	Suggestion	Estimated Savings ($K incl. contingency)	Comments (blue text has changes since last time)	Project Manager Approved	PM Comments	rejected	still being evaluated
1.x							
	Drop the IPND, just build an 8 plane object and quit	580.0	Savings are likely small, perhaps zero in parts since parts are dominated by injection molding, but save assembly labor (at least 75% of 444 K$) and work in the MINOS Service Bldg (245 K$)	**NO**	**Prototype remains an important task.**	**580**	
			Could just test 8 planes in a testbeam and learn most of what we need on how the detector fits together				
			Dropping this test increases the risks that we won't find problems with neutrino event recognition until Ash River. Another object of the IPND is to do a long term test of the electronics, cooling, … and an 8 plane test cannot duplicate the statistics of a 196 plane test running 24x7.				
			Since we intend to re-use 3 of the 4 modules, it just moves these costs downstream to the Near Detector. Except for the MINOS bldg. work.				
	Drop the direct refrigeration effort on the IPND	90.0	This is for 2 of the 4 IPND blocks. The C&S has 4 blocks cooled by water. IPND has 4 blocks total, but apparently 6 are being cooled.	**80.0**	**Allow investigation with a much smaller number of channels.**	**10**	
			No progress since the cooling review due to other draws on people's time.				
			Recall this method held the prospect of savings perhaps as much as $ 1 M compared to a water system. But this is yet to be proved. A flexible quick disconnect was the major unsolved problem for direct refrigeration.				
2.0.							
	Move the Gap Kickers off project	7,000.0	Note our Director's Review suggested this one. Doesn't work unless there are buildings in which to do the work. Current plans slide buildings downstream two years, then the argument that the work is useful for others is less robust? Maybe the argument is more robust since clearly needed if any of the complex is to remain operational?	**3,900.0**	**Proposed to Directorate. Need their response before we can take credit.**	**3100**	
			Don't expect an update on buildings until March, 2008.				
			This is one of the 5 systems + R&D (& it's the most sophisticated of the systems).				
			High risk since these are the very people pulled many ways by other accelerator duties.				
			To avoid high risk, perhaps leave all R&D on project and just move the final construction off-project. Saves about half the total. This is the method proposed.				
			Building 2 similar systems (inj & gap), build one on project and one off-project? This is the method proposed.				
	Plug Horn 2 hole with T-Blocks	400.0	"modified" T-blocks, but cheaper than construction of a "dummy module" in the current plan.	**400.0**			
	Take credit for NuMI Target Hall chiller work already occuring in FY07	100.0	This is part of the tritium mitigation work funded by the Directorate.	**100.0**			
	Additional NuMI Cooling System upgrades are not known to be essential, …	1,500.0	Could we drop them? Or reduce contingency? Or what?	**200.0**	**Approximate, Nancy still needs final numbers from Karl.**	**1300**	
			Hard to make a plan without the studies to see what is needed & studies are part of the C&S task for this cooling. Previous NuMI descope removed instrumentation needed now for these studies.				

	Suggestion	Estimated Savings ($K incl. contingency)	Comments (blue text has changes since last time)	Project Manager Approved	PM Comments	rejected	still being evaluated
			Will take more than a year to do the studies				
			Nancy / Elaine will try to develop a plan that takes some middle ground.				
	Further optimization of Kicker designs	2,400.0	Might have an answer on the timescale of August 1. The question is one of the number of bumpers. Might relax specs and then build only 1 of 3 as a risk mitigating backup.	**2,400.0**	**Nancy needs Chris Jensen to sign off week of 7/16**		
			The number is larger than the first estimate of ~ 500 K$ once the protoyping and burdening were included. 3 of the kicker systems had two bumper systems each, one coarse and one fine. This now removes all the fine bumper systems.				
			One of the 3 is on the gap clearing system, so can't be counted here again, but removing it does reduce the required lab commitment for moving the gap kicker off-project.				
