WHC-SP-1190
Volume 0
UC-2000

Spent Nuclear Fuel Project High-Level Information Management Plan

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Date Published
September 1996

Prepared for the U.S. Department of Energy
Office of Environmental Restoration and
Waste Management

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Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

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P.O. Box 62
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(615) 576-8401

Printed in the United States of America

DISCLM-3.CHP (1-91)

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Document Number:	WHC-SP-1190, Rev. 0
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NOTE

This document was prepared in October 1995. It was formally released the following summer so it could serve as a baseline information management plan.

LIST OF TERMS

A-E	architect-engineer
ADS	activity data sheet
AMS	Activity Management System
BCSR	BCS Richland, Inc.
BMS	Business Management System
CAD	computer-aided drafting or drawing
CDM	Contracts Data Management and Integration
CIO	Chief Information Officer
CSB	Canister Storage Building
D&D	decontamination and decommissioning
DCS	Document Control Services
DOE	U.S. Department of Energy
DOE-HQ	DOE Headquarters (Washington, D.C.)
DRM	Documentation and Records Management Services
EIS	environmental impact statement
EPDS	Environmental Planning Data System
ESOE	End System Operating Environment
FDS	Financial Data System
FFTF	Fast Flux Test Facility
FY	fiscal year
HATS	Hanford Action Tracking System
HEIS	Hanford Environmental Information System
HLAN	Hanford Local Area Network
ICF KH	ICF Kaiser Hanford Company
IM	information management
IMPP	Information Management Planning Project
IMSC	Information Management Steering Committee
IRM	information resource management
ISEARCH	information services electronic archives
IT	information technology
MCO	multi-canister overpack
MCS	Management Control System
NRC	U.S. Nuclear Regulatory Commission
PDC	packaging design criteria
PNL	Pacific Northwest Laboratory
RL	Richland Operations Office (DOE)
RMIS	Records Management Information System
S/RID	standards/requirements identification document
SAR	safety analysis report
SARP	safety analysis report for packaging
SEMP	system engineering management plan
SGML	Standard Generalized Markup Language (ISO standard)
SHARE	Search Hanford Accessible Reports Electronically
SNF	spent nuclear fuel
SNFP	Spent Nuclear Fuel Project
TAP	Technical Acquisition Plan
TCD	Tank Characterization Database
TDB	Technical Databook
TWRS	Tank Waste Remediation System
USQ	unreviewed safety question

WBS	work breakdown structure
WHC	Westinghouse Hanford Company

ACKNOWLEDGEMENTS

The Information Management Planning Project was sponsored by E. L. Wells, BCS Richland, Inc., the Spent Nuclear Fuel Project Information Manager. The multicontractor team consists of P. J. Cowley (Pacific Northwest Laboratory), G. C. Main (BCS Richland, Inc.), S. B. McCargar (Westinghouse Hanford Company), R. McVeety (Pacific Northwest Laboratory), and J. Scott (Technical Resources International). These individuals bring a strong base of experience to the team. Cowley, Main, and McCargar have many years of information management (IM) experience at the Hanford Site and have worked on a variety of IM planning and information architecture projects. McVeety has a broad IM background and has worked on a similar IM planning and architecture project for the Tank Waste Remediation System. Scott has been associated with the Spent Nuclear Fuel Project for several years and understands the project and its technical processes.

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

This document presents the results of the Spent Nuclear Fuel Project (SNFP) Information Management Planning Project (IMPP), a short-term project that identified information management (IM) issues and opportunities within the SNFP and outlined a high-level plan to address them. This high-level plan for the SNFP IM focuses on specific examples from within the SNFP. The plan's recommendations can be characterized in several ways. Some recommendations address specific challenges that the SNFP faces. Others form the basis for making smooth transitions in several important IM areas. Still others identify areas where further study and planning are indicated. The team's knowledge of developments in the IM industry and at the Hanford Site were crucial in deciding where to recommend that the SNFP act and where they should wait for Site plans to be made.

Because of the fast pace of the SNFP and demands on SNFP staff, input and interaction were primarily between the IMPP team and members of the SNFP Information Management Steering Committee (IMSC). Key input to the IMPP came from a workshop where IMSC members and their delegates developed a set of draft IM principles. These principles, described in Section 2, became the foundation for the recommendations found in the transition plan outlined in Section 5.

Availability of SNFP staff was limited, so project documents were used as a basis for much of the work. The team, realizing that the status of the project and the environment are continually changing, tried to keep abreast of major developments since those documents were generated. To the extent possible, the information contained in this document is current as of the end of fiscal year (FY) 1995.

Programs and organizations on the Hanford Site as a whole are trying to maximize their return on IM investments. They are coordinating IM activities and trying to leverage existing capabilities. However, the SNFP cannot just rely on Sitewide activities to meet its IM requirements. While the SNFP can use some work done Sitewide and by projects such as the Tank Waste Remediation System (TWRS), they will still need to make some IM investments of their own.

1.2 SPENT NUCLEAR FUEL PROJECT BACKGROUND

The Hanford SNFP was established to safely store spent nuclear fuel (SNF) at the Hanford Site. The overall responsibility for the management of spent nuclear fuel at the Hanford Site is with the U.S. Department of Energy, Richland Operations Office (RL). Westinghouse Hanford Company (WHC) is the project manager and integrating contractor. Other key participants are the ICF-Kaiser Hanford Company (ICF-KH), Pacific Northwest Laboratory (PNL), and BCS Richland, Inc. (BCSR).

The SNFP is one of the highest priority projects for the U.S. Department of Energy (DOE) from both Site and national perspectives. The project is part of a national initiative by DOE to accomplish cost-effective and timely disposition of the defense-related spent nuclear fuels currently under its auspices at facilities located across the nation. The current strategy for the national program is to establish regional centers for the various types of nuclear fuel. The Hanford Site is one of the three major regional locations designated. It contains approximately 80 percent of the nation's spent fuel inventory. The Hanford Site project has received substantial support based upon the high vulnerability of the fuel conditions at the K Basins. National SNF strategies are being developed concurrently with those at the Hanford Site.

The fuel on site is stored in both wet and dry configurations with differing conditions and levels of vulnerability. As currently envisioned, the Hanford Site will focus on the N Reactor fuels currently located in the K Basins. The fuel in wet storage at the K Basins is of more critical environmental concern than the other spent fuel, and makes up more than 95 percent of the fuel inventory on site. Therefore, the Hanford Site SNFP team has expedited K Basins fuel and sludge removal plans that address the primary concern. N Reactor fuel not located at the K Basins will be transferred to the basins until subsequent drying, staging, conditioning, and interim storage functions can be initiated. Fast Flux Test Facility (FFTF) fuel, which is already loaded into casks, will be staged locally until an ultimate disposition is determined. Other Hanford Site fuels are currently planned for shipment to the Idaho National Engineering Laboratory, Idaho Falls, Idaho. Changes to the national strategy can affect the current mission and scope of the SNFP.

The SNFP's mission is to provide safe, economic, and environmentally sound management of the Hanford Site SNF. The foremost mission element is to meet or exceed all safety and environmental requirements for the project. The scope of the SNFP covers safe storage and disposition of SNF at the K Basins, accepting fuel from existing storage facilities, constructing new systems and facilities, as necessary, to stabilize and store the fuel prior to final disposition, and deactivation of designated facilities to a readiness state for decontamination and decommissioning (D&D).

The SNFP is part of the larger environmental cleanup mission at the Hanford Site. It was developed consistent with the overall Systems Engineering approach being used on Site to divide and implement functions required to accomplish the overall environmental cleanup mission. The SNFP mission fits within three Hanford Sitewide functions:

- Deactivation of facilities
- Storage, treatment, and disposition of special nuclear materials and nuclear fuel
- Provision of essential Site capabilities.

The mission of the K Basins facilities is deactivation, not continuation of SNF storage. Deactivation includes the safe operation of all facilities that provide temporary, alternative, or interim storage, transfer, and stabilization for the SNF during deactivation. The SNFP will also operate the facilities that have a mission to receive, stabilize, and/or store SNF, including operating any new facilities that may be required to complete the mission. New systems and facilities will be designed and constructed as needed.

The SNFP has the following technical objectives:

- Correcting existing K Basin physical-plant deficiencies and maintaining a safe working environment during deactivation.
- Designing and constructing a canister storage building (CSB) and a fuel stabilization facility for K Basin fuel.
- Providing and expediting a safe, environmentally sound method to retrieve, package, and transport K Basin fuel to the CSB, where it will be of less risk to workers, the public, and the environment.
- Providing pre-interim storage for other Hanford Site SNF until it is transferred off site.
- Transferring Hanford Site SNF from sources other than N Reactor off site for disposition.
- Deactivating the K Basins, CSB, fuel stabilization facility, and pre-interim storage for transition to D&D.

To meet the SNFP objectives, the Path-Forward strategy has been developed for implementation of expedited K Basins fuel and sludge removal. The recommended Path Forward results in options that can achieve the target start of fuel removal (with significantly less risk of delays) and at lower estimated costs than were projected by the initial Path Forward approach. The goal of the SNFP is to safely and cost-effectively begin removing fuel from K Basins by December 1, 1997.

