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TITLE: Advanced Recovery and Integrated Extraction System (ARIES)  
Program Plan [Rev. 1]

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**Advanced Recovery and Integrated Extraction System (ARIES)  
Program Plan**

**[Rev. 1]**

**by**

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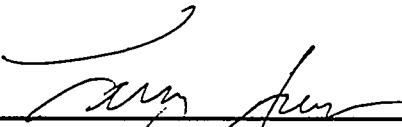
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**February 2, 1996**

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Derivative Classifier

## **1.0 INTRODUCTION**

The Advanced Recovery and Integrated Extraction System (ARIES) demonstration combines various technologies, some of which were/are being developed under previous/other Department of Energy (DOE) funded programs. ARIES is an overall processing system for the dismantlement of nuclear weapon primaries. The program will demonstrate dismantlement of nuclear weapons and retrieval of the plutonium into a form that is compatible with long term storage and that is inspectable in an unclassified form appropriate for the application of traditional international safeguards. The success of the ARIES demonstration would lead to the development of a transportable modular or other facility type systems for weapons dismantlement to be used at other DOE sites as well as in other countries.

The purpose of the ARIES process is to receive weapon pits, disassemble them, and provide a product of either a plutonium metal button or plutonium oxide powder appropriately canned to meet all requirements for long term storage. This demonstration is a 24-month program with full operation planned during the last three to six months. The ARIES system is modular in design to offer credible scaling, incorporation of modifications or new concepts, and future transportability and exportability capabilities. For the 24-month program, only pits with a straightforward design configuration will be processed.

ARIES will develop and demonstrate the following modular elements:

- A pit bisection module used to cut open and physically separate the various components of the weapon pits,
- A hydride-dehydride recycle module to remove the plutonium from the weapon component substrate surfaces and cast it as a metal ingot,
- A parallel hydride-oxide (HYDOX) module to remove plutonium from the weapon component substrate surfaces and produce plutonium oxide,
- A module that results in a double containment inspectable, long term storage package of either the plutonium metal or oxide. The canning task packages the material in air-tight cans compatible with materials disposition long term storage requirements in conjunction with an electrolytic decontamination task to decontaminate the outside surfaces of the material cans for removal from the glovebox environment, and
- A nondestructive assay (NDA)/instrument support module for analyzing the sealed storage cans to provide accountability and process control of all the special nuclear material and waste items produced by ARIES.

Each module task includes the design, fabrication, and testing of the equipment, and installation of the unit and associated equipment into a glovebox. Other equipment

installation, such as part declassification or a melting/casting furnace, may be included for this demonstration, but have not yet been defined as module tasks.

A final task consists of all the activities necessary to integrate the individual modules into an operational system within the plutonium facility (TA-55) at Los Alamos National Laboratory (LANL). This task includes facility preparation activities, design and assembly of a conveyer system compatible with all the modules, acquisition of the gloveboxes, design and assembly of a control system to operate the integrated assembly, and preparation of all system documentation requirements. Additionally, this task represents the integrated demonstration of the dismantlement of the nuclear weapon primaries for the last three to six months.

## **2.0 BACKGROUND**

In October 1994, the Secretary of Energy and the Congress created the Office of Fissile Material Disposition (MD) within the DOE. The MD program is responsible for the DOE's technical and management activities in two major areas. First, DOE activities need to provide a safe, secure, environmentally sound, and inspectable future storage option for all weapons-usable fissile materials. Second, they must provide disposition options for those fissile materials declared surplus to national defense needs.

The objective of ARIES is to demonstrate feasibility of a process for disassembly, extraction, and conversion of plutonium from weapons components into forms suitable for disposition and /or storage while emphasizing pollution prevention. Currently, no integrated system exists for the complete dismantlement and recovery of nuclear material from different weapons' designs. A second objective is to develop and demonstrate feasibility of a modular ARIES processing system that could be used by both the US and Russia.