	Add mitigation for high radiation levels in MI		Current estimate at $ 750 K. Also extends shutdown by ~ 1 month		**not a cost savings**		
2.1.							
	Reduce HVAC to 10,000 cfm	107.5	This is based on Guarino's ANL work in NOVA-doc-1975 v2 where he relaxed the design requirement from 5 ppm to 10 ppm (requirement is < 50 ppm) The outgassing rate also seems to be lower when the MMA is trapped between our layers of PVC. Probably should check the calculation before changing plans?	**NO**	**better solution in next idea**	**107.5**	
	Combine the two MMA ventillation systems into one	250.0	The glue machine is close to the edge of the Assembly Area and MMA is heavier than air. Can we duct the glue machine over the edge or through the concrete floor and use one 20,000 cfm system sucking from the bottom of the Assembly area?	**250.0**			
	Reduce loading dock by one 24 ft bay	250.0	The Assembly group in WBS 2.9 accepts this as a possibility but warn that it will make their job tougher. They would compensate some with an excess parts trailer parked at one roll-up door (for leftover pallets, ….). Still need the same number of truck bays. Revised number (from 200 to 250) is now burdened.	**250.0**			
	Reduce the Access Road to one lane	528.8	one lane is ~ 30% of the roadbed width, but likely only save 15-20 % since need some kind of signaling system as yet unestimated.	**NO**	**safety issue**	**528.8**	
			Report from Mark that SK had such a road. This was a 1 mile public paved road on the side of a mountain.				
			We are building a public road, not a private driveway. U of Minn will have an easement for the access road and will not own the land. Other owners will want access to their land on their terms.				
			The current logging road probably sees one round trip per week. We intend 10 truck round trips per week + 35 round trips for people in the workforce daily (140/wk).				
			The EAW has the above # of trips + 40 - 70 trips per day during construction. The EA has to treat this traffic as well. Both these documents are in their final revision. Changing plans now to a different type of road would require more work. We submit these documents in about 3 weeks.		others more motivated by this issue and the next line.		

	Suggestion	Estimated Savings ($K incl. contingency)	Comments (blue text has changes since last time)	Project Manager Approved	PM Comments	rejected	still being evaluated
			We intend the Access Road to be a CD-3a request with an Advanced Technical Design. Changing the road design now runs counter to this effort and will cause a delay on regenerating 40 pages of drawings.				
	Don't pave the Access Road	740.0	Part of the $ 740 K is for road markings and signage, so we wouldn't save it all.	**NO**	**safety issue**	**740**	
			Gravel roads are notoriously bumpy. They require intense maintenance that nobody ever does to keep the bumps under control. They are not designed for truck traffic. A quick web search shows some evidence that typical gravel roads in Minn are limited to 5 ton/axle. Overloading roads by a factor of 2 reduces road life by a factor of 4.				
			6/29 information that we actually have to pave the road earlier in the project. The concrete roof planks will require a road rated for 9 tons per axle. Independent cost estimates of the building have pointed out this fact.				
			A gravel road may require a redesign of the road. We would have to assess the design for curves and slopes for safety. Again this runs counter to our CD-3a request and existing EA work.		others more motivated by this issue		
			We already worry about how to pack the final modules so that they will not suffer tranportation damage and even spend money to recheck them all after arrival at Ash River. A gravel road increases this risk.				
	No shielding on the North end of the Assembly Area, leaves detector open to cosmic rays from the North	1,677.0	Mark & Leon: If the angles shielded are shallower than 45^{o}, this would not be a problem. Mark will need the month of July to do the full analysis.	**1,677.0**			
			For the 45^{o} criterion, we appear to be safe even for a 20 kt detector				
			As a risk mitigation, we could stipulate use of existing Fermilab blocks in an operating phase. There are many blocks at B0, C0, and D0 tied to the Collider program which will end before we need blocks.		Transporting Fermilab blocks estimated at ~ $ 135 K.		