The project includes several subprojects and a full contingency of functional support organizations. The subprojects are in the conceptual design or preconceptual design stage.

SNFP is composed of a relatively tight core of very experienced programmatic, project, and technical staff. In implementing its charter it has been encouraged to seek and use resources from the private sector as much as possible. Both DOE and WHC have experienced management staffs that have developed a constructive working relationship with each other. Although the project will be operating in the environment of the Hanford Site, the staff has been challenged to reengineer the way they do business with a bias to expediting and implementing the project objectives as rapidly as possible consistent with safety and economical constraints. Innovative methods of

implementing the contracting, procurement, regulatory, engineering, and construction functions required to complete the project have been encouraged.

This project is considered a solution to one of the highest risk issues in the DOE complex and has strong political support at all levels. It has implemented an aggressive approach to public and stakeholder involvement. The DOE representatives have been supportive in securing funding and appropriate audiences for issues of importance to the project. Congruence is sought from the major stakeholders, and local and national levels of DOE for the strategic planning of the project. Several oversight organizations can become involved including the Hanford Advisory Board, the Defense Nuclear Facility Safety Board, and a variety of peer both within and outside the project structure. This type of visibility will require an efficient means of securing data and project media that relate to a wide variety of questions. To support the high-visibility, fast-paced project, IM is critical and needed as soon as possible. It is vital that the early assumptions, decisions, rationale, and expectations for the project get effectively documented. This is a multifaceted project that will need a correspondingly multifaceted IM capability.

1.3 INFORMATION MANAGEMENT ENVIRONMENT

The Information Age continues to revolutionize engineering, technology development, office and work processes, and business in general. Powerful workstations, nationwide networking, and advanced information delivery methods are becoming integral to the SNFP operations, and similar opportunities continue to present themselves.

The Hanford Site is experiencing a parallel revolution in its workscope, management approach, workforce, and culture. In a changing political environment DOE has directed reductions in scope, budget, and workforce along with incentives to privatize and outsource Hanford activities.

The SNFP was conceived within this new working environment and has organized to work within it, with the result that it has confronted some of the problems still being anticipated by others. The SNFP is learning to work within an environment of rapid change to ensure that business needs continue to be met safely and with minimal disruption. With the SNFP work being conducted around the country, information technology (IT) can help the project to proceed at a rapid pace.

This section identifies IT factors and Hanford IM activities that form the context for the SNFP IM planning. The Information Management Plan is founded on many of these and recommends continual leveraging on others.

1.3.1 Information Technology

Three areas of advancing IT will continue to improve the SNFP's ability to acquire, process, package, and release information:

Networks. Faster networking capabilities reaching more individuals and information. Benefit: The ability to share information with multiple distributed project participants and stakeholders.

Work Stations. Faster personal computers with more storage and processing capabilities and friendlier user interfaces. Benefit: More computer and data processing solutions at the workplaces of a greater percentage of workers.

Information Delivery Technologies. The word "document" is evolving to mean a package of information that may have been collected in multiple formats. Benefit: An individual can readily study related information in text, drawings, and photographs at the same time and place. Document development becomes a task of assembling information from multiple sources and locations with the help of templates and other automated tools.

1.3.2 Hanford Information Management

In response to the impact of the Information Age, industry and government have developed new policies, procedures, strategies, architectures, and plans. Business process reengineering and quality improvement groups are studying information flow and incorporating IT solutions into day-to-day processes. RL and the Hanford Site contractors have cooperated in a number of activities to improve the management of Hanford Site information. Some of the studies, strategies, and initiatives that influence the SNFP IM are described in the following paragraphs.

The Hanford Site

Strategic Plan for Hanford Site Information Management (DOE/RL-94-69 Rev. 0, 9/94)

> "The mission for Hanford Site information management is to create a working environment that delivers the right data and information of known quality in a usable form and at an acceptable cost to the people who need it, where they need it, and when they need it."

Strategies

- Structure and maintain a Sitewide management and control process for IM.
- Sustain Sitewide leadership to ensure effective IM.
- Enhance and refine the data collection process.
- Develop an information access and delivery mechanism.
- Establish information analysis processes that support customer needs.

- Develop an effective and efficient Hanford Site information architecture.

RL CIO Support Function (June 1995)

The RL Site Management Board approved the implementation of a chief information officer (CIO) support function. This was done "in recognition of the level of Information Resource Management at the Hanford Site (approximately $172 million in FY 1995), over 650 systems in use or development, the criticality of information resource management (IRM) to the success at Hanford, and to provide high level coordination and policy direction for IRM activities as recommended in the Strategic Plan for Hanford Site Information Management."

Data Management Plans (RL/94-94 Rev 0, March 1995)

Data management plans for 10 Hanford Site business functions were released in 1995. *Deactivate Facilities/Nuclear Materials Management* identifies K Basins as a facility to be deactivated but limits the scope of the majority of the plan to the Plutonium/Uranium Extraction Plant.

Information Architecture Project

This project, initiated in May 1995, will provide a framework for managing information and improving RL's IM interfaces with contractors, DOE Headquarters (DOE-HQ), and external stakeholders.

Hanford Information System Inventory

An inventory of active and inactive Hanford information systems is maintained for the Hanford Site by the WHC Contracts Data Management and Integration (CDM) organization. Summary reports are available on the Hanford Local Area Network (HLAN) in the Soft Reporting application.

Data Standards Library

Data value standards, protocol standards, and definitions used across the Hanford Site and/or WHC are maintained on the HLAN in Hanford Information. WHC CDM coordinates the development process for these and maintains the current listing.

A data value standard identifies units of measure, coded or abbreviated names or identifiers, and other values that must have the same meaning, content, and format to all WHC or Hanford Site users. A protocol standard identifies a method, regulation, agreement, or external standard adopted for compliance.

Hanford Site Information Resource Management: An Architecture for the 1990s, Rev. 1, 1994 (RL-ADP-89-0002)

The architecture for the 90s identifies an infrastructure envisioned to support the Site's computational and networking requirements through the

1990s. The standards-based infrastructure establishes criteria for implementation of an environment that supports the Hanford Site's strategic objectives and mission assignments, meets current and future information processing needs of the Site, and takes advantage of modern technology.

Westinghouse Hanford Company - documents

Hanford Strategic Information Plan, Rev. 1, 1995 (WHC-EP-0788)

This plan extends the *Strategic Plan for Hanford Site Information Management* with "an interpretation of the strategic resources based on the Hanford mission." Reviewing the Site functionally gives a non-biased view of the work needing to be performed by Hanford contractors.

Guidebook of Data Management Practices (TRAC-0696, October 1992)

The guidebook provides an overview of data management concepts and practices and describes the data management infrastructure.

Westinghouse Hanford Company Data Management Plan Template (WHC-SD-GN-30008)

The template provides guidelines for the content and writing of data management plans. These plans discuss how data management is implemented within the scope of any given project, program, or business function. The template was used for the development of *Data Management Plans* (RL/94-94).

Westinghouse Hanford Company - Corporate-Level Initiatives

Business Process Reengineering

WHC and its partners ICF-KH and BCSR launched a full-scale reengineering effort early in 1995, expecting to radically redesign their work. Starting with a clean sheet of paper and assisted by CSC Index consultants, a fundamental change in the way business is done is expected, in part because of "technology-enabled visioning."

Chief Information Officer

The BCSR president was appointed WHC CIO in mid-1995. Primary responsibilities of the CIO are twofold: integrating and improving the IT efficiency and effectiveness of WHC, BCSR, and ICF KH; and establishing IT policies and plans to ensure that efforts are focused on strategic programmatic needs. Several initiatives proposed at the time of his appointment are described below (Information Management Initiatives).

IRM Task Team (report completed August 1994)

A WHC task team was convened to address costs, redundancies, service levels, productivity, and other IRM-related topics. Recommendations

included setting and managing budget levels, aggressively increasing outsourcing, and reducing duplicated IRM functions within WHC.

Business Management System

The Business Management System (BMS) Migration Project was initiated in the second quarter of FY 1995 to define requirements for a financial information system that will carry WHC through the end of the Hanford Site mission. Three major issues are addressed in the high-level architecture requirements drafted in September 1995:

- More effective ad hoc reporting capability for the end user
- Improved credibility of the financial management process
- Reduced operational costs for administering the financial management process.

The high-level architecture requirements were developed following a methodology similar to that used in the SNFP IMPP.

WHC Programmatic Initiatives

TWRS Information System Definition, Engineering Study and Implementation Plan (WHC-SD-WM-PLN-099)

In early 1994, WHC initiated a study to develop an IM strategy to help TWRS manage its IM processes more effectively. The study results were documented in May 1995, and implementation of recommended actions began several months later. BCSR led the project; WHC, PNL, MAC Technical Services Company, ICF-KH, and DMR, Inc. participated.

The TWRS study was an architecture study similar to the SNFP IMPP. Since the TWRS study was complete when the SNFP IMPP was initiated, the IMPP has been able to leverage TWRS findings and will be able to apply TWRS successes to the SNFP. For example, the Tank Farm Information Center, an extended document management center and project library with indexes, bibliographies, and files available for reference by TWRS staff, was created. A similar concept will be deployed in the SNFP.

