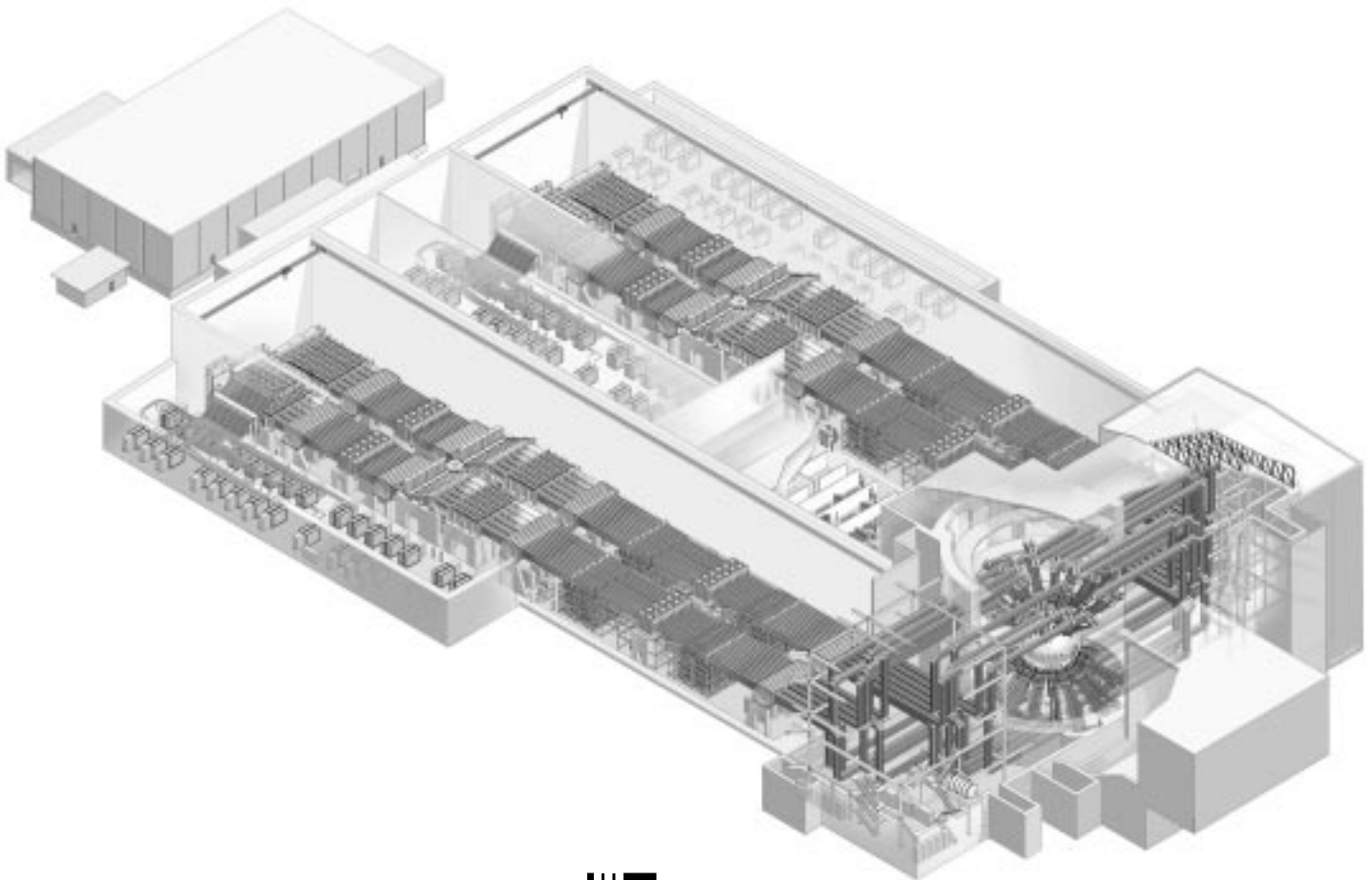


NIF Title III Engineering Plan

June 1998



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NIF Title III Engineering Plan

June 1998

NIF Title III Engineering Plan

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List of Acronyms

NIF	National Ignition Facility
DOE	US Department of Energy
AE	Architect Engineer Firm
CM	Construction Management firm
PC	Primary Criteria
FR	Functional Requirement
SDR	System Design Requirement
SSDR	Sub-System Design Requirement
ICF	Inertial Confinement Fusion
ORR	Operational Readiness Review
NEPA	National Environmental Policy Act
WBS	Work Breakdown Structure
FSAR	Final Safety Analysis Report
APE	Associate Project Engineer
IPS	Integrated Project Schedule
ERP	Enterprise Resource Planning (System)
LRU	Line Replaceable Unit

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1.0 Introduction

This National Ignition Facility (NIF) *Title III Engineering Plan* defines the engineering work to be performed by the NIF Project Team, in parallel with hardware procurement, fabrication, assembly, and installation, between the end of Title II design and the completion of the Project. This period is from mid-FY1998 to FY2003, with the beginning of Title III engineering being phased by subsystem according to the requirements of the integrated project schedule.

This plan includes seven sections and four appendices. The purpose of each section and Appendix is outlined in Table 1.

Table 1 - Overall Contents of this document

Section	Title	Purpose
1	Introduction	General introduction, background, scope, and purpose of the document
2	Title III Objectives	Overall objectives of Title III
3	Responsibilities	Overall responsibilities of participants in Title III
4	Title III Deliverables, Responsibilities, and Acceptance Criteria	the heart of the document; a detailed listing of Title III deliverables, including descriptions of each, detailed responsibilities, and acceptance criteria.
5	Title III Schedule	General comments on Title III schedule
6	Title III Cost	General comments on Title III cost
7	References	Listing of reference documents
App A	Glossary of Important Terms	Definition of important terms used in this document
App B	Summary of Title III deliverables	A one-page summary listing of Title III deliverables

App C	Sample Format and Content for Deliverables	Sample formats for Title III deliverables
App D	Revision Record	Record of release and revision

1.1 Background and Scope

Title I design, which was completed, reviewed, and approved in December 1996, included all work necessary to complete the *preliminary* design of the NIF Project and established an integrated definition of all major subsystems with associated cost and schedule projections for project completion. With the completion of Title I, the facility and special equipment designs were mature enough to justify the release of resources to proceed with final engineering design details. Title I activity ended with a formal design review and U.S. Department of Energy (DOE) approval to proceed to Title II design (i.e., detailed design).

Title II design¹ included all work necessary to define the *detailed* design configuration of the Project, incorporating all the necessary details, and then to review, check, approve, and accept the documentation into the procurement and construction packages. It also included preparation of acceptance test requirements and Project cost estimates to support bid evaluation.

Title III engineering begins at the initiation of procurement action, i.e., the submission of requisitions. It extends from the beginning of the fabrication/construction phase and continues through the completion of construction and equipment acceptance tests. It includes field engineering, problem resolution, configuration control, documentation maintenance, and the technical staff required to maintain all engineering records, including as-built drawings at Project completion. It includes the revision of existing design documentation and the generation of any new design documentation required as construction proceeds, engineering analysis to evaluate proposed design changes, and engineering support for inspection, assembly, installation, and testing.

Title III engineering services for facilities and conventional equipment are provided under contract with an Architect Engineer firm (AE) working with a Construction Management firm (CM). Title III engineering for special equipment is furnished by the Laboratory Project Staff.

1.2 Purpose of this Document

The purpose of this document is to define the work that must be accomplished by the NIF Project during Title III Engineering. This definition is intended to be sufficiently detailed to provide a framework for yearly planning, to clearly identify the specific deliverables so that the Project teams can focus on them, and to provide a common set of objectives and processes across the Project. This plan has been preceded by similar documents for Title I² and Title II¹ design and complements the Site Management Plan³, the Project Control Manual⁴, the Quality Assurance Program Plan⁵, the RM Parsons NIF Title III Configuration Control Plan⁶, the Integrated Project Schedule⁷, the Preliminary Safety Analysis Report⁸, the Configuration Management Plan⁹, and the Transition Plan¹⁰.

This plan is not intended to be a stand-alone document. The NIF Project has developed an extensive base of source documents for requirements, procedures, plans, etc. In addition, the technical, cost, and schedule baselines are formally managed separately from this plan. In order to avoid duplication of information contained in other documents and the change-management burden that would result, this plan makes extensive reference to other documents when those documents are the primary source of information. This document is meant as an overview and does not supercede more specific documents. The current revision of the referenced documents should be consulted for definitive information.