			There is a similar suggestion to make cheaper shielding blocks with an estimated cost savings of ~ 600 K$, but clearly NO shield at all is the cheapest.				
			May need a chipboard curtain wall at the edge of the Loading Dock after assembly to properly separate the fire protection areas. Need 1 hour fire barrier. Or a stud and sheetrock wall. Or use the block pivoter bookend as most of the wall and just trim out around the edges to the walls.				
			This may impact supernova searches, but such searches are not part of the base construction project. We believe a supernova search can just use the part of the detector which is well shielded, or use part of the detector as a shield in place of the north wall.		Supernova proposal would have to consider need for shielding and cost for transport of blocks as a minimum.		
	No shielding over the Assembly Area etiher, use a Pre-engineered building in this area instead. Save shielding $ and building construction $.	1,365.0	70 feet at 24 K$/ ft replaced by pre-engineered building at ~ 120 $/ sq ft.	**1,365.0**			
			For the 45^{o} criterion, we appear to be safe for a 20 kt detector.				
			Since it's 45^{o} from the south we are worried about.				
			This facilitates installation of ventillation duct work, access passages.				

	Suggestion	Estimated Savings ($K incl. contingency)	Comments (blue text has changes since last time)	Project Manager Approved	PM Comments	rejected	still being evaluated
	If reduce shielding over Assembly Area, can we also reduce the berms on the sides of the detector hall?	71.0	Yes, again use the 45^{o} criterion. Berms can be cut back from the north end of the building at 45^{o}.	**71.0**			
			May need to do something with extra spoils in this case				
			As a risk mitigation (or for supernova searches), make sure the side berms are 10 ft thick granite before they taper away.				
	Fewer Catwalks	380.0	Currently 2714 K$ for 7 levels.	**NO**	**Better plan in next item**	**380**	
			Could we at least lose the bottom one? And 1/7th of the cost? Note the actual levels need re-adjustment anyway to match manifold spacing.				
			Estimate on 6/29 notes still need catwalk supports, so only save 130 K$ maximum.				
			Should we re-examine a different solution? E.g. leave the top catwalk, but replace the rest with a system that moves vertically like around the pivoter, but also translates horizontally? It was ruled out as not cost effective long ago, but under what conditions? Steve recalls questions about how such systems blocked the exit aisle when on the bottom level...				
	Move detector to the east edge of the building to save catwalk space	50.0	Save one stairway @ ~ $ 50 K	**1,706.0**	**Number may be larger when all the details are put in for other WBS's.**		
			Save on exit from the East side?				
	Sum of 10 lines is		Move exit on South to the southwest corner?				
	1,706.0		Steve says HVAC is OK, Fire Protection is OK.				
		1,490.0	Save on catwalks on East and South. Nominally save 300' + 60' out of 660' = 55% of 2.714 M$ = 1.49 M$				
		(50.0)	Not quite says Steve. Still need a top catwalk on the East to provide exit from the rolling platform in case the scintillator dispenser in the center catches fire and you are on the wrong side of the fire. Then still need the exits on East and South as well. Could we administratively control this? Nominally have to add back in a top catwalk 3 ft wide (not 6 ft anyway) for such exit. (360ft)(3ft)$20/sq ft = 22 K$ + support costs				
		(84.0)	But make catwalks on West wider (5 ft --> 10 ft) at an extra cost of ~ $300 K. Catwalk floor goes at ~ $20 / sq ft. If put the whole 5 ft from the East on the West, this costs 7(300)(5)$20 = $ 210 K plus a little more to support those floors. Alternate would be to add only 2 ft to West, leaving 3 ft for top East, then additional widening cost is cut to $ 84 K. We choose this one for Steve's design.				
