Primary Certification

Mission Supporting Goals and Measures

Primary Certification integrates the laboratory research and development efforts in hydrotesting, subcritical experiments, materials science, engineering, and dynamic system behavior to develop certification tools and methodologies to certify the performance and safety of any rebuilt or aged primary to a specific yield.

Subprogram Goal

Developed tools and methodologies to certify the performance and safety of any rebuilt or aged primary to a specific yield.

Performance Indicators

Percentage of scheduled subcritical experiments completed on/ahead of schedule.
Percentage improvement in assessed predictive capability relative to goals of 2005 and 2010.

Annual Performance Results and Targets

FY 2002 Results	FY 2003 Targets	FY 2004 Targets
Completed electronic archiving of prompt diagnostic data from underground nuclear tests.	Begin developing logic for quantification of margins and uncertainties (QMU) for use in the W76 and W88 warhead physics package certification.	Complete 100% of the 4 scheduled subcritical experiments.
Developed a new fiber optic diagnostic for measuring high explosive burn front; velocity was developed; improvements continue.	Evaluate historical test data for archiving.	Complete the initial 60% of FY 2005 goal in assessed predictive capability.
Made improvements to the radiographic scatter reducing collimator that allows flash X-Ray radiography of thick- weapon geometry objects. Successfully fired weapon geometry hydros.	Provide validation data for high fidelity material model development by executing a suite of subcritical experiments in U1a Complex at Nevada Test Site (to include Piano). Validate pit material equation-of-state models.	Conduct scheduled major hydrotests at DARHT and Container Firing Facility to support Life Extension Programs and Significant Findings Investigations.

FY 2002 Results	FY 2003 Targets	FY 2004 Targets
Fired Oboe 7, 8, and 9 subcritical experiments successfully; yielded excellent results.	Evaluate thermochemically based high explosive equation-of-state.	Finalize Qualitative Methodologies and Uncertainties methodology for FY 2005 implementation.
Demonstrated Stallion radiographic probe.	Execute four subcritical Experiments.	Determine jointly by Los Alamos and Lawrence Livermore National Laboratories the specific data required from radiography for primary certification.
Developed and demonstrated the radiographic capabilities used at U1A in support of subcritical experiments in support of pit certification.	Serve as the radiographic source system integrator for Los Alamos National Laboratory's (LANL's) subcritical experiments.	
	Validate first SubCritical Radiographic Prototype at LANL.	Provide a new high explosive model with improved material data.
	Install the Armando subcritical experiment radiographic probe system in U1a Complex at Nevada Test Site.	

Funding Schedule

(dollars in thousands)

	FY 2002	FY 2003	FY 2004	$ Change	% Change
Legacy Data Analysis and Archiving	2,824	3,721	4,422	701	18.8%
Materials Science Integration/Analysis	12,605	15,120	21,636	6,516	43.1%
Engineering Component Analysis	250	0	0	0	??
Boost Physics	5,156	4,655	14,475	9,820	211.0%
Integrated Hydro Test Assessment	1,855	0	0	0	??
Subcritical Experiments	27,882	23,663	25,316	1,653	7.0%
Total, Primary Certification	50,572	47,159	65,849	18,690	39.6%

Detailed Program Justification

(dollars in thousands)

	FY 2002	FY 2003	FY 2004
Legacy Data Analysis and Archiving	**2,824**	**3,721**	**4,422**

This effort uses modern codes, tools and physics understanding to re-analyze Nevada Test Site legacy underground test data and other data to support an improved understanding of weapons in the stockpile. This is critical for developing a modern baseline against which to assess the impact on performance of significant finding investigations (SFI's) and proposed stockpile Life Extension Programs (LEP's). **This activity also mentors new scientists.**

Materials Science Integration and Analysis	**12,605**	**15,120**	**21,636**

Supports experimental work to develop and test data bases and models for properties of materials used in weapons primaries. New diagnostics are developed to provide more precise data. The new high explosive (HE) and burn models combined with improved materials models are required to support the W80 SLEP and will be used in B61 baseline work.

This effort is centered on validation of models and codes, primarily using small-scale science and engineering experiments, specifically for polymers, for the phase properties and other physics of nuclear and advanced materials, as well as interface dynamics and high explosive models. The material science work supporting primary predictive capability and certification is coordinated with and contributes to efforts in other campaigns and Directed Stockpile Work (DSW).

Engineering Component Analysis	**250**	**0**	**0**

Evaluated the impact on weapons performance provided by the development of new engineering technologies such as precision casting and laser welding.

Boost Physics	**5,156**	**4,655**	**14,475**

Supports experimental work required to develop an improved understanding of boost physics, which is the single greatest source of uncertainty in our understanding of a primary weapons system. This work supports the testing and evaluation of new code capabilities against both archived and new experimental data. This work contributes knowledge for the W80 Stockpile Life Extension Program (SLEP) and B61 baseline. Increased effort in this area represents a shift in funding in order to support the increased participation by LANL in the primary certification campaign. This effort will support the study of the role of radiography in primary certifications which is necessary in order to develop a justification for and the requirements for an advanced radiography facility. A key element of this is increased emphasis on improving boost physics models, which are the greatest source of uncertainty in our ability to certify primaries.

Integrated Hydro Test Assessment	**1,855**	**0**	**0**

Manage the hydrotest program including facilities and the integration of hydrotest schedules in support of and funded through other stockpile activities. Evaluate results of integrated hydro tests.

Subcritical Experiments	**27,882**	**23,663**	**25,316**

Coordinates and maintains the schedule for subcritical experiments in support of and funded through other stockpile activities. Funding is for Bechtel Nevada support of Lawrence Livermore National Laboratory subcritical experiments, including fielding at U1a Complex and instrumentation and diagnostics. It also supports Sandia National Laboratories' development of radiographic sources to support pit certification.

Total, Primary Certification	**50,572**	**47,159**	**65,849**

Explanation of Funding Changes

Primary Certification	FY 2004 vs. FY 2003 ($000)
• **Legacy Data Analysis and Archiving** - Increase reflects adjustment for escalation	701
• **Materials Science Integration/Analysis** - Funding increase supports subcritical experiment schedule (Piano 1, Trumpet 3 and 4), diagnostic development, and material property research	6,516
• **Boost Physics** - Increased emphasis on funding primary certification work which is generic to the stockpile through the Primary Certification Campaign	9,820
• **Integrated Hydro Test Assessment**	0
• **Subcritical Experiments** - Additional funding reflects increasing radiographic capability	1,653
Total Funding Change, Primary Certification	**18,690**

Capital Operating Expenses and Construction Summary

Capital Operating Expenses [a]

(dollars in thousands)

	FY 2002	FY 2003	FY 2004	$ Change	% Change
General Plant Projects	0	0	0	0	N/A
Capital Equipment	2,684	2,765	2,847	83	3.00%
Total, Capital Operating Expenses	2,684	2,765	2,847	83	3.00%

[a] Since funds are appropriated for Operations and Maintenance, which includes operating expenses, capital equipment and general plant projects, we no longer budget separately for capital equipment and general plant projects. FY 2003 and FY 2004 funding shown reflects estimates based on actual FY2002 obligations.