Information Management Initiatives

Business Area Managers/Functional CIOs

Following a successful 1994 initiative to assign a senior BCSR manager as TWRS information manager, BCSR has implemented the concept across its customer base. A BCSR senior manager has been assigned to serve as the SNFP information manager.

Nationalization of IT Resources

Network file servers, personal computers, and UNIX servers across WHC are being "nationalized," that is, managed as corporate assets. The goal is to meet overall company requirements through the best use of available resources. Under this program, the repair, maintenance, and upgrade of hardware components are managed by BCSR, which is certified as an Authorized Service Center for several standard products. The annual replacement program brings in cost-effective, high-end equipment where needed and phases out high-maintenance, low-capacity older items. A fundamental requirement and benefit of the program is the ability to maintain standards, which reduces costs for training, repair, hardware interfaces, operating software, information exchange, and application portability.

End System Operating Environment

WHC workstations are being migrated from the WHC Core workstation standard to the WHC End System Operating Environment (ESOE). The ESOE includes standard operating software, an interface with the Hanford Area Network and TCP/IP-32, and a standard applications programming interface. These support an application suite of standard products, including electronic mail, calendaring, word processing, spreadsheet, graphics, presentation products, and access to World Wide Web technology on the Internet.

Software Distribution Programs

The ESOE enables a software distribution program that allows automated distribution and installation of current revisions of application software. In addition, the capability supports a metered software program to be implemented in early FY 1996. Under the metered software program, site licenses for software can be shared in a controlled fashion among a number of occasional users.

Information Delivery Architecture

BCSR is refining and implementing the architecture for information generation, capture, transport, storage, and delivery. The architecture provides a unifying vision for development of a set of IT components that work together. A key component is the image management system, information services electronic archives (ISEARCH), and supporting capabilities that will allow end users to identify information resource locations (documents) and obtain downloaded images at their own or nearby workstations.

Document Management

Until recently, WHC's document control, project libraries, records management, and other document management functions were dispersed across the company. During FY 1995 an integrated document management

process was defined. The SNFP is one of the early participants in the newly defined process.

2.0 ARCHITECTURE PRINCIPLES

The architecture principles are the high-level guidelines that provide direction and information for the SNFP IMPP's recommendations. They apply to the way that the SNFP structures, uses, manages, and controls its IM processes, resources, products, and services. The principles were developed at an August 1995 workshop of the IMSC. They are listed here in order of priority. (H = high, MH = medium-high, M = medium, L = low.)

P1. Optimize for Fast-Track (H)
P2. Ensure Relevant Information is Accessible to Meet Project Requirements (H)
P3. Conduct the SNFP Using a Small Project Team with External Organizational Support (H)
P4. Leverage Off What Others Have Done (H)
P5. Organize to Balance Autonomy and Integration (MH)
P6. Provide Traceability to Preserve Institutional Memory (MH)
P7. Use WHC Information Technology Infrastructure When Known and Appropriate (MH)
P8. Apply WHC Document Management System and Processes for the SNFP Use (MH)
P9. Value and Preserve Metadata (MH)
P10. Use a Formal Decision Process for Deployment of IM Technology (MH)
P11. Support IM Training (MH)
P12. Coordinate Centralized and Decentralized IM Processes (MH)
P13. Make Appropriate, Cleared Information Available to Stakeholders (M)
P14. Integrate IM into the Normal Business Process (M)
P15. Communicate Project Information to all Participants (M)
P16. Challenge External Controls (M)
P17. Design Business Processes and IM Capabilities Together (M)
P18. Track and Manage IM Costs (L)

The principles, their rationales, and their implications for IM are described in Appendix A. Many of the principles are related to other principles and may overlap in part. Appendix B contains a table that shows the relationships between the principles.

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3.0 INFORMATION MANAGEMENT ARCHITECTURE

The IM architecture is the underlying blueprint, or structure, for planning and decision-making in activities that use or produce information. This section describes the general SNFP architectural approach. Section 4 contains specific applications of the architecture.

The architecture is the basis for developing, supporting, and integrating manual and automated information and information systems. Its design reflects and incorporates the SNFP information management principles (Section 2) and is independent of specific organizational structures. It is presented at a high level, referencing generic subjects rather than relatively dynamic technological detail. This ensures persistence through minor fluctuations in SNFP needs and multiple changes in IT. As specific topical areas are selected for further analysis, the architecture may be applied to lower levels of detail, to reflect the "as-built" environment, immediate needs, and candidate solutions.

As for a building, the architecture is presented as several views of the IM structure. These interrelated views allow disciplinary focus on several standard categories of IM. Two views are presented in Sections 3.1 and 3.2:

- 3.1 Business Process/Information Management View.
  The components of a typical SNFP activity that uses or produces information are established in a generic model. The events that represent completion of an IM activity are Information Acquired, Information Processed, Information Packaged, and Information Released.

- 3.2 Information Management Infrastructure View.
  Business processes dealing with information depend on formal and casual, central and personal, electronic and manual data, tools, services, and practices. The Information Management Infrastructure is presented as four types of elements: Information Resource, Technology and Application Resource, IM-Specific Business Process, and Management Control.

Section 3.3 describes the modeling technique and gives an example of how the architecture can be applied to analyze a particular business area.

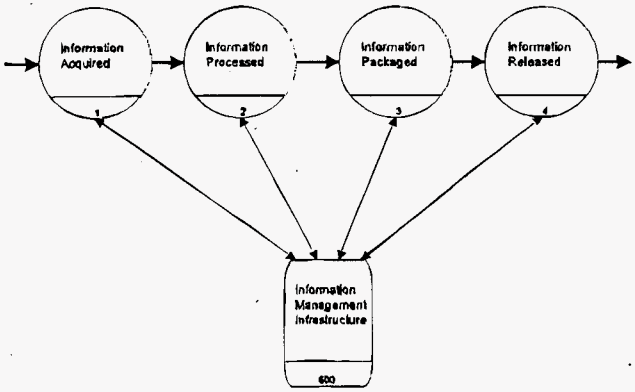
3.1 BUSINESS PROCESS/INFORMATION MANAGEMENT VIEW

A business process is the execution of a series of activities that leads to the achievement of a measurable business result. This result may be the creation of a product or service, or an intermediate component that contributes directly or indirectly to the creation and delivery of products or services.

The SNFP has hundreds of processes, if the intermediate and indirect ones are counted along with those specifically identified in the technical baseline. Most if not all of these use or produce information and so could be analyzed in a detailed IM architecture.

The business process/information management view, presented in Figure 3-1, is a model of a generic SNFP process that in some way handles information. The view is simplified by ignoring the other aspects of the typical process. From this starting point, the model can be used to help study any particular SNFP business process.

Figure 3-1. Information Management View of a Generic Business Process. [1]



Each model component can be broken down into lower level elements such as those listed in Sections 3.1.1 through 3.1.4.

3.1.1 Information Acquired

This component of an information-using process includes one or more subprocesses like the following (not necessarily in this order):

- Locate information
  - Telephone/Mail queries
  - Bibliography/Reference list

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[1] Note: The modeling technique is "event-driven," with events (signifying completion of processes or activities) in circles and participants in rounded rectangles. See Section 3.3 for a description of the modeling technique.

- Card catalog
- Index/Table of contents
- News media
- Surfing the Internet
- Records search
- Iterate/Dig deeper

- Convert to "readable" form and format
  - Paper/disk/file/strip chart/sound recording
  - Language translation
  - Graphical image/Character recognition
  - Standard measurement units
  - Hardware media
  - Software format
  - Sort, select, merge

- Transport to work location
  - Personal/Mail/Courier
  - Phone
  - Voice
  - Computer network

- Validate
  - Time/Date/Location/Context
  - Appropriate review and release
  - Sufficient/Complete
  - Pedigree

3.1.2 Information Processed

"Information processed" refers to the completion of the activities that business processes do in manipulating information to achieve internal information products. The information may have been input to the business process or developed within the process by sampling, observation, computation, or other data process. Some typical information processing activities are the following:

- Convert to processable format
  - Record
  - Photograph
  - List/Tabulate
  - Copy
  - Draw
  - Software

- Simple process
  - Arithmetic
  - Rotate/Zoom
  - Plot
  - Digitize
  - Sort/Select/Parse/Recombine

- Summarize
  - Synthesize
  - Integrate
  - Characterize
- Analyze
  - Model
  - Interpret
- Design
- Document findings
  - Text
  - Graphic/Drawing
  - Spreadsheet
  - Display
  - Report

3.1.3 Information Packaged

Information is packaged for ease of use and reference, to meet end-user requirements, for presentation, and for dissemination. Following are some typical packaging activities:

- Group
  - Box
  - File
  - Eliminate duplicates and irrelevancies
- Describe
  - Definition
  - Pedigree
  - Associated information
  - Keywords
  - Packaging
  - Storage
  - Retrieval information
- Label
- Store
  - Paper file
  - Electronic file
- Index
- Format
  - for Presentation
  - for Audience
  - for Display
  - for Storage