		300.0	But reduce number of West catwalks from 7 to 4, to save $(300)(10)$20 = $ 240 K + supports. In this case catwalks view 3 manifolds Reducing to 3 saves another $ 60 K, now catwalks view 4 manifolds. Reduce to 4 for next design.				
			Would have to buy mobile stairs (< $500 each) or powered (vertical only so can't ram the detector) stock pickers (~$ 3,000 each) to reach the higher manifolds. These objects seem to be ~ 36 -39" wide, so a West catwalk of 7 ft provide sufficient space and leaves 3 ft exit clear.				

	Suggestion	Estimated Savings ($K incl. contingency)	Comments (blue text has changes since last time)	Project Manager Approved	PM Comments	rejected	still being evaluated
			Reduce width of buliding to save even more $? This would take a larger re-design effort, so do not consider for now. Looks like we need the full span anyway for wider catwalks.				
			Eliminates flipping of modules on the loading dock if all vertical mainfolds point one way (East). Makes 24 ft shorter loading dock credible. This must save assembly labor also?				
			What about the cabling lengths and labor?				
			What about the scintillator piping lengths and labor?				
	Loosen Temp / Humidity requirements on the Loading Dock	94.0	The delta T and delta RH requirements strongly drive the design. Savings not clear since this is now tied up with the MMA ventilation requirements. $94K is perhaps a minimum.	**NO**	**Assembly Group must evaluate the effect on the PVC of delta T and delta RH ranges.** Time scale is more than two weeks, but we have to keep looking at this one during the next 6 months before the building design is complete.	**94**	
			At CD-1 the requirements were 60 ^{o}F for heating with propane fired unit heaters, 90 ^{o}F in summer (ventillation only), and NO humidity restrictions.				
			Could we use refrigerated trailers to acclimatize the modules? Maybe even on the whole trip from Factory #2 ?				
	Reduce to only one movable access platform on the top of the detector	218.0	Clearly introduces some conficts between cabling / electronics / scintillator filling. Revised number (174 --> 218) now is burdened.	**NO**	**After evaluating the possibility of scheduling as an alternative, the Detector Assembly Group does not believe this can be done.**	**218**	
			Could we designate shifts for each type of work and live with one platform?				
			Dave reports that height differences between the top catwalk and the moving platform (caused by pivoter as it pivots) may require scintillator dispenser permanently on one platform.				
	Eliminate Elevator	271.0	Revised number (217 --> 271) is now burdened. Restricts loads to those that can be hand carried.	**NO**	**Safety issue**	**271**	
			May have repercussions on emergency removal of injured personnel				
			May have ADA implications.				
	Jib Crane instead of 10 ton crane	266.3	quotes for both exist, (251-38) = 213 K$ is the difference + 25% contingency	**NO**	**not possible**	**266.3**	
			The jib crane handles all material upstream of the glue machine?				
			Dave Ayres believes a jib crane was shown to be too slow for the assembly tasks. Such cranes are not powered for horizontal movements.				
			Bill Miller says the problem with the jib crane is not speed, but that it would be a very non-standard jib for the area we need to cover. And therefore expensive, apparently more so than a 10 ton bridge crane -- the 38 K$ estimate is just wrong.				

	Suggestion	Estimated Savings ($K incl. contingency)	Comments (blue text has changes since last time)	Project Manager Approved	PM Comments	rejected	still being evaluated
	Two Jib cranes to replace all bridge cranes?	592.5	Means one on the wall in the middle of the Assembly Area. Saves less because a 10 ton jib cost more (guess at 50% more) ==> (251-1.5*38) = 194K$. Saves an additional 280 K$ because now the crane rail support structure is not needed.	**NO**	**not possible**	**592.5**	
			Can it lift a block pallet?				
			Dave Ayres believes a jib crane was shown to be too slow for the assembly tasks.				
			No can do, see Bill Miller's comment 5 lines above.				
