00
8	1810 7503	"Back office" support for FPA and final assembly becomes a chronic bottleneck, stretching out the time required to complete	VU	+ $0	+ $600	+ 0.00	+ 2.00
9	1810	Modular coil damaged during assembly requiring significant rework to coil	VU	+ $10	+ $20	+ 0.00	+ 0.50
10	1810	VV surface component (coolant tube, flux loop, or TC) damaged during FPA requiring significant rework	VU	+ $10	+ $20	+ 0.00	+ 0.50

NCSX Risk Register

No.	Job	Risk Description	Likelihood of Occurrence [a]	Cost Impact ($k) Low CI	High CI	Schedule Impact (mos) Low SI	High SI
11	1810	Unacceptable distortion in a field period when welding modular coil shims requiring	VU	+ $25	+ $35	+ 0.75	+ 1.25
12	1810	Field period damaged during loading, transport, or unloading from TFTR TC to NCSX TC	NC				
13	1815	Multiple vacuum leaks during initial pumpdown	NC				
14	7503	Insulation on TF/PF coil fails during initial cooldown and testing requiring in situ repair	VU	+ $50	+ $150	+ 1.00	+ 2.00
15	7503	Insulation on TF/PF coil fails during initial cooldown and testing requiring dismantling stellarator core	NC				
16	7503	Insulation on modular coil fails during initial cooldown and testing requiring in situ repair	VU	+ $50	+ $150	+ 1.00	+ 2.00
17	7503	Insulation on modular coil fails during initial cooldown and testing requiring stellarator core disassembly	NC				
18	7503	Unanticipated problems with cryostat penetrations (icing, excessive condensation). May require warming up the	U	+ $15	+ $30	+ 0.25	+ 1.00
19		Loss or prolonged unavailability of certain key personnel from the project could substantially impact the schedule.					
	1901	Mike Cole (ORNL)	VU	+ $0	+ $0	+ 0.00	+ 0.50

NCSX Risk Register

No.	Job	Risk Description	Likelihood of Occurrence [a]	Cost Impact ($k) Low CI	Cost Impact ($k) High CI	Schedule Impact (mos) Low SI	Schedule Impact (mos) High SI
	8203	Tom Brown (PPPL)	VU	+ $0	+ $0	+ 0.00	+ 0.50
	8204	Art Brooks (PPPL)	VU	+ $0	+ $0	+ 0.00	+ 0.50
	8205	Bob Ellis (PPPL)	VU	+ $0	+ $0	+ 0.00	+ 0.50
	1802 7401	Mike Viola (PPPL) Erik Perry (PPPL)	VU	+ $0	+ $0	+ 0.00	+ 0.50
20	1803 7503	Assembly sled for final assembly is not adequately stiff or does not provide repeatable motion	U	+ $25	+ $75	+ 0.00	+ 0.00
21	7503	TC floor is not adequately rigid for present metrology plan	VU	+ $50	+ $200	+ 0.00	+ 0.00
22	1421 7503	Modular coils are shorted across toroidal break between field periods causing problematic field errors	NC				
23	8101	GPP projects not completed in time to support project needs	NC				
24	8501	Coils are hooked up with incorrect polarity	U				
25	8101	Escalation of Stainless Sheet and Inconel higher than base escalation rates	VL	+ $37	+ $266	+ 0.00	+ 0.00

NCSX Risk Register

No.	Job	Risk Description	Likelihood of Occurrence [a]	Cost Impact ($k) Low CI	Cost Impact ($k) High CI	Schedule Impact (mos) Low SI	Schedule Impact (mos) High SI
26	8101	Escalation of Copper higher than base escalation rates	VL	+ $11	+ $81	+ 0.00	+ 0.00
27	8101	Labor rates may be significantly lower/higher than projected	L	($500)	+ $500	(0.50)	+ 0.50
28	1810 1815 7503	Metrology equipment and general purpose tooling/ lifting equipment (e.g.cranes) not available to support the schedule	U	+ $0	+ $150	+ 0.00	+ 0.50
29	1352	No suitable PF coil vendor submits bid. PF coils need to be built in-house.	U	+ $0	+ $300	+ 0.00	+ 0.00
30	8101	Funding profile may not match assumptions which in turn could impact cost and schedule	U	+ $0	+ $0	(2.00)	+ 2.00
31	8101	Overhead rates may change signficiantly which in turn could impact cost and schedule	U	($900)	+ $0	(1.00)	+ 0.00

[a] VL= Very Likely (P>80%), L=Likely (80%>P>40%), U=Unlikley (40%>P>10%), VU=Very Unlikely (P<10%), NC=Non-credible (P<1%)

APPENDIX D

UNCERTAINTY MODEL RESULTS

Percentiles	Total ETC With Uncertainty Contingency	Total Schedule Duration	Schedule Mitigation Cost Adder
0%	52,808	40.19	6.94
5%	55,014	43.33	8.70
10%	55,413	44.13	24.02
15%	55,690	44.75	44.46
20%	55,938	45.22	62.57
25%	56,136	45.69	80.75
30%	56,326	46.11	97.53
35%	56,498	46.53	114.46
40%	56,660	46.96	131.68
45%	56,829	47.42	148.57
50%	57,000	47.90	163.93
55%	57,190	48.38	180.19
60%	57,375	48.89	197.62
65%	57,572	49.48	215.24
70%	57,772	50.10	234.96
75%	58,005	50.71	258.27
80%	58,263	51.40	283.53
85%	58,541	52.16	316.73
90%	58,885	53.13	355.28
95%	59,421	54.41	408.85
100%	61,862	58.67	637.15

APPENDIX E

RISK MODEL RESULTS

Percentiles	Risk Cost Contingency	Risk Schedule Contingency
0%	-498.49	-1.82
5%	-216.57	-0.40
10%	-94.19	-0.29
15%	0.00	-0.18
20%	65.58	-0.06
25%	110.56	0.00
30%	144.78	0.00
35%	178.54	0.00
40%	210.52	0.00
45%	242.43	0.00
50%	270.66	0.00
55%	304.60	0.08
60%	383.41	0.19
65%	486.13	0.31
70%	588.48	0.42
75%	718.08	0.93
80%	894.63	1.92
85%	1,085.93	2.76
90%	1,281.86	3.76
95%	1,530.11	6.85
100%	3,400.87	15.23

Risk Contingency Summary		
@90%	Cost Risks	$1,282
	Cost Impact of Schedule	$758
	Total Risk Contingency	$2,040

APPENDIX F

SCHEDULE CONTINGENCY COSTING BASES

Standing army calculation

WBS	JOB	Description	Cost/yr	Cost/mo.
19	1901	Stellarator core management	$185	$15
81	8101	PPPL Management	$1,000	$83
81	8102	ORNL Management	$158	$13
82	8202	Engineering mgt	$550	$46
82	8203	Design Integration	$98	$8
82	8204	Systems Analysis	$0	$0
82	8205	Dimensional control	$0	$0
82	8215	Plant Design	$0	$0
89	8998	Allocations	$430	$36
				$202

Second Shift oversight,support, cost dif

Crane support, fixture setup, misc support	1.2 fte	$17
Field Supervision	1.0 fte	$25
Metrology crews (task dependent)	n/a	$0
Metrology engineer	.5 fte	$16
Shift differntial (@ 5fte crew size)		$7
		$64

APPENDIX G

BASIS FOR SPREAD OF CONTINGENCY BY FISCAL YEAR

Major Contributors to Uncertainty Contingency

		Spread of Dollars by Year						Weighted Contingency Spread by Year				
Job	**%**	**2007**	**2008**	**2009**	**2010**	**2011**		**2007**	**2008**	**2009**	**2010**	**2011**
* 7503 - Job: 7503 - Machir	38%	0%	0%	19%	81%	0%		0%	0%	7%	31%	0%
A - Oversight and Superv	5%	0%	0%	35%	51%	14%		0%	0%	2%	3%	1%
S0P0 - General Assy Suppo	6%	0%	0%	24%	57%	19%		0%	0%	1%	3%	1%
* S4P1 - Station 5- Final FF	2%	0%	0%	100%	0%	0%		0%	0%	2%	0%	0%
13P - PF Coil Fabrication	2%	0%	59%	39%	2%	0%		0%	1%	1%	0%	0%
	54%							0%	0%	10%	37%	2%
All Other	46%	Assume spread equally with none in 2007 and extra in 2011							12%	12%	12%	12%
Total Uncertainty Contingency Spead									12%	22%	49%	18%
Uncertainty Contingency							8,391		973	1,844	4,108	1,510
Risk Contingency Spread												
Primary contributor is Labor Rate risk, so spread as constant % of base costs									25%	25%	25%	25%
Risk Contingency							1,282		320	320	320	320
Schedule Contingency all in 2011												2,347
Total Contingency by Year							12,063		1,293	2,164	4,428	4,178
									11%	18%	37%	35%
Conservative Projection									***20%***	***25%***	***30%***	***25%***

APPENDIX H

CRYSTAL BALL® REPORT

Crystal Ball Report - Custom
Simulation started on 7/27/2007 at 15:29:18
Simulation stopped on 7/27/2007 at 15:30:55

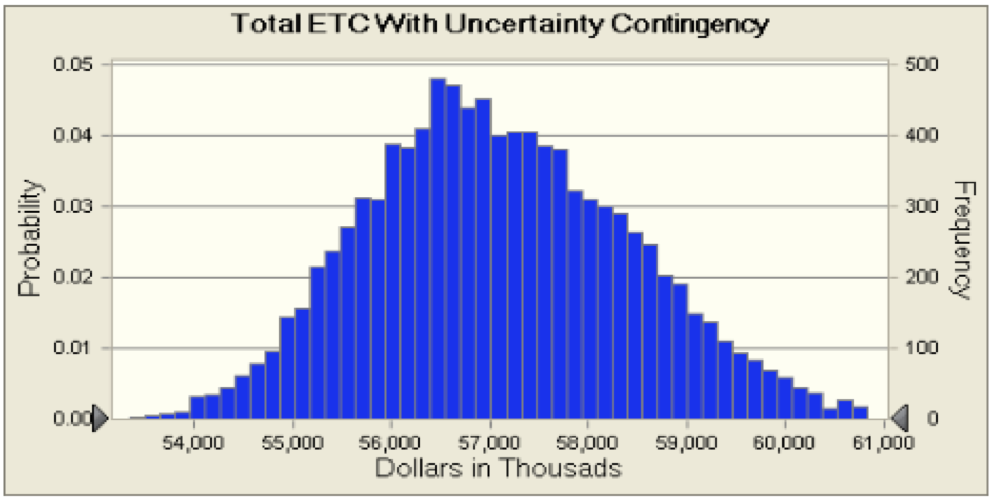
Run preferences:	
Number of trials run	10,000
Monte Carlo	
Random seed	
Precision control on	
Confidence level	95.00%
Run statistics:	
Total running time (sec)	96.78
Trials/second (average)	103
Random numbers per sec	19,838
Crystal Ball data:	
Assumptions	192
Correlations	31
Correlated groups	17
Decision variables	0
Forecasts	5

Forecasts

Worksheet: [NCSX Risk-Contingency Model - 7-27-07-play.xls]Estimate Uncertainty Range

Forecast: Total ETC With Uncertainty Contingency **Cell: L150**

Summary:
Entire range is from 52,808 to 61,862
Base case is -500
After 10,000 trials, the std. error of the mean is 13



Statistics:	Forecast values
Trials	10,000
Mean	57,092
Median	57,000
Mode	---
Standard Deviation	1,337
Variance	1,787,735
Skewness	0.2238
Kurtosis	2.74
Coeff. of Variability	0.0234
Minimum	52,808
Maximum	61,862
Range Width	9,054
Mean Std. Error	13

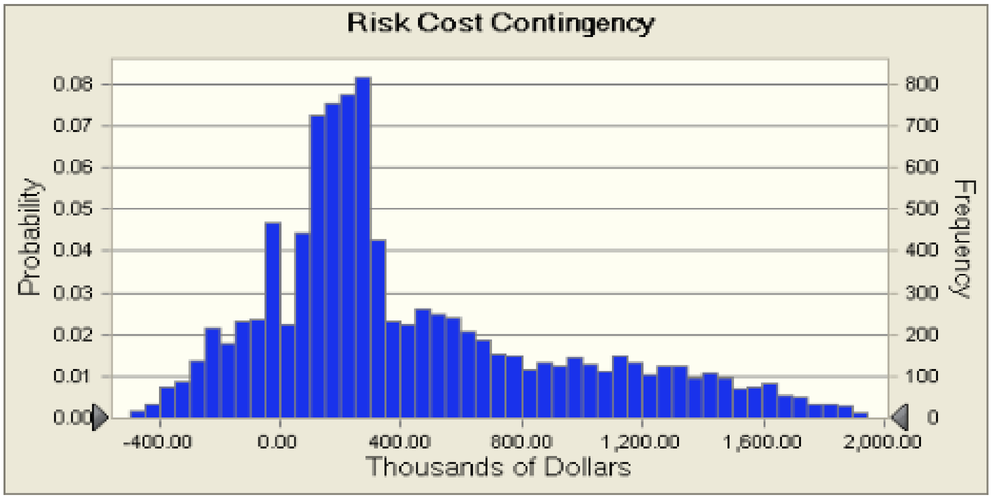
Forecast: Total ETC With Uncertainty Contingency (cont'd) **Cell: L150**

Percentiles:	Forecast values
0%	52,808
10%	55,413
20%	55,938
30%	56,326
40%	56,660
50%	57,000
60%	57,375
70%	57,772
80%	58,263
90%	58,885
100%	61,862

Worksheet: [NCSX Risk-Contingency Model - 7-27-07-play.xls]Risk Model

Forecast: Risk Cost Contingency **Cell: Q41**

Summary:
Entire range is from -498.49 to 3,400.87
Base case is 0.00
After 10,000 trials, the std. error of the mean is 5.34



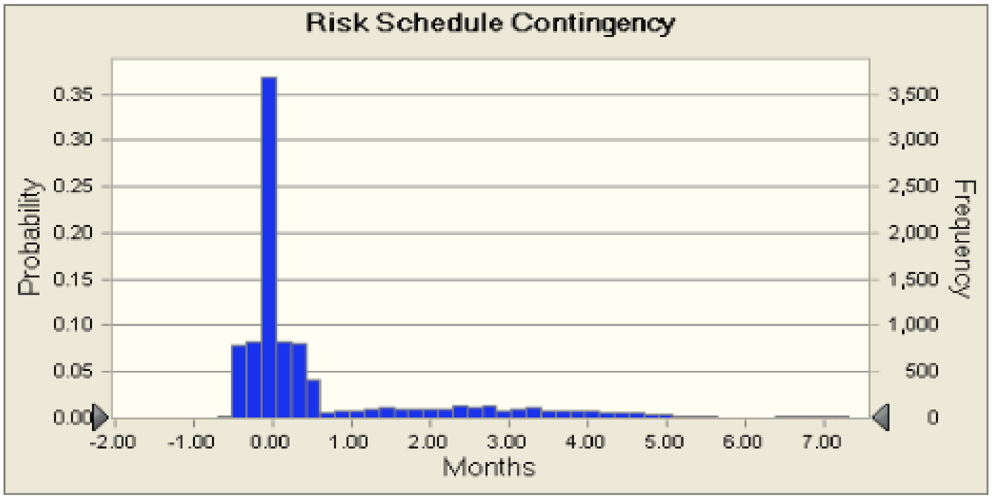
Statistics:	Forecast values
Trials	10,000
Mean	450.79
Median	270.67
Mode	0.00
Standard Deviation	533.89
Variance	285,039.23
Skewness	1.09
Kurtosis	3.89
Coeff. of Variability	1.18
Minimum	-498.49
Maximum	3,400.87
Range Width	3,899.36
Mean Std. Error	5.34

Forecast: Risk Cost Contingency (cont'd) **Cell: Q41**

Percentiles:	Forecast values
0%	-498.49
10%	-94.19
20%	65.58
30%	144.78
40%	210.52
50%	270.66
60%	383.41
70%	588.48
80%	894.63
90%	1,281.86
100%	3,400.87

Forecast: Risk Schedule Contingency **Cell: R41**

Summary:
Entire range is from -1.82 to 15.23
Base case is 0.00
After 10,000 trials, the std. error of the mean is 0.02