  - for Transport

- Destroy
  - Superseded versions
  - Outdated records

3.1.4 Information Released

When information is to be released for use by others (or by the information generator at some time in the future), several additional activities establish its validity, completeness, and availability:

- Review
  - Technical
  - Administrative
  - Editorial
  - Programmatic
  - Security
  - Proprietary

- Establish configuration
  - Complete and correct package
  - Approvals in place
  - Version control

- Notify recipients
  - Identify recipients
  - Establish notification requirements
  - Announce information availability

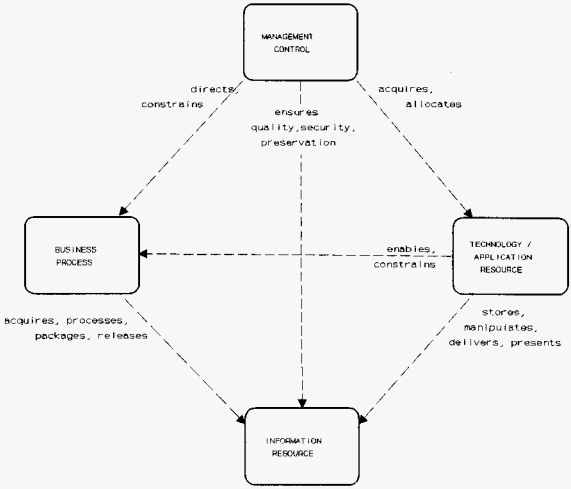
- Provide information
  - Put into repository/holding area
  - Distribute via phone/courier/mail/electronic means
  - Display

- Maintain records

3.2 INFORMATION MANAGEMENT INFRASTRUCTURE

Information users and developers have IM responsibilities and needs for an infrastructure that supports their processes. From an IM perspective, four types of elements work together as the SNFP IM infrastructure. Figure 3-2 shows the four elements.

Figure 3-2. Information Management Infrastructure Elements.



As seen in the business process view, business processes acquire, process, package, and release information resources. They are enabled and constrained by the technology and application resources available to them, for it is these resources that store, manipulate, deliver, and present information. Tieing these together are the management control processes, such as policies and standards, that direct and constrain business processes, acquire and allocate technology resources, and endeavor to ensure quality, security, and preservation of information.

Basic SNFP principles and organizational approaches call for some centralized infrastructure to support WHC-based activity. In addition, centralized policies and standards will streamline communications across multiple independent SNFP contractors. These must be designed to ensure that SNFP information is available, usable, timely, and reliable when needed by an internal or external SNFP business process. Balancing autonomous control and dependence on a centrally managed infrastructure is recognized as important to the SNFP IM. The infrastructure view provides a way of identifying the responsibilities that may be centrally assumed or delegated to the field. Components of the Information Management Infrastructure are described in the following sections.

3.2.1 Information Resource

The Information Resource component consists of the major collections of data, or information domains, that support identified business processes. When the architecture is applied to study details of a specific business process, the information domain is further analyzed to identify specific subject areas and characteristics. Some of the characteristics of interest are the following:

- Metadata
  - Data type
  - Data definition
  - Data value standard
  - Index
  - Data quality objectives
  - Retrieval location
  - Pedigree (source, accuracy)
- Domain and subject area relationships
- Information repository
  - Record
  - File
  - Form
  - Document
  - Database
  - Library

3.2.2 Information Technology and Application Resource

The Technology Resource model describes the hardware and software used to support the business environment, considering communications and processing needs, geographic locations, data volumes, and types. The model includes the user's view of the application resources and general Hanford Site utilities used and/or available to support the SNFP processes, for example, the following:

- Information technology
  - Network type
  - Cabling
  - Application Server
  - Workstation hardware
  - Workstation software (e.g., ESOE)
  - Nonstandard hardware and software
  - Mainframe
  - Internet access
- Application
  - SNFP-owned
  - WHC central system
  - other available resources

- General user application software
  - electronic mail
  - calendaring
  - word processing
  - spreadsheet
  - data base
  - CAD
  - project management/scheduling

3.2.3 Information-Management-Specific Business Processes

A number of IM services are available from onsite and offsite providers. Some are provided on a contract basis for specific tasks or deliverables while others are included in the infrastructure and are automatically accessible to most Hanford Site users. Standards and guidelines for IM activities exist to establish requirements and provide procedures for meeting them, so that work may be performed in house or by a servicing organization. The service area often has an open interface between the business process and the service provider, such that service levels and who does what can be tailored to business needs and capabilities. Examples of IM-specific business processes are the following:

- Records management
- Document production
- Document control
- Software development
- Information retrieval
- End-user training and support
- Data administration
- Technical editing
- Software configuration management
- File server management
- Internet publishing

3.2.4 Management Control

Management controls are seen as statements of mission, policy, performance targets, organizational structures, and procedures. The SNFP IMSC has been identified as the principal source of SNFP IM controls. As the architecture matures, its evolving management controls will serve as the mortar that glues its differing views and building blocks into a cohesive real-world system. Some examples of management controls in the IM area are:

- IM policy
  - Priorities
  - Use of standards
  - Information security
  - Acquisition justification

- Standards
  - Software practice
  - QA requirement
  - Data quality objectives
  - Software packages
  - Protocol
  - Electronic deliverable
  - Information protection
  - Report format

- Resource allocation
  - IM/IT budget
  - IT utilization control
  - Choice of service provider
  - Service level
  - Nationalization

3.3 ARCHITECTURE MODELING APPROACH

The modeling techniques used in this section are adopted from the OPAL techniques used in *DMR Architecture*[2]. DMR Architecture provides a methodology and techniques for analyzing an organization and structuring it for change. It uses the "organization architecture" approach to describe the components of an organization, their relationships, and how they support the organization's objectives. This plan addresses the IM slice of the SNFP organization.

Two models are used in this architecture, a dynamic process model and an object relationship model. The models represent the business processes and relationships between architecture components, or participants, in the process.

Typically, a business process is modeled as a series of events (circles), participants in the events (rounded rectangles), and precedence relationships (arrows). An event represents the completion of an activity that produces observable change. A participant is a type of physical or abstract object that is involved in the event. Figure 3-1 is a high-level business process model. Three types of operational relationships between events and participants are depicted:

- **Do Relationship (double-headed arrow between participant and event).** The participant enables the event and is not consumed in the process. Examples of participants in DO relationships are operators, computers, and procedures.

- **Use Relationship (arrow heading from the participant into the event).** The participant is consumed during the event or undergoes a state change as a result of the process. Examples of

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[2] DMR Architecture is a proprietary product of DMR Group Inc., Montreal.

participants used in an event are K Basin sludge, organizational budget, and documents, which may change state from Rev. 0 to Rev. 1.

- **Change Relationship (arrow heading from the event into the participant).** The participant is created by the event or is the result of a state change caused by the event. Examples of changed participants are packaged concentrated SNF (created from the sludge), redistributed budget, and a Rev. 1 document.

The object-relationship modeling technique provides for associations among participants, as shown in Figure 3-2. Participant objects can be decomposed into specialization, composition, and other subtypes not illustrated in this plan.

Overall, the modeling techniques facilitate business process change by supporting analysis of existing processes and candidate revisions. Depending on the purpose of the model and the goal of the change, details can be added and removed to allow focus and process optimization. Participants can be decomposed to more specific components (e.g., computer to workstation or network server or mainframe). Computer-based tools are available to support drawing, maintaining relationships, documenting, and conducting optimization and alternatives analyses.

4.0 APPLYING THE ARCHITECTURE

Section 3 examined the generic business process from the perspective of an IM architecture. It is an SNFP principle that information management is an integral part of every business process. By focusing on the IM components of SNFP business processes, opportunities for improved effectiveness emerge. Information management successes in one business process can be leveraged into other processes with reduced cost and schedule impacts. While this is happening, common needs for infrastructure support surface and improvements can be cost-effectively deployed across a broad base.

The IM infrastructure supports four business process functions:

- Information acquired
- Information processed
- Information packaged
- Information released.

In this section, the architecture is applied to particular SNFP functional areas.

The following subsections have been divided according to cross-functional areas and project functional areas. For each functional area, some background is provided, each of the four IM functions and the IM infrastructure are discussed, and recommendations are made. In some cases, "quick hits" (activities that can be accomplished in less than six months or that have a high priority) have been identified and are presented. Many of the discussions reference software applications used to accomplish that function. Appendix C contains a summary list of applications used by SNFP.

4.1 CROSS-FUNCTIONAL AREAS

4.1.1 Document Management

The SNFP has a full spectrum of engineering, regulatory, administrative, and correspondence documents to manage. The documents produced and received include drawings, specifications, contracts, technical designs, project plans, topical reports, procedures, vendor information, reviews and audits, administrative correspondence, and reference materials. The document management effort is complex because of a workscope that combines operational, construction, characterization, and design efforts conducted by several contractors and subcontractors in a fast-paced environment.

A plan for managing SNFP documents, *Spent Nuclear Fuel Project Document Management Plan* (WHC-SD-SNF-MP-001 Rev. 0) is being implemented in FY 1996.