	Replace 25 ton bridge crane with a 10 ton bridge crane	50.2	quotes from Liftmaster in NOVA-doc-1915.	**50.0**	**We only need 10 tons.**		
	Eliminate Barite, leave as future shielding upgrade if shown to be required	1,253.0	Mark indicates this risky, since cosmic backgrounds go up a factor of 50. Mark would want to do the complete analysis.	**NO**		**1253**	
			We would have a risk mitigation in place since the roof would be designed to hold 12 inches of barite but would start with zero inches.				
			However, we can eliminate the barite over the Assembly Area with no penalty (except perhaps for supernovas). Saves about 20% of total. See next lines				
	Error found in Barite cost	832.0	Steve says the cost for Detector Hall + Assembly area should have been 421 K$, not 1253 K$ as above	**832.0**	**fixes error**		
		76.0	Then eliminating the barite over the Assembly Area saves 76 K$	**76.0**			
	Analyze power bill with an eye to reductions in the estimate	none	In the "errors fixed" version of the schedule, the full power bill has been properly transferred off-project to the Cooperative Agreement operations phase. So this suggestion is now moot.	**-**	**already done**		
	Reduce maintenance costs at Ash River	none	In the "errors fixed" version of the schedule, all maintenance costs have been properly transferred off-project to the Cooperative Agreement operations phase. So this suggestion is now moot.	**-**	**already done**		
	Shorten the building one more time.	900.0	Currently long enough for a 20 kt detector. Reduce to a length for an 18 kt detector. That's 30 feet shorter in the deep pit @ 24K$/ft	**720.0**	**Will shorten to keep 271 ft for 40 blocks (~ 18.4 kt). So save on only 24 ft, not 30 ft.**	**180**	
			35 blocks (~ 16.1 kt) takes 237 ft				
			Space for crane to drop block pallet already removes _____ ft. Turns out it removed zero.				
2.2.							
	Reduce Fluor (pseudocumene + waveshifter) percentage to save money		We have 5.5% fluors now. Ch 6 of the TDR uses 20% of the 38 p.e. to allow use of the less transparent oil from our two vendors. Suppose we reduce the Fluors instead of allowing the second vendor and accept additional risk from only one vendor? We actually expect that other vendors will qualify -- we just don't have quotes from them now.	**1,400.0**	**Testing new mixtures now, if results as expected, then will implement this savings. Guess that save 163 K$ less than** since waveshifter price does depend on quantity.	**163**	

	Suggestion	Estimated Savings ($K incl. contingency)	Comments (blue text has changes since last time)	Project Manager Approved	PM Comments	rejected	still being evaluated
		1,563.0	The TDR only talks about increasing the fluors for the poorer oil by 60% to get the same p.e. performance as the good oil. Can we reduce the fluors with the good oil to get 80% of the current performance? Chuck Bower NOVA-doc-967 indicates that we might keep ~ 80% of the light with ~75% of the baseline fluors (pseudocumene + PPO + bis-MSB mixed in the same ratio relative to one another). Dropping 25% of the fluors saves 1,800 K$ and replacing those ~ 50,000 gallons with mineral oil costs ~ 240 K$. Net gain of 1,563 K$.				
2.3.							
	Reduce the fiber quantity.	1,040.0	The Director's Review had fiber for a 20 kt detector, justified as needed for spares since we do not yet understand breakage. Carl and Ron estimate a cost of 0.65 $/m if we buy 16,200 km for 18 kt vs. $0.63 / m if we buy 18,000 km for 20 kt. That's $ 10.53 M vs. $ 11.34 M, and ~ 4% spare for a detector @ 18 kt. The difference is 0.81 M$ + 28% contingency = 1.04 M$	**1,040.0**			
			Carl is estimating the price with minimal information. Ron has done a different extrapolation using 0.8mm and 0.7mm data. We probably will have to go back to Kuraray for a defendable quote/BOE.				