## **3.0 SCOPE**

The ARIES program encompasses all administrative, technical, engineering, procurement, and installation tasks necessary for design, procurement, fabrication, installation, hot start-up, and operation of the complete system. The program includes the following features:

Administrative Scope: The key administrative tasks are organization of resources, definition of requirements, development and maintenance of schedules, cost control, and progress tracking. Work packages will be a primary tool for achieving administrative success. Additional elements of administrative scope include the following: resolution of ES&H and TA-55 facility requirements, start-up activities, configuration management, operational tasks, and formal implementation of close-out activities upon program completion.

Technical Scope: ARIES focuses on assimilating all the individual modules into an integrated system within a TA-55 laboratory. The completed system will be sized, assembled, and operated to confirm the feasibility of the pit disassembly and conversion process. ARIES will prove the functionality of the processes and assess their

transportability. The system will demonstrate straightforward maintenance and flexibility to accommodate future improvements. The technical scope requires that ARIES be designed by experts in each functional area: pit disassembly, hydride/dehydride plutonium removal and consolidation, hydride/oxidation plutonium removal and consolidation, product canning, electrolytic decontamination, NDA, control and instrumentation, and containment design. The final ARIES configuration will combine the designs of these technical experts into a practical operating system.

**Boundaries:** The ARIES program is bounded by the following LANL factors:

1. The program is initiated through formal action by the FMDP to allocate funds and by each Laboratory's ability to obtain resources.
2. The program is terminated at completion of assigned implementation tasks by issuance of a program close-out package.
3. The program is constrained by impacts to other ongoing work at the Laboratories. The constraints will not impact technical scope, although schedule and extent of self-sufficiency of ARIES subsystems could be affected. Relative priorities of ARIES versus other work at each Laboratory is the key to the extent of constraints.
4. ARIES is designed and constructed within the safety envelope and available space at TA-55.
5. ARIES is designed for successful hot start-up by utilizing a set of processes that have already been demonstrated in plutonium operations.

The ARIES program will be conducted with a high degree of control over development, design, construction, and start-up to ensure forward progress and testing of the integrated system beginning 1 April 1997.

## **4.0 ORGANIZATION**

ARIES is unique because the project uses a matrix management approach with dedicated staff from two national laboratories responsible for the success of the project. This arrangement is described below.

### **4.1 Configuration**

ARIES is sponsored by the DOE's Material Disposition program. It is conducted as a cooperative program between LANL and Lawrence Livermore National Laboratory (LLNL) with LANL as the lead laboratory. LANL's Nuclear Materials & Stockpile Management (NMSM) program office is responsible for overall administration of the ARIES program. The LLNL Nonproliferation/Arms Control/International Security Directorate (ISAM) is responsible for administration of the Livermore portions of the ARIES program.

The Nuclear Materials Technology (NMT) Division at LANL is responsible for overall project management and system implementation of ARIES as well as the operation of

TA-55. The ARIES demonstration project leader is an NMT staff member and he is supported by the LLNL ARIES project leader.

This organization is structured to meet the diversity of technologies and staff needed for successful program implementation. The staff required represents an integration of several disciplines from both laboratories. Consequently, the team is matrixed, for the purpose of technical work, to the LANL ARIES demonstration project leader.

Various organizations from both labs provide supporting work for development, design, procurement, fabrication, installation, and operation. Requests for such services will be initiated either by the organizations whose staff are matrixed to ARIES, or by the ARIES Physical Integration Team (PIT). In both cases, each laboratory project leader will approve the work requests from his organization and track costs and schedule.