1.3 Basis and Assumptions

The basis for NIF Title III engineering is the Title II (detailed) design completed in a phased manner by subsystem, from March 1997 through August 2001. The design drawings, specifications, other procurement documentation, and governing design criteria (e.g., Primary Criteria (PC), Functional Requirements (FRs), System Design Requirements (SDRs), Sub-System Design Requirements (SSDRs), and Interface Control Documents (ICDs)) form the basis for Title III engineering. As a part of the Title II design phase, final design packages and procurement documents are formally reviewed, approved, and placed under configuration management.

The assumptions for this plan are as follows:

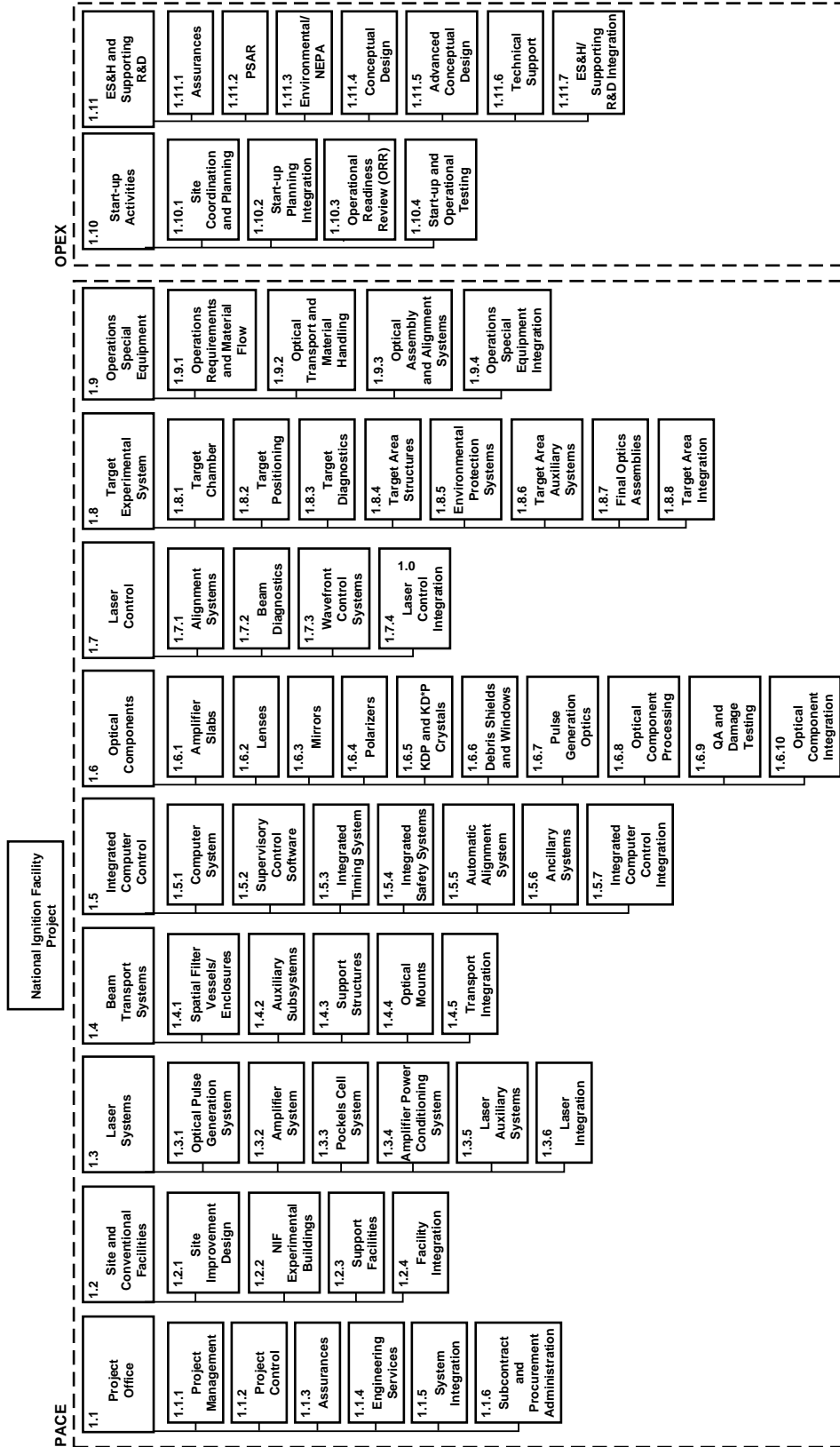
1. The project budgets for Title III activities are defined in the Cost Account Plans.
2. Title III begins October 1, 1998 and ends September 30, 2003. Individual subsystems begin Title III work earlier or later than this, depending on the requirements of the integrated project schedule.

3. Project baseline change control will be achieved through a set of hierarchical Baseline Change Control Boards¹¹.
4. Formal configuration management will be utilized within the project to maintain control of changes, traceability of designs, and control of costs.
5. A first laser “bundle” (consisting of 8 individual beamlines) will be deployed, started up, and tested in advance of all other bundles. Successive bundles will be started up sequentially, handed off to the Inertial Confinement Fusion (ICF) Program, and operated by the Program in parallel with the completion of other bundles.
6. An Operational Readiness Review (ORR) will be conducted after start-up of the first bundle, and before handoff to the operating Program. Internal management prestart reviews will be conducted before start-up of subsequent laser bundles.
7. The technical state at the end of the project is defined in *Project Completion Criteria*¹².
8. No formal or informal design reviews will be commissioned by organizations outside the Project.

The participants in the Title III engineering and associated operating-funded activities include DOE, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Sandia National Laboratories, University of Rochester’s Laboratory for Laser Energetics, Argonne National Laboratory (National Environmental Policy Act (NEPA) document preparer), The Parsons Infrastructure and Technology Group, Inc., Albert C. Martin and Associates, Sverdrup Facilities, Inc., engineering support contractor(s), and other subcontractors for design and construction..

1.4 Work Breakdown Structure

The NIF Project Summary Work Breakdown Structure (WBS) shown in Figure 1 is the organizing element for all Title III Engineering activities¹³. The WBS organizes the technical work scopes, cost estimates and tracking, and integrated schedule.



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Figure 1. NIF WBS tree.

2.0 Title III Objectives

The objective of Title III engineering is to support the procurement, fabrication, assembly, installation, and testing of NIF systems, structures, and components in a manner that achieves the completion of the NIF Project on schedule and within budget, meeting all technical requirements. As a part of completing the Project, Title III engineering will ensure that adequate information is developed, retained, and handed off to the ICF Program to permit safe and efficient operation.

The criteria of a successful Title III effort are:

- Deployment of high-quality hardware that achieves required operating parameters.
- Timely completion of project milestones.
- Controlled use of project contingency, and overall completion within budget.
- Accurately known as-built configuration.
- Smooth phased handoff to the ICF Program.
- Disciplined system-engineering approach to requirements verification and testing.
- Strict control of baseline changes.
- Successful Operational Readiness Review (ORR).
- Effective resolution of problems as they arise.
- Accurate and complete archival of project data.
- Successful completion of all externally-required documents (Final Safety Analysis Report (FSAR), etc).

These objectives form the basis for the deliverables outlined in Section 4. Completion of those deliverables, in concert with completion of the hardware and software, will ensure the success of the NIF Project.

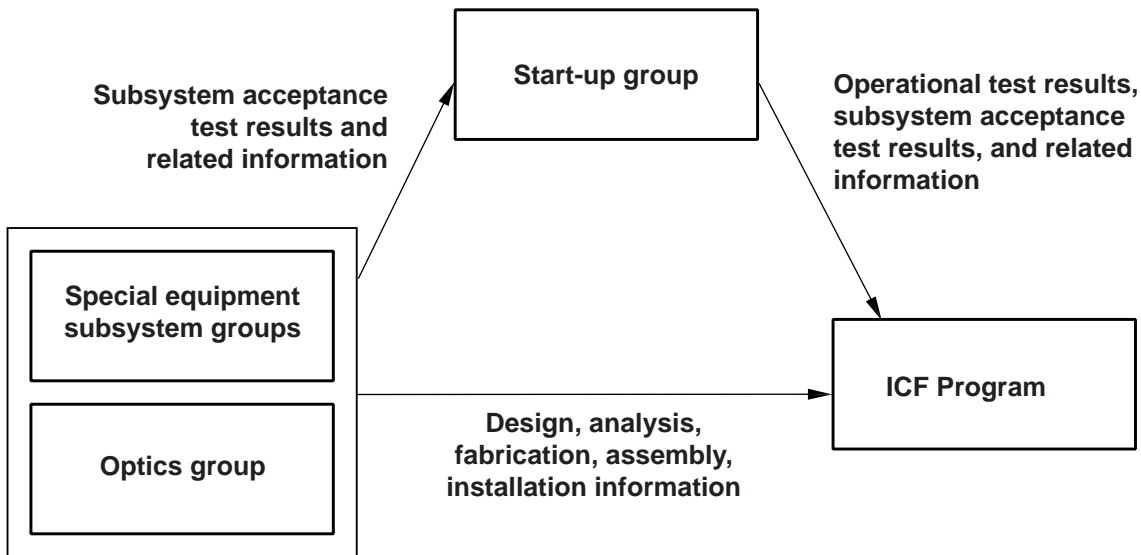
3.0 Responsibilities

Responsibilities within the NIF Project are clearly defined.