			This is like WBS 2.2 -- we scale to the final kt, but current thinking for fiber (long lead time single vendor) is to scale to some final maximum number of kt we might achieve. Could also change that philosophy, but then any upscope might cost an extra > 100% per meter. E.g., buying 18 kt now and 2 kt later implies a price increase of > 2,000 K$ eliminating the amount saved above on the 2 kt.				
			Can we structure a contract so that we can get extra fiber at the base price of our main buy? Yes, Bob Cibic believes this can be done as long as the company gets notified of the option well before shutting down production (so they don't have to restart later). So, we might buy just enough for 16 kt (say ~ 13,500 km at $0.69/m). This is $ 9.3M + 2.6 M contingency vs. the $ 11.5 M + 3.2 M contingency in the current C&S at $.63/m for 18,000 km for 20 kt. Saves $ 2.8 M, but allows no upscope. Then with the option for another 2-4 kt at the same $0.69/m price we would know how to upscope and not have to pay higher price....		**This part is left for the next step when we downsize the detctor mass**		
	Drastically reduce the QA effort on fiber	1,041.3	MINOS survived by just sampling to check the Kuraray results, reduce our effort to 10% of the spools vs. all of them?	**NO**	**Can't reduce in our initial plan. Perhaps can save $ eventually if all goes well**	**1041.3**	
			But we have clear evidence that Kuraray cannot maintain a standard quality in just the small amount of fiber we have seen to date. Variations at 16m are just way larger than the variations at 8 m seen by MINOS.				
			Our allocation of assembly random errors is dominated by the fiber errors. See Chapter 6 of the TDR.				
			We have already been criticized in reviews about our QA, how do we defend doing less at this stage? Maybe we can reduce the effort later and convert $ to kt, but how to claim that now?				
			Carl will add a task to produce a QA device to be stationed at Kuraray. This will be identical to the MSU device.		**NOTE !**		

	Suggestion	Estimated Savings ($K incl. contingency)	Comments (blue text has changes since last time)	Project Manager Approved	PM Comments	rejected	still being evaluated
			Carl will think about a possible phased program of QA after looking at his BOE again.				
	Assume we can get the duty free price on fiber	903.0	This requires Dept of Commerce action that Bob Cibic will initiate ~ 3 months before a Purchase Order. Saves 6.7 % of cost. On 10.53 M$ + 28% contingency as in first 2.3. item above, this saves 903 K$.	**903.0**			
			Carl will have to write up a risk for this one. But other Kuraray fibers are duty free, so the risk should be low.				
2.4.							
	Move structural tests to a sampling technique under this WBS instead of measuring the actual extrusions in WBS 2.5. ?	costs increase in WBS 2.4., reduces costs in WBS 2.5.	We don't have a technique in hand to test every extrusion in the detector structurally.	**Yes**	**but not a cost savings**		
			We don't have a sampling technique in hand either.				
			Note that 7 of 8 members of the Structural Analysis Review group believe testing of every actual extrusion is required, at least until any sampling technique is proven to find all problems.				
2.5.							
	Reduce number of factories to ONE	2,760.0	Ken has done a cost benefit analysis on multiple scenarios. The cheapest one (by ~ 113 K$) is a single factory in Duluth, followed by a single factory in Minneapolis. Dropping the Fermilab factory saves 2,760 K$, mostly in labor. Options of a single factory at Extrutech or at Ash River do not seem cost effective. Labor rates have now been checked	**2,760.0**	**See full Cost / Benefit analysis** (Ken: write this up and refer to the supporting NOVA notes)		
			A single factory will make us more vulnerable to a fire. This risk will have to be evaluated formally. Fire alarms get people out, fire protection saves the building but not the detector parts or assembly tools, so aggressive fire prevention is required or we could suffer a big delay. Ken will put this in his formal risk analysis.				