#### 4.2 Program Organization

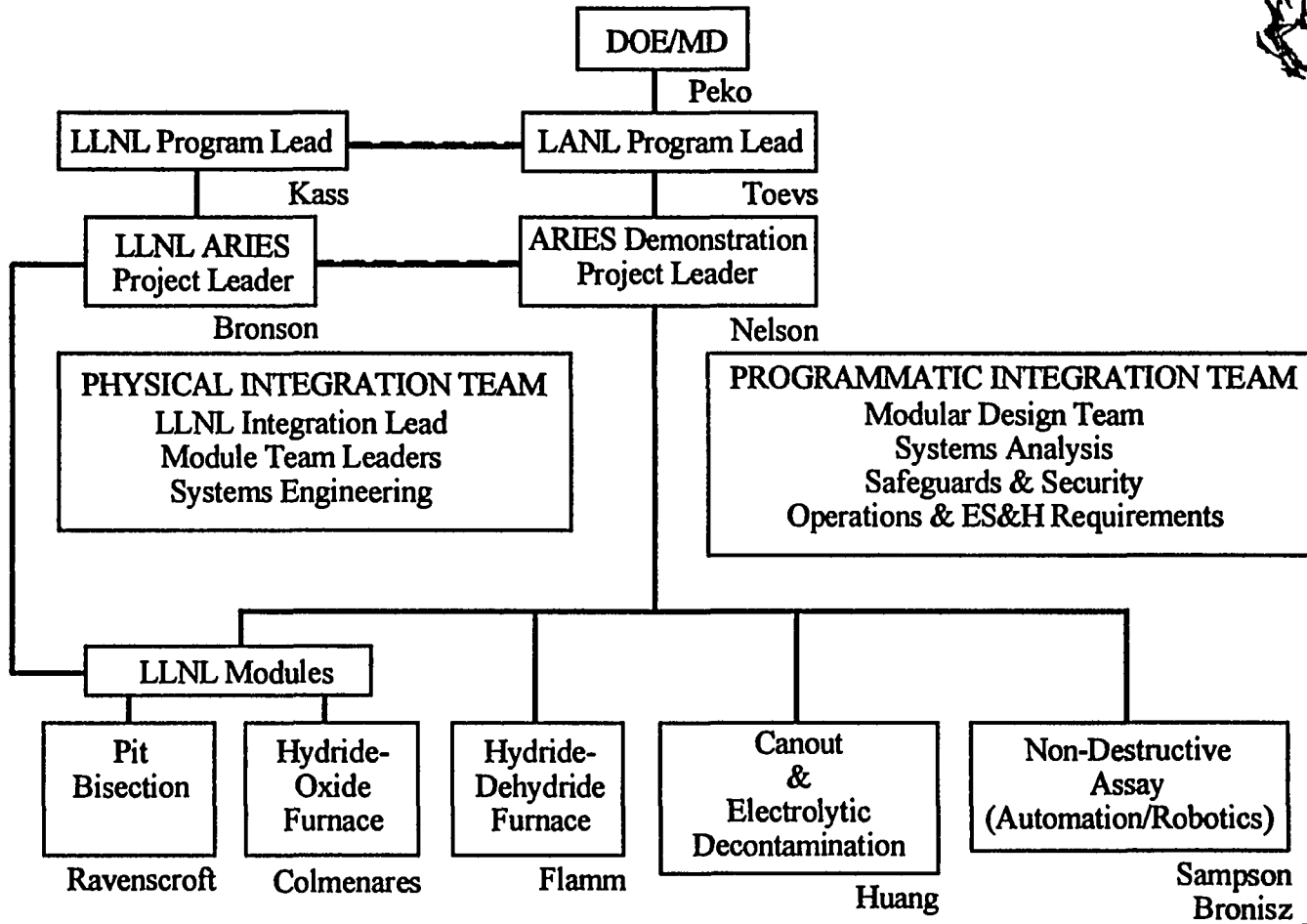
Both organizations will develop selected modules at their respective laboratories. System integration and operation will be performed by the team at TA-55. A LLNL team member has been assigned to LANL to serve as the LLNL integration lead and on-site representative. An organizational chart of the ARIES project is shown in Figure 1.

The ARIES program requires design, procurement, fabrication, assembly and installation, safety and environmental reviews, start-up procedures and readiness reviews, as well as, program administration and resource allocation. These requirements are met by establishing several module teams with specific responsibilities, as shown in Table 1.

Each of the modules will involve the design of the equipment, its glovebox, and its support equipment. This effort also includes fabrication and testing of the equipment, installation of the equipment in the gloveboxes, and hot testing. In addition to the responsibilities listed above and in Table 1, all Module Teams (MTs) will support start-up reviews, prepare required documentation, and interface with one another as needed through the PIT, and through direct contact with other team members.