- **Delivery of *subsystem* hardware that meets technical requirements, on-schedule and within budget**, is the responsibility of the line organizations (i.e., those run by Associate Project Engineers (APEs)). This responsibility is delegated by the Project Manager to the Associate Project Engineers, the System Engineers, the Lead Engineers, their staff, and contractors. The Special Equipment and Optics responsibility is complete when the deployed hardware has been accepted by the NIF Start-up, Performance Testing, and Operations Group.
- **Start-up and system activation** is the responsibility of the NIF Start-up, Performance Testing, and Operations Group. It includes the acceptance of subsystem acceptance test results through the completion of bundle-by-bundle operational tests and handoff to the ICF Program.
- **Operation and maintenance of NIF systems** is the responsibility of the ICF Program following bundle-by-bundle handoff from the NIF Start-up, Performance Testing, and Operations Group.
- **Smooth transition to operation** is the joint responsibility of the NIF Project and ICF Program. Planning for this transition will be performed by an integrated team and approved by both organizations.
- **Safety** is the responsibility of the line organizations and each individual within the Project. The responsibilities are defined in the NIF Construction Safety Program¹⁴, the Conventional Facility Health and Safety Plan¹⁵, the NIF Startup/Operations Engineering and Special Equipment Construction Health and Safety Plan¹⁶, the Preliminary Safety Analysis Report⁸, the Final Safety Analysis Report (in preparation), and applicable Facility Safety Procedures and Operational Safety Procedures as they are developed.
- **Configuration Management** is the responsibility of the line organizations with overall leadership by the Configuration Management group (see Configuration Management Plan⁹). The process required (e.g., change control, change implementation) will be specified, administered, and supported by the Configuration Management group, and line organizations will use those processes to maintain accurate configuration accounting.
- **Project Documentation** is the responsibility of the line organizations. A significant number of Title III engineering deliverables relate to providing adequate documentation to the NIF Start-up, Performance Testing, and Operations team before subsystems can be approved as complete.

- **Quality Assurance** is the responsibility of the line organizations. Line organizations will meet this responsibility by implementing the procedures in the Project Control Manual⁴ and the Quality Assurance Program Plan⁵. NIF Project Assurances will help line organizations achieve their quality goals by ensuring that the Project Control Manual contains appropriate requirements and guidance for performing quality-related activities. NIF Project Assurances will also assess implementation of these procedures.
- **Construction Management** is the responsibility of the Site Manager and Construction Managers, as described in the NIF Site Management Plan³.

During Title III engineering, responsibility for hardware/software systems is handed off from the Special Equipment and Optics groups to the NIF Start-up, Performance Testing, and Operations Group and ultimately to the Operating Program. Information of various types is also handed off from the Special Equipment and Optics Groups to the NIF Start-up, Performance Testing, and Operations Group and to the Operating Program (see Figure 2).



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Figure 2. Information handoff during Title III Engineering.

Specific responsibility for deliverables is detailed in Section 4.

4.0 Title III Deliverables, Responsibilities, and Acceptance Criteria

Table 2 specifies the Title III deliverables.

The left 4 columns of this table identify each deliverable, its purpose, a description of the format and content, and the criteria that will be used to determine its acceptance. Appendices at the end of this document provide sample formats for many of the deliverables. This defines the “what” and the “why”.

The fifth column indicates when it should be completed.

The next 12 columns specify which WBS elements shall provide each of the deliverables. An “x” indicates the deliverable should be provided at WBS level 2. Numbers, such as “.1” and “.2” indicate which WBS level 3 areas are required to provide the deliverable. This is the first part of the definition of the “who”.

The last 11 columns indicate the Project position title that is responsible for preparing, providing input, reviewing, approving, etc., each deliverable. This completes the definition of the “who”.

Table 2 - Description of Title III deliverables

Deliverable name	Purpose	Description	Acceptance Criteria	When Due	WBS elements responsible for deliverables x - applies to WBS level 2 element; .1, .2, etc. - applies to specified WBS Level 3 elements											Responsible Individuals G - Provide guidance I - Provides information Prepares P - R - reviews C - concurs A - approves										
					1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	Lead Engr	Sys Engr	APE/L	Proj Ctrl Mgr	Project Mgr	Asnc Mgr	QA Mgr	Sys Int Mgr	Start-up Mgr	Start-up Sci	Other
Project Deliverables																										
FSAR	Documents and thoroughly reviews facility hazards; evaluates facility risks; identified controls; shows that the facility can be operated safely, with minimal risk to workers, the public, and the environment; confirms that NIF design features to prevent and mitigate accidents are installed and functional.	Document, standard format defined by DOE, documenting formal safety review of design during 100% Title II review; confirmation by walkdown of systems after installation.	1. Reviewed by safety officers. 2. All design features required to prevent and mitigate accidents in place and inspected. 3. All action items closed out. 4. Approved by AD for Laser Program, concurred by DOE-OAK and LLNL Site Manager.	by ORR	x	x	x	x	x		x	x	x	x	x		I,R	I,R	I,C		C	P				C - Site Mgr A - LLNL AD for Lasers
ORR for first bundle	Confirm that all pre-operational activities are complete and reviewed prior to first bundle operation by Operating Program.	Formal review with review committee, action tracking, and formal closeout of action items. Review consists of: • 1-day stand-up session. • 2 weeks of document review. • Committee report/action items. • Action item tracking and formal closeout. • Written closeout report to committee chairman. • Approval of ORR closeout report by committee chairman.	1. Review approved by review committee. 2. All action items closed out and confirmed with committee chairman. 3. Closeout memo approved by committee chairman. 4. Closeout approved by Project Manager.	Before handoff to Operating Program										x		I	I	I		A	C,G	R	R	P	R	A - DOE
Project completion management review (CD4)	Confirm that the NIF Project is complete and all deliverables have been met.	Formal review with DOE: • NIF/DOE develop review criteria. • NIF presents stand-up review (overall Project summary). • DOE performs completion audit of documents. • NIF submits project summary report (30 pages). • DOE approves.	1. NIF meets project completion criteria. 1a. NIF meets as-yet-unwritten completion criteria, related to as-built dwgs, procedures, etc, etc. 2. Project summary report shows all criteria are met. 3. Report approved by review committee. 4. Action items closed out. 5. Closeout approved by DOE.	at end of project	x											I	I	C	C	P	C	R	R	R	R	A - DOE
Project summary report (written)	Document completion and closeout of all project activities.	Document, 50 pages, similar to SIS Program document.	1. Project summary report shows all criteria are met. 2. Report approved by project manager.	before completion review	x													P	P	A	P	P	P	P		
Program Transition deliverables																										
Procedures for turnover to operations	Detail the plans and requirements for turning over bundles and other items to operations.	Document, 10 pages, describing the process for bundle-by-bundle handoff from NIF Start-up, Performance Testing, and Operations Group to Operating Program. Process will involve ORR for 1st bundle, smaller reviews for other bundles.	1. Details approvals necessary for handoff to operating program. 2. Complies with ORR requirements. 3. Approved by Project mgr and Program Mgr.	early in Title III										x		I	I	C		A	R		R	P	C	A - Program Mgr
System Operations and Maintenance Plan	Documents the plans for operating and maintaining NIF, to define the requirements for this effort.	Provides a manual for operation and maintenance of NIF, including details on organization, job functions, and method of accomplishment (approx 50 pages).	1. Development of process flows for O&M activities. 2. Definition of tasks, personnel requirements, infrastructure, organization. 3. Under Configuration Management 4. Approved by operating program representative.	Before 1st bundle operation	x	x	x	x	x	x	x	x	x	x	x	I	I	R		C	R	R	R	P	I	A - Operating program representative.
OSPs	Define safe procedures for operation and maintenance of systems, structures, and components during project.	Standard LLNL format and content.	1.Approved per LLNL Health and Safety Manual ¹⁷ Chapter 2, and Supplement 2.02. 2. Under Configuration Management 3. Addresses concurrent construction and operation, when applicable.	Before subsystem operation			.1	.1	.2	.2	.3	.3	.4	.4	.5	.5	.6	.7								G- LLNL H&S Manual