	Counter suggestion to make sure we have two complete factories, each capable of all the work	not a cost savings	The idea is that if the building completion is delayed (aren't they all?) then we may have to accelerate the assembly. This is more easily done with two factories. Also a plus of keeping the costs under control if there is a little competition.	**NO**	**Not cost effective.**		
2.6.							
	Squeeze testing time for APDs	140.0	Increase the throughput of the testing machines. Also lower contingency from 100% to 50% since tests have already been done now.	**140.0**			
	Raise dark current threshold on APDs from 5 nA to 10 nA	828.0	Roger's interpretation of Hamamatsu cost increase memo. "20% of price increase due to yield factor by tolerance,..." 20% of increase is $33 per APD + 57% contingency, so on 16,000 devices this is 828 K$	**NO**	**Evaluation must proceed, but we won't know what to do in time for August 1**	**828**	
			John O says technical ramifications still need thought.				

	Suggestion	Estimated Savings ($K incl. contingency)	Comments (blue text has changes since last time)	Project Manager Approved	PM Comments	rejected	still being evaluated
			Dark current increase from 5 to 10 nA means ~ 6 p.e. of noise. Noise changes from 2-3 p.e. to 8-10 p.e. and the threshold has to be raised. This risk needs simulations which will take about 2 weeks. In the CDR we looked at thresholds of 15 and 20 p.e. on a mean signal of 20 p.e. and found full FoM at 15 but 98% FoM at 20.				
			It may be possible to allow 20% of the devices to have dark currents in the range 5 - 10 nA to keep costs down (yield question). Allowing 20% of the devices to be in the 5-10 nA range comes from observations of the first 20 delivered. Small statisitics.				
			Recover by cooling more? Takes a lot of power. The TECs are at limits.				
			Could use higher dark current devices on horizontal cells where noise is less critical. Or put on the top few horizontals where the verticals have 200 p.e.				
	Reduce number of APDs	1,001.0	The current Hamamatsu quote is for 16,000 devices. This is enough for 20 kt (42 blocks) + 2.4% spares. If we reduce this to what we need for 18 kt (38 blocks), we only need ~14,500. At the price in our schedule ($425 each + 57% contingency), this would save $ 1001 K (not $ 334 K incorrectly calculated in last version). However we do not understand very well how this price changes with quantity. Hamamatsu told us the price increased by 10-15% when we dropped the quantity from 25,700 on 11/14/05 to 16,000 on 5/31/07. If increases another 10 - 15% when we drop to 18 kt, then there is no savings at all. A power law fit to the 25,700 & 16,000 quantities predicts only a 1.5 - 3.5% increase, in which there would be a savings of at least 662	662.0	uncertainty here until we get a final quote.	339	
			We would need a new quote from Hamamatsu for any reduced number. BEST TO ASK ONLY ONCE.				
			CMS had a deal with Hamamatsu to understand the yield and then the price was linked to the yield.				
	Like with fiber above, buy for 16 kt and have an option for more at the 16 kt price	?	As in fiber above, Bob Cibic believes this can be done. It is harder with Hamamatsu because they can deliver all the APDs before we can decide if we can upscope. So the condition of "not shutting down the production line" can't be met. Well, actually it would be met perhaps by the time the building is done -- maybe that can be the option trigger in this case?	NO	This part is left for the next step when we downsize the detector		
2.7.	**No items suggested**		Have we really squeezed the software tasks to get scientists doing as much as possible?				
			Leon says he has filled 75% of his plea for help from last fall.				
			Gary notes that new Collaborators (e.g. Tennessee interested) could help here.				
2.8.	**Plan for success. Use all 4 IPND modules in the Near Detector instead of just 3 of the 4.**	175.0	Savings: One third of Near fiber = 23 K$. One third of Near module M&S = 10 K$. One third of Near module SWF = 120 K$. One third of Near cradle structure = 22 K$.	175.0	Will need to add contingency to the IPND R&D task however. There is no scope contingency left here.		
			This is easier to consider now since the vertical extrusions with the new die inserts did in fact work at Extrutech on June 28.				