Integration of all modules into an operational system within TA-55 consists of several activities including the following: facility preparation, design and assembly of a conveyor system compatible with all the modules, acquisition of gloveboxes, design and assembly of a control system to operate the integrated assembly, and preparation of all system documentation requirements. Gloveboxes will be procured from a commercial supplier, or to expedite installation, by adaptation and relocation of existing gloveboxes. Commercial services may also be used to decontaminate the demonstration facility room in preparation for installing the ARIES gloveboxes.

**Figure 1: ARIES Demonstration Organization**





**Table 1: ARIES Project Module Teams**

<u>Team</u>	<u>Participation</u>	<u>Responsibilities</u>
Project Executive Team (PET)	LANL/NMSM Disposition Program Manager, LLNL/Fissile Materials Program Manager, LANL ARIES Demo Project Leader, LLNL ARIES Project Leader	<ul style="list-style-type: none"> <li>• Top level decisions</li> <li>• Prioritization of LANL TA-55 and LLNL-332 ARIES activities</li> <li>• High-impact change control</li> </ul>
Physical Integration Team (PIT)	LANL ARIES Demo Project Leader, LLNL ARIES Project Leader, LLNL Integration Lead (@LANL), Module Team Leaders, Other NMT Facility group members, LANL/ESA-EPE, LLNL/EE, others, Quality Assurance	<ul style="list-style-type: none"> <li>• Technical baseline approval</li> <li>• TA-55 facility preparation</li> <li>• Module process integration</li> <li>• Glovebox design &amp; procurement</li> <li>• ARIES configuration control</li> <li>• Low-impact change control</li> <li>• Supervisory/distributed system controller design, fabrication, and installation</li> </ul>
Programmatic Integration Team	LANL/NMSM Disposition Program Manager, LLNL/Fissile Materials Program Manager, LANL ARIES Demo Project Leader, LLNL ARIES Project Leader, TSA, ESA, NMT, NIS, others	<ul style="list-style-type: none"> <li>• Modular Design Team</li> <li>• Systems Analysis</li> <li>• Safeguards &amp; Security</li> <li>• Operations</li> <li>• ES&amp;H Requirements</li> </ul>
<b>Module Teams (MTs)</b>		
Pit Disassembly Module	Lead: LLNL/DTED Support: LANL/TSA-7	Simple pit bisector design, fabrication, assembly, cold-test, system integration, test & operation.
Hydride/Dehydride Module	Lead: LANL/NMT-5 Support: LLNL/ISAM	Hydride dehydride module design, fabrication, assembly, system integration, test & operation.
HYDOX Module	Lead: LLNL/ISAM Support: LANL/NMT-5	HYDOX module development, hot test, ARIES design, fabrication, cold test, system integration, test & operation.
Electrolytic Decontamination & Canout Module	Lead: LANL/NMT-6, ESA-EPE	Electrolytic decontamination and canout task designs, fabrication, assembly, system integration, test & operation.
Nondestructive Assay/Instrumentation Support Module	Lead: LANL/NIS-5 NMT-4, ESA-MT	NDA/Instrument Support module design, fabrication, assembly, system integration, test & operation. Includes fixed and robotic automation design for NDA module.

## 5.0 REQUIREMENTS

Development and placement of ARIES in TA-55 must conform to a comprehensive set of requirements and guidance governed by LANL and NMT Facilities and Safety Operations groups. All phases of the implementation program, from inception through design, construction, and start-up, are reviewed by these groups. The program must ensure that all requirements are met to maintain the TA-55 safety envelope and to avoid unnecessary delays during pre-start-up review.

### 5.1 Environment, Safety, and Health (ES&H) Reviews

Safety of the environment, the off-site population, and the workers, is assured by performance of safety reviews of the proposed ARIES design. The mechanism for ensuring that appropriate reviews are performed involves completion of a LANL ES&H Questionnaire, followed by a large number of design and operating envelope evaluations performed by independent laboratory organizations. These reviews are governed by various DOE Orders, Federal Regulations and Rules, and State of New Mexico Regulations.

National Environmental Policy Act (NEPA) Evaluations: The project management team (with assistance from LANL's ES&H organization) will assure compliance with all existing laboratory NEPA requirements related to the installation and operation of ARIES in TA-55. A NEPA Categorical Exclusion was granted for ARIES by DOE on May 31, 1995. [See Appendix A.]