Deliverable name	Purpose	Description	Acceptance Criteria	When Due	WBS elements responsible for deliverables x - applies to WBS level 2 element; .1, .2, etc. - applies to specified WBS Level 3 elements											Responsible Individuals G - Provide guidance I - Provides information P - Prepares R - reviews C - concurs A - approves											Other									
					1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	Lead Engr	Sys Engr	APE/L	Proj Ctr Mgr	Project Mgr	Asac Mgr	QA Mgr	Sys Int Mgr	Start-up Mgr	Start-up Sci											
FSPs	Defines safety and environmental controls for long-term activities in facilities.	Standard LLNL format and content	1.Approved per LLNL Health and Safety Manual ¹⁷ Chapter 2, and Supplement 2.02 2. Under Configuration Management	Before ORR												x		I	I	C							C						P	G	A - Ape for Ops	
Subsystem operational description and draft operating procedures	Op descr: Explain how a subsystem functions, to provide background for operating procedures (the "why's") Draft Op procedures: Define and document initial standard operating procedures for systems, structures, and components. Provide basis for final procedures. (The "what's" "how's" and "when's")	Document, TBD standard format, 5-10 pages for each "operable" component, subsystem, or system. Suitable for training material. Written document, any convenient format, 5-30 pages for each "operable" component, subsystem, or system, see Ref. 18.	1. Contains basic system description. 2. Describes basic subsystem operating principles. 3. Provides references to other descriptions. 4. Approved by Operations APE. 5. Under Configuration Management. 1. Defines actions required from subsystem operators for subsystem operation during acceptance testing. 2. Defines procedures for unusual circumstances. 3. Approved by Operations APE.	before first Acceptance Tests before first Acceptance Tests of subsystem		x	.1	.2	.3	.4	.5	.6	.7					P	R	C							C						G,C	C	A - APE for Ops	
Final operating procedures	Define, document, and approve standard operating procedures for systems, structures, and components. Provide basis for training. (The "what's" "how's" and "when's")	Document, standard format TBD by NIF Start-up, Performance Testing, and Operations Group, 5-30 pages for each "operable" component, subsystem, or system.	1. Defines actions required from operators for conducting shots of all types. 2. Defines procedures for unusual circumstances. 3. Approved by Operations APE. 4. Under configuration management.	Before hand-off to Operations													x	R	R	C							C						P	C	A - APE for ops	
Maintenance plans and procedures																																				
Plans	Define, document, and approve the plan for planned maintenance for systems, structures, and components. Provide basis for Operations and Maintenance Plan and staffing.(The "what" and "when")	Document, TBD standard format, approx 10 pages for each WBS level 3 subsystem, see Ref. 18.	1. Identifies all planned maintenance activities, refers to procedures. 2. Specifies the numbers and skills required. 3. Approved by Operating Program Representative, see Ref. 18. 4. Under Configuration Management	Early in Title III		x	x	x	x										I	P	C							R	R				G,R		A - APE for Ops R - RAM group	
Draft Procedures	Define and document standard maintenance procedures for systems, structures, and components. Provide basis for final procedures. (The "how" and "where".)	Document, TBD standard format, 5-50 pages for each subsystem, see Ref. 18.	1. Contains basic system description. 2. Defines actions required from maintenance personnel (of all types) for planned maintenance. 3. Defines procedures for unusual/unplanned circumstances. 4. Approved by Operating Program Representative, see Ref. 18.	TBD - NIF Start-up, Performance Testing, and Operations Group		x	.1	.2	.3	.4	.5	.6	.7						P	R							C	R					G,R		A - APE for Ops R - RAM group	
Final Procedures	Document and approve standard maintenance procedures for systems, structures, and components. Provide basis for training. (The "how" and "where".)	Document, TBD standard format, 5-50 pages for each subsystem, see Ref. 18.	1. Contains basic system description. 2. Defines actions required from maintenance personnel (of all types) for planned maintenance. 3. Defines procedures for unusual/unplanned circumstances. 4. Approved by Operating Program Representative, see Ref. 18. 5. Under Configuration Management.	Before handoff to operations													x	R	R	C							C	C					P		A - APE for Ops	
Final software operating manuals	Provide basic instructions to NIF operators on how to use the ICCS.	Document, >100 pages. Format and organization to be selected by ICCS group. (Note: this works together with online help.)	1. Contains basic system description for operators' use. 2. Defines normal and abnormal operating procedures, including start-up, shut-down, partial operation, etc. 3. Approved by Operations group. 4. Under Configuration Management.	Working documents at handoff, improved during use			.1	.2	.3	.4									P	R	C						C	R							A - APE for Ops	
ICCS Software online help system	Provide detailed help for ICCS operators.	Part of the ICCS software. (Supplements operating manual)	1. Accessible from within each operating software module. 2. Approved by Operations Group.	Working documents at handoff, improved during use			.1	.2	.3	.4									P	R	C						C	R					R		A - APE for Ops	

Deliverable name	Purpose	Description	Acceptance Criteria	When Due	WBS elements responsible for deliverables											Responsible Individuals														
					x - applies to WBS level 2 element; .1, .2, etc. - applies to specified WBS Level 3 elements											G - Provide guidance I - Provides information Prepares R - reviews C - concurs A - approves														
					1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	Lead Engr	Sys Engr	APE/L	Proj Ctrl Mgr	Project Mgr	Asac Mgr	QA Mgr	Sys Int Mgr	Start-up Mgr	Start-up Sci	Other				
Training Development	Participate as subject-matter experts in the analysis, design, development, and implementation of performance-based training.	Attend selected operations group meetings, prepare and deliver 1 training class for each operable or maintainable unit.	1. Approved by Operating Program Representative.	Before installation and testing in place		x	.1	.1	.1	.8	.1	.1	.1	x		I,P	I,R	C										P	R	A - Ape for Ops
completed mgmt start-up reviews for each bundle	Confirm readiness to handoff each bundle to Operating Program.	Internal review meeting with identified review committee. Standard checklist reviewed, action items assigned, tracked and closed out.	0. Checklist for bundle handoff developed by NIF Start-up, Performance Testing, and Operations Group team and Operating Program, and approved during ORR. 1. All items on the list completed, or specific exceptions identified. 2. Review committee approves report on completion of checklist and closeout of action items. 3. Project manager approves report.	before handoff of each bundle to Operating Program										x		I	I	R		A	C	R	R			P	C	C - Review committee		
Configuration data																														
As-built bills of material (by serial number)	Define the actual configuration of all NIF hardware, by serial number where appropriate.	Standard report produced by NIF Configuration Management Information System on request. Indented parts list format or equal. See Appendix B-1.	1. Produced by NIF Configuration Management Information System. 2. Under Configuration Management. 3. Audited/verified by QA (sampling TBD).	maintained throughout Title III, due at end of acceptance test for each bundle		x	.1	.1	.1		.1	.1	.1			I,P	I,R					R,A	I,R						P - CM staff (on demand)	
As-built drawings, specifications, etc.	Define the actual configuration of all NIF hardware.	Standard report produced by NIF Configuration Management Information System on request. Indented parts list with "described by" relationships, or equal. See Appendix B-2.	1. Produced by NIF Configuration Management Information System. 2. Under Configuration Management. 3. Audited/verified by QA (sampling TBD).	maintained throughout Title III, due at end of acceptance test for each bundle, revised as req'd during operational testing		x	.1	.1	.1	.10	.1	.1	.1			P,A	P,R,A	R,C,A				R,A	R						P - CM staff (throughout) A - CCB4 (high level items only)	
Software Release Descriptions	Document sufficient information to allow maintenance, modification, upgrade and troubleshooting of ICCS software.	Document, 100-1000 pages. This is the product of the Physical Configuration Audit (PCA) defined by the Software CM Plan ¹⁹	1. Defines sufficient information to allow maintenance, modification, upgrade and troubleshooting of ICCS software. 2. Approved by Operations group.	At end of acceptance tests, when modifications are complete			.1	.2	.2		.1	.3				P	R	C			C	R								
Configuration audit reports	Demonstrate correspondence between the actual configuration and as-built documentations	As specified in Procedure 10.1, Independent Assessments ²⁰	Verifies compliance with Title II change control process and NIF Configuration Management Plan ⁹ .	as req'd	x											I	I	I			G,A	P	R,I							
Design Basis information																														
project files	Maintain complete information on the NIF project and the resulting hardware, for future use by operations for troubleshooting, maintenance, upgrading, etc.	Documents maintained in NIF PDM, with QA file as backup.	1. Released "Documents" exist in file, with 80% confidence. 2. Released "Design documents" and related change documents are in PDM and/or QA file with 95% confidence. 3. Released "drawings" are in PDM and/or ERC file with 99% confidence. Confidence may be determined by QA audit.	continuous	(all)	(all)	(all)	(all)	(all)	(all)	(all)	(all)	(all)	(all)	(all)	P,R,A	P,R,A	P,R,A	P,R,A	P,R,A	P,R,A	P,R,A	P,R,A	P,R,A	P,R,A	P,R,A	P,R,A	P,R,A	P,R,A	P,R,A - all project personnel A - QA audits