4.1.2 Advanced Information Generation and Delivery

Today, most documents are prepared on computers using word processors, drawing packages, spreadsheets, and other office automation software. During document preparation, electronic mail is frequently used to move files electronically between the SNFP staff for review and comment. However, the typical mode of final document distribution is paper-based.

Most organizations recognize that the computer can be a powerful ally in managing documents and information, but consider it too difficult and expensive to use. Newly evolving technology and the investments that some organizations have already made have created an environment in which an evolutionary path towards electronic document management in offices is possible and more cost-effective than managing documents manually. Field and construction workers will still rely heavily on paper (e.g., drawings, lists), at least for the foreseeable future. Work at the Site is under way to determine how to provide better electronic access and delivery of documents to users under current fiscal constraints.

4.1.2.1 Information Acquired. The SNFP documents may be generated by the project itself or come from outside sources. Documents generated by the project are almost always generated using a computer and standard desktop software packages like word processors, drawing packages, and spreadsheets. Because the software packages are common across the internal Hanford community working on the project, sharing files has been relatively straightforward (e.g., WordPerfect 5.1 is the commonly accepted form for sharing word processing files regardless of whether staff are using personal computers or Apple Macintoshes).

However, acquiring documents from subcontractors and other locations is not always so simple. The SNFP has instituted a policy of including specifications for electronic document format in the terms and conditions and statements of work for subcontractors. They call for documents to be delivered electronically in formats that can be handled by the onsite Hanford community.

Delivery of electronic drawings is currently a vexing problem. WHC and subcontractors do not always use the same versions of drawing packages. When the drawings are delivered in a different version than that used by WHC, they often cannot be handled by the software available to internal SNFP staff. Subcontracts and statements of work should specify requirements for delivery of drawings in a form that can be used by SNFP. In some cases this may require software upgrades by SNFP. In other cases subcontractors will have to upgrade or change software. Although there has been a WHC moratorium on upgrades to software, that limitation is expected to be lifted soon, so justified and cost-effective software upgrades can be made. If the moratorium is not lifted, an exception should be sought so the SNFP can obtain the upgrades it needs to handle these materials electronically.

4.1.2.2 Information Processed. Information technology is often being used in the processing of documents and other forms of information. Sections of documents are passed between project members using electronic mail. Comments

may be delivered electronically either as a separate document or by putting the comments directly into the body of the document. However, the final production of the document is most often done by printing pages of the document on paper, pasting up figures, and assembling the pages for reproduction and binding. All these paper-based steps are performed to prepare the document for physical distribution as a paper product once it is cleared for release. It is unlikely that the SNFP or any other project at the Hanford Site will completely move away from this method of producing documents in the near term.

While new technology will help improve electronic information management, there are current standard WHC processes that should be adopted by the SNFP. Subcontractors will need training on how these standards apply to them. Good business processes should be followed to protect the electronic versions of documents. Backups and physical security of the computers storing these documents should be routinely required. Consideration should be given to how electronic versions should be managed so electronic versions of paper documents found in the project files can be easily located.

4.1.2.3 Information Packaged. More and more, users are asking, "Can you send that document to me electronically?" Usually the answer is a partial yes. The text can be delivered electronically but figures are either unavailable electronically or have been generated in such a way that the typical user cannot display the electronic figures when they are sent. This method of transferring documents requires the intervention of two people. The requestor contacts a DCS service center, where a point of contact sends the requested document. When documents are available on line, human intervention is only required by the person desiring access to the document. Often, only a portion of the document is needed so it is advantageous and more cost-effective if the user can locate and process only the portions of interest. Being able to access not only the text, but also any figures, tables, drawings, or pictures associated with the document would also be advantageous. Internet technology, using a subset of the SGML called Hypertext Markup Language, can perform most of these packaging functions. In addition, links between documents can be established. For example, instead of simply referencing another document, a link to that document can be established so the user can move immediately to that document.

The SGML provides important packaging capabilities. As the technology matures, documents generated using the SGML can be processed even if the user's computer and the author's word processor are incompatible. Newer versions of word processors are able to generate SGML documents. The SGML "readers" to allow users to display and print SGML documents are also evolving. These trends will significantly change the way documents are prepared and packaged. The SNFP needs to plan for their eventual deployment.

Use of multiple versions of documents is an issue that must be managed by the SNFP. Many SNFP documents are released over time as different versions. Later versions of documents supersede earlier versions. However, material in earlier versions may have been the basis on which project decisions were made, and there is a need to associate that decision with its basis. The RMIS can accommodate all versions of a document, but those

versions are only linked through common document numbers, titles, etc. Also, the RMIS does not differentiate between the most recent version of a document and its predecessors. Users are responsible for identifying and using the proper version for their purposes. Provisions are also needed to easily link a decision to the appropriate version of a document. Full text search and creating links between and within documents can help address these issues.

4.1.2.4 Information Released. WHC has policies and procedures in place for reviewing documents and releasing information. These are described in Section 4.1.1.4.

Current WHC document review practices can be followed by SNFP as part of the information release process. However, technology and methods for electronic review and comment resolution are now available and have been used in some areas in WHC.

The increasing utilization of subcontractors and the desire of regulators and the public to have access to SNFP information, including readily available electronic access, increase the complexity of the information release process. If documents and other forms of information are to be released electronically, security provisions must be put into place to assure that documents are released only to the appropriate parties. Information technology exists that can assure appropriate release but this technology must be brought to the SNFP and implemented. Of even greater importance is that management control must be exercised to define the policy that identifies what cannot be released and to establish processes by which documents are released to interested parties.

4.1.2.5 Information Management Infrastructure. We cannot throw away what works and start over. Rather we must build on what is in place while working to improve the pieces that are either too limited or do not fit well into the overall evolving architecture. This document recommends that the SNFP support and participate in the development of a proposed information delivery architecture. Two topics important to the architecture, managing document images and the use of the SGML for document generation are discussed below. These two examples do not present all the issues associated for applying IT to documents, but they illustrate the complexity of the technology and its impact on the way work will be done in the future.

Image Technology is currently being deployed on the Hanford Site to effectively manage documents as electronic images. Linking this technology with Internet technology appears to be a feasible step for the SNFP to take in evolving towards effective and efficient document delivery. For several years, the Hanford Site has recognized the value of storing electronic images of paper documents. An electronic image can be thought of as an electronic "picture" of a piece of paper, photo, or drawing. This image captures not only the words contained on the page, but also any signatures, logos, or other marks on the paper when the image was created. The capability to capture images is especially important for older documents that may not exist in electronic form. The ISEARCH system provides for the management and electronic image storage of documents. The images are retrievable via RMIS. The system currently has online optical storage capacity for 11 million pages.

About 1.5 million are stored currently. The SNFP is considering how RMIS and ISEARCH can be used to support document management.

However, RMIS and ISEARCH are not the entire answer to managing documents. Storing documents as images has several disadvantages. Images are large and take a lot of storage capacity as well as network resources to move them between computers. Unless the images are scanned and converted into a processable electronic form, a full text search of the content is not possible. A user's capability to search for information in image form is limited to the identification and descriptive data stored in the associated RMIS database.

While storing images is important for historical information and records management, it is not the preferred method of handling documents that are available electronically or for documents being generated. Storing and accessing the electronic document in its native form is superior for most uses. Not only are the storage requirements smaller, a full text search is possible. Relationships between documents and document sections can also be stored and used during information searches.

SGML Today, the majority of documents at the Hanford Site are produced by a word processing package like WordPerfect, which uses its own internal format. Exchanging documents between software packages is limiting and difficult. The SGML standard was developed to better address problems of document packaging and the delivery of information in multiple media, including text, images, and video. The SGML is being actively promoted as a standard for technical documents by DOE. The introduction of SGML will mean major changes in the processes and skills applied to package information, and these are not currently understood. Work is under way at the Site to determine how to deploy and use the SGML, However, the immature SGML market, high cost of packages for generating SGML documents, and the limited expertise in using SGML will continue. At this point, the SNFP does not need to take action, but the project needs to be aware that these types of standards will change the way documents are generated in the future.

4.1.2.6 Recommendations. Support and participate in the development of an overall Hanford Site information delivery architecture that supports the electronic generation, management, packaging, and release of documents.

Use WHC standard processes for document and information release. Develop business processes that determine when documents can be released to the appropriate parties including internal Hanford Site staff, offsite contractors, and the general public.

4.1.2.7 Quick Hits. Perform a cost/benefit analysis to determine whether electronic document management (including electronic generation, packaging, and release) is feasible within the SNFP. Identify a quick hit such as managing comments on the SNFP EIS where electronic document management is applied and evaluate its success.

In conjunction with the electronic Technical Databook (TDB) and the SNFP Home Page, establish a pilot project to integrate the SNFP Home Page with the ability to retrieve ISEARCH images.

Develop a plan for achieving and maintaining compatibility of drawing packages with subcontractors. Coordinate with subcontractors to make sure products are delivered in an electronic form that the SNFP can use without losing information.