Worker and Facility Safety: The ARIES project will follow all safety and health requirements as outlined in the TA-55 Safety Manual (LA-12177-M, Rev. 1, Plutonium Facility, October 1992). All applicable Occupational Safety and Health Act (OSHA) requirements and DOE Orders related to worker health and safety are addressed in the manual. Oversight of conformance to these documents is provided by the NMT Division Office, NMT Facilities group, and the Environmental Safety & Health Division (ESH).

### 5.2 Design and Installation Work

Design and installation of ARIES must conform to various standards and requirements to ensure equipment performance, security, and safety of the plant workers and the public. Current LANL TA-55 procedures have been written and approved to assure compliance with all applicable DOE orders and ASME/ANSI/ASHE codes. Significant procedures and requirements are identified below.

- ARIES Project Quality Assurance Plan (QAD-101-R00, January 1996)
- LANL Readiness Assessment Program (538-GEN-R01, November 1995)
- LANL Configuration Management Procedures
  - Controlling Process Changes in PF-4 at TA-55 (564-GEN-R00, May 1995)

- Initiating Facility and Process Changes at TA-55 (565-GEN-R00.4, November 1995)
- Procurement Specification for Process Enclosure (NMT-B-PS-11610-ROO)

### 5.3 Program Administration

The program to implement ARIES is governed by various guidance documents and policies. While these requirements principally deal with large projects and/or construction, adherence to their intent will expedite progress and allow conformance with evolving management practices at Los Alamos. The most significant requirements derive from the control documents listed below.

- NMT (Gen Series 400 & 500) Safe Operating Procedures
- TA-55 Work Order Control System Users Guide
- Policy Book for NMT Division
- Los Alamos National Laboratory Financial Management Handbook
- Los Alamos National Laboratory Administrative Policies and Procedures Manual
- Lawrence Livermore National Laboratory Administrative Policies and Procedures Manual

## 6.0 PROGRAM CONTROL

The ARIES program relies on existing capabilities at LANL and LLNL for control of costs, scheduling, preparation and control of documents, and overall administration of the program. Significant program control features, including a description of major documentation, are discussed below.

### 6.1 Documentation

#### 6.1.1 Programmatic Documentation

Technical Task Plans (TTPs): These plans define the ARIES objective, scopes of work, project responsibilities, current fiscal year funding levels, benefits, major milestones, counterpart support, and assumptions necessary to meet task milestones for each of the five major modules and the integration task.

ARIES Program Plan: The ARIES Program Plan is the chief document governing initiation and administration of the ARIES implementation program. It describes the mission and goals of ARIES, the configuration of the implementation program, detailed implementation plans, requirements and regulations that must be addressed, and resource needs for meeting program goals. Together with other program documents describing designs, resolution of requirements and regulations, procurement, installation, and start-up, the Program Plan forms the foundation of a comprehensive and retrievable database for reviews, audits, evaluations, and modifications.

**ARIES Project Quality Assurance Plan (QAP):** The ARIES QAP describes the ARIES project organizational structure, functional responsibilities, levels of authority, and interfaces. Functional responsibilities include work such as requirements for program organization and project control, personnel training and qualification, quality improvement, documentation control, work processes, design processes, procurement processes, inspection and acceptance testing, and management and independent review assessment.

### 6.1.2 Design Documentation

**Preconceptual Design Report:** This report describes the preliminary investigation that forms the basis for equipment selection, system layout, TA-55 space selection, and further refinement in the conceptual design that follows. The process baseline identified in the Preconceptual Design Report is not expected to radically change during conceptual design; however, mechanical design of process equipment will evolve as engineering and supporting development studies progress.

**Conceptual Design Report (CDR):** Typically, the CDR describes the preliminary design for a line item project. Though ARIES is not a line item project, this report is part of the ARIES design documentation. CDRs contain construction and cost estimate detail, narratives and drawings, justifications relating to mission and program requirements, sizing, key feature requirements, and what drives them, relationships with other projects and the ARIES objective and mission. Significant alternatives addressed during all phases of conceptual development are included in the CDR along with rationale for choosing the approach being proposed.