Deliverable name	Purpose	Description	Acceptance Criteria	When Due	WBS elements responsible for deliverables											Responsible Individuals											
					x - applies to WBS level 2 element; .1, .2, etc. - applies to specified WBS Level 3 elements											G - Provide guidance I - Provides information Prepares P - R - reviews C - concurs A - approves											
					1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	Lead Engr	Sys Engr	APE/L	Proj Ctrl Mgr	Project Mgr	Asac Mgr	QA Mgr	Sys Int Mgr	Start-up Mgr	Start-up Sci	Other	
CAD models	Maintain complete information on NIF hardware, for future use by operations for troubleshooting, maintenance, upgrading, etc.	ProE and AutoCAD 3D models maintained in ProPDM (or equal). CF models in Intergraph.	1. Models "released" in ProPDM (CF in Intergraph). 2. Operations design supervisor approves receipt of models.	by end of project		(all)	(all)	(all)		(all)	(all)	(all)	(all)														P,R - designers A - Ops design supervisor
Physics basis document, updated with actual test results	Provide physics basis necessary to operate laser within safe limits. Used for evaluating proposed shot parameters.	Document, approx 100 pages. Format and organization TBD by System Integration. Includes test results for Bu31, and as much of C1 and C2 as possible.	1. Reflects the NIF laser design at end of project, and test results from 1st bundle and C1, C2. 2. Contains performance predictions based on reasonable predictions of changes over NIF lifetime. 3. Defines safe operating limits with respect to optical damage, filamentation, SBS, and SRRS limits and controls.	Maintain continuously, submit at end of project	x																			A		P,R - Analyst team A - Project Scientist	
Baseline Prop92 model (or equivalent)	Provide basic laser system model, for use in evaluating proposed shots, evaluating upgrades, troubleshooting, and optimizing.	Computer input files, combined with controlled version of codes.	1. Input file reflects as-built configuration with reasonable fidelity. 2. Input file is under CM. 3. Analysis code is under CM. 4. NIF Project Scientist approves. 5. Analysts supporting operations acknowledge receipt of model.	Maintain continuously, submit at end of project	x																			A		P,R - Analyst team A - Project Scientist	
Title III Engineering Basis Book (includes other deliverables)	To collect all relevant design and as-built data by subsystem, and hand off to operating program.	An update of Title II DBB, with added sections. Title III book shall contain all sections of Title II DBB that changed. Title III book shall also contain additional sections containing deliverables in the Title III Engineering Plan. (Title II DBB will be "frozen" at end of Title II.) See Appendix B-5 for detailed Table of Contents.	1. Review by QA. 2. Approved by APE. 3. Accepted by operating program.	At end of project			.1	.1	.1		.1	.1	.1					R	R	R	R	R					
Fracture-Control Plans for brittle vacuum barriers	Define and document plan for controlling brittle-fracture of vacuum-loaded components, which could cause significant damage	Per new LLNL Mechanical Engineering guidelines	see LLNL ME Department guidelines (and under Configuration Management)																								
Supporting calculations	Maintain complete information on the NIF project and the resulting hardware, for future use by operations for troubleshooting, maintenance, upgrading, etc.	Memos, safety notes, reports, and other documents as appropriate.	1. In NIF PDM. 2. Checked and approved.	Continuous	s	x	.1	.1	.1	.1	.1	.1	.1					P,R A	P,R A	P,R A							others per LLNL policy

Deliverable name	Purpose	Description	Acceptance Criteria	When Due	WBS elements responsible for deliverables x - applies to WBS level 2 element; .1, .2, etc. - applies to specified WBS Level 3 elements											Responsible Individuals G - Provide guidance I - Provides information P - Prepares R - reviews C - concurs A - approves												
					1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	Lead Engr	Sys Engr	APE/L	Proj Ctrl Mgr	Project Mgr	Asac Mgr	QA Mgr	Sys Int Mgr	Start-up Mgr	Start-up Sci	Other		
Operational and Pre-operational testing and inspection																												
Final Subsystem Completion Checklists	Document the status of all items to be delivered at the time of handoff to the startup team, and confirm acceptance (and any conditional acceptance) by startup team	Checklist of items with signature blanks and boxes to fill in specific references (hardware, documents, procedures, spares, test results, records, etc) See Appendix B-3	0. Subsystem completion checklist assembled by subsystems and start-up team together 1. Subsystem completion checklist completed 2. Approved by NIF Start-up, Performance Testing, and Operations Group team (note that checklist items may be accepted at the discretion of the NIF Start-up, Performance Testing, and Operations Group, even if incomplete. If further action is required by the subsystem after acceptance, this can be noted on the checklist at signoff.)	at handoff to startup team for each subsystem for each bundle		x	.1	.1	.1		.1	.1	.1				P	R	C			C	R	R	A	A		
Startup test history and data	Maintain complete records to facilitate troubleshooting.	Documents, format and content as dictated by ATP or OTP, containing test results.	1. Contains complete startup history, including shot numbers. 2. In NIF PDM or Operational Test Database. 3. Approved by Project Mgr.	at handoff to operation											x						A				P	P	C - APE for ops	
Part/component history files by serial number (where were they, and when)	Maintain records to permit safe operation and troubleshooting.	Standard report from PDM or ERP See Appendix B-4	1. Histories are tracked in PDM, ERP or equal. 2. Report can provide list of serial numbered parts by position and date. 3. Data is 95% accurate, verified by QA audit (TBD sampling).	continuous	x												P,R	P,R									P - CM staff (on demand) A - QA audit	
System Operational Test information:																												
System Operational Test Plans	Define, document, and approve the plans for <i>system operational</i> testing. Provide basis for schedule planning, equipment acquisition, and staffing.	Document, approx 20-50 pages.	1. All system test procedures identified and referenced. 2. Objective identified for each test. 3. Overall test resources detailed (people, calendar time, work areas, etc). 4. Approved by System Engineers, APEs, and Operating Program Representative. Under CM.	early in Title III											X		R	C	C			R	R	C	P	C	A - Operating Program Representative	
System operational test procedures (include acceptance criteria)	Define, document, and approve detailed procedures for <i>system operational</i> tests. Provide instructions for test personnel.	See Ref. 21.	See Ref. 21. (under Configuration Management)	early in Title III											x				C			C	C		P	A	A - Operating Program Representative	
System operational test results	Maintain records of all key tests/inspections for operations use.	Various forms, as specified in OTPs.	1. OTP referenced. 2. Items under test identified, by serial number where appropriate. 3. Test personnel, equipment, and date identified. 4. Approved by Startup Mgr. 5. Filed in NIF PDM and/or QA file with NIF number and/or in OTP database.	at end of system operational testing of each bundle											x				C			C	C		P	A	P - test personnel A - Operating Program Representative	