Investigate how workflow systems can be used for collaborative efforts, particularly document development. Workflow systems, such as those based on Lotus Notes, can be used to enable multiple reviewers to share comments, work on comment resolution, and make comments on comments. This technology has been investigated and looks promising, but funding limitations have precluded further piloting.

4.1.3 Decision Traceability

The documents and data leading to the SNFP technical decisions need to be maintained and associated with the information whose legitimacy depends on them. The two types of formal decisions are decisions against formally identified issues and engineering and programmatic decisions. A systematic method is needed to identify decisions made and trace back to the information on which they were based. The method should include tools, policies, and procedures, and provide control of the data. The current approach is to document all considerations leading to a decision in a single document.

The data needed to track decisions documents the environment for the decisions including the basis for the decisions (e.g., technology and engineering studies), safety considerations, risk, qualitative ratings, etc. It may also include configuration control and closure criteria. The information or documents used as the basis for the decision must be retrievable across the project and over time.

4.1.3.1 Information Acquired. Decisions that need to be made generally are derived from issues, technical needs, stakeholder concerns, or internal problems. Issues are currently identified in SNFP formal documents such as the *Spent Nuclear Fuel Project Technical Baseline Document* and the *Integrated Process Strategy for K Basins Spent Nuclear Fuel*. The issue or problem that requires a decision is documented and tracked as part of the decision-making process. Documents and other references are collected as needed to form the basis for making the decision. These references should be easy to locate and need to be tracked along with the issue and resulting decision.

4.1.3.2 Information Processed. The reference information is reviewed and analyzed to develop a rationale for making a decision. The information is generally evaluated against cost and schedule; health, safety, and environmental risks; technical, safety, and regulatory requirements; and technical feasibility. Most of this analysis is done manually, but tools to easily retrieve the reference information can be invaluable to both the decision-making and decision-tracking process. A baseline of accurate facts

and associated metadata (quality, source, pedigree, meaning, etc.) is needed to make and support decisions.

4.1.3.3 Information Packaged. The decisions made are documented, generally as formal SNFP documents. To ensure traceability, the specific reference information and rationale used to make the decision should also be documented along with the decision. Document management processes must be designed to ensure that early decisions and backup information are not lost as documents are revised. Also, decisions and decision bases need to be packaged in an indexed electronic form for easy, quick retrieval.

4.1.3.4 Information Released. The issue is brought to closure with the approval of the decision, based on established closure criteria. A configuration control process should be used and responsibilities for decision tracking approval determined.

4.1.3.5 Information Management Infrastructure. The TDB is being developed for the SNFP to make design bases available in appropriate format, with pedigrees and related reference materials. The SNFP responsibility for the TDB has not yet been assigned. Currently no automated tools are in use that identify decisions and associate them with the information on which they were based.

4.1.3.6 Recommendations. IM capabilities are needed that allow decision makers to trace their decisions back to the information used in making the decisions. Use the TDB where feasible to locate and access information used as the basis for decisions.

4.1.4 Commitment Management

A commitment is defined as "any task an individual or organization is assigned or agrees to perform for other individuals or organizations by a specific date." This is a different view of commitments from that presented in the discussion of Regulatory Commitment Tracking in Section 4.2.1. The type of commitments in this context (section 4.1.4) are also sometimes referred to as actions, action items, or activities. Commitments need to be managed and tracked in some way by every organization. Each organization must know that its agreed-on commitments and actions are being worked, by whom, when they are due, and when they are actually completed. Commitments are generally tracked by data such as source, due date, priority, assignee (name and/or organization), task description, and closure criteria.

Many organizations or projects, including the SNFP, need a consistent method to manage commitments and make them visible across the entire project. Commitments were not being managed effectively within the SNFP. No central visibility resulted in some action items being overlooked. The environment consisted of the following:

- Multiple or duplicate systems that were not integrated
- Ill-defined communication between parties
- No central tracking organization
- Areas where no tracking was done.

The situation was evaluated in May 1995. As a result, the SNFP decided to standardize on the Hanford Action Tracking System (HATS) for corrective actions, and the Activity Management System (AMS) for other commitments and action items. A corrective action refers specifically to measures taken to correct conditions adverse to quality, safety, or the environment and, where necessary, to prevent or minimize recurrence of the conditions.

Closely related to commitment tracking is the need to track issues that may derive from internal problems or stakeholder concerns. The data needed for managing these issues is similar to that needed for managing commitments and actions. It includes the source of the issue, description, due and closure dates, priority, status, resolution, responsible organization/person, and disposition. One specific concern for issues management is how to identify and provide visibility for the issues. Currently, issues arise with business functions, but no process exists to make them known to the project.

4.1.4.1 Information Acquired. Commitments are generally initiated by a source document or other request for an action (e.g., from management). Commitments that need to be tracked by the SNFP may result from any of the following:

- RL and WHC audits
- Corrective actions
- Nonconformance reports
- Correspondence
- Change control requests for procedures
- Report due dates
- Award fee and nonfinancial objectives
- Activities requiring resources
- Internal division requests
- Surveillances
- Occurrence reports
- Readiness assessments
- Meeting action items
- Milestones
- Work assignments
- Training issues
- Employee concerns
- Informal requests.

Initial information for the commitment/action is entered into the HATS or AMS through several central points of contact within the SNFP. At the time of data collection, the originating document and organization or person are identified. A due date may be specified by the originator or originating document.

4.1.4.2 Information Processed. After the initial data on a new commitment/action is collected, the source materials should be reviewed for understanding. Some negotiation with the originator on expected deliverables or the due date may take place. The actions necessary to satisfy the commitment are determined and an assignment of responsibility is made. The

commitment may also be broken down into subactions if required. A notification of the assigned commitment/action is made to the assignee. Some systems automatically make this notification via cc:Mail. The assignee can accept or reject the assignment. Relative priority for the commitment or action may be assigned at this time if it was not done earlier. The status of the action can be regularly updated as work progresses. The due date may be adjusted or the action reassigned if necessary. Coordination with other organizations and systems may be required, which may lead to additional actions.

4.1.4.3 Information Packaged. Generally two kinds of information on commitments/actions need to be packaged and released.

Individual commitments. Completion of the task(s) necessary to satisfy the action are documented, the actions and results are described, and a response is formulated. The date of completion is also documented.

Summary reports. Management often requires summary reports that provide visibility across the project based on criteria such as open items, delinquent items, items assigned to a specific individual or organization, etc. The HATS and the AMS both offer all users numerous reporting options for standard and ad hoc electronic reports. Hard-copy reports can also be generated by the user and distributed to management or nonusers if needed.

Requirements for archiving SNFP commitment information need to be determined. Closed items in the AMS are transferred to an archive table. This table can be deleted or transferred to a disk based on criteria established by the project. An interface from the HATS to the Search Hanford Accessible Reports Electronically (SHARE) database for archiving and trending has been considered, but requirements have not yet been defined.

4.1.4.4 Information Released.

Individual commitments. On completion of a commitment or action, based on agreed deliverables, the response or deliverables are released to the originator or other designated organization or individual. The originator then reviews the delivered information and makes the final determination whether to accept and close out the commitment.

Summary reports. Standard HATS reports are distributed electronically to a wide audience across the company through Soft Reporting. AMS summary reports can be generated by any authorized viewer or they can be distributed to management and others electronically via cc:Mail or hard-copy reports.

4.1.4.5 Information Management Infrastructure. The HATS and the AMS have been selected for use by the SNFP for commitment management and tracking. While much of the work of tracking individual commitments and actions could be done manually, doing so is very labor-intensive. The use of automated tools offers visibility across the project and provides the capability of easily providing summary reports. Both systems also include automatic notification capabilities through cc:Mail so that a manual process need not be relied on to ensure timely assignments.

Training has been given for both systems and they are in the process of being deployed. The HATS is a company-wide system, administered by a central group, with users distributed among WHC projects and organizations. The SNFP has been rapidly implementing its use of the HATS. However, training on the corrective action management process is still needed. The administration of the AMS is the responsibility of the SNFP. As of September 1995, AMS was not fully deployed within the SNFP and progress was minimal. Processes still needed to be developed or implemented and additional assistance in the use of the tool provided.

4.1.4.6 Recommendations. Complete the implementation and deployment of the HATS and the AMS for commitment management within the SNFP. This includes the processes as well as effective use of the tools.

Examine the needs for issues management (including identification) and its relationship to commitment management. Determine if the same or similar processes and tools can be used. Because the data needed is the same or very similar, leveraging what already exists may be possible.

4.1.4.7 Quick Hits. Deploy the HATS and the AMS in the SNFP for commitment management across all levels of users. This includes developing and implementing processes for managing commitments and actions, making sure all users understand the data, and providing additional training and assistance if necessary.

Evaluate the HATS and the AMS systems and associated processes to track issues. If appropriate, make necessary changes to the process to accommodate issues identification and management.