**Definitive Design Packages:** The definitive design completes the design as required of the modules and provides the documents necessary to prepare a bid package for equipment or glovebox construction. The definitive design provides: final specifications for construction and equipment procurement, detailed drawings as required for equipment or glovebox construction, design calculations, construction schedule, and identification of required permits.

### 6.1.3 Procurement Packages:

Procurement Packages include documents consisting of the Definitive Design Package, purchase request, specification, sole source justification, quality assurance review, purchase order, and incoming inspection report.

### 6.1.4 Start-Up and Safety Review Documentation

**Safe Operating Procedures (SOPs):** Procedures used for long term operations that may involve significant hazards such as those specified in the Laboratory Environment, Safety and Health Manual, AR 1-3 or other supporting AR sections.

**Criticality Safety Reviews:** Reviews performed by the group Criticality Safety Officer (CSO) of criticality safety limit postings, operator compliance with criticality safety limits, and new operations and operational changes (in conjunction with HS-6).

**Acceptance Test Plan (each Module):** A document that describes component testing necessary to ensure adequate performance of the ARIES process equipment.

**Operation Test Plan:** A document that describes testing necessary to ensure functionality of the ARIES equipment.

**Calibration Plan:** A document that identifies the ARIES measuring and test equipment (M&TE) and the requirements for calibrating and certifying those M&TE that require periodic calibration.

**Preventive Maintenance Plan:** A document that identifies ARIES process equipment requiring preventive maintenance, maintenance actions to be performed, and the recommended maintenance intervals.

**Configuration Management Documentation:** ARIES installation and room preparation will affect the PF-4, TA-55 Facility. Configuration Management reviews the work package, requires numerous documents that depict alterations and demonstrate facility standards, provides for approved as-builts as well as process and instrumentation drawings (P&IDs), etc.

#### 6.1.5 Operating Procedures

**Overall system operation:** A document describing overall operation of the ARIES system. This document collects individual module procedures to give an understanding of system performance.

**Individual module procedures:** These are operating procedures for each module of the ARIES system, including operation prior to system integration. Individual module procedures include step-by-step instructions for operation of the module, as well as, warnings and hazard notices.

#### 6.1.6 As-Built Design Packages (At completion of project):

These packages contain documented data describing the condition actually achieved in the ARIES project, including record drawings, and specifications showing construction as actually accomplished.

#### 6.1.7 Final Project Report:

This report consists of structured, written analyses of the ARIES project, prepared to surface aspects that should either be perpetuated or improved upon in future projects.

The report serves as a method for the module teams to improve services by evaluating the lessons learned.

## 6.2 Document Control

An important feature of ARIES is the creation of a retrievable database for configuration control, safety assessment, and historical reference purposes. The database will contain all major documentation related to ARIES, such as the following: final drawings, calculations, safety review data, start-up information and the major documents shown in Section 6.1. The database will consist of both electronically stored information and a hard copy library. The hard copy library will be maintained by the ARIES Physical Integration Team at TA-55. Both sets of records will be semi-permanent files remaining in existence for five years beyond disassembly and decommissioning of the ARIES equipment.

## 6.3 Cost/Schedule Tracking

The costs for the ARIES implementation program will be tracked monthly by creation of separate ARIES cost codes and work packages for both LANL and LLNL. Charges for contracts, interdivisional charges, procurement charges, and other expenses amenable to monitoring through existing LANL and LLNL accounting procedures will be tracked and reported in ARIES program status updates.

An intermediate schedule will be created early in the program. More detailed schedules will be developed as part of the TTPs and as information is received, such as craft scheduling through the Facilities and Safety Operations group. In either case, the schedule will be updated monthly and critical path analysis used to highlight areas of concern. Schedule data and cost data will be integrated, as needed, to indicate performance achieved by participating organizations and subcontractors. Scheduling is tracked to assess facility resource needs.

## 7.0 IMPLEMENTATION PLAN

Implementation of ARIES involves many discrete, but related, major activities. Failure in any one of these could jeopardize the anticipated hot start-up date. It is essential, therefore, that these activities be clearly defined, together with key organizations responsible for their execution, to allow precise tracking of scheduled progress by the ARIES demonstration project leader. Progress tracking will enable early detection of problems and potential delays, allowing the ARIES demonstration project leader to focus resources on appropriate resolutions and recovery plans. The major activities are briefly described below together with the principal organizations involved.