Statistics:	Forecast values
Trials	10,000
Mean	1.03
Median	0.00
Mode	0.00
Standard Deviation	2.25
Variance	5.04
Skewness	2.59
Kurtosis	9.90
Coeff. of Variability	2.18
Minimum	-1.82
Maximum	15.23
Range Width	17.05
Mean Std. Error	0.02

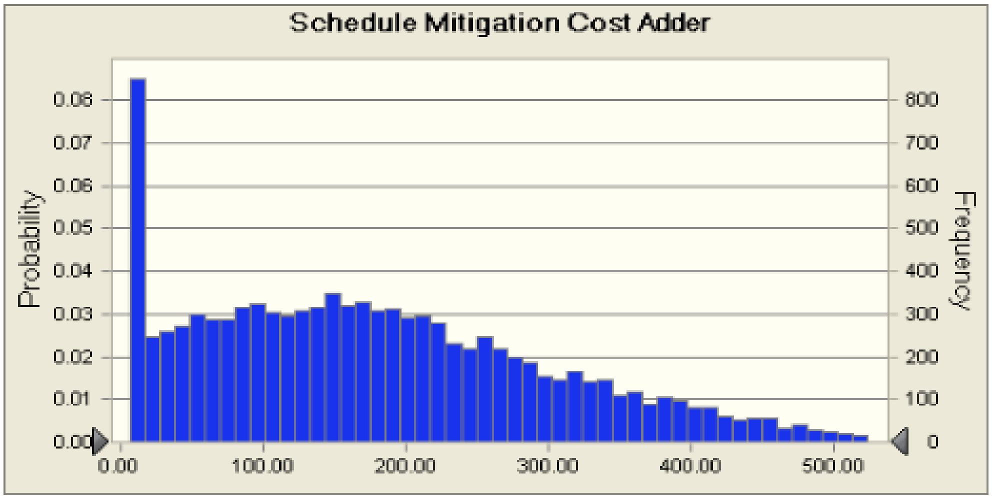
Forecast: Risk Schedule Contingency (cont'd) **Cell: R41**

Percentiles:	Forecast values
0%	-1.82
10%	-0.29
20%	-0.06
30%	0.00
40%	0.00
50%	0.00
60%	0.19
70%	0.42
80%	1.92
90%	3.76
100%	15.23

Worksheet: [NCSX Risk-Contingency Model - 7-27-07-play.xls]Schedule Ranges

Forecast: Schedule Mitigation Cost Adder **Cell: J16**

Summary:
Entire range is from 6.94 to 637.15
Base case is 0.00
After 10,000 trials, the std. error of the mean is 1.23



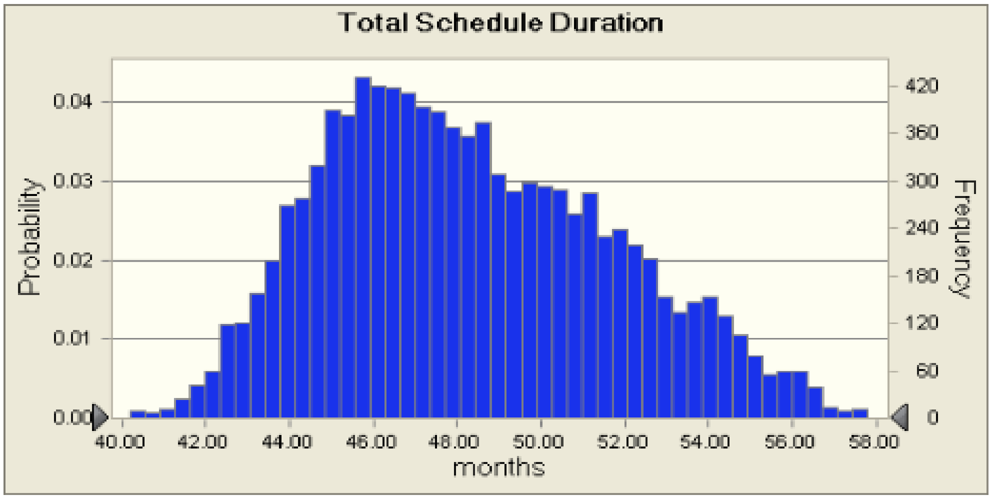
Statistics:	Forecast values
Trials	10,000
Mean	179.25
Median	163.95
Mode	8.70
Standard Deviation	122.88
Variance	15,100.14
Skewness	0.6040
Kurtosis	2.78
Coeff. of Variability	0.6855
Minimum	6.94
Maximum	637.15
Range Width	630.22
Mean Std. Error	1.23

Forecast: Schedule Mitigation Cost Adder (cont'd) **Cell: J16**

Percentiles:	Forecast values
0%	6.94
10%	24.02
20%	62.57
30%	97.53
40%	131.68
50%	163.93
60%	197.62
70%	234.96
80%	283.53
90%	355.28
100%	637.15

Forecast: Total Schedule Duration **Cell: I16**

Summary:
Entire range is from 40.19 to 58.67
Base case is 0.00
After 10,000 trials, the std. error of the mean is 0.03



Statistics:	Forecast values
Trials	10,000
Mean	48.29
Median	47.90
Mode	---
Standard Deviation	3.40
Variance	11.53
Skewness	0.3611
Kurtosis	2.46
Coeff. of Variability	0.0703
Minimum	40.19
Maximum	58.67
Range Width	18.47
Mean Std. Error	0.03

Forecast: Total Schedule Duration (cont'd) **Cell: I16**

Percentiles:	Forecast values
0%	40.19
10%	44.13
20%	45.22
30%	46.11
40%	46.96
50%	47.90
60%	48.89
70%	50.10
80%	51.40
90%	53.13
100%	58.67

End of Forecasts

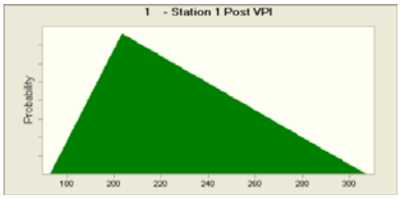
Assumptions

Worksheet: [NCSX Risk-Contingency Model - 7-27-07-play.xls]Estimate Uncertainty Range

Assumption: 1 - Station 1 Post VPI **Cell: L49**

Triangular distribution with parameters:

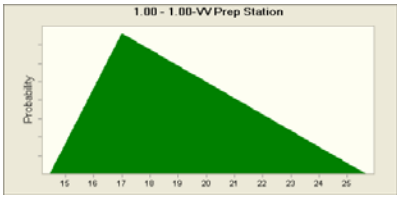
Minimum	173	(=J49)
Likeliest	203	(=I49)
80%	254	(=K49)



Assumption: 1.00 - 1.00-VV Prep Station **Cell: L68**

Triangular distribution with parameters:

Minimum	14	(=J68)
Likeliest	17	(=I68)
80%	21	(=K68)

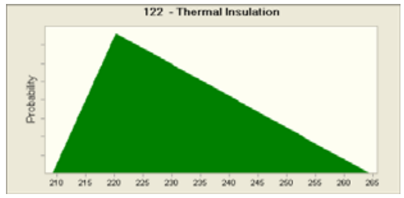


Assumption: 122 - Thermal Insulation **Cell: L5**

Triangular distribution with parameters:

Minimum	209	(=J5)
Likeliest	220	(=I5)
80%	242	(=K5)

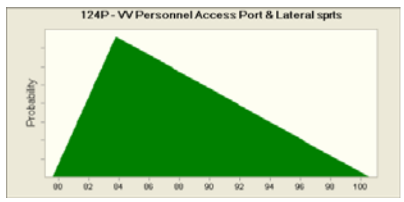
Assumption: 122 - Thermal Insulation (cont'd) **Cell: L5**



Assumption: 124P - VV Personnel Access Port & Lateral sprts **Cell: L3**

Triangular distribution with parameters:

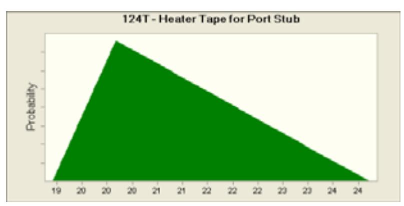
Minimum	80	(=J3)
Likeliest	84	(=I3)
80%	92	(=K3)



Assumption: 124T - Heater Tape for Port Stub **Cell: L6**

Triangular distribution with parameters:

Minimum	19	(=J6)
Likeliest	20	(=I6)
80%	22	(=K6)

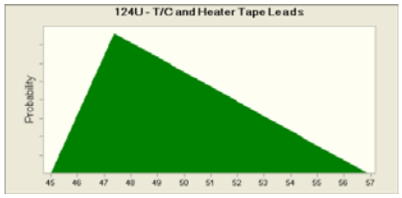


Assumption: 124U - T/C and Heater Tape Leads **Cell: L100**

Triangular distribution with parameters:

Minimum	45	(=J100)
Likeliest	47	(=I100)
80%	52	(=K100)

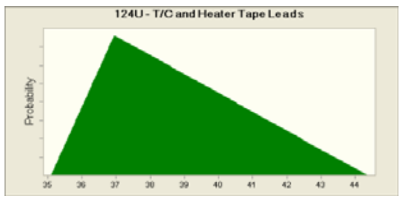
Assumption: 124U - T/C and Heater Tape Leads (cont'd) **Cell: L100**



Assumption: 124U - T/C and Heater Tape Leads **Cell: L7**

Triangular distribution with parameters:

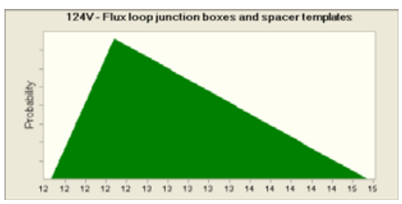
Minimum	35	(=J7)
Likeliest	37	(=I7)
80%	41	(=K7)



Assumption: 124V - Flux loop junction boxes and spacer templates **Cell: L8**

Triangular distribution with parameters:

Minimum	12	(=J8)
Likeliest	12	(=I8)
80%	14	(=K8)

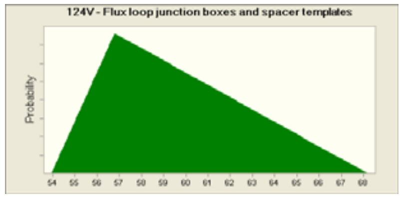


Assumption: 124V - Flux loop junction boxes and spacer templates **Cell: L101**

Triangular distribution with parameters:

Minimum	54	(=J101)
Likeliest	57	(=I101)
80%	62	(=K101)

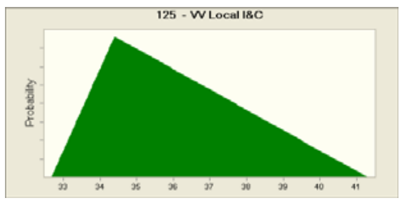
Assumption: 124V - Flux loop junction boxes and spacer templates (cont'd) **Cell: L101**



Assumption: 125 - VV Local I&C **Cell: L4**

Triangular distribution with parameters:

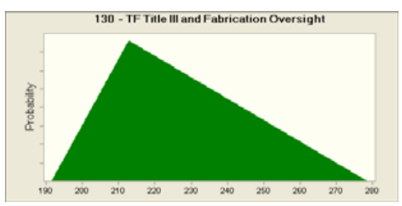
Minimum	33	(=J4)
Likeliest	34	(=I4)
80%	38	(=K4)



Assumption: 130 - TF Title III and Fabrication Oversight **Cell: L16**

Triangular distribution with parameters:

Minimum	191	(=J16)
Likeliest	213	(=I16)
80%	245	(=K16)

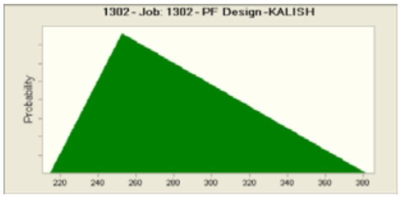


Assumption: 1302 - Job: 1302 - PF Design -KALISH **Cell: L11**

Triangular distribution with parameters:

Minimum	215	(=J11)
Likeliest	253	(=I11)
80%	316	(=K11)

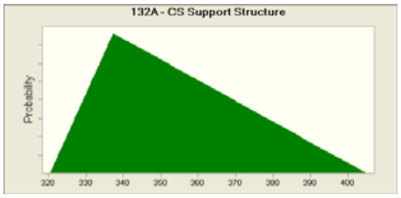
Assumption: 1302 - Job: 1302 - PF Design -KALISH (cont'd) **Cell: L11**



Assumption: 132A - CS Support Structure **Cell: L13**

Triangular distribution with parameters:

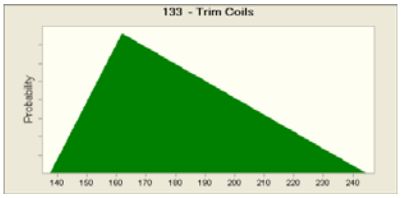
Minimum	320	(=J13)
Likeliest	337	(=I13)
80%	371	(=K13)



Assumption: 133 - Trim Coils **Cell: L14**

Triangular distribution with parameters:

Minimum	138	(=J14)
Likeliest	162	(=I14)
80%	202	(=K14)

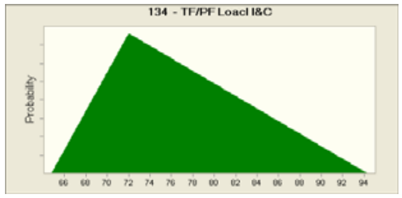


Assumption: 134 - TF/PF Loacl I&C **Cell: L15**

Triangular distribution with parameters:

Minimum	65	(=J15)
Likeliest	72	(=I15)
80%	83	(=K15)

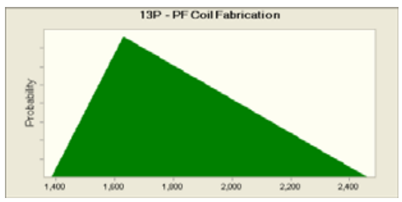
Assumption: 134 - TF/PF Loacl I&C (cont'd) **Cell: L15**



Assumption: 13P - PF Coil Fabrication **Cell: L12**

Triangular distribution with parameters:

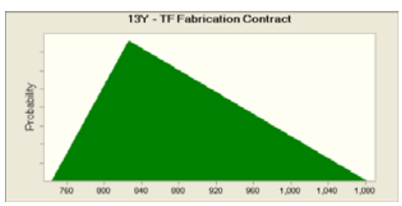
Minimum	1,385	(=J12)
Likeliest	1,630	(=I12)
80%	2,037	(=K12)



Assumption: 13Y - TF Fabrication Contract **Cell: L17**

Triangular distribution with parameters:

Minimum	744	(=J17)
Likeliest	826	(=I17)
80%	950	(=K17)

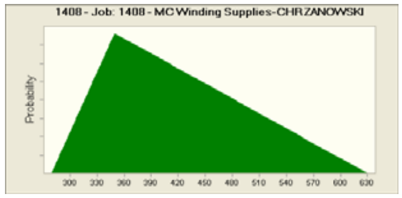


Assumption: 1408 - Job: 1408 - MC Winding Supplies-CHRZANOWSKI **Cell: L21**

Triangular distribution with parameters:

Minimum	280	(=J21)
Likeliest	350	(=I21)
80%	489	(=K21)

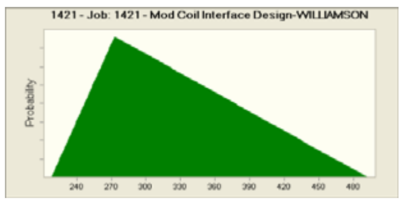
Assumption: 1408 - Job: 1408 - MC Winding Supplies-CHRZANOWSKI (cont'd) **Cell: L21**



Assumption: 1421 - Job: 1421 - Mod Coil Interface Design-WILLIAMSON **Cell: L29**

Triangular distribution with parameters:

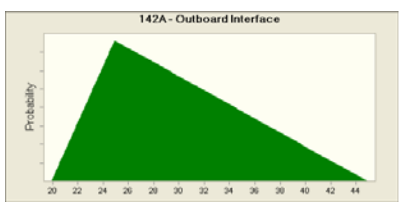
Minimum	218	(=J29)
Likeliest	273	(=I29)
80%	382	(=K29)



Assumption: 142A - Outboard Interface **Cell: L28**

Triangular distribution with parameters:

Minimum	20	(=J28)
Likeliest	25	(=I28)
80%	35	(=K28)