Deliverable name	Purpose	Description	Acceptance Criteria	When Due	WBS elements responsible for deliverables x - applies to WBS level 2 element; .1, .2, etc. - applies to specified WBS Level 3 elements											Responsible Individuals G - Provide guidance I - Provides information P - Prepares R - reviews C - concurs A - approves										
					1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	Lead Engr	Sys Engr	APE/L	Proj Ctrl Mgr	Project Mgr	Asac Mgr	QA Mgr	Sys Int Mgr	Start-up Mgr	Start-up Sci	Other
					Subsystem acceptance test information:																					
Subsystem acceptance test plans	Define, document, and approve the plans for <i>subsystem</i> acceptance testing and inspection. Provide basis for schedule planning, equipment acquisition, and staffing.	Document, approx 5-20 pages for each subsystem.	1. All subsystem test procedures identified and referenced. 2. Objective identified for each test. 3. Overall test resources detailed (people, calendar time, work areas, etc). 4. Approved by System Engineer, APE, and NIF Start-up, Performance Testing, and Operations Group (for SW, approved also by SW Test Engineer). 5. Under CM.	early in Title III except software - late in Title III		x	.1	.1	.1	.1	.1	.1	.1							R	R	C	G,A	G,C	for SW: A - SW test engineer	
Subsystem acceptance test procedures (include acceptance criteria)	Define, document, and approve detailed procedures for <i>subsystem</i> acceptance tests/inspections. Provide instructions for test personnel.	See Ref. 21.	See Ref. 21. (under Configuration Management)	early in Title III except software - late in Title III		x	.1	.1	.1	.1	.1	.1	.1							G,C	C		G,C	G	for SW: A,P - SW test engineer	
Subsystem acceptance test results	Maintain records of all key tests/inspections for operations use.	Various forms, as specified in ATPs.	1. ATP referenced. 2. Items under test identified, by serial number where appropriate. 3. Test personnel, equipment, and date identified. 4. Approved by subsystem engineer. 5. Filed in NIF PDM and/or QA file with NIF number.	at end of subsystem acceptance testing of each bundle		x	.1	.1	.1	.1	.1	.1	.1						P,R	R	R		A	R	P - test personnel for SW: P - SW test engineer	
Component inspection and test information:																										
plans	Document and approve the plans for tests and inspections <i>below subsystem level</i> .	(If updated after Title II) Document, 5 pages for each subsystem.	1. Updated to reflect actual Title III inspections.	early in Title III, before RFPs (if required)		x	.1	.1	.1	.1	.1	.1	.1									G	R			
procedures	Define, document, and approve detailed test/inspection procedures for components. Also required for procurement.	(If updated after Title II) Document, 1-5 pages for each type of inspection.	1. Updated to reflect actual Title III inspections. 2. Specified in affected RFPs. 3. Under Configuration Management	early in Title III, before RFPs (if required)			.1	.1	.1	.1	.1	.1	.1							P	A		G	R		
results	Maintain records of all key data for operations use.	various forms as convenient, include raw data.	1. Each record references part number inspected, serial number (if appropriate), and procedure. 2. Inspection personnel, equipment, and date identified. 3. Filed in NIF PDM and/or QA file with NIF number (MDMS for optics).	at end of subsystem acceptance testing for each bundle	x		.1	.1	.1	.1	.1	.1	.1							P	A		G	R		

Deliverable name	Purpose	Description	Acceptance Criteria	When Due	WBS elements responsible for deliverables x - applies to WBS level 2 element; .1, .2, etc. - applies to specified WBS Level 3 elements											Responsible Individuals G - Provide guidance I - Provides information P - Prepares R - reviews C - concurs A - approves													
					1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	Lead Engr	Sys Engr	APE/L	Proj Ctrl Mgr	Project Mgr	Asac Mgr	QA Mgr	Sys Int Mgr	Start-up Mgr	Start-up Sci	Other			
					QA plans	Describe vendor management plans for NIF Project work.	QA Plans identify subcontractor management activities, and identifies departures from NIF QA Plan.	1. Follows content of the NIF Project QA plan ⁵ . 2. Prepared by vendors. 3. Approved by Project.	30 days prior to the start of subcontracted work	x		.1 .2 .3 .4 .5	.1 .2 .3 .4 .5 .6 .7 .8 .9	.1 .2 .3 .4 .5 .6	.1 .2 .3 .4 .5 .6 .7	.1 .2 .3 .4 .5 .6 .7				R,C	C	C					A		
procedures	Describe vendor work processes for critical NIF Project work.	Follows the format of the Project Control manua, Specific procedures are identified by Lead Engineers in subcontract documents	1. Follows the format and content of Project Procedure 1.1 ²⁶ 2. Prepared by vendors. 3. Approved by Project.	30 days prior to the start of subcontracted work	x		.1 .2 .3 .4 .5	.1 .2 .3 .4 .5 .6 .7 .8 .9	.1 .2 .3 .4 .5 .6	.1 .2 .3 .4 .5 .6 .7	.1 .2 .3 .4 .5 .6 .7																	P - vendors, as directed by subcontract	
Software test results, with statistical analysis of RAM	Maintain records of all ICCS software tests, and document RAM results.	Document, TBD format, TBD pages This is the product of Functional Configuration Audit (FCA) defined by the Software CM Plan ⁶ .	The FCA is performed under the direction of the Operations Software Test Manager. Defect data is collected during software testing.	Provided after IV&V of facility software releases			.1 .3 .4	.2 .2 .3 .4 .5 .6	.1 .2 .3	.1 .2 .3	.3 .2 .3				P	R	C				C	R						A - Software test manager	
RAM database	Provide basis for estimating NIF RAM performance.	Accumulated data handed off to Operating Program in TBD format.	Accumulated data handed off to Operating Program in TBD format.	At handoff to Operating Program	x	.2	.1 .2 .3 .4 .5	.1 .2 .3 .4 .5 .6	.2 .3	.1 .2 .3	.2 .2 .3	.2 .3			I	R	C								P			A - Operations Representative	
Title-III Implementation plans																													
Updated schedules for procurement, fabrication, assembly, installation and testing	For integration across project, to support planning and management.	Integrated Project Schedule (IPS) files, statused monthly, and updated as required during Title III.	1. Approved by SE, APE, and Proj Mgr.	during preparation of CAPs, and as required. Statused monthly	.5	(all)	(all)	(all)	(all)	(all)	(all)	(all)	(all)			P	A	A									A		
Final Transport/shipping/handling plan (by subsystem)	Plan handling aspects to ensure compatibility within subsystem and with site facilities	For significant items, updated as required from Title II.	1. Approved by APE.	early in Title III	.5		.1 .2 .3 .4 .5	.1 .2 .3 .4 .5 .6 .7 .8 .9	.1 .2 .3 .4 .5 .6	.1 .2 .3 .4 .5 .6 .7	.1 .2 .3 .4 .5 .6 .7			P	A													P - vendors	

Deliverable name	Purpose	Description	Acceptance Criteria	When Due	WBS elements responsible for deliverables x - applies to WBS level 2 element; .1, .2, etc. - applies to specified WBS Level 3 elements											Responsible Individuals G - Provide guidance I - Provides information Prepares P - R - reviews C - concurs A - approves										
					1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	Lead Engr	Sys Engr	APE/L	Proj Ctrl Mgr	Project Mgr	Asnc Mgr	QA Mgr	Sys Int Mgr	Start-up Mgr	Start-up Sci	Other
					Final Assembly / installation / acceptance plan	For integration, planning, and management of project.	Updated as required from Title II.	1. Approved by APE.	early in Title III	.5		.1 .2 .3 .4 .5	.1 .2 .3 .4			.1 .2 .3	.1 .2 .3	.1 .2 .3			P	R	C			
Management deliverables																										
CAPs (yearly)	Management of work packages.	same as Title II. Workscope statement, CAP summary sheet, Primavera schedule at appropriate level of detail for tracking, NPS input sheet.	1. Approval by originator, SE, APE, and project control manager.	yearly	(all)	(all)	(all)	(all)	(all)	(all)	(all)	(all)	(all)	(all)	(all)	P	R	C	A	A						
Monthly / quarterly progress reports (written and oral)	Project reporting.	same as Title II.	Approval of Senior Staff Engineer.	monthly	(all)	(all)	(all)	(all)	(all)	(all)	(all)	(all)	(all)	(all)	(all)	P	P	P	R	A	R	R	P	P		

5.0 Title III Schedule

The NIF Project schedule baseline was approved at the end of Title I, as reflected in the Project Execution Plan²³. This schedule baseline was founded on the detailed Integrated Project Schedule (IPS), which consists of interlinked schedule files. The IPS captures all schedule data for the Project, from long-range plans to detailed yearly work planning. Schedule activities are broken down at the level of detail appropriate for various applications. For yearly work planning and management, tasks are identified and milestones are selected for inclusion in Cost Account Plans. For installation planning and coordination, tasks are broken down into fine detail, to clarify interfaces and overlaps. The IPS is maintained by formal change-control procedures^{24,25}. For the most current version, consult the Project Lead Scheduler.