4.1.5 Budget and Schedule Processes

Budget and schedule information are managed by organization, WBS, cost account plan, contract, project, and other categories within the SNFP. The SNFP budget and schedule baselines are developed in concert with the SNFP technical baseline, according to schedules established by DOE-HQ programs, RL, and WHC. Baseline information is developed, assessed, approved, reported, and managed within the overall structure established by the WHC Management Control System (MCS). The MCS is described in WHC-EP-0388, *Management Control System*, and implemented by procedures in WHC-CM-2-5, *Management Control System.*

WHC is undergoing reengineering in a number of administrative areas, including business management. An architecture for WHC is being defined to support the company's operational needs and the RL's interface and integration requirements. The plan is to define a business management system architecture that will carry WHC through the end of the Hanford mission.

Application systems used by WHC for these processes are the following:

Budget

EPDS Environmental Planning Data System, for development and management of activity data sheets (ADS), which are submitted to DOE-HQ for budget planning and development.

FDS Financial Data System, eight modules used for contractor budget preparation, cost accumulation, performance measurement, capital and general accounting, under the WHC MCS

Soft Reporting
A network server application for distribution of FDS reports in display, printable, and downloadable formats

Schedule

PX WHC standard scheduling system. Commercial project management software

Primavera (P3)
Alternate software, used by the SNFP. Commercial project management software

Translators

Primavera-to-FDS
In-house product written for WHC/TWRS several years ago

Primavera-to-PX
In-house product written in 1995 to provide master schedule data to the WHC standard scheduling system.

Those actively involved in budget and schedule development (program business managers, activity managers, schedulers, responsible managers, and others) need powerful computers and efficient, reliable software to meet their deadlines. In addition, they need fast and dependable network support. Currently, problems with the level of workstation and network support need to be addressed.

4.1.5.1 Information Acquired. Inputs to the budget and schedule processes include candidate milestones, estimates and refinements developed within the SNFP, and the guidelines and constraints provided by program and company drivers and by contracting organizations.

Information initially arrives by correspondence, on paper, and typically is entered into EPDS, FDS, schedule, and working databases by SNFP personnel. Company-level data, such as service and overhead rates, may be entered centrally for use by all. The SNFP is responsible for knowing that all data in company systems is correct and consistent with guidance and constraints. Functional managers and budget/schedule personnel are responsible for maintaining backup information to substantiate their data.

An access-control approach allows personnel with planning responsibilities and a need to know access to developing data. Once the SNFP-level data is approved (for planning or budgeting or work or purchase), information is made accessible to broader audiences through Soft Reporting.

4.1.5.2 Information Processed. Budget and schedule data undergo a number of iterations before they are approved and work is authorized. Planning for projects may begin with schedule development based on a systems engineering technical baseline and/or specific requests or concepts. Resource allocations are associated with schedules, then used to develop budget scenarios. Milestone schedules are positioned in time based on schedule logic and budget and resource levels. Much of this activity is initiated years before the first project work is executed, and much of the activity is on a crash basis as late-breaking guidelines and new interface requirements are imposed at the eleventh hour.

Computer processing is essential to handle complex schedule and budget data and the multiple algorithms that result in critical paths, phasing under multiple constraints, and interrelationships of schedules and budgets. Alternate scenarios are evaluated, dissected, and regrouped often, and developers are challenged to maintain consistency and completeness with each new scenario.

4.1.5.3 Information Packaged. The MCS defines budget, schedule, and performance reports to meet diverse company and DOE requirements. The FDS maintains the data and includes packaged reports and rollup capabilities to accomplish these.

The Site Management System, company organizations, WBS, and other classification schemes challenge the packaging capabilities of the current systems that produce the information and the individuals who must interpret it. Organizing reports into the separate categories/classifications is the responsibility of the system that produces the information. Relatively sophisticated software that maintains appropriate classification attributes and disseminates the information is necessary so that data can consistently be sorted and selected for specific needs.

The Soft Reporting system was developed to support this need. It provides prepackaged reports on a scheduled basis. These are available on the screen, on paper, or downloadable for organization manipulation and further repackaging. Query capability assists in locating information. The system allows the user to limit printed and downloaded data to selected subsets of the full reports.

4.1.5.4 Information Released. Along with the extensive set of guidance and tools provided by the FDS, Soft Reporting, and project management software, the MCS establishes rigorous baseline management controls over budget and schedule data. Thresholds are formally established for budget approvals, work authorization, contracting, and performance-report submittals.

Tools for managing budget and schedule configurations are provided by the FDS and project management software packages. When a data package is approved, the higher-level organization receiving it takes ownership, and a "system" outside of SNFP control (a WHC Finance organization) takes responsibility to ensure its protection and integrity. Good business practice within the SNFP requires maintenance of the originally signed papers and

support material, as supported by records management and correspondence control processes.

4.1.5.5 Recommendations. Document the budget/scheduling processes and determine if the information retained, data flow, and tools are optimal to support internal processes given current SNFP programmatic, company, and project constraints. Recommend improvements.

4.1.5.6 Quick Hit. Scheduling and budget personnel are constrained by old-technology workstations and network support that fails two to three times a week. The nationalization program could provide faster workstations until top-of-the-line processors are procured, and network alternatives may be available that would improve reliability. These should be investigated immediately.

4.2 PROJECT FUNCTIONAL AREAS

4.2.1 Regulatory

4.2.1.1 Information Acquired. Inputs to the regulatory process are the applicable regulations, the processes proposed to accomplish the SNFP mission, the technical and safety bases for the project, and the SNFP implementing documents.

4.2.1.2 Information Processed. The following regulatory functions manipulate the information acquired.

- Identify applicable regulatory requirements
- Ensure that the applicable regulatory requirements are met
- Conduct the appropriate safety analyses
- Prepare the required safety documentation
- Obtain the required approvals and authorizations for the SNFP activities and facilities.

Related subfunctions include the following:

- Establish the linkage between the driving regulations and codes and standards to the WHC implementing documents
- Establish the identifiers for the Price-Anderson-related requirements, the safety basis requirements, the RCRA-related requirements, and other applicable regulations
- Document the regulatory relationship to the project document hierarchy
- Establish a regulatory compliance strategy that addresses the complex context of the SNFP. (The early basis activities will be driven principally by DOE directives while the CSB will be driven

principally by the U.S. Nuclear Regulatory Commission regulations.)

- Establish a compliance strategy and plan traceable to chapter and verse of the applicable regulatory drivers
- Prepare surveillance audit sheets
- Report on regulatory compliance status
- Track and update project compliance strategy based on the evolving regulatory environment
- Demonstrate project compliance to the applicable codes and standards and regulations.

4.2.1.3 Information Packaged. The information generated by the regulatory processes can be packaged in a variety of ways. The project management plan calls for several reports that will document the status of regulatory compliance for the project. The regulatory requirements basis applicable to the Path-Forward facilities and activities are summarized in the *SNFP Regulatory Strategy* document (WHC 1995a). Details of the safety basis, including a detailed definition of the requirements that apply, will be included in controlled (and approved) SNFP design and safety documentation. The requirements basis approach will be different for many of the different subprojects. Because the K Basins are not new facilities, they will be addressed by the applicable DOE orders and directives. The DOE directives are documented via unreviewed safety question (USQ) evaluations and amendments to the K Basins safety analysis report (SAR). The multi-canister overpack (MCO) containers requirements basis will be by DOE directives and rules augmented as appropriate by Nuclear Regulatory Commission (NRC) requirements and documented in a design/topical report. Transportation systems for onsite transportation, including demonstration of a level of safety comparable to NRC regulations, are documented in the packaging design criteria (PDC) and onsite safety analysis report for packaging (SARP). The CSB and the stabilization facility requirements basis is established by DOE directives and rules augmented by Title 10 *Code of Federal Regulations* (CFR) Parts 0-199 requirements and documented in a single SAR prepared to DOE Order 5480.23 format and content.

Table 4-1 summarizes the safety documents required for the K Basins modifications, MCO containers, the transportation system, the CSB, and the stabilization facility. The required safety documents are discussed in more detail in the *SNFP Regulatory Strategy* document (WHC 1995a).

Table 4-1. Safety Documents Required for the SNFP.

Program Element	Rqmts Doc	PSE	EA	EIS[1]	USQ Revws	SAR	IOSR & ISB Docs[2]	MCO Design/ Topical Report	SARP	PDC	TSR (5480.22)	ORA/R (5480.31)

K Basins Modifications	✓	✓[3]	✓		✓	✓[4]	✓[4]					✓
MCO Containers	✓	✓		✓	✓			✓				
Transportation System				✓	✓				✓	✓		
Canister Storage Building	✓	✓		✓	✓	✓					✓	✓
Stabilization Facility	✓	✓		✓	✓	✓					✓	✓

[1] Environmental Impact Statement for expedited fuel removal from K Basins.
[2] Including a HAZOPS evaluation of proposed K Basins modifications.
[3] The Preliminary Safety Evaluation will cover any K Basins capital projects.
[4] Amendment(s)/Revisions to existing SARs.

4.2.1.4 Information Released. The regulatory-requirements basis for the SNF Path-Forward projects will be developed and documented in controlled functions and requirements document(s) that will form the basis for facility and equipment design. Requirements will be reviewed and approved early in the conceptual design phase of the SNFP. A regulatory review team, with joint WHC and DOE membership, will facilitate the review and approval process.

