Agenda for the HENEX 100% Design Review

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1. Opening (John Seely, john.seely@nrl.navy.mil)
2. Optical Design (Larry Hudson, larry.hudson@nist.gov)
3. Mechanical Design (Layne Marlin, lmarlin@ssd5.nrl.navy.mil)
4. Electronic Design (Rob Atkin,ratkin@tigerinnovations.com)
5. Interface/Sensor (Glenn Holland, gholland@ssd5.nrl.navy.mil)
6. Closing (John Seely, john.seely@nrl.navy.mil)

Questions/comments: Please refer to presentation number 6.

Milestone schedule

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Requirements accepted by JCDT	M0						
Conceptual Design Review accepted by JCDT	M1		Dec-00				
Engineering 65% Design Review accepted by JCDT	M2		Apr-01				
Engineering 100% Design Review accepted by JCDT	M3		Sep-01				
Assembly and benchtesting complete	M4 a			Sep-02			
Functional testing at NIF complete	M4 b				Jun-03		
Dry run review at NIF	M5				Sep-03		
First use on NIF (secondary diagnostic)	M6					Dec-03	
Functional operation on NIF (primary diagnostic)	M7					Jun-04	
Accepted by facility	M8						Mar-05

Total cost breakdown with calibration

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Diagnostic:	High Energy X-Ray Spectrometer						Responsible Lab:	NRL		
Acronym:	HENEX						Responsible Engineer:	Layne Marlin		
Primary mission:	X-ray spectral distribution						Responsible Scientist:	John Seely		
Secondary mission:							Responsible Expert Group(s):	X-ray spectroscopy		
	First use on NIF(M6)	Facility acceptance(M8)		Comments: Requires DIM manipulator.						
	30-Dec-03	15-Mar-05								
			(actual)	(actual)	all costs in $K as spent loaded at the applicable rate					
Item	Effort (FTE)	Other contributors	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
Management	0.8		20	20	40	40	30	20		
Scientist support	1.8		70	60	130	50	50			
Design (M0 - M3)	1.8		60	140	70					
Procurement			22	313	100	40	100	20		
Assembly (M4a)	0.3				50					
Deployment at LLE	0.1					20				
Functional Testing at NIF (M4b)	0.1					13				
Installation at NIF (M5)	0.1					16				
First use at NIF (M6)	0.6						85			
Absolute calibrations	1.3						258			
Operation on NIF (M7 & M8)	1.0						88	61		
Total FTEs:	7.9	Total k$:	172	533	390	179	611	101		

FY02 Cost Accounting Plan (CAP)

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FTE REPORT
man months

Job Classification		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	FY02 Average
Management	*plan*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Software Support	*plan*	0.6	0.6	0.6	0.6	0.6	0.5	0.4	0.3	0.2	0.1	0.1	0.1	0.4
Electronics Engineer	*plan*	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.3
Electronics Technician	*plan*	0.1	0.1	0.1	0.1	0.1								0.1
Mechanical Engineer	*plan*	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2
Mechanical Technician	*plan*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Scientist Support	*plan*	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.6	0.3
Other	*plan*													
Total FTE	*plan*	2.0	2.0	2.0	2.0	1.9	1.6	1.5	1.3	1.3	1.3	1.3	1.3	1.6

COST REPORT
$K

Type of Cost		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Labor	*plan*	$28	$28	$28	$28	$28	$23	$23	$20	$20	$20	$20	$16	$282
Procurements	*plan*			$40	$20	$20	$20							$100
Other (Travel to LLNL)	*plan*						$4					$4		$8
Total Cost	*plan*	$28	$28	$68	$48	$48	$47	$23	$20	$20	$20	$24	$16	$390

FY02 CAP Milestones

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FY02 milestones (includes milestones just before and just after the FY period)				
Date	**description**	**level**	**Definition**	**IPS code**
9/27/01	HENEX 100% design review complete (M3)	3	This milestone will be completed when the 100% design review has been presented and the review committee has recommended acceptance. The deliverables for the 100% design review and the process for the review and criteria acceptance of the 100% design are	2A45165
3/19/02	Fabrication of subsystem parts	4	This milestone will be completed when the HENEX mechanical hardware and electronics have been fabricated and the control software has been completed.	2A48140
5/23/02	Assembly of components	4	This milestone will be completed when the mechanical hardware diffraction optics and electronics have been assembled and the control software has been integrated with the sensors.	2A48150
7/31/02	Instrument validation at NIST and NRL	4	This milestone will be completed when HENEX x-ray spectral images have been acquired using x-ray sources at NIST and NRL. This includes a full test of the sensor control electronics.	2A48170
9/10/02	HENEX Fab & Assembly Complete (M4a)	3	This milestone will be completed when HENEX has been fully integrated and tested in the laboratory. The test results will be summarized in a report that will become part of the deliverables for the M4a milestone review.	2A45290
12/4/02	First use at LLE	4	This milestone will be completed when HENEX has been deployed at LLE and x-ray spectral images have been successfully recorded.	2A48220

What's not included in the current cost plan

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Early procurements (included in the project budget):	**$K**		
Rad-icon sensors for sensitivity tests	10		
Scintillator test depositions optimized for each channel	5		
Electronics breadboard and sensor readout tests	100		
Crystals for bending tests (RAP and ADP)	10		
Estimated operations/replacement costs (not included in the project budget):	**$K Each**	**Number**	**$K Total**
Replacement frontend filters	1	5	5
Replacement pre-mounted crystal and spare crystals for each channel	10	5	50
Replacement fiber optic cables	2	2	2
Backup spare sensor assembly with scintillator & filter	20	5	100
Drive Electronics complete replacement	70	1	70
Diagnostic Interface Unit complete replacement	23	1	23
			250
Possible add-ons (not included in the project budget):			
DIM cart adaptor	10	1	10
Film assemblies (5 to mount on HENEX and 5 with pre-loaded film for the next shot)	6	10	60
Crystal characterizations (topographs,rocking curves,reflectivity)	3	5	15
Extend transmission crystal range to 60 keV	50	1	50
Implement additional CMOS sensors for x-ray & neutron dose measurements	50	2	100
Retrofit CMOS sensor electronics to have adjustable gain offset (software controlled)	20	1	20
Add Sleep Mode to Drive Electronics (would extend battery lifetime)	20	1	20
Upgrade battery capacity (would extend lifetime)	30	1	30
10-diode array for time-dependent flux measurements on transmission crystal channel	25	2	50
Imbedded fast digitizing electronics	200	1	200
Multi-channel fiber optic cable/feedthrough for diode channels	175	1	175
			730

Conclusions and Comments

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The Henex project is meeting schedule, scope and cost

The project is a good example of out source contract for diagnostics

There are additions that can be add to the basic instrument if desired

Being the first diagnostic in series of diagnostics to come we are faced with defining the guidelines and interface issues with the NIF project.

- Many guidelines are incomplete or conflicting
- Not relevant to the diagnostic developer

We are moving from a R&D mode to more of an under ground test environment (Shot cost driven Nova/Omega 10k Vs. NIF 100k)

We have discover that many things are over looked.

- Project interface is costly
- Documentation requirements are not defined
- NIF shot sequencing is not well understood