6.0 Title III Cost

The NIF Project cost baseline was approved at the end of Title I, as reflected in the Project Execution Plan²³. This cost baseline and the internal breakdown of the budget is maintained by the Project via formal change-control processes²⁴. Detailed Cost Account Planning is performed approximately yearly, within this overall budget framework. For a listing of the Title III engineering budget, consult the Project Control Office.

7.0 References

- [1] *NIF Title II Design Plan*, NIF-1249.
- [2] *NIF Title I Design Plan*, NIF-96-650
- [3] *NIF Site Management Plan*, NIF-2564.
- [4] *NIF Project Control Manual Table of Contents*, NIF-4165.
- [5] *NIF Quality Assurance Program Plan*, NIF-618.
- [6] *RM Parsons NIF Title III Configuration Control Plan (Parsons Document 6/98)*, **ref????**
- [7] *Integrated Project Schedule*.
- [8] *Preliminary Safety Analysis Report*, NIF-LLNL-96-238, UCRL-ID-123759.
- [9] *Configuration Management Plan 96-070*.
- [10] *Transition Plan. ???*
- [11] *NIF Project Procedure 1.7, Project Change Control*, NIF-3790
- [12] *Project Completion Criteria*, NIF-1587-0A.
- [13] *NIF Work Breakdown Structure*, NIF-5000220.
- [14] *NIF Construction Safety Program*, UCRL-ID 125990 Rev 1, June 1997.
- [15] *NIF Conventional Facilities Construction Health and Safety Plan*, NIF-4430.
- [16] *NIF Start-up/Operations and Special Equipment Construction Health and Safety Plan*, NIF-2437.
- [17] *LLNL Health and Safety Manual*, M-010.
- [18] *NIF Operations Procedures Plan*, NIF-9004.
- [19] *NIF Software Configuration Management Plan*, NIF-5476.
- [20] *NIF Project Procedure 10.1, Independent Assessments*, **ref????**
- [21] *Project Procedure 8.3, Standard Content for Acceptance Test Procedures*
- [22] *NIF Project Procedure 8.2.*, NIF-2052
- [23] *National Ignition Facility Project Execution Plan*, UCRL-ID-126525.
- [24] *Project Procedure 6.4, Engineering Change Control*, NIF-3132 .

- [25] *Project Procedure 1.3, Schedule Preparation, Statusing, and Revision, NIF-320 .*
- [26] *Project Procedure 1.1, Preparation of Project Control Manual Procedures , NIF-95-469.*

Appendix A - Glossary of Important Definitions

- Activation - synonymous with Start-up. The process that begins when all subsystems are completed for a given operational unit (such as a bundle), and effort is initiated to operate all subsystems together to make a laser system. Activation ends when a bundle is shown to meet its Operational Test Requirements. This marks the completion of the NIF Project's responsibility for the operational unit.
- Acceptance test - a test conducted to determine whether a subsystem or component meets its requirements; if successful, work on that subsystem or component is complete except for integration into the next-higher-level system.
- Bundle - a functional grouping of laser beams, 2 beams wide by 4 beams high. A bundle is the smallest unit that can be operated completely independently of all other similar units.
- Component acceptance test - a test conducted to determine whether a component meets its requirements; if successful, work on that component is complete except for integration into the next-higher-level system. Component acceptance tests are typically used as the final test before accepting items from vendors.
- End of project - the formal end of construction of the NIF. This occurs when all project hardware is complete, installed, and has been acceptance tested. Operational tests will have been successfully completed on a portion of the overall system, as defined by the Project Completion Criteria. In general, all of Laser Bay 1 will have completed operational testing, and all of Laser Bay 2 will be installed and successfully through Subsystem Acceptance Tests.
- ERP – Enterprise Resource Planning system. A computer software system that will be used for initiating and tracking procurement, maintaining hardware inventory, maintain bills of materials, etc.
- Inspection - the process of comparing the physical configuration of a component to the design configuration and noting deviations.
- Operational test - a test in which multiple subsystems are operated as an integrated unit. Typically, operational tests involve using NIF subsystems together to make an integrated laser system.
- Start-up - see Activation.
- Subsystem - a WBS level 3 entity.

Subsystem acceptance test - a test conducted to determine whether a subsystem meets its requirements; if successful, work on that subsystem is complete and it is handed off to the NIF Start-up, Performance Testing, and Operations Group for activation. Typically subsystem acceptance tests will be conducted for a given operational unit, such as a bundle or cluster. The completion of subsystem acceptance tests for a given subsystem for all operational units marks the end of the Special Equipment Associate Project Engineer, System Engineer, or Lead Engineer's responsibility for that WBS element.

Appendix B – Summary of Title III Deliverables

This appendix is a table that summarizes the Title III deliverables, which are described in detail in Section 4 (Table 1). In addition, the table indicates which of these deliverables is defined further by Appendix B.

Project Deliverables	Appendix B Sample provided?
• FSAR	no
• ORR for first bundle	no
• Project completion management review	no
• Project summary report	no
Program Transition deliverables	
• procedures for turnover to operations	no - see [6]
• System Operations and Maintenance Plan	no
• OSPs	no - see [17]
• FSPs	no - see [17]
• Subsystem operational description and draft operating procedures	no - see [6]
• Final Operating Procedures	no - see [6]
• Maintenance plans and procedures	no - see [6]
• Final software operating manuals	no
• ICCS Software online help system	no
• Training development	no
• Management prestart review	no
Configuration	
• as-built bills of material (by serial number)	B-1
• As-built drawings, specifications, etc	B-2
• Software Release Descriptions	no
• Configuration audit reports	no
Design Basis information	
• project files	no
• CAD models	no
• Physics basis document, updated with actual test results (1st bundle and LB1)	no
• Baseline Prop92 model (or equivalent)	no
• Title III Engineering Basis Book (includes other deliverables)	B-5
• Fracture-Control Plans for brittle vacuum barriers	no
• supporting calculations	no
Operational and pre-operational inspection and testing	
• Final Subsystem Completion Checklists	B-3
• Startup test history and data	no
• part / component history files by serial number (where were they, and when)	B-4
• System operational test information	no
• Subsystem acceptance test information	no
• Component inspection and test information	no
• QA plans and procedures	no - see [8]
• Software test results, with statistical analysis of RAM	no
• RAM database	no
Title-III Implementation plans	
• Updated schedules for procurement, fabrication, assembly, installation and testing	no
• Final Transport/shipping/handling plan (by subsystem)	no - see [1]
• Final Assembly/installation/acceptance plan	no - see [1]
Management deliverables	
• CAPs (yearly)	no
• monthly / quarterly progress reports (written and oral)	no

Appendix C - Sample Format and Content for Deliverables

Appendix C-1 - Sample format and content for As-Built Bills of Material

This deliverable will be a standard table produced by the ERP System. It will be a complete indented parts list showing actual part numbers and quantities used and listing serial numbers installed. A sample is shown below. In this sample, the design of an LRU was changed, and both new and old versions were used.

Bill of Material effective date: mm/dd/yy

Indent Level	Part No.	Qty	Part Name	Serial numbers
1	AAA-123456	1	NIF	
2	AAA-123457	1	LB#1 Special Eq.	
...				
5	AAA-234567	6	LM1 LRU	1,2,3,8,9,11,
5	AAA-345987	6	LM1 LRU, mod 1 design	23,24,25,26,31,32
...				
10	N5305-1234	24	Screw, M8x25, brass socket head	

Appendix C-2 - Sample format and content for As-Built Dwgs, specifications, etc.

This deliverable will be a standard table produced by the ERP System. It will be a complete indented parts list showing actual part numbers used and listing all documents and drawings that describe each part. This will include drawings, specifications, assembly procedures, test results, etc. A sample is shown below.