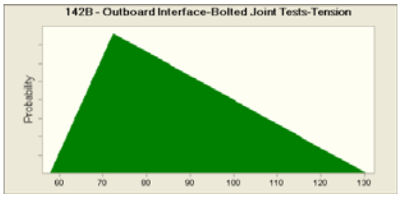


Assumption: 142B - Outboard Interface-Bolted Joint Tests-Tension **Cell: L30**

Triangular distribution with parameters:

Minimum	58	(=J30)
Likeliest	72	(=I30)
80%	101	(=K30)

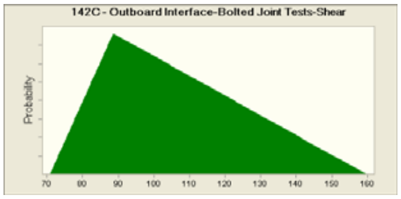
Assumption: 142B - Outboard Interface-Bolted Joint Tests-Tension (cont'd) **Cell: L30**



Assumption: 142C - Outboard Interface-Bolted Joint Tests-Shear **Cell: L31**

Triangular distribution with parameters:

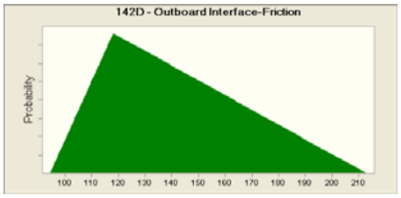
Minimum	71	(=J31)
Likeliest	89	(=I31)
80%	124	(=K31)



Assumption: 142D - Outboard Interface-Friction **Cell: L32**

Triangular distribution with parameters:

Minimum	95	(=J32)
Likeliest	118	(=I32)
80%	165	(=K32)

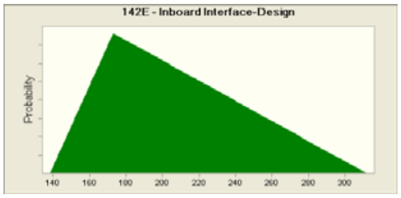


Assumption: 142E - Inboard Interface-Design **Cell: L33**

Triangular distribution with parameters:

Minimum	138	(=J33)
Likeliest	173	(=I33)
80%	242	(=K33)

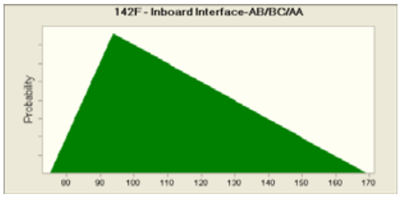
Assumption: 142E - Inboard Interface-Design (cont'd) **Cell: L33**



Assumption: 142F - Inboard Interface-AB/BC/AA **Cell: L34**

Triangular distribution with parameters:

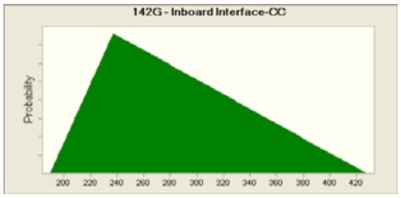
Minimum	75	(=J34)
Likeliest	94	(=I34)
80%	131	(=K34)



Assumption: 142G - Inboard Interface-CC **Cell: L35**

Triangular distribution with parameters:

Minimum	190	(=J35)
Likeliest	237	(=I35)
80%	332	(=K35)

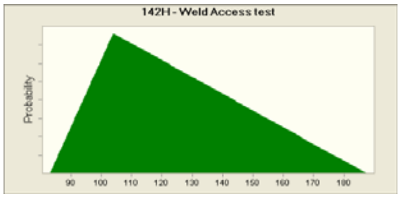


Assumption: 142H - Weld Access test **Cell: L36**

Triangular distribution with parameters:

Minimum	83	(=J36)
Likeliest	104	(=I36)
80%	146	(=K36)

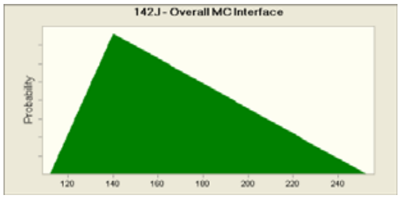
Assumption: 142H - Weld Access test (cont'd) **Cell: L36**



Assumption: 142J - Overall MC Interface **Cell: L37**

Triangular distribution with parameters:

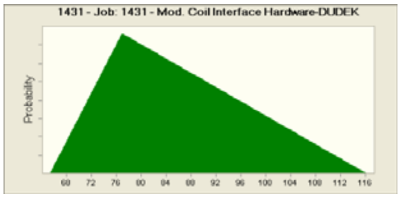
Minimum	112	(=J37)
Likeliest	140	(=I37)
80%	196	(=K37)



Assumption: 1431 - Job: 1431 - Mod. Coil Interface Hardware-DUDEK **Cell: L38**

Triangular distribution with parameters:

Minimum	65	(=J38)
Likeliest	77	(=I38)
80%	96	(=K38)

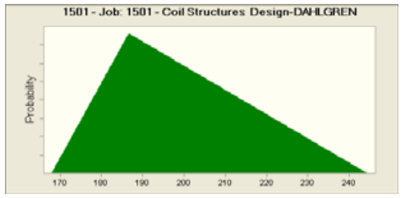


Assumption: 1501 - Job: 1501 - Coil Structures Design-DAHLGREN **Cell: L53**

Triangular distribution with parameters:

Minimum	168	(=J53)
Likeliest	187	(=I53)
80%	215	(=K53)

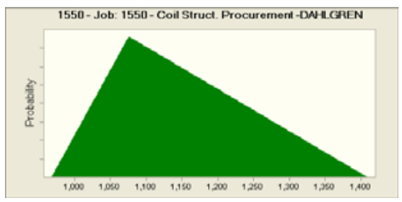
Assumption: 1501 - Job: 1501 - Coil Structures Design-DAHLGREN (cont'd) **Cell: L53**



Assumption: 1550 - Job: 1550 - Coil Struct. Procurement -DAHLGREN **Cell: L54**

Triangular distribution with parameters:

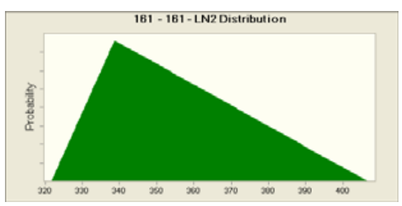
Minimum	968	(=J54)
Likeliest	1,076	(=I54)
80%	1,237	(=K54)



Assumption: 161 - 161 - LN2 Distribution **Cell: L56**

Triangular distribution with parameters:

Minimum	322	(=J56)
Likeliest	339	(=I56)
80%	373	(=K56)

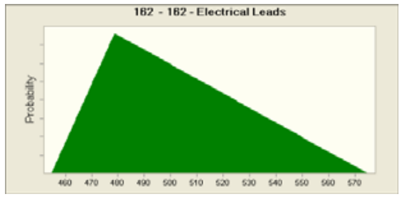


Assumption: 162 - 162 - Electrical Leads **Cell: L57**

Triangular distribution with parameters:

Minimum	455	(=J57)
Likeliest	479	(=I57)
80%	527	(=K57)

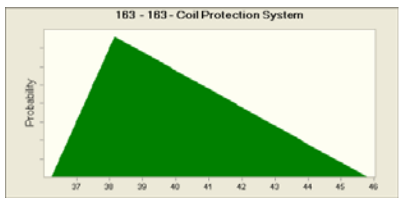
Assumption: 162 - 162 - Electrical Leads (cont'd) **Cell: L57**



Assumption: 163 - 163 - Coil Protection System **Cell: L58**

Triangular distribution with parameters:

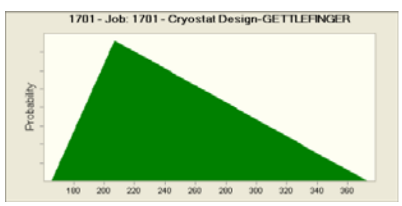
Minimum	36	(=J58)
Likeliest	38	(=I58)
80%	42	(=K58)



Assumption: 1701 - Job: 1701 - Cryostat Design-GETTLEFINGER **Cell: L59**

Triangular distribution with parameters:

Minimum	166	(=J59)
Likeliest	207	(=I59)
80%	290	(=K59)

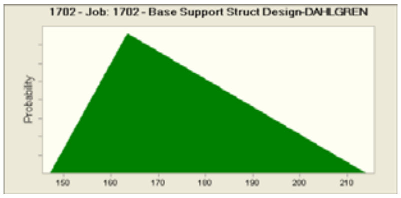


Assumption: 1702 - Job: 1702 - Base Support Struct Design-DAHLGREN **Cell: L60**

Triangular distribution with parameters:

Minimum	147	(=J60)
Likeliest	163	(=I60)
80%	188	(=K60)

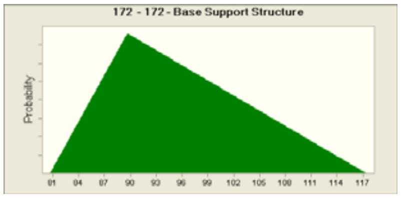
Assumption: 1702 - Job: 1702 - Base Support Struct Design-DAHLGREN (cont'd) **Cell: L60**



Assumption: 172 - 172 - Base Support Structure **Cell: L62**

Triangular distribution with parameters:

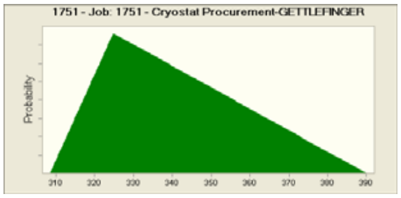
Minimum	81	(=J62)
Likeliest	90	(=I62)
80%	103	(=K62)



Assumption: 1751 - Job: 1751 - Cryostat Procurement-GETTLEFINGER **Cell: L61**

Triangular distribution with parameters:

Minimum	309	(=J61)
Likeliest	325	(=I61)
80%	357	(=K61)

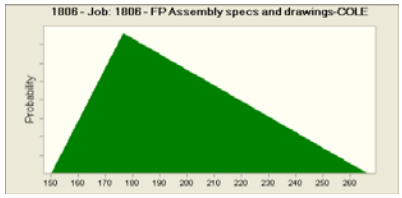


Assumption: 1806 - Job: 1806 - FP Assembly specs and drawings-COLE **Cell: L73**

Triangular distribution with parameters:

Minimum	150	(=J73)
Likeliest	176	(=I73)
80%	221	(=K73)

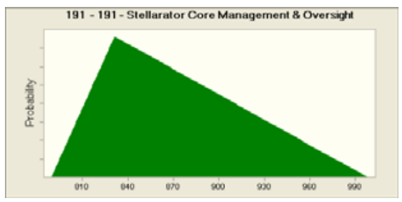
Assumption: 1806 - Job: 1806 - FP Assembly specs and drawings-COLE (cont'd) **Cell: L73**



Assumption: 191 - 191 - Stellarator Core Management & Oversight **Cell: L94**

Triangular distribution with parameters:

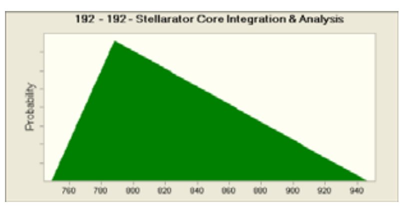
Minimum	790	(=J94)
Likeliest	831	(=I94)
80%	914	(=K94)



Assumption: 192 - 192 - Stellarator Core Integration & Analysis **Cell: L95**

Triangular distribution with parameters:

Minimum	749	(=J95)
Likeliest	788	(=I95)
80%	867	(=K95)

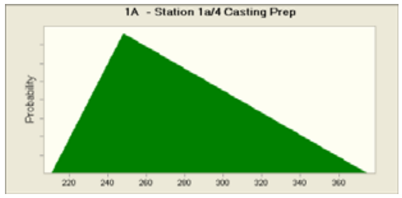


Assumption: 1A - Station 1a/4 Casting Prep **Cell: L45**

Triangular distribution with parameters:

Minimum	211	(=J45)
Likeliest	248	(=I45)
80%	310	(=K45)

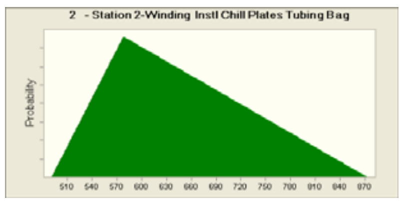
Assumption: 1A - Station 1a/4 Casting Prep (cont'd) **Cell: L45**



Assumption: 2 - Station 2-Winding Instl Chill Plates Tubing Bag **Cell: L46**

Triangular distribution with parameters:

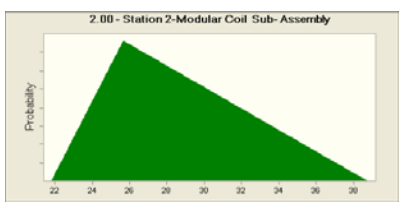
Minimum	491	(=J46)
Likeliest	578	(=I46)
80%	723	(=K46)



Assumption: 2.00 - Station 2-Modular Coil Sub- Assembly **Cell: L69**

Triangular distribution with parameters:

Minimum	22	(=J69)
Likeliest	26	(=I69)
80%	32	(=K69)

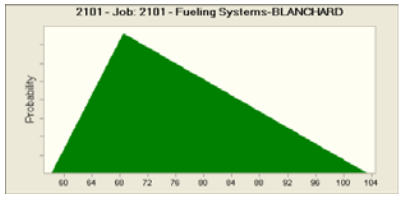


Assumption: 2101 - Job: 2101 - Fueling Systems-BLANCHARD **Cell: L96**

Triangular distribution with parameters:

Minimum	58	(=J96)
Likeliest	68	(=I96)
80%	86	(=K96)

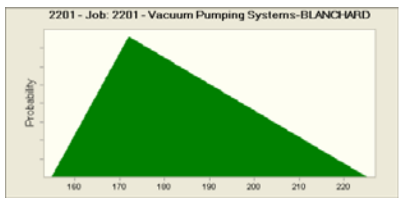
Assumption: 2101 - Job: 2101 - Fueling Systems-BLANCHARD (cont'd) **Cell: L96**



Assumption: 2201 - Job: 2201 - Vacuum Pumping Systems-BLANCHARD **Cell: L97**

Triangular distribution with parameters:

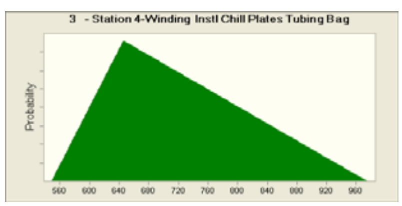
Minimum	155	(=J97)
Likeliest	172	(=I97)
80%	198	(=K97)



Assumption: 3 - Station 4-Winding Instl Chill Plates Tubing Bag **Cell: L47**

Triangular distribution with parameters:

Minimum	549	(=J47)
Likeliest	646	(=I47)
80%	807	(=K47)

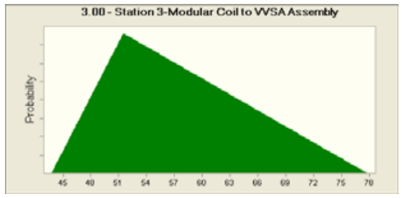


Assumption: 3.00 - Station 3-Modular Coil to VVSA Assembly **Cell: L70**

Triangular distribution with parameters:

Minimum	44	(=J70)
Likeliest	52	(=I70)
80%	64	(=K70)

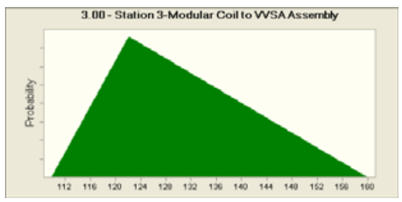
Assumption: 3.00 - Station 3-Modular Coil to VVSA Assembly (cont'd) **Cell: L70**



Assumption: 3.00 - Station 3-Modular Coil to VVSA Assembly **Cell: L65**

Triangular distribution with parameters:

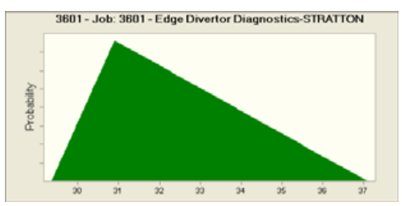
Minimum	110	(=J65)
Likeliest	122	(=I65)
80%	140	(=K65)



Assumption: 3601 - Job: 3601 - Edge Divertor Diagnostics-STRATTON **Cell: L103**

Triangular distribution with parameters:

Minimum	29	(=J103)
Likeliest	31	(=I103)
80%	34	(=K103)

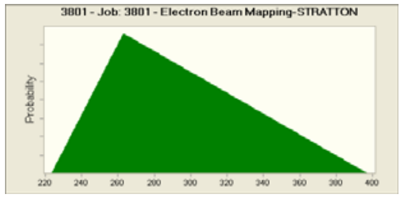


Assumption: 3801 - Job: 3801 - Electron Beam Mapping-STRATTON **Cell: L104**

Triangular distribution with parameters:

Minimum	224	(=J104)
Likeliest	263	(=I104)
80%	329	(=K104)

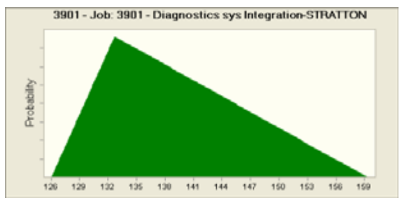
Assumption: 3801 - Job: 3801 - Electron Beam Mapping-STRATTON (cont'd) **Cell: L104**



Assumption: 3901 - Job: 3901 - Diagnostics sys Integration-STRATTON **Cell: L105**

Triangular distribution with parameters:

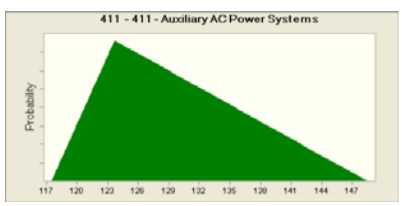
Minimum	126	(=J105)
Likeliest	133	(=I105)
80%	146	(=K105)



Assumption: 411 - 411 - Auxiliary AC Power Systems **Cell: L107**

Triangular distribution with parameters:

Minimum	118	(=J107)
Likeliest	124	(=I107)
80%	136	(=K107)

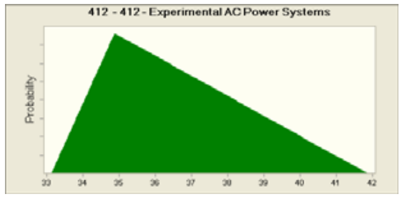


Assumption: 412 - 412 - Experimental AC Power Systems **Cell: L108**

Triangular distribution with parameters:

Minimum	33	(=J108)
Likeliest	35	(=I108)
80%	38	(=K108)

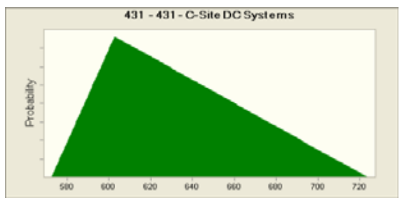
Assumption: 412 - 412 - Experimental AC Power Systems (cont'd) **Cell: L108**



Assumption: 431 - 431 - C-Site DC Systems **Cell: L109**

Triangular distribution with parameters:

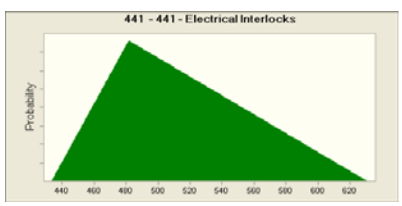
Minimum	573	(=J109)
Likeliest	603	(=I109)
80%	663	(=K109)



Assumption: 441 - 441 - Electrical Interlocks **Cell: L110**

Triangular distribution with parameters:

Minimum	434	(=J110)
Likeliest	482	(=I110)
80%	554	(=K110)

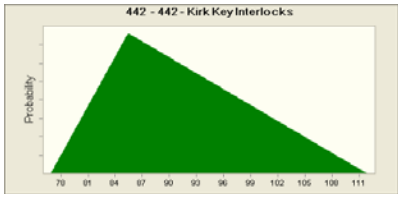


Assumption: 442 - 442 - Kirk Key Interlocks **Cell: L111**

Triangular distribution with parameters:

Minimum	77	(=J111)
Likeliest	85	(=I111)
80%	98	(=K111)

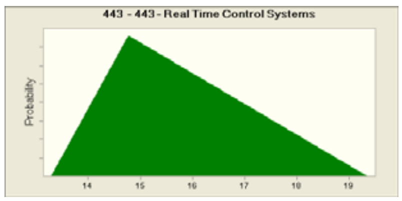
Assumption: 442 - 442 - Kirk Key Interlocks (cont'd) **Cell: L111**



Assumption: 443 - 443 - Real Time Control Systems **Cell: L112**

Triangular distribution with parameters:

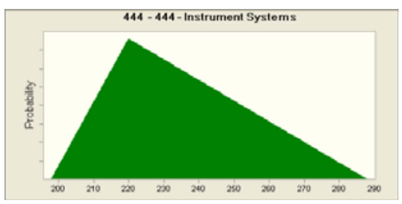
Minimum	13	(=J112)
Likeliest	15	(=I112)
80%	17	(=K112)



Assumption: 444 - 444 - Instrument Systems **Cell: L113**

Triangular distribution with parameters:

Minimum	198	(=J113)
Likeliest	220	(=I113)
80%	253	(=K113)

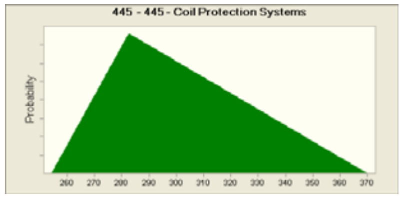


Assumption: 445 - 445 - Coil Protection Systems **Cell: L114**

Triangular distribution with parameters:

Minimum	254	(=J114)
Likeliest	283	(=I114)
80%	325	(=K114)

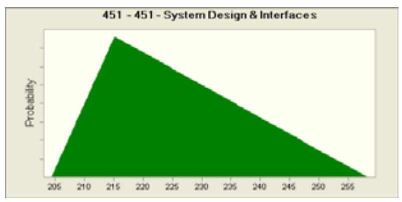
Assumption: 445 - 445 - Coil Protection Systems (cont'd) **Cell: L114**



Assumption: 451 - 451 - System Design & Interfaces **Cell: L115**

Triangular distribution with parameters:

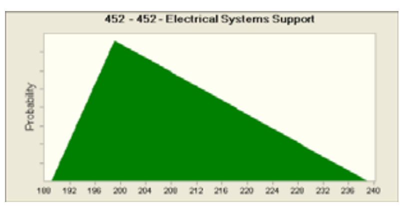
Minimum	204	(=J115)
Likeliest	215	(=I115)
80%	237	(=K115)



Assumption: 452 - 452 - Electrical Systems Support **Cell: L116**

Triangular distribution with parameters:

Minimum	189	(=J116)
Likeliest	199	(=I116)
80%	219	(=K116)

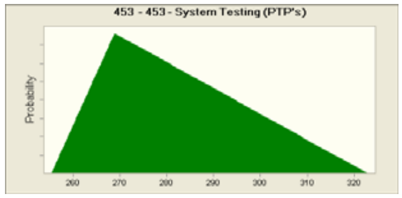


Assumption: 453 - 453 - System Testing (PTP's) **Cell: L117**

Triangular distribution with parameters:

Minimum	255	(=J117)
Likeliest	269	(=I117)
80%	296	(=K117)

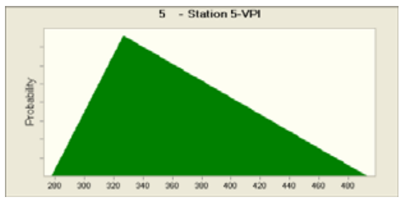
Assumption: 453 - 453 - System Testing (PTP's) (cont'd) **Cell: L117**



Assumption: 5   - Station 5-VPI **Cell: L48**

Triangular distribution with parameters:

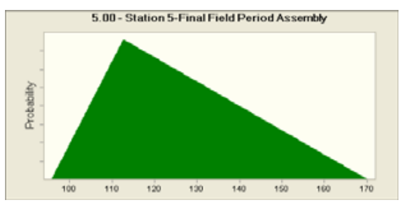
Minimum	278	(=J48)
Likeliest	327	(=I48)
80%	408	(=K48)



Assumption: 5.00 - Station 5-Final Field Period Assembly **Cell: L71**

Triangular distribution with parameters:

Minimum	96	(=J71)
Likeliest	113	(=I71)
80%	141	(=K71)

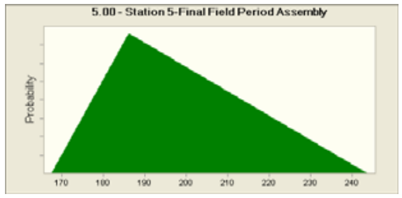


Assumption: 5.00 - Station 5-Final Field Period Assembly **Cell: L66**

Triangular distribution with parameters:

Minimum	168	(=J66)
Likeliest	186	(=I66)
80%	214	(=K66)

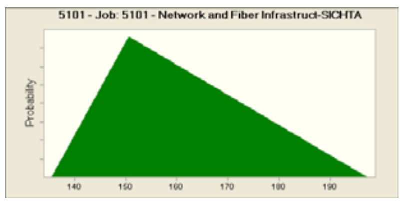
Assumption: 5.00 - Station 5-Final Field Period Assembly (cont'd) **Cell: L66**



Assumption: 5101 - Job: 5101 - Network and Fiber Infrastruct-SICHTA **Cell: L118**

Triangular distribution with parameters:

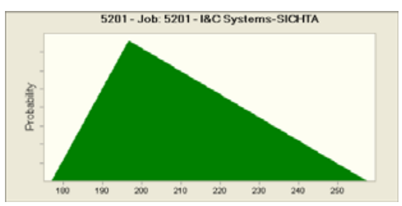
Minimum	136	(=J118)
Likeliest	151	(=I118)
80%	173	(=K118)



Assumption: 5201 - Job: 5201 - I&C Systems-SICHTA **Cell: L119**

Triangular distribution with parameters:

Minimum	177	(=J119)
Likeliest	197	(=I119)
80%	226	(=K119)

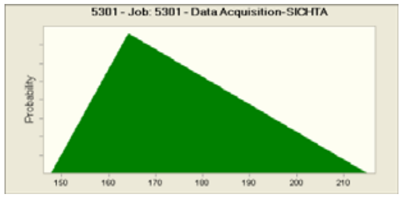


Assumption: 5301 - Job: 5301 - Data Acquisition-SICHTA **Cell: L120**

Triangular distribution with parameters:

Minimum	148	(=J120)
Likeliest	164	(=I120)
80%	189	(=K120)

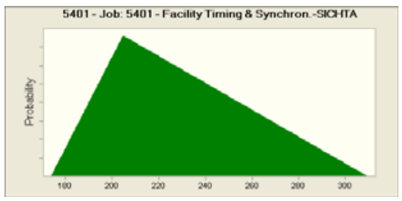
Assumption: 5301 - Job: 5301 - Data Acquisition-SICHTA (cont'd) **Cell: L120**



Assumption: 5401 - Job: 5401 - Facility Timing & Synchron.-SICHTA **Cell: L121**

Triangular distribution with parameters:

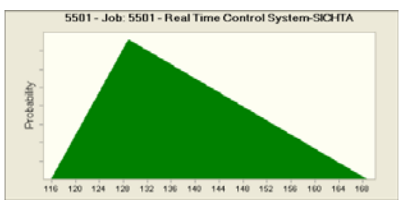
Minimum	174	(=J121)
Likeliest	205	(=I121)
80%	256	(=K121)



Assumption: 5501 - Job: 5501 - Real Time Control System-SICHTA **Cell: L122**

Triangular distribution with parameters:

Minimum	116	(=J122)
Likeliest	129	(=I122)
80%	148	(=K122)

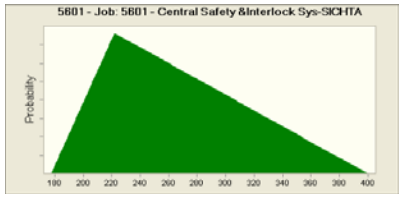


Assumption: 5601 - Job: 5601 - Central Safety &Interlock Sys-SICHTA **Cell: L123**

Triangular distribution with parameters:

Minimum	178	(=J123)
Likeliest	222	(=I123)
80%	311	(=K123)

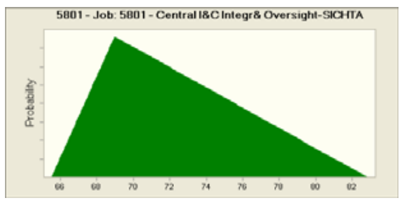
Assumption: 5601 - Job: 5601 - Central Safety &Interlock Sys-SICHTA (cont'd) **Cell: L123**



Assumption: 5801 - Job: 5801 - Central I&C Integr& Oversight-SICHTA **Cell: L124**

Triangular distribution with parameters:

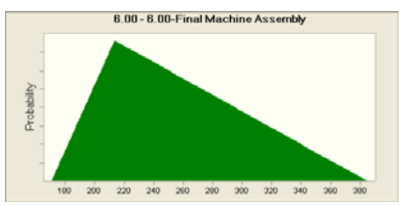
Minimum	66	(=J124)
Likeliest	69	(=I124)
80%	76	(=K124)



Assumption: 6.00 - 6.00-Final Machine Assembly **Cell: L67**

Triangular distribution with parameters:

Minimum	171	(=J67)
Likeliest	214	(=I67)
80%	299	(=K67)

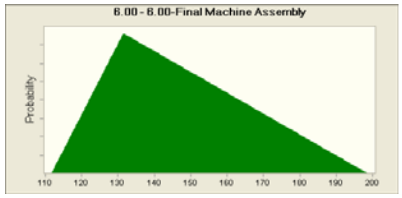


Assumption: 6.00 - 6.00-Final Machine Assembly **Cell: L72**

Triangular distribution with parameters:

Minimum	112	(=J72)
Likeliest	132	(=I72)
80%	164	(=K72)

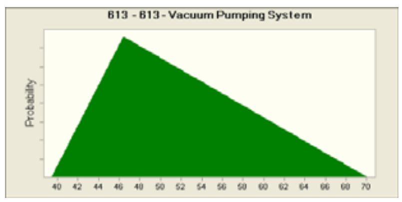
Assumption: 6.00 - 6.00-Final Machine Assembly (cont'd) **Cell: L72**



Assumption: 613 - 613 - Vacuum Pumping System **Cell: L125**

Triangular distribution with parameters:

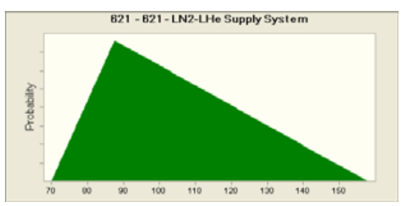
Minimum	39	(=J125)
Likeliest	46	(=I125)
80%	58	(=K125)



Assumption: 621 - 621 - LN2-LHe Supply System **Cell: L126**

Triangular distribution with parameters:

Minimum	70	(=J126)
Likeliest	88	(=I126)
80%	123	(=K126)

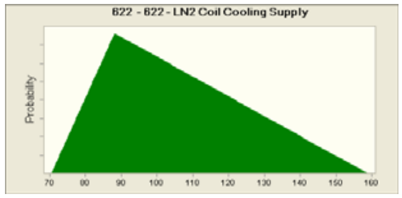


Assumption: 622 - 622 - LN2 Coil Cooling Supply **Cell: L127**

Triangular distribution with parameters:

Minimum	71	(=J127)
Likeliest	88	(=I127)
80%	123	(=K127)

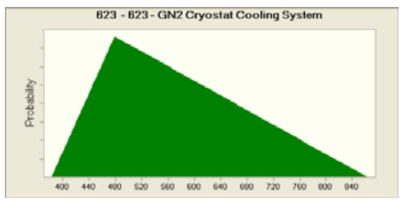
Assumption: 622 - 622 - LN2 Coil Cooling Supply (cont'd) **Cell: L127**



Assumption: 623 - 623 - GN2 Cryostat Cooling System **Cell: L128**

Triangular distribution with parameters:

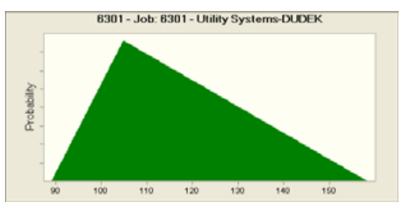
Minimum	383	(=J128)
Likeliest	479	(=I128)
80%	670	(=K128)