	Suggestion	Estimated Savings ($K incl. contingency)	Comments (blue text has changes since last time)	Project Manager Approved	PM Comments	rejected	still being evaluated
2.9.							
	Shorter Loading Dock	already above	But will add a task to rent a trailer near the loading dock for excess packing materials.		**Evaluating trailer cost.**		
			Can Ken flip the modules? He says yes & they will fit in the truck contrary to previous reports.				
	Need access tunnel from loading dock to catwalk / elevator	cost increase, not savings	difficult to do inside the granite berm, might be easier if the Assembly area is not shielded…. Dave Ayres suggests removing the labyrinth tunnel and installing an access tunnel which is more useful.		**Easy to do with Assembly Area as pre-engineered building but will increase cost of building.**		
	Need transportation costs to get shipping materials from Ash River back to Minneapolis	cost increase, not savings	Bill & Earl believe this was left out, Dave confirms.		**We have to add this one back in**		
	Assembly Area needs to be ~ 20 feet longer	cost increase?	Drawings seem to indicate that a block pallet cannot be placed on the south end of the pivoter with the crane.	-	**Not a problem after all**		
			Not a cost increase if we nibble on the 20 kt space to gain whatever is needed. OK as long as we don't go below 18 kt.				
			This is only 3 ft 6 inches (hook to edge of crane), not 20 feet?				
	Reduce pressure testing time at Ash River	no change?	Reduction in time from 24 hours to 8 hours (Ken is the source of this smaller number) makes a shorter loading dock more palatable. Labor to set up and record results is presumably the same and only the testing time is changed.	-			
			Ken says 8 hours is enough to detect a 9 micron leak. With statisitical probability of leaks, this leads to 0.2 liters per year from the whole detector. If every module leaks at the rate of a 6 micron leak, then the total is 10 liters per day.				
	Move Machine Shop outfitting to CA Operations phase	49.0	There is only room for a very small Tech shop in the current design. M&S only in 2.9.2.2. BOE does not agree with "errors fixed" Cost & Schedule. Used "errors fixed" C&S number here.	**49.0**			
			Labor is covered in 2.9.4. BOE says labor is 20 hrs "Lab Manager" (who is on CA) + 160 hrs tech.				
	Move Office Area outfitting to CA Operations phase	67.0	M&S only in 2.9.2.6. BOE does not agree with "errors fixed" Cost & Schedule. Used "errors fixed" C&S number here.	**67.0**			
			Labor is covered in 2.9.4. BOE says labor is 20 hrs "Lab Manager" (who is on CA) + 80 hours tech.				
	Move Safety Equipment to CA Operations phase	93.0	M&S only in 2.9.2.7. BOE does not agree with "errors fixed" Cost & Schedule. Used "errors fixed" C&S number here.	**93.0**			
			Labor is covered in 2.9.4. BOE says labor is 20 hours "Lab Manager" who is on CA + 160 hours tech. Also talks about 4,124 hours total (time of assembly crew in training) and this does belong on 2.9.4.				
	Transfer all Building Operations labor to the CA	700.0	Bill Miller is working on this one. We have to keep the partition very clear in each case or the BOEs will be too confused.	**?**	**Still evaluating**		**700**
			It is believed that at least 1 FTE belongs off-project.				
2.10.							

	Suggestion		Estimated Savings ($K incl. contingency)		Comments (blue text has changes since last time)	Project Manager Approved	PM Comments		rejected	still being evaluated
	Reduce Project Management Cost?		net of zero?		Will attempt to put in defensible peaks and valleys in ES&H and Project Engineering correlated with expected work loads year by year. Ramp down of scheduling effort is already in there. An expediter as suggested strongly by the reviewers is not in there.					
	Total		34,058.5		but many are double counted	**21,366.0**			**11,992.4**	**700.0**
						sum:	**34,058.40**			