Organization Development: The ARIES technical staff is assembled from both laboratories using a matrix management approach with the ARIES demonstration project leader providing project direction for ARIES-related work, and both

laboratory project leaders providing technical direction, as described in Section 4.0 of this report.

**Program Plan:** Development of the ARIES Program Plan is essential to meeting milestones and accomplishing goals. Completion of the Program Plan is the responsibility of the ARIES Physical Integration Team.

**Preconceptual Design/Functional Design Criteria (FDC):** A design concept will be developed early in the implementation phase. This concept, together with functional criteria for process operations, will establish a footprint to be used for ARIES space selection in PF-4 and for development of a technical baseline. A preconceptual report will be issued at the conclusion of this activity. Each module's Design/Development Team (DDT) is responsible for establishing a process system concept design that satisfies functional requirements. Integration of the concepts into a feasible design is the responsibility of the Physical Integration Team. The process system DDTs will develop layouts and requirements that correspond to TA-55 and LANL criteria.

**Conceptual Design:** The conceptual design of ARIES follows from the preconceptual design. It includes selection of the most appropriate location for the system, refinement of the process system design, establishment of a rudimentary material balance for eventual test operations, and description of needed auxiliary equipment and interfaces. The DDTs are responsible for development of the conceptual design of each of the module components and for input to a conceptual design report, to be assembled by the Physical Integration Team.

**Definitive Designs:** The conceptual design and results from development studies form the basis for the ARIES definitive, or Title II, designs. The design packages, produced primarily by the DDTs, include process and instrumentation diagrams, mechanical drawings, equipment specifications, installation drawings, facility layouts, and utility tie-in requirements. Each laboratory is instrumental in design review and approval during this phase.

**Procurement:** After completion of each of the definitive design packages, the module teams, with the approval of their respective laboratory project leader, will initiate purchase requests for procured components. All purchase requests must follow appropriate procurement procedures for each laboratory. After bid reviews and awarding of contracts, purchased equipment is manufactured, inspected by the appropriate design team, quality assurance team, and delivered.

**Decontamination and Decommissioning (D&D) of space:** The room identified for ARIES contains existing equipment and gloveboxes that must be removed. This involves preparation of a D&D Plan, establishment of a work package that contains numerous work requests for LANL's support contractor, and cleanout of the desired

space. ARIES team members will be responsible for much of the glovebox cleaning and waste removal, with assistance from other LANL groups and support contractors.

Installation: Once decontaminated space for ARIES is available, gloveboxes and process equipment will be installed. Development of an installation plan by the Physical Integration Team, establishment of service requests for contractor support, and actual installation work by LANL's support contractor and ARIES staff are essential to installation. This work will proceed in two phases. The first phase will typically consist of receipt of gloveboxes and cold setup at both LANL and LLNL. The second phase involves transporting the gloveboxes to the selected space in PF-4 and final installation.

Safety/NEPA Reviews: A series of reviews and assessments, performed primarily by LANL's ES&H organization and NMT Division staff, are required to ensure personnel and environmental safety.

Start-up Activities: Initiation of plutonium (hot) operation activities for ARIES involves several related subtasks. Installed equipment must be tested, labeled, and posted with pertinent safety limits. Test data and as-built design information must be compiled for the system configuration database. Operating procedures and accountability parameters must be established. An independent system review and an NMT Safety Committee Review must be performed, followed by cold operability testing and operator training. These subtasks are governed by the TA-55 START procedure and will be performed primarily by the ARIES staff and other appropriate LANL and LLNL organizations.

The activities identified on Table 2 represent a much larger set of subtasks needed to implement ARIES. Numerous discrete steps are involved in this program. Failure to achieve any one of the major milestones shown in Table 2 could result in slipping the projected hot start-up date. Close program tracking and early detection and resolution of problems will avoid jeopardizing this date.