Assumption: 6301 - Job: 6301 - Utility Systems-DUDEK **Cell: L129**

Triangular distribution with parameters:

Minimum	89	(=J129)
Likeliest	105	(=I129)
80%	131	(=K129)

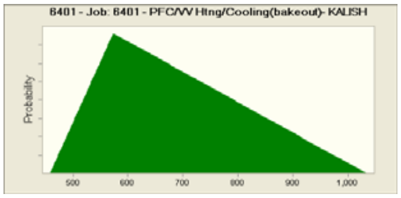


Assumption: 6401 - Job: 6401 - PFC/VV Htng/Cooling(bakeout)- KALISH **Cell: L130**

Triangular distribution with parameters:

Minimum	459	(=J130)
Likeliest	573	(=I130)
80%	803	(=K130)

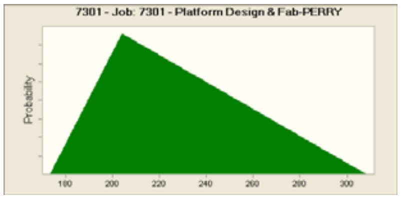
Assumption: 6401 - Job: 6401 - PFC/VV Htng/Cooling(bakeout)- KALISH (cont'd) **Cell: L130**



Assumption: 7301 - Job: 7301 - Platform Design & Fab-PERRY **Cell: L131**

Triangular distribution with parameters:

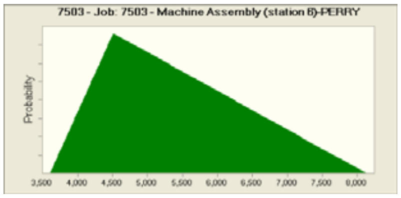
Minimum	174	(=J131)
Likeliest	204	(=I131)
80%	255	(=K131)



Assumption: 7503 - Job: 7503 - Machine Assembly (station 6)-PERRY **Cell: L135**

Triangular distribution with parameters:

Minimum	3,609	(=J135)
Likeliest	4,512	(=I135)
80%	6,317	(=K135)

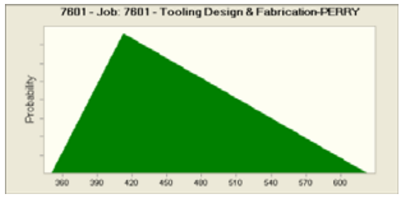


Assumption: 7601 - Job: 7601 - Tooling Design & Fabrication-PERRY **Cell: L136**

Triangular distribution with parameters:

Minimum	351	(=J136)
Likeliest	413	(=I136)
80%	516	(=K136)

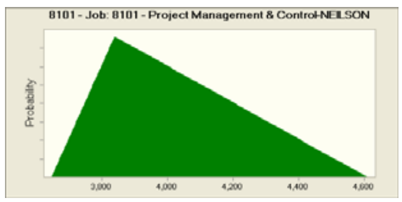
Assumption: 7601 - Job: 7601 - Tooling Design & Fabrication-PERRY (cont'd) **Cell: L136**



Assumption: 8101 - Job: 8101 - Project Management & Control-NEILSON **Cell: L138**

Triangular distribution with parameters:

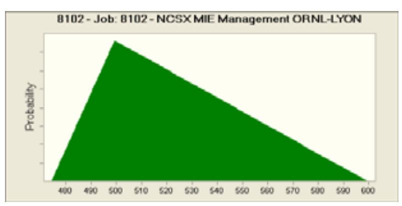
Minimum	3,647	(=J138)
Likeliest	3,839	(=I138)
80%	4,223	(=K138)



Assumption: 8102 - Job: 8102 - NCSX MIE Management ORNL-LYON **Cell: L139**

Triangular distribution with parameters:

Minimum	474	(=J139)
Likeliest	499	(=I139)
80%	549	(=K139)

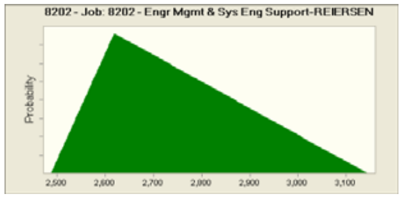


Assumption: 8202 - Job: 8202 - Engr Mgmt & Sys Eng Support-REIERSEN **Cell: L141**

Triangular distribution with parameters:

Minimum	2,488	(=J141)
Likeliest	2,619	(=I141)
80%	2,881	(=K141)

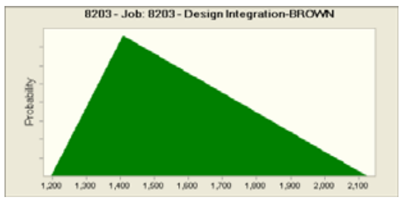
Assumption: 8202 - Job: 8202 - Engr Mgmt & Sys Eng Support-REIERSEN (cont'd) **Cell: L141**



Assumption: 8203 - Job: 8203 - Design Integration-BROWN **Cell: L142**

Triangular distribution with parameters:

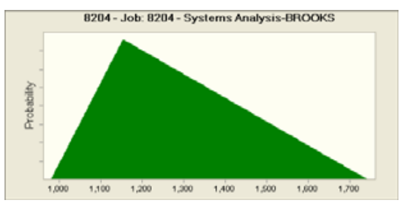
Minimum	1,196	(=J142)
Likeliest	1,408	(=I142)
80%	1,760	(=K142)



Assumption: 8204 - Job: 8204 - Systems Analysis-BROOKS **Cell: L143**

Triangular distribution with parameters:

Minimum	981	(=J143)
Likeliest	1,154	(=I143)
80%	1,442	(=K143)

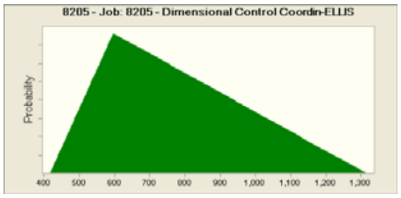


Assumption: 8205 - Job: 8205 - Dimensional Control Coordin-ELLIS **Cell: L144**

Triangular distribution with parameters:

Minimum	418	(=J144)
Likeliest	597	(=I144)
80%	955	(=K144)

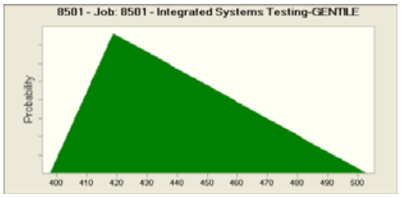
Assumption: 8205 - Job: 8205 - Dimensional Control Coordin-ELLIS (cont'd) **Cell: L144**



Assumption: 8501 - Job: 8501 - Integrated Systems Testing-GENTILE **Cell: L147**

Triangular distribution with parameters:

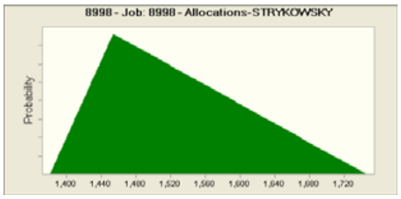
Minimum	398	(=J147)
Likeliest	419	(=I147)
80%	461	(=K147)



Assumption: 8998 - Job: 8998 - Allocations-STRYKOWSKY **Cell: L149**

Triangular distribution with parameters:

Minimum	1,381	(=J149)
Likeliest	1,454	(=I149)
80%	1,599	(=K149)

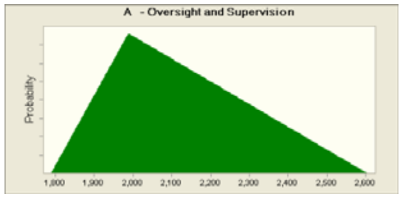


Assumption: A - Oversight and Supervision **Cell: L63**

Triangular distribution with parameters:

Minimum	1,789	(=J63)
Likeliest	1,988	(=I63)
80%	2,286	(=K63)

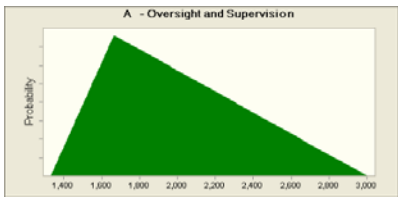
Assumption: A - Oversight and Supervision (cont'd) **Cell: L63**



Assumption: A - Oversight and Supervision **Cell: L132**

Triangular distribution with parameters:

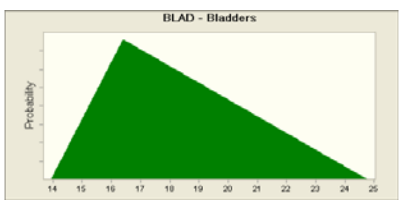
Minimum	1,333	(=J132)
Likeliest	1,666	(=I132)
80%	2,332	(=K132)



Assumption: BLAD - Bladders **Cell: L39**

Triangular distribution with parameters:

Minimum	14	(=J39)
Likeliest	16	(=I39)
80%	21	(=K39)

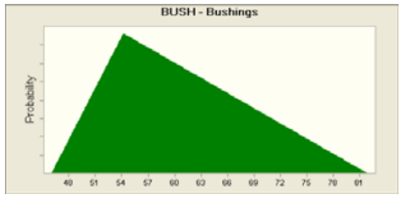


Assumption: BUSH - Bushings **Cell: L40**

Triangular distribution with parameters:

Minimum	46	(=J40)
Likeliest	54	(=I40)
80%	68	(=K40)

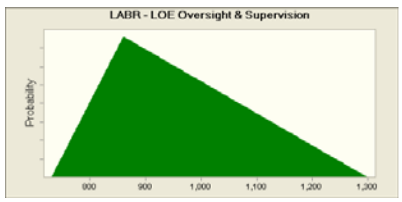
Assumption: BUSH - Bushings (cont'd) **Cell: L40**



Assumption: LABR - LOE Oversight & Supervision **Cell: L50**

Triangular distribution with parameters:

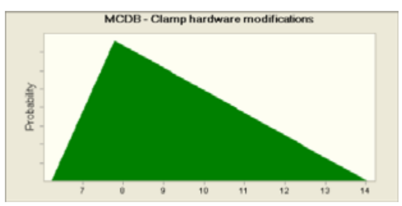
Minimum	731	(=J50)
Likeliest	860	(=I50)
80%	1,075	(=K50)



Assumption: MCDB - Clamp hardware modifications **Cell: L23**

Triangular distribution with parameters:

Minimum	6	(=J23)
Likeliest	8	(=I23)
80%	11	(=K23)

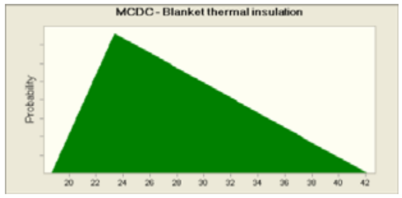


Assumption: MCDC - Blanket thermal insulation **Cell: L24**

Triangular distribution with parameters:

Minimum	19	(=J24)
Likeliest	23	(=I24)
80%	33	(=K24)

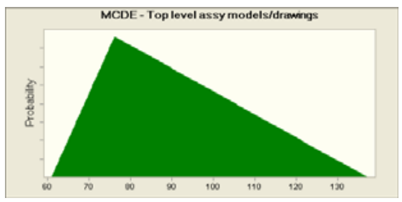
Assumption: MCDC - Blanket thermal insulation (cont'd) **Cell: L24**



Assumption: MCDE - Top level assy models/drawings **Cell: L25**

Triangular distribution with parameters:

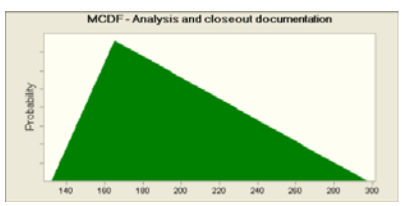
Minimum	61	(=J25)
Likeliest	76	(=I25)
80%	107	(=K25)



Assumption: MCDF - Analysis and closeout documentation **Cell: L26**

Triangular distribution with parameters:

Minimum	132	(=J26)
Likeliest	165	(=I26)
80%	231	(=K26)

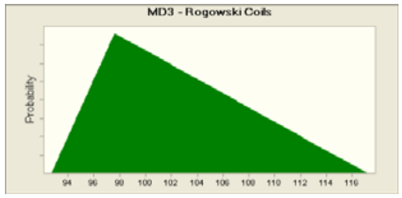


Assumption: MD3 - Rogowski Coils **Cell: L98**

Triangular distribution with parameters:

Minimum	93	(=J98)
Likeliest	98	(=I98)
80%	107	(=K98)

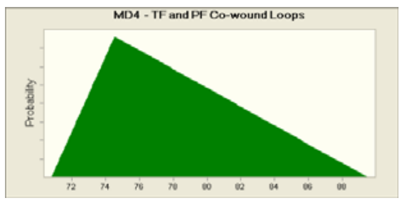
Assumption: MD3 - Rogowski Coils (cont'd) **Cell: L98**



Assumption: MD4 - TF and PF Co-wound Loops **Cell: L99**

Triangular distribution with parameters:

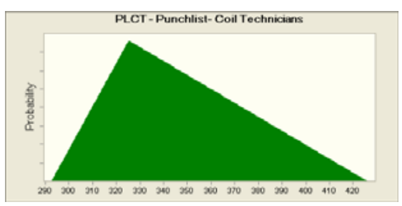
Minimum	71	(=J99)
Likeliest	75	(=I99)
80%	82	(=K99)



Assumption: PLCT - Punchlist- Coil Technicians **Cell: L52**

Triangular distribution with parameters:

Minimum	293	(=J52)
Likeliest	325	(=I52)
80%	374	(=K52)

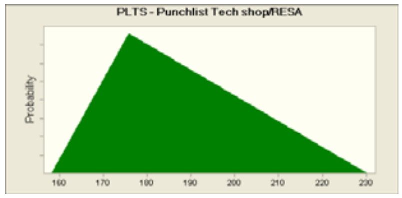


Assumption: PLTS - Punchlist Tech shop/RESA **Cell: L51**

Triangular distribution with parameters:

Minimum	158	(=J51)
Likeliest	176	(=I51)
80%	202	(=K51)

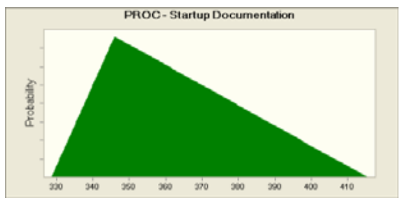
Assumption: PLTS - Punchlist Tech shop/RESA (cont'd) **Cell: L51**



Assumption: PROC - Startup Documentation **Cell: L148**

Triangular distribution with parameters:

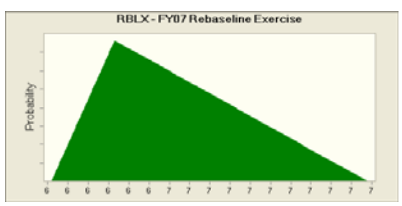
Minimum	329	(=J148)
Likeliest	346	(=I148)
80%	381	(=K148)



Assumption: RBLX - FY07 Rebaseline Exercise **Cell: L55**

Triangular distribution with parameters:

Minimum	6	(=J55)
Likeliest	6	(=I55)
80%	7	(=K55)

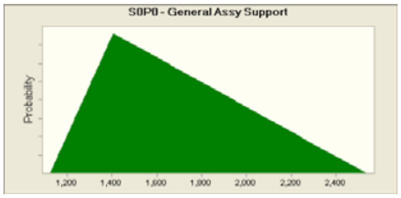


Assumption: S0P0 - General Assy Support **Cell: L134**

Triangular distribution with parameters:

Minimum	1,125	(=J134)
Likeliest	1,407	(=I134)
80%	1,969	(=K134)

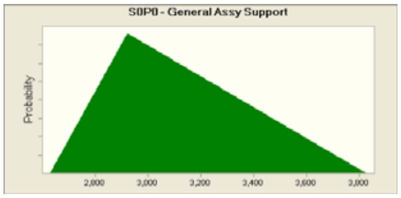
Assumption: S0P0 - General Assy Support (cont'd) **Cell: L134**



Assumption: S0P0 - General Assy Support **Cell: L74**

Triangular distribution with parameters:

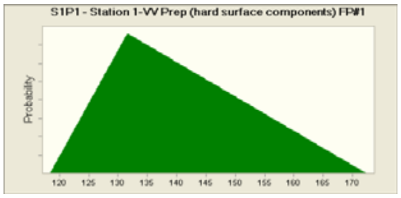
Minimum	2,630	(=J74)
Likeliest	2,922	(=I74)
80%	3,361	(=K74)