Effective Date: mm/dd/yy

Indent Level	Part No.	Described by	
1	AAA-123456	AAA-123456-ZZ	NIF Top Assembly dwg
2	AAA-123457	AAA-123457-0H	Laser Bay #1 Assembly
...			
5	AAA-234567	AAA-234567-0B NIF-5001234-0C NIF-0022334-0A NIF-0022445-0A	LM1 LRU Ass'y dwg LM1 LRU Ass' procedure LM1 LRU batch 1 Acceptance test data LM1 LRU batch 2 acceptance test data
5	AAA-345987	AAA-345987-0A NIF-5001234-0D NIF-5004567-0A NIF-0022556-0A NIF-0022667-0A	LM1 LRU, mod 1, Ass'y dwg LM1 LRU, mod 1, Ass'y procedure LM1 LRU, mod 1, new widget spec LM1 LRU batch 8 Acceptance test data LM1 LRU batch 9 acceptance test data
...			
10	N5305-1234	NIF-5000345-0A	NIF Quality Standard - Screws, metric, brass, socket head

Appendix C-3 – Sample format and content for Final Subsystem Completion Checklist

The Subsystem Completion Checklist is intended to be a simple checklist of the items that must be handed off by the lead engineers and system engineers to the startup team before the subsystem is complete. The objective is to provide a vehicle for documenting the completion of each subsystem, as well as an index to other key pieces of documentation. The checklist will be different for each subsystem, but all will contain certain items in common. The following is a developmental draft of this checklist (all data is fictitious).

Subsystem: WBS 1.3.1 Optical Pulse Generation

Lead Engineer: Jim Davin

System Engineer: Doug Larson

Item	Reference	notes and comments on status	approved/restrictions (signature/ date)
Turnover procedure	NIF-XYXYXY-0A		<i>clower 4/1/03</i>
OSPs	OSP-XYXY (NIF-XYXYXY) OSP-1357 (NIF-XYXYXY)	for PAM testing in PAMMA for PABTS alignment in Laser Bay	<i>clower 4/1/03</i> <i>clower 4/1/03</i>
Operating Procedures	NIF-XYXYXY-0A	Procedures not completed, but drafts are sufficient in view of schedule pressure	<i>clower 4/1/03</i> conditional on completion within 60 days
Maintenance Plans	NIF-XYXYXY-0D NIF-XYXYXY-0E	for PAM For PABTS	<i>clower 4/1/03</i> <i>clower 4/1/03</i>
Maintenance Procedures	NIF-XYXYXY-0D	reference is maintenance plan, which refers to all procedures	<i>clower 4/1/03</i>
as-built BOMs, dwgs, specs	in ERP, start with Part AAA-XYXYXY	BOM and all dwgs, specs, and docs released under CM and up to date	<i>clower 4/1/03</i>
CAD models	in directory NIF:sam:johnny:opg	description of models given to Sam	<i>clower 4/1/03</i>
Index to supporting calcs	All supporting calcs in PDM as docs under WBS 1.3.1		<i>clower 4/1/03</i>
Acceptance Test Plans, procedures, and test results	NIF-XYXYXYX-0A NIF-XYXYXYX-0C NIF-XYXYXYX-0B	Acceptance Test Plan, references all procedures Overall test result summary document, with references to specific test results	<i>clower 4/1/03</i> <i>clower 4/1/03</i>

Item	Reference	notes and comments on status	approved/restrictions (signature/ date)
Inspection plans, procedures, and test results	NIF-XYXYXYX-0A	Inspection Plan, references all procedures	<i>clower 4/1/03</i>
	NIF-XYXYXYX-0C NIF-XYXYXYX-0B	Overall inspection record summary, with references to specific test results	<i>clower 4/1/03</i>

Appendix C-4 - Sample format and content for Part/Component History Files by Serial Number

This deliverable will be a standard report produced by the ERP system on demand. It will show the entire history of any serialized part, including any processing or assembly internal to Lawrence Livermore National Laboratory, all installations, inspections, etc, that are done under a NIF work order. Below is a sample of the type of information provided.

Part Number: AAA-123456 - Laser Amplifier Slab
Serial number: 2468

Date	Action	PO/Work Order	Comments
4/1/02	received	PO 44444	
4/2/02	transferred to OAB	WO 55555	
4/3/02	cleaned	WO 55555	
4/3/02	inspected	WO 55555	see MDMS file abcdefg for data
4/3/02	assembled	WO 55555	into LRU s/n 98765
4/4/02	inspected	WO 55555	passed
4/6/02	Installed	WO 87878	location MA3/B31L
4/1/03	Removed	WO 98989	
4/2/03	disassembled	WO 98989	
4/2/03	inspected	WO 98989	see MDMS file abcdefg for data ready for refurb
4/3/03	sent to refurb	PO 55555	
5/3/03	received	PO 55555	
5/2/03	transferred to OAB	WO 77777	
5/3/03	cleaned	WO 77777	
5/3/03	inspected	WO 77777	see MDMS file abcdefg for data
5/3/03	assembled	WO 77777	into LRU s/n 63245
5/5/03	inspected	WO 77777	passed
5/6/03	Installed	WO 34343	location PA2/B24L
9/1/03	Removed	WO 56565	
9/6/03	Installed	WO 56565	location PA4/B12L

Appendix C-5 - Title III Engineering Basis Book Outline

The following table (next page) shows the outline of the Title III Engineering Basis Book in the left column.

The first 25 sections are the sections in the Title II Design Basis Book, as indicated by the checks in the second column. For Title III, most of these sections do not need to be resubmitted, because they are either obsolete (do not apply any longer), were completed by the design groups in Title II and new information is not relevant, or are replaced by a Title III deliverable. Some items, designated by "U" in the third column, should be included in the Title III Book if they have been updated during Title III.

The Title III Engineering Basis book shall consist of any sections of the Title II Design Basis Book that have been updated, along with items 26 through 40. Items 26 to 40 either are new items (which had no counterpart in Title II design), or replace items in the Title II Design Basis Books. The right column lists the Title II item numbers that were replaced by each Title III deliverable.

Note that all items in the Title III Engineering Basis Book are listed separately as deliverables in the Title III Engineering Plan. The Title III book is simply a collection of that set of deliverables for each subsystem.

	T-II Deliverable?	T-III Deliverable?	Title III Deliverable which replaces listed Title II Deliverable	T-II Deliverable which is replaced by listed T-III deliverable
I TITLE II VIEWGRAPHS	√		obsolete	
II REQUIREMENTS				
1. Review for Compliance	√		36	
2. PC/FR, SDR, SDDR, SRS	√	Update		
3. ICDs	√	Update		
4. Other Requirements	√	Update		
5. Review of Physics Basis	√		36	
6. Design Review Comments	√		36	
III DESIGN				
7. Product Data Structure	√		31	
8. Drawing Package	√		32	
9. Supporting Analysis	√	Update		
10. Prototype	√		36	
11. Software Models	√		27	
12. RAM Budget/Analysis	√		33, 38	
13. FMEA Analysis	√	Update	38	
14. Q-Level Requirements	√	Update		
IV DESIGN IMPLEMENTATION PLANS				
15. Procurement Plan	√		obsolete	
16. Transport/Shipping/Handling	√	Update		
17. Assembly/Installation Plan	√	Update		
18. ATPs Identified	√		36	
19. Preliminary Master Training Plan	√		completed	
20. Preliminary Operations Staffing Plan	√		completed	
21. Operations & Maintenance Plans	√		27, 28	
22. Preliminary Software Manuals	√		29, 30	
V PROCUREMENT READINESS				
23. Cost Estimate Reconciliation	√		obsolete	
24. Schedules	√		39	
25. Procurement Package	√		obsolete	
VI PROGRAM TRANSITION DELIVERABLES				
26 26. OSPs		√		new
27. Subsystem Operational Description and draft operating procedures	√	√		new, 21, 11
28. Maintenance plans and procedures	√	√		21
29. Final software operating manual	√	√		22
30. ICCS software online help system	√	√		22
VIII CONFIGURATION				
31. As-built bills of material (by serial number)		√		7
32. As-built drawings, specifications, etc		√		8
33. Software Design Descriptions		√		11
34. Configuration audit reports		√		new
VIII PRE-OPERATIONAL INSPECTION AND TESTING				
35. Final Subsystem Completion Checklists		√		new
36. Acceptance test information		√		new, 1,5,6,10, 18
37. Inspection information		√		new
38. Software test results, with statistical analysis of RAM		√		new
39. RAM database (demonstrating that requirements will be met)		√		12,13
IX TITLE-III IMPLEMENTATION PLANS				
40. Updated schedules for procurement, fabrication, assembly, installation and testing		√		24

Appendix D - Revision Record

Revision	Date	By	Description
0A	7/22/98	G. Deis	Initial Issue