**Table 2: ARIES Demonstration  
Intermediate Implementation Schedule**

<u>TASK NAME</u>	<u>PLAN START</u>	<u>ACTUAL START</u>	<u>PLAN FINISH</u>	<u>% COMPLETE</u>
Project Planning Documentation	10/2/95	10/2/95	2/2/96	100%
TA-55 Facility Planning and Preparation	10/2/95	10/2/95	9/30/96	25%
Facility Layout and Glovebox Design Complete	10/2/95	10/2/95	3/29/96	50%
Individual Module Components Designed	10/2/95	10/2/95	3/29/96	50%
Gloveboxes Acquired, Purchased, and Received	2/1/96	10/2/95	9/30/96	50%
Individual Module Components Purchased and Built	4/1/96	NA	9/30/96	0%
Assembly and Cold Testing of Modules	10/1/96	NA	1/31/97	0%
Integration and Assembly into TA-55, PF-4	10/1/96	NA	3/31/97	0%
Shipment of Cold-Tested LLNL Modules	1/16/97	NA	1/31/97	0%
Safety Review, Hot Testing, and Operational System	4/1/97	NA	9/30/97	0%

## 8.0 RESOURCES

Execution of the ARIES demonstration requires a variety of resources, including both manpower and support services. The matrix approach to staffing of ARIES relies on staff from several LANL and LLNL organizations. Personnel will report to their line management for administrative direction and to their respective project leader for technical direction. Estimates for total manpower from participating organizations through FY96 are in each Technical Task Plan.

In addition to the manpower assigned to directly work on ARIES, additional personnel and resources from other organizations in both laboratories and some outside vendors and contractors may be used for special design or supporting equipment fabrication. Examples of these other resources are procurement services, ES&H support, documentation services, craft support, etc.

## 9.0 BUDGET

The funding needed to support the LANL and LLNL staff assigned to ARIES, acquisition of material and supplies (M&S), acquisition of capital equipment, and anticipated services contracts are estimated in Table 3 for FY96 and Table 4 for FY97. Based on the estimates described in both tables, the combined cost of the ARIES demonstration LANL staff and LLNL staff for both fiscal years is \$26 million.

**Table 3: Budget (in \$1000) and Matrixed Manpower (in FTEs)  
Estimates for ARIES Demonstration  
for FY96**

SHORT TITLE	LANL		LLNL		Engineering		
	ALLOC	ALLOC	Pu Staff	Pu Techs	Support	NDA	Other
Pit Bisection	125	700	0.50	0.80	3.15		0.20
HYDOX	125	1,000	0.25	2.15	4.45		0.30
Hydride/Dehydride	570	150	0.75	2.00	0.75		
Canning/Decon	800		0.50	2.30	1.00		
NDA/Inst Support	1,150		0.50	0.40	1.00	2.00	
Integration	2,830	950	4.20	1.25	3.85		3.35
Operating Funds	\$5,600	\$2,800	6.70	8.90	14.20	2.00	3.85
Capital Equipment	\$4,300	\$1,000					
<b>TOTAL</b>	<b>\$9,900</b>	<b>\$3,800</b>					

**Table 4: Budget (in \$1000) and Matrixed Manpower (in FTEs)  
Estimates for ARIES Demonstration  
for FY97**

SHORT TITLE	LANL ALLOC	LLNL ALLOC	Pu Staff	Pu Techs	Engineering Support	NDA	Other
Pit Bisection	270	700	0.75	1.35	2.15		0.20
HYDOX	210	800	0.50	1.50	2.15		0.25
Hydride/Dehydride	875		1.50	2.00	0.50		
Canning/Decon	900		1.00	3.00	0.50		
NDA/Inst Support	1,300		1.00	1.00	1.00	2.00	
Integration	4,730	1,500	3.00	1.00	12.50		3.00
Operating Funds	\$8,285	\$3,000	7.75	9.85	18.80	2.00	3.45
Capital Equipment	\$750						
<b>TOTAL</b>	<b>\$9,035</b>	<b>\$3,000</b>					

If the ARIES Demonstration is disassembled after FY97, the estimated cost for decommissioning and decontamination for FY98 is \$1.5 million.

## 10.0 OPERATIONAL PLANS

The current ARIES program will conclude with the system test. A follow-on program may be instituted to install further improvements and additions to the system.



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