Assumption: S1P1 - Station 1-VV Prep (hard surface components) FP#1 **Cell: L75**

Triangular distribution with parameters:

Minimum	118	(=J75)
Likeliest	132	(=I75)
80%	151	(=K75)

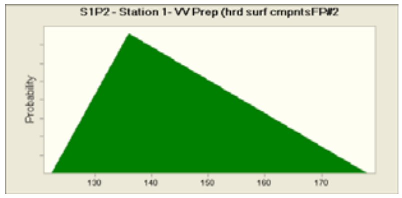


Correlated with:	Coefficient
S1P2 - Station 1- VV Prep (hrd surf cmpntsFP#2 (L76)	0.80
S1P3 - Station 1- VV Prep (hrd surf cmpntsFP#3 (L77)	0.80
S1SP - Station 1-Spool pieces (3) (spacers) (L78)	0.80

Assumption: S1P2 - Station 1- VV Prep (hrd surf cmpntsFP#2 **Cell: L76**

Triangular distribution with parameters:

Minimum	122	(=J76)
Likeliest	136	(=I76)
80%	156	(=K76)

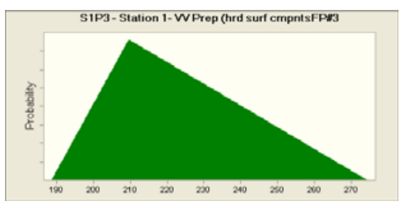


Correlated with:	Coefficient
S1SP - Station 1-Spool pieces (3) (spacers) (L78)	0.80
S1P1 - Station 1-VV Prep (hard surface components) FP#1	0.80
S1P3 - Station 1- VV Prep (hrd surf cmpntsFP#3 (L77)	0.80

Assumption: S1P3 - Station 1- VV Prep (hrd surf cmpntsFP#3 **Cell: L77**

Triangular distribution with parameters:

Minimum	189	(=J77)
Likeliest	210	(=I77)
80%	241	(=K77)



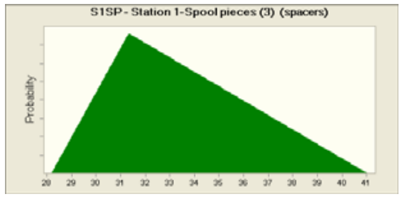
Correlated with:	Coefficient
S1SP - Station 1-Spool pieces (3) (spacers) (L78)	0.80
S1P1 - Station 1-VV Prep (hard surface components) FP#1	0.80
S1P2 - Station 1- VV Prep (hrd surf cmpntsFP#2 (L76)	0.80

Assumption: S1SP - Station 1-Spool pieces (3) (spacers) **Cell: L78**

Triangular distribution with parameters:

Minimum	28	(=J78)
Likeliest	31	(=I78)
80%	36	(=K78)

Assumption: S1SP - Station 1-Spool pieces (3) (spacers) (cont'd) **Cell: L78**

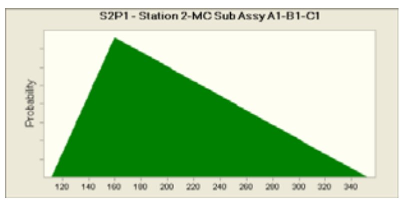


Correlated with:	Coefficient
S1P2 - Station 1- VV Prep (hrd surf cmpntsFP#2 (L76)	0.80
S1P3 - Station 1- VV Prep (hrd surf cmpntsFP#3 (L77)	0.80
S1P1 - Station 1-VV Prep (hard surface components) FP#:	0.80

Assumption: S2P1 - Station 2-MC Sub Assy A1-B1-C1 **Cell: L82**

Triangular distribution with parameters:

Minimum	112	(=J82)
Likeliest	160	(=I82)
80%	256	(=K82)



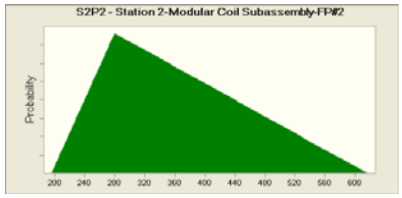
Correlated with:	Coefficient
S2P2 - Station 2-Modular Coil Subassembly-FP#2 (L84)	0.80
S2PZ - Station 2 MC Sub Assy A2-B2-C2 (L83)	0.80
S2P3 - Station 2-Modular Coil Subassembly-FP#3 (L85)	0.80

Assumption: S2P2 - Station 2-Modular Coil Subassembly-FP#2 **Cell: L84**

Triangular distribution with parameters:

Minimum	196	(=J84)
Likeliest	280	(=I84)
80%	448	(=K84)

Assumption: S2P2 - Station 2-Modular Coil Subassembly-FP#2 (cont'd) **Cell: L84**

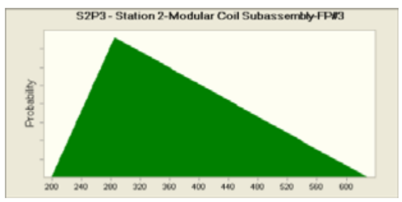


Correlated with:	Coefficient
S2P1 - Station 2-MC Sub Assy A1-B1-C1 (L82)	0.80
S2P3 - Station 2-Modular Coil Subassembly-FP#3 (L85)	0.80
S2PZ - Station 2 MC Sub Assy A2-B2-C2 (L83)	0.80

Assumption: S2P3 - Station 2-Modular Coil Subassembly-FP#3 **Cell: L85**

Triangular distribution with parameters:

Minimum	200	(=J85)
Likeliest	285	(=I85)
80%	456	(=K85)



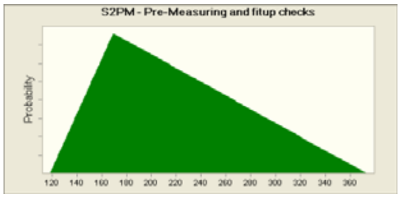
Correlated with:	Coefficient
S2P2 - Station 2-Modular Coil Subassembly-FP#2 (L84)	0.80
S2PZ - Station 2 MC Sub Assy A2-B2-C2 (L83)	0.80
S2P1 - Station 2-MC Sub Assy A1-B1-C1 (L82)	0.80

Assumption: S2PM - Pre-Measuring and fitup checks **Cell: L81**

Triangular distribution with parameters:

Minimum	119	(=J81)
Likeliest	169	(=I81)
80%	271	(=K81)

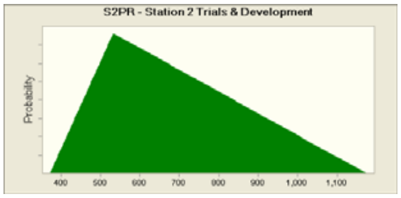
Assumption: S2PM - Pre-Measuring and fitup checks (cont'd) **Cell: L81**



Assumption: S2PR - Station 2 Trials & Development **Cell: L79**

Triangular distribution with parameters:

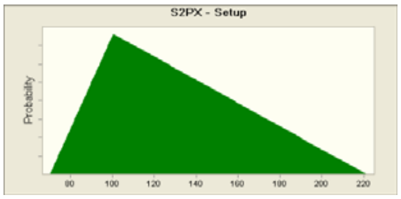
Minimum	373	(=J79)
Likeliest	533	(=I79)
80%	853	(=K79)



Assumption: S2PX - Setup **Cell: L80**

Triangular distribution with parameters:

Minimum	70	(=J80)
Likeliest	100	(=I80)
80%	161	(=K80)

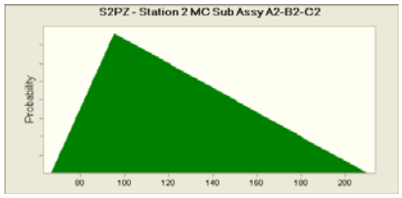


Assumption: S2PZ - Station 2 MC Sub Assy A2-B2-C2 **Cell: L83**

Triangular distribution with parameters:

Minimum	67	(=J83)
Likeliest	95	(=I83)
80%	153	(=K83)

Assumption: S2PZ - Station 2 MC Sub Assy A2-B2-C2 (cont'd) **Cell: L83**

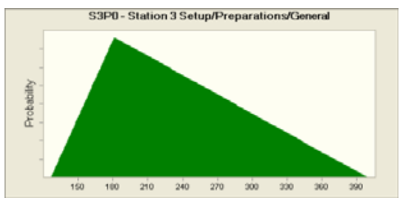


Correlated with:	Coefficient
S2P1 - Station 2-MC Sub Assy A1-B1-C1 (L82)	0.80
S2P3 - Station 2-Modular Coil Subassembly-FP#3 (L85)	0.80
S2P2 - Station 2-Modular Coil Subassembly-FP#2 (L84)	0.80

Assumption: S3P0 - Station 3 Setup/Preparations/General **Cell: L86**

Triangular distribution with parameters:

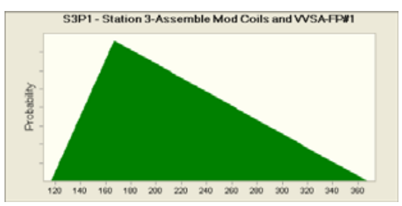
Minimum	127	(=J86)
Likeliest	181	(=I86)
80%	290	(=K86)



Assumption: S3P1 - Station 3-Assemble Mod Coils and VVSA-FP#1 **Cell: L87**

Triangular distribution with parameters:

Minimum	117	(=J87)
Likeliest	167	(=I87)
80%	267	(=K87)

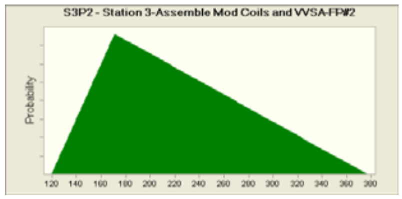


Correlated with:	Coefficient
S3P2 - Station 3-Assemble Mod Coils and VVSA-FP#2 (L8	0.80
S3P3 - Station 3-Assemble Mod Coils and VVSA-FP#3 (L8	0.80

Assumption: S3P2 - Station 3-Assemble Mod Coils and VVSA-FP#2 **Cell: L88**

Triangular distribution with parameters:

Minimum	120	(=J88)
Likeliest	171	(=I88)
80%	274	(=K88)

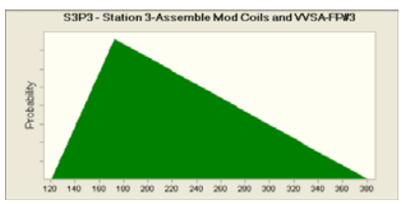


Correlated with:	Coefficient
S3P1 - Station 3-Assemble Mod Coils and VVSA-FP#1 (L8	0.80
S3P3 - Station 3-Assemble Mod Coils and VVSA-FP#3 (L8	0.80

Assumption: S3P3 - Station 3-Assemble Mod Coils and VVSA-FP#3 **Cell: L89**

Triangular distribution with parameters:

Minimum	121	(=J89)
Likeliest	173	(=I89)
80%	276	(=K89)



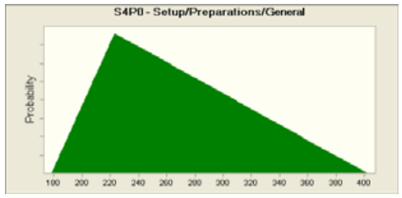
Correlated with:	Coefficient
S3P1 - Station 3-Assemble Mod Coils and VVSA-FP#1 (L8	0.80
S3P2 - Station 3-Assemble Mod Coils and VVSA-FP#2 (L8	0.80

Assumption: S4P0 - Setup/Preparations/General **Cell: L90**

Triangular distribution with parameters:

Minimum	179	(=J90)
Likeliest	223	(=I90)
80%	312	(=K90)

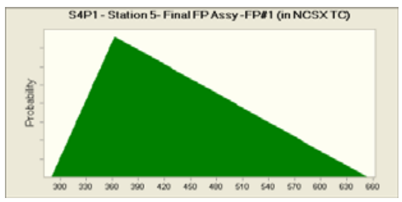
Assumption: S4P0 - Setup/Preparations/General (cont'd) **Cell: L90**



Assumption: S4P1 - Station 5- Final FP Assy -FP#1 (in NCSX TC) **Cell: L91**

Triangular distribution with parameters:

Minimum	290	(=J91)
Likeliest	363	(=I91)
80%	508	(=K91)

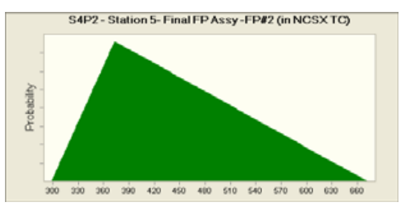


Correlated with:	Coefficient
S4P2 - Station 5- Final FP Assy -FP#2 (in NCSX TC) (L92)	0.80
S4P3 - Station 5- Final FP Assy -FP#3 (in NCSX TC) (L93)	0.80

Assumption: S4P2 - Station 5- Final FP Assy -FP#2 (in NCSX TC) **Cell: L92**

Triangular distribution with parameters:

Minimum	298	(=J92)
Likeliest	373	(=I92)
80%	522	(=K92)

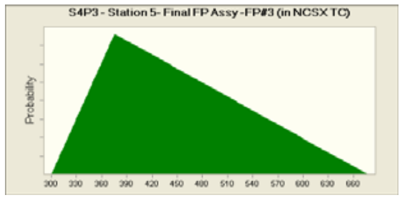


Correlated with:	Coefficient
S4P3 - Station 5- Final FP Assy -FP#3 (in NCSX TC) (L93)	0.80
S4P1 - Station 5- Final FP Assy -FP#1 (in NCSX TC) (L91)	0.80

Assumption: S4P3 - Station 5- Final FP Assy -FP#3 (in NCSX TC) **Cell: L93**

Triangular distribution with parameters:

Minimum	300	(=J93)
Likeliest	376	(=I93)
80%	526	(=K93)

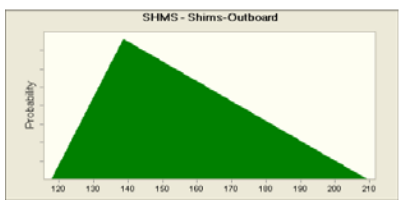


Correlated with:	Coefficient
S4P2 - Station 5- Final FP Assy -FP#2 (in NCSX TC) (L92)	0.80
S4P1 - Station 5- Final FP Assy -FP#1 (in NCSX TC) (L91)	0.80

Assumption: SHMS - Shims-Outboard **Cell: L41**

Triangular distribution with parameters:

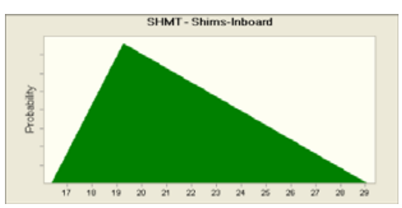
Minimum	118	(=J41)
Likeliest	139	(=I41)
80%	173	(=K41)



Assumption: SHMT - Shims-Inboard **Cell: L42**

Triangular distribution with parameters:

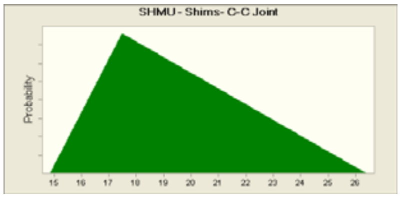
Minimum	16	(=J42)
Likeliest	19	(=I42)
80%	24	(=K42)



Assumption: SHMU - Shims- C-C Joint **Cell: L43**

Triangular distribution with parameters:

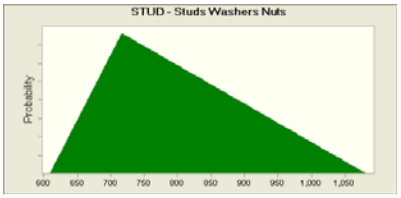
Minimum	15	(=J43)
Likeliest	17	(=I43)
80%	22	(=K43)



Assumption: STUD - Studs Washers Nuts **Cell: L44**

Triangular distribution with parameters:

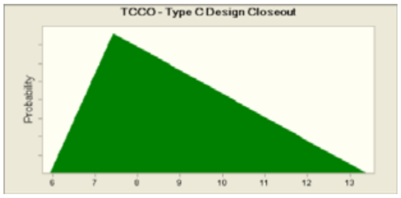
Minimum	609	(=J44)
Likeliest	717	(=I44)
80%	896	(=K44)



Assumption: TCCO - Type C Design Closeout **Cell: L27**

Triangular distribution with parameters:

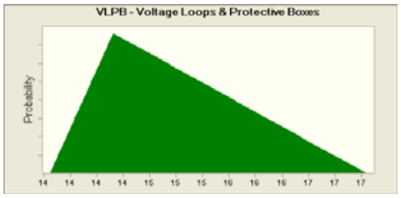
Minimum	6	(=J27)
Likeliest	7	(=I27)
80%	10	(=K27)



Assumption: VLPB - Voltage Loops & Protective Boxes **Cell: L102**

Triangular distribution with parameters:

Minimum	14	(=J102)
Likeliest	14	(=I102)
80%	16	(=K102)

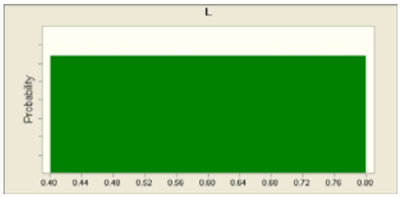


Worksheet: [NCSX Risk-Contingency Model - 7-27-07-play.xls]Likelihood

Assumption: L **Cell: B24**

Uniform distribution with parameters:

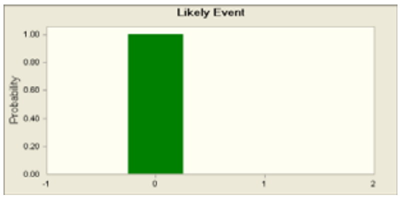
Minimum	0.40
Maximum	0.80



Assumption: Likely Event **Cell: C24**

Yes-No distribution with parameters:

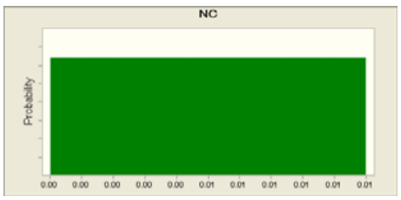
Probability of Yes(1)	0.0	(=B24)



Assumption: NC **Cell: B25**

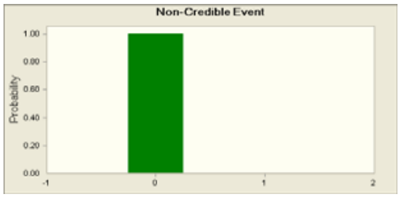
Uniform distribution with parameters:

Minimum	0.00
Maximum	0.01



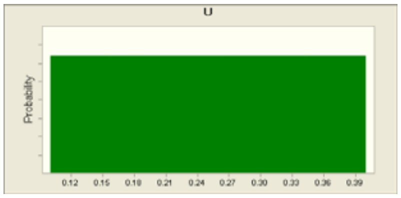
Assumption: Non-Credible Event **Cell: C25**

Yes-No distribution with parameters:
Probability of Yes(1) 0.0 (=B25)



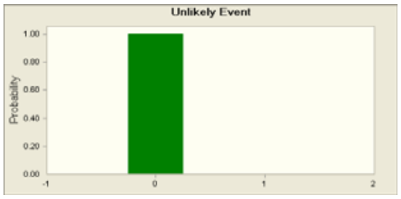
Assumption: U **Cell: B26**

Uniform distribution with parameters:
Minimum 0.10
Maximum 0.40



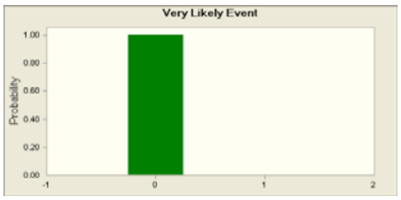
Assumption: Unlikely Event **Cell: C26**

Yes-No distribution with parameters:
Probability of Yes(1) 0.0 (=B26)



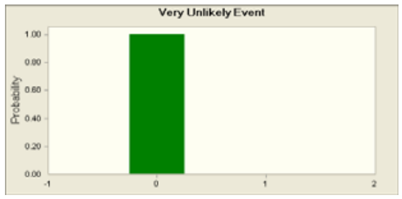
Assumption: Very Likely Event **Cell: C27**

Yes-No distribution with parameters:
Probability of Yes(1) 0.0 (=B27)



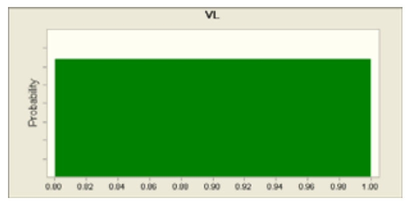
Assumption: Very Unlikely Event **Cell: C28**

Yes-No distribution with parameters:
Probability of Yes(1) 0.0 (=B28)



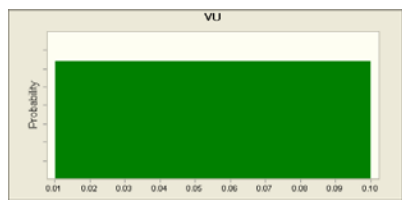
Assumption: VL **Cell: B27**

Uniform distribution with parameters:
Minimum 0.80
Maximum 1.00



Assumption: VU **Cell: B28**

Uniform distribution with parameters:
Minimum 0.01
Maximum 0.10

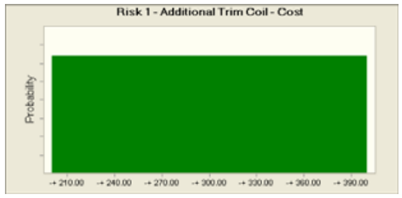


Worksheet: [NCSX Risk-Contingency Model - 7-27-07-play.xls]Risk Model

Assumption: Risk 1 - Additional Trim Coil - Cost **Cell: N4**

Uniform distribution with parameters:
Minimum -+ 200.00 (=I4)
Maximum -+ 400.00 (=J4)

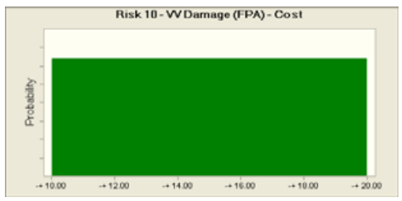
Assumption: Risk 1 - Additional Trim Coil - Cost (cont'd) **Cell: N4**



Assumption: Risk 10 - VV Damage (FPA) - Cost **Cell: N13**

Uniform distribution with parameters:

Minimum	-+ 10.00	(=I13)
Maximum	-+ 20.00	(=J13)

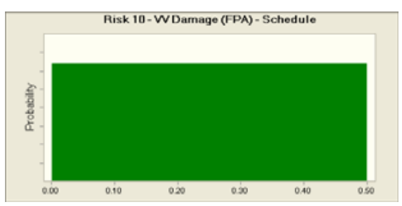


Correlated with:	Coefficient
Risk 10 - VV Damage (FPA) - Schedule (O13)	0.90

Assumption: Risk 10 - VV Damage (FPA) - Schedule **Cell: O13**

Uniform distribution with parameters:

Minimum	0.00	(=K13)
Maximum	0.50	(=L13)

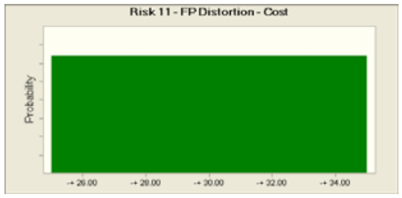


Correlated with:	Coefficient
Risk 10 - VV Damage (FPA) - Cost (N13)	0.90

Assumption: Risk 11 - FP Distortion - Cost **Cell: N14**

Uniform distribution with parameters:

Minimum	-+ 25.00	(=I14)
Maximum	-+ 35.00	(=J14)

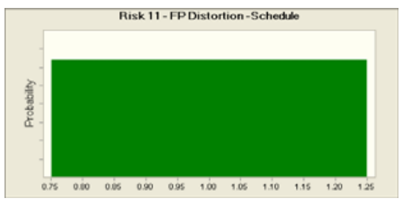


Correlated with:	Coefficient
Risk 11 - FP Distortion -Schedule (O14)	0.90

Assumption: Risk 11 - FP Distortion -Schedule **Cell: O14**

Uniform distribution with parameters:

Minimum	0.75	(=K14)
Maximum	1.25	(=L14)

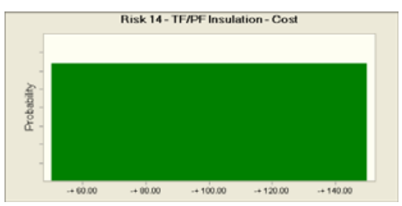


Correlated with:	Coefficient
Risk 11 - FP Distortion - Cost (N14)	0.90

Assumption: Risk 14 - TF/PF Insulation - Cost **Cell: N17**

Uniform distribution with parameters:

Minimum	-+ 50.00	(=I17)
Maximum	-+ 150.00	(=J17)

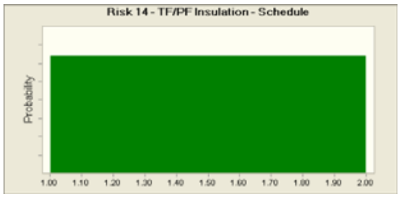


Correlated with:	Coefficient
Risk 14 - TF/PF Insulation - Schedule (O17)	0.90

Assumption: Risk 14 - TF/PF Insulation - Schedule **Cell: O17**

Uniform distribution with parameters:

Minimum	1.00	(=K17)
Maximum	2.00	(=L17)

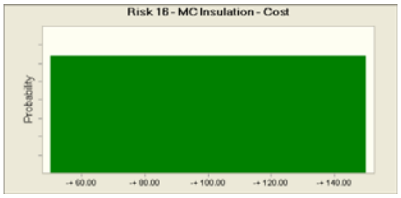


Correlated with:	Coefficient
Risk 14 - TF/PF Insulation - Cost (N17)	0.90

Assumption: Risk 16 - MC Insulation - Cost **Cell: N19**

Uniform distribution with parameters:

Minimum	-+ 50.00	(=I19)
Maximum	-+ 150.00	(=J19)

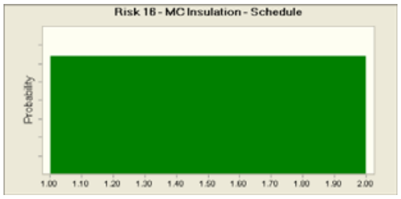


Correlated with:	Coefficient
Risk 16 - MC Insulation - Schedule (O19)	0.90

Assumption: Risk 16 - MC Insulation - Schedule **Cell: O19**

Uniform distribution with parameters:

Minimum	1.00	(=K19)
Maximum	2.00	(=L19)

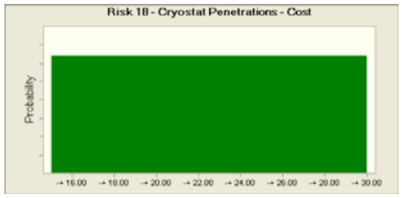


Correlated with:	Coefficient
Risk 16 - MC Insulation - Cost (N19)	0.90

Assumption: Risk 18 - Cryostat Penetrations - Cost **Cell: N21**

Uniform distribution with parameters:

Minimum	-+ 15.00	(=I21)
Maximum	-+ 30.00	(=J21)

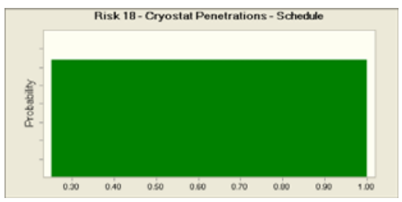


Correlated with:	Coefficient
Risk 18 - Cryostat Penetrations - Schedule (O21)	0.88

Assumption: Risk 18 - Cryostat Penetrations - Schedule **Cell: O21**

Uniform distribution with parameters:

Minimum	0.25	(=K21)
Maximum	1.00	(=L21)

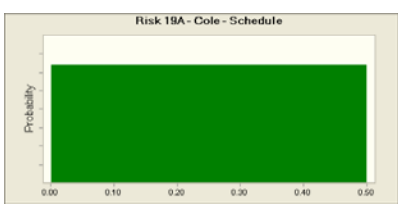


Correlated with:	Coefficient
Risk 18 - Cryostat Penetrations - Cost (N21)	0.88

Assumption: Risk 19A - Cole - Schedule **Cell: O23**

Uniform distribution with parameters:

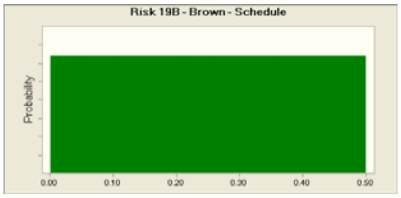
Minimum	0.00	(=K23)
Maximum	0.50	(=L23)



Assumption: Risk 19B - Brown - Schedule **Cell: O24**

Uniform distribution with parameters:

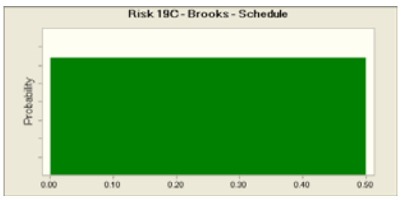
Minimum	0.00	(=K24)
Maximum	0.50	(=L24)



Assumption: Risk 19C - Brooks - Schedule **Cell: O25**

Uniform distribution with parameters:

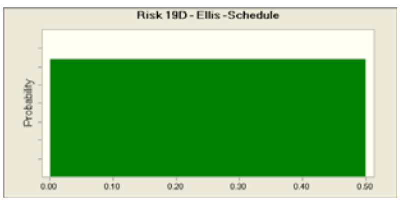
Minimum	0.00	(=K25)
Maximum	0.50	(=L25)



Assumption: Risk 19D - Ellis -Schedule **Cell: O26**

Uniform distribution with parameters:

Minimum	0.00	(=K26)
Maximum	0.50	(=L26)

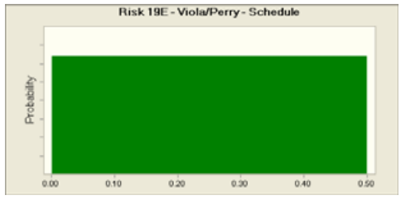


Assumption: Risk 19E - Viola/Perry - Schedule **Cell: O27**

Uniform distribution with parameters:

Minimum	0.00	(=K27)
Maximum	0.50	(=L27)

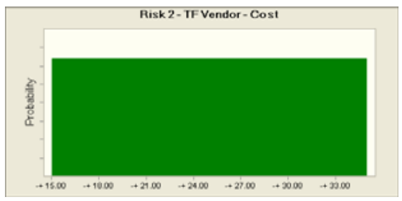
Assumption: Risk 19E - Viola/Perry - Schedule (cont'd) **Cell: O27**



Assumption: Risk 2 - TF Vendor - Cost **Cell: N5**

Uniform distribution with parameters:

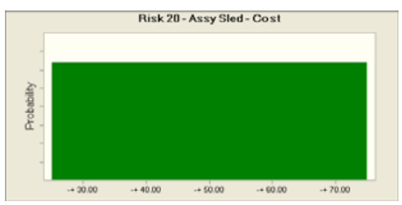
Minimum	-+ 15.00	(=I5)
Maximum	-+ 35.00	(=J5)



Assumption: Risk 20 - Assy Sled - Cost **Cell: N28**

Uniform distribution with parameters:

Minimum	-+ 25.00	(=I28)
Maximum	-+ 75.00	(=J28)

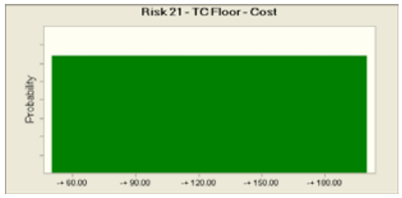


Assumption: Risk 21 - TC Floor - Cost **Cell: N29**

Uniform distribution with parameters:

Minimum	-+ 50.00	(=I29)
Maximum	-+ 200.00	(=J29)

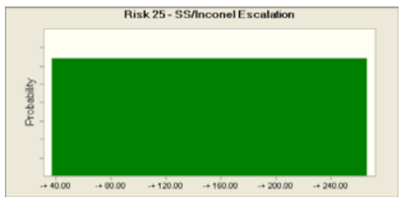
Assumption: Risk 21 - TC Floor - Cost (cont'd) **Cell: N29**



Assumption: Risk 25 - SS/Inconel Escalation **Cell: N33**

Uniform distribution with parameters:

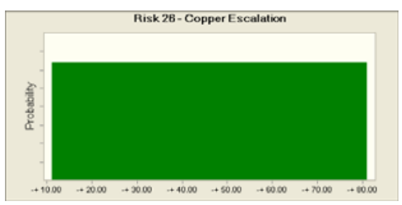
Minimum	-+ 37.00	(=I33)
Maximum	-+ 266.16	(=J33)



Assumption: Risk 26 - Copper Escalation **Cell: N34**

Uniform distribution with parameters:

Minimum	-+ 11.00	(=I34)
Maximum	-+ 81.00	(=J34)

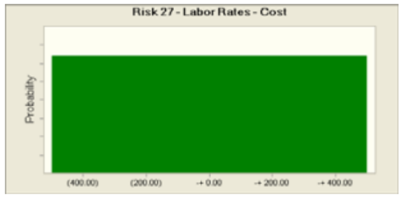


Assumption: Risk 27 - Labor Rates - Cost **Cell: N35**

Uniform distribution with parameters:

Minimum	(500.00)	(=I35)
Maximum	-+ 500.00	(=J35)

Assumption: Risk 27 - Labor Rates - Cost (cont'd) **Cell: N35**

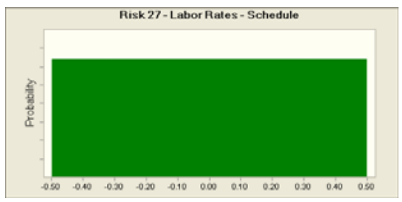


Correlated with:	Coefficient
Risk 27 - Labor Rates - Schedule (O35)	1.00

Assumption: Risk 27 - Labor Rates - Schedule **Cell: O35**

Uniform distribution with parameters:

Minimum	-0.50	(=K35)
Maximum	0.50	(=L35)

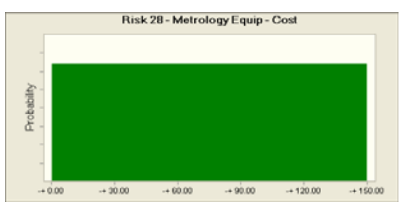


Correlated with:	Coefficient
Risk 27 - Labor Rates - Cost (N35)	1.00

Assumption: Risk 28 - Metrology Equip - Cost **Cell: N36**

Uniform distribution with parameters:

Minimum	-+ 0.00	(=I36)
Maximum	-+ 150.00	(=J36)

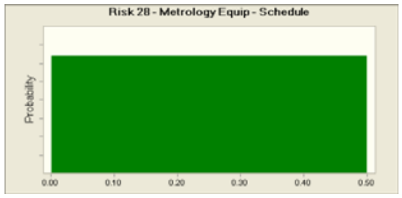


Correlated with:	Coefficient
Risk 28 - Metrology Equip - Schedule (O36)	0.90

Assumption: Risk 28 - Metrology Equip - Schedule **Cell: O36**

Uniform distribution with parameters:

Minimum	0.00	(=K36)
Maximum	0.50	(=L36)

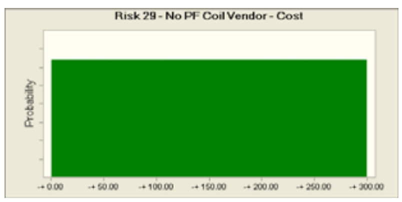


Correlated with:	Coefficient
Risk 28 - Metrology Equip - Cost (N36)	0.90

Assumption: Risk 29 - No PF Coil Vendor - Cost **Cell: N37**

Uniform distribution with parameters:

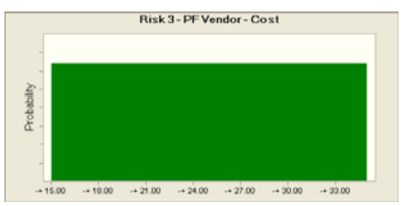
Minimum	-+ 0.00	(=I37)
Maximum	-+ 300.00	(=J37)



Assumption: Risk 3 - PF Vendor - Cost **Cell: N6**

Uniform distribution with parameters:

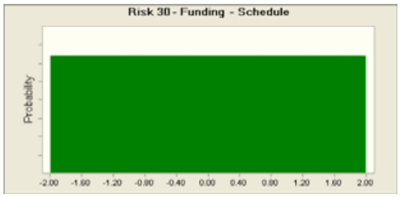
Minimum	-+ 15.00	(=I6)
Maximum	-+ 35.00	(=J6)



Assumption: Risk 30 - Funding - Schedule **Cell: O38**

Uniform distribution with parameters:

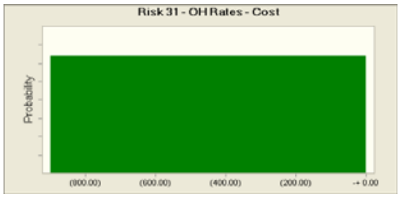
Minimum	-2.00	(=K38)
Maximum	2.00	(=L38)



Assumption: Risk 31 - OH Rates - Cost **Cell: N39**

Uniform distribution with parameters:

Minimum	(900.00)	(=I39)
Maximum	-+ 0.00	(=J39)

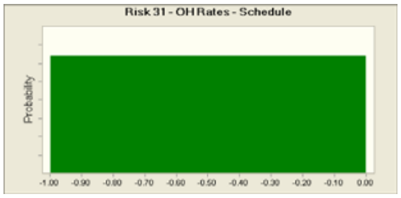


Correlated with:	Coefficient
Risk 31 - OH Rates - Schedule (O39)	1.00

Assumption: Risk 31 - OH Rates - Schedule **Cell: O39**

Uniform distribution with parameters:

Minimum	-1.00	(=K39)
Maximum	0.00	(=L39)

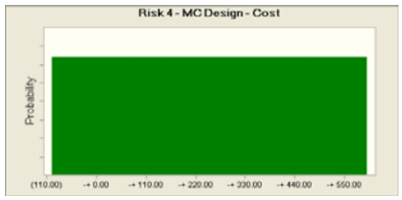


Correlated with:	Coefficient
Risk 31 - OH Rates - Cost (N39)	1.00

Assumption: Risk 4 - MC Design - Cost **Cell: N7**

Uniform distribution with parameters:

Minimum	(100.00)	(=I7)
Maximum	-+ 600.00	(=J7)

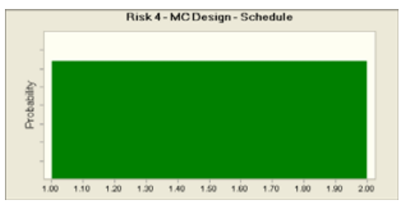


Correlated with:	Coefficient
Risk 4 - MC Design - Schedule (O7)	0.90

Assumption: Risk 4 - MC Design - Schedule **Cell: O7**

Uniform distribution with parameters:

Minimum	1.00	(=K7)
Maximum	2.00	(=L7)

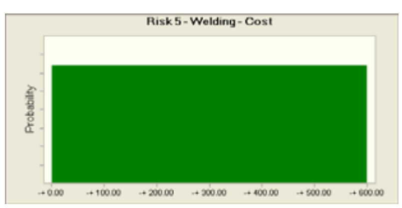


Correlated with:	Coefficient
Risk 4 - MC Design - Cost (N7)	0.90

Assumption: Risk 5 - Welding - Cost **Cell: N8**

Uniform distribution with parameters:

Minimum	-+ 0.00	(=I8)
Maximum	-+ 600.00	(=J8)

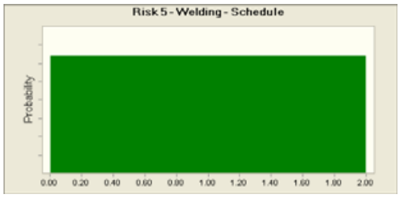


Correlated with:	Coefficient
Risk 5 - Welding - Schedule (O8)	0.90

Assumption: Risk 5 - Welding - Schedule **Cell: O8**

Uniform distribution with parameters:

Minimum	0.00	(=K8)
Maximum	2.00	(=L8)

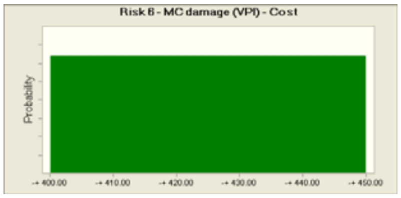


Correlated with:	Coefficient
Risk 5 - Welding - Cost (N8)	0.90

Assumption: Risk 6 - MC damage (VPI) - Cost **Cell: N9**

Uniform distribution with parameters:

Minimum	-+ 400.00	(=I9)
Maximum	-+ 450.00	(=J9)

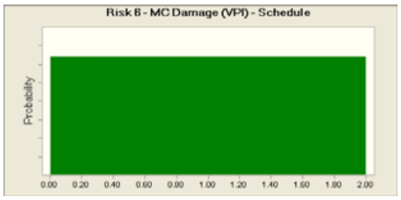


Correlated with:	Coefficient
Risk 6 - MC Damage (VPI) - Schedule (O9)	0.90

Assumption: Risk 6 - MC Damage (VPI) - Schedule **Cell: O9**

Uniform distribution with parameters:

Minimum	0.00	(=K9)
Maximum	2.00	(=L9)

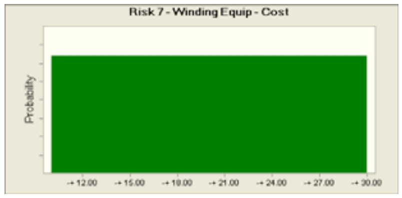


Correlated with:	Coefficient
Risk 6 - MC damage (VPI) - Cost (N9)	0.90

Assumption: Risk 7 - Winding Equip - Cost **Cell: N10**

Uniform distribution with parameters:

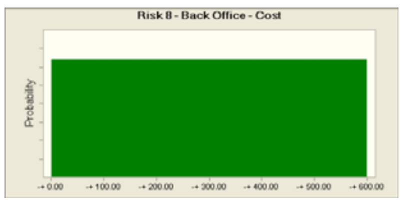
Minimum	-+ 10.00	(=I10)
Maximum	-+ 30.00	(=J10)



Assumption: Risk 8 - Back Office - Cost **Cell: N11**

Uniform distribution with parameters:

Minimum	-+ 0.00	(=I11)
Maximum	-+ 600.00	(=J11)

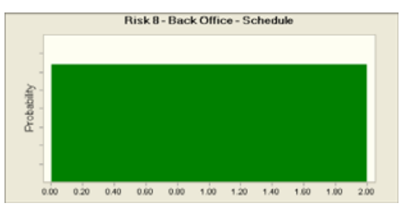


Correlated with:	Coefficient
Risk 8 - Back Office - Schedule (O11)	0.90

Assumption: Risk 8 - Back Office - Schedule **Cell: O11**

Uniform distribution with parameters:

Minimum	0.00	(=K11)
Maximum	2.00	(=L11)

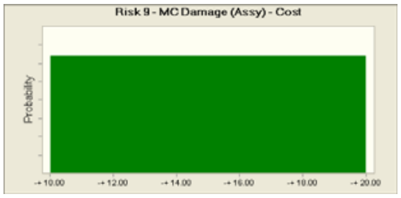


Correlated with:	Coefficient
Risk 8 - Back Office - Cost (N11)	0.90

Assumption: Risk 9 - MC Damage (Assy) - Cost **Cell: N12**

Uniform distribution with parameters:

Minimum	-+ 10.00	(=I12)
Maximum	-+ 20.00	(=J12)

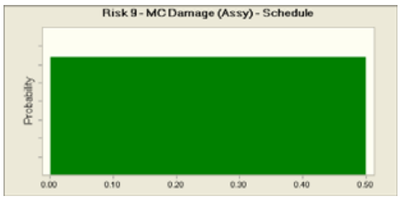


Correlated with:	Coefficient
Risk 9 - MC Damage (Assy) - Schedule (O12)	0.90

Assumption: Risk 9 - MC Damage (Assy) - Schedule **Cell: O12**

Uniform distribution with parameters:

Minimum	0.00	(=K12)
Maximum	0.50	(=L12)



Correlated with:	Coefficient
Risk 9 - MC Damage (Assy) - Cost (N12)	0.90

Worksheet: [NCSX Risk-Contingency Model - 7-27-07-play.xls]Schedule Ranges

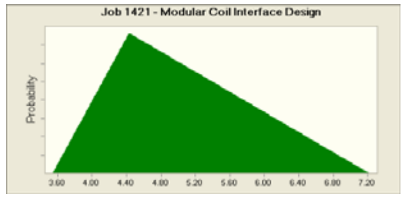
Assumption: Job 1421 - Modular Coil Interface Design **Cell: H6**

Chris Gruber:
90% Correlation with Estimate Probability Profile

Triangular distribution with parameters:

Minimum	3.54	(=E6)
Likeliest	4.43	(=C6)
90%	6.20	(=F6)

Assumption: Job 1421 - Modular Coil Interface Design (cont'd) **Cell: H6**

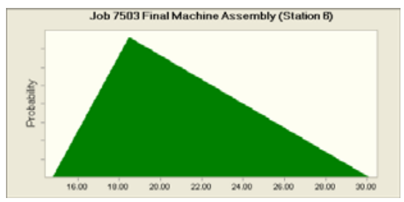


Assumption: Job 7503 Final Machine Assembly (Station 6) **Cell: H13**

Chris Gruber:
90% Correlation with Estimate Probability Profile

Triangular distribution with parameters:

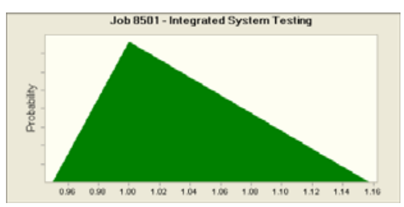
Minimum	14.78	(=E13)
Likeliest	18.48	(=C13)
90%	25.87	(=F13)



Assumption: Job 8501 - Integrated System Testing **Cell: H14**

Triangular distribution with parameters:

Minimum	0.95	(=E14)
Likeliest	1.00	(=C14)
90%	1.10	(=F14)

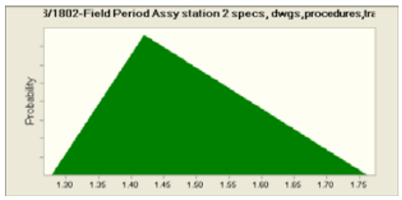


Assumption: Jobs 1806/1802-Field Period Assy station 2 specs, dwgs,procedures,trai **Cell: H7**

Chris Gruber:
Independent of Estimate Uncertainty

Triangular distribution with parameters:

Minimum	1.28	(=E7)
Likeliest	1.42	(=C7)
90%	1.63	(=F7)

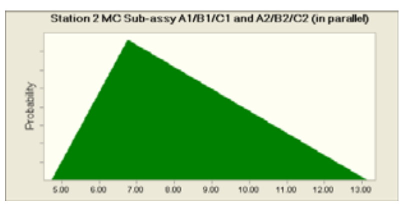


Assumption: Station 2 MC Sub-assy A1/B1/C1 and A2/B2/C2 (in parallel) **Cell: H9**

Chris Gruber:
90% Correlation with Estimate Probability Profile

Triangular distribution with parameters:

Minimum	4.73	(=E9)
Likeliest	6.76	(=C9)
90%	10.82	(=F9)



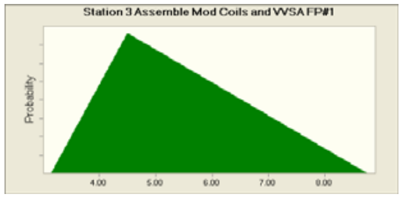
Assumption: Station 3 Assemble Mod Coils and VVSA FP#1 **Cell: H10**

Chris Gruber:
90% Correlation with Estimate Probability Profile

Triangular distribution with parameters:

Minimum	3.15	(=E10)
Likeliest	4.50	(=C10)
90%	7.20	(=F10)

Assumption: Station 3 Assemble Mod Coils and VVSA FP#1 (cont'd) **Cell: H10**

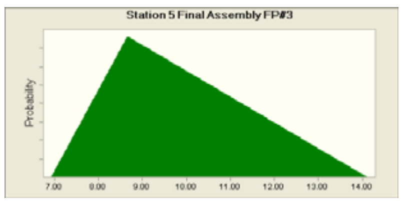


Assumption: Station 5 Final Assembly FP#3 **Cell: H12**

Chris Gruber:
90% Correlation with Estimate Probability Profile

Triangular distribution with parameters:

Minimum	6.93	(=E12)
Likeliest	8.66	(=C12)
90%	12.12	(=F12)



End of Assumptions