The review and approval process is consistent with and based on the approaches to regulatory compliance, safety analysis, and documentation defined in the DOE's *Regulatory Policy* (DOE 1995), the *SNFP Regulatory Strategy* document (WHC 1995a), the *SNFP Safety Analysis Review and Approval Plan* (WHC 1995b), and WHC-CM-3-5, Chapter 12.7, "Approval of Environmental, Safety, and Quality Affecting Documents" (WHC 1994b). The review and approval process for the SNFP transportation and packaging activities is documented separately in the *SNFP Safety Analysis Report for Packaging (SARP) Approval Plan* (WHC 1995c).

Construction and operation of the SNFP facilities will be authorized under current DOE statutory authority and DOE administrative processes. DOE directives and rules form the basis for authorizing SNFP activities. DOE's policy is that new SNFP facilities will achieve nuclear safety equivalence to comparable NRC-licensed facilities. This will be accomplished by augmenting DOE requirements with NRC regulatory requirements as necessary to achieve nuclear safety equivalence and by adopting appropriate features of the NRC licensing process. The authorization approach for each major SNFP program element is described in detail in the *SNFP Regulatory Strategy* (WHC 1995a). The regulatory document review and authorization process is key to the progress and initiation of each SNFP project subelement design and construction process. This review and authorization process includes the following items.

- DOE authorization to begin fuel and sludge removal will be implemented in accordance with the operational readiness assessment/review (ORA/R) process of DOE Order 5480.31.

- Design and fabrication of the MCOs do not require DOE authorization as part of the regulatory process. However, certain DOE programmatic reviews and approvals may be required.

- The transportation system will be reviewed and operations will be authorized by RL under the current administrative process for Hanford onsite shipment. This process includes a demonstration of safety comparable with NRC regulatory requirements.

- The authorization process for the CSB will involve documentation of facility safety using a single SAR prepared to the format and content guidelines of DOE Order 5480.23. Facility funding authorization and construction authorization will be based on a preliminary safety evaluation and the environmental impact statement (EIS). The SAR/TSR preparation, review, and approval process will be completed during the construction phase and will provide the safety basis for authorizing facility operation. An ORA/R will be conducted in accordance with DOE Order 5480.31 before operating authorization is granted.

- The stabilization facility safety basis will be documented in a single SAR. The authorization process will be identical to the CSB process.

The review and approval processes are described in more detail in the *SNFP Safety Analysis Review and Approval Plan* (WHC 1995b).

4.2.1.5 Information Management Infrastructure. Establishing and recording the safety and regulatory processes of the project will be accomplished by a combination of hard-copy documentation supported by electronic data and document systems. The electronic solutions implemented to support the general project data management, and document management functions should be sufficient to meet the general regulatory documentation requirements.

An additional level of IM and analysis is required to support the regulatory compliance status and control processes. The regulatory function for the project requires that a chapter-by-chapter analysis be conducted to develop the project-specific interpretation and compliance strategy. An electronic system is needed to track the applicable modifications to the regulatory and/or compliance strategies. Systems are available to document and analyze the compliance to regulatory standards. The project systems engineering and the Hanford standards/requirements identification document (S/RID) approaches to regulatory interpretation and compliance demonstration are being developed. Commercially available systems used in the commercial reactor industry are being evaluated, as are software systems that have been developed to meet the DOE infrastructure requirements.

The following is a preliminary set of requirements that the desired regulatory commitment tracking system must meet.

1) Commitment ownership
   - enter commitments, change/update commitments, assign responsible parties

2) Link from DOE Order, letter, key decisions, etc., to implementing procedure

   - procedures should have direct links to assigning referenced commitments (letters, DOE orders, etc.)

   - ability to track from commitment side, how a commitment is implemented

   - inclusion of a warning that would appear if a user tried to change a procedural step that was tied to a commitment.

3) Keyword search/reporting for all commitments per project, per type of commitment (60-day compliance, etc.)

4) Procedural steps and key issues can/would include all commitments that may apply

5) A key issues list could be developed with all the appropriate commitments, etc., tied to it

6) Electronically available over HLAN (on a server attainable by path on any machine) and easy to use

7) Adequate support from BCSR (maintainer), low down time

8) Activity management privacy - appropriate access by personnel for changes/additions/etc.

9) Access to dockets, NRC regulations, DOE orders electronically with fully searchable text

10) Ability to cut/paste docket, NRC regulations, DOE orders into the regulatory commitment tracking system with the applicable reference.

4.2.1.6 Recommendations. The regulatory function should adopt the general information architecture established for the information and document management of the project. Further, a study should be conducted to establish the detailed requirements for the regulatory commitment tracking system and then to use these requirements to select an existing tracking application if possible. Currently, the HATS and the AMS are available to limited portions of the SNFP organizational elements. These applications should be evaluated for applicability to regulatory commitment tracking before considering alternative options.

4.2.1.7 Quick Hits. A regulatory commitment tracking study is being conducted by Technical Resources International for the SNFP. This effort will use criteria similar to those presented here to evaluate the commitment tracking systems currently available to the project as well as those systems currently in use in the commercial sector. This study is expected to provide some technical guidance before November 1995.

4.2.2 Systems Engineering

The systems engineering function is responsible for establishing the systematic processes used to ensure that the technical requirements and basic design criteria of the SNFP subelements are clearly defined throughout design, acquisition, construction, and operation, including those imposed on all project participants and subcontractors.

4.2.2.1 Information Acquired. Information used as input to the systems engineering process includes the reports and technical bases documents that constitute the project programmatic requirements, technical requirements, regulatory requirements, characterization planning and data, and process engineering requirements.

4.2.2.2 Information Processed. The systems engineering processes are instituted during the formulation stages of the project and continue through the life of the project. The basic systems engineering process for the SNFP meets the requirements defined by DOE Order 4700.1. The SNFP will use the systems engineering process as a tool to aid in the development of a physical system which meets mission needs. The SNFP systems engineering process, as presented in the systems engineering management plan (SEMP), meets the intent of the Hanford Site systems engineering process and practices defined in the Hanford Site SEMP (WHC 1994) and the Hanford Systems Engineering Manual (WHC 1994).

The systems engineering process shall accomplish the following:

- Define the Mission
- Identify the functions to be performed
- Analyze and define the mission requirements and compliance requirements which apply to the functions
- Identify alternative architectures
- Evaluate these alternatives and select the architecture that best meets the requirements
- Perform tests to predefine metrics to verify that the mission requirements will be met
- Provide information for decisions.

4.2.2.3 Information Packaged. The information products resulting from the direct systems engineering activities include:

- An SEMP
- SNFP technical baseline document
- Functions and requirements (high level)
- Function diagrams
- Function hierarchy and descriptions.

4.2.2.4 Information Released. The systems engineering products follow standard WHC review, clearance, and release processes.

4.2.2.5 Information Management Infrastructure. Establishing and recording the SNFP systems engineering processes and products will be accomplished by a combination of hard-copy documentation supported by electronic applications. The electronic solutions implemented to support the general project data management, and document management functions should be sufficient to meet the general systems engineering documentation requirements.

The general commitment tracking requirements for the systems engineering function should be able to be addressed by existing commitment tracking systems in use by SNFP. The S/RID functions within the regulatory organization are similar to the regulatory and commitment strategies established under the systems engineering functions. The project systems engineering and the Hanford S/RID approaches to regulatory interpretation and compliance demonstration are being developed. The project is establishing a strategy that will optimize the performance objectives of both the systems engineering and regulatory organizations. Consequently, the commitment tracking technology assessment being addressed by the regulatory organization also should be reviewed in light of any additional requirements/needs of the systems engineering function. Commercially available systems that are in use in the commercial reactor industry are being evaluated as well as software systems that have been developed to meet the DOE infrastructure requirements.

4.2.2.6 Recommendations. The systems engineering function should adopt the general information architecture established for the information and document management of the project. The regulatory commitment tracking study being sponsored by the SNFP regulatory organization (See Section 4.2.1.7) should be broadened to address the combined requirements of both organizations. The general commitment tracking for systems engineering action items and project commitments should be able to be addressed by HATS or AMS currently available to SNFP on the network (See Section 4.1.4).

4.2.3 Process Engineering

The process engineering functions for the project are responsible for:

- Establishing the technical and safety bases for the project
- Providing process engineering support to the subprojects

- Establishing the SNFP Path Forward
- Providing technical interface between the SNFP and Hanford waste management organizations
- Preparing and maintaining all process flow diagrams
- Describing, acquiring, installing, checking out, and operating the SNFP Safeguard and Accountability System.

4.2.3.1 Information Acquired. Information to support the process engineering function will come from a wide variety of sources including:

- Technical literature review
- Review of existing SNFPs and/or facilities elsewhere in the U.S. and abroad
- Technical input from the SNFP technology support organization
- Data from the SNFP characterization organization
- Review of regulatory requirements and input from the systems engineering and regulatory organizations
- Review of the project management plan and all topical support plans that establish the project mission and functions and requirements
- Trade and engineering studies conducted by this and other project elements.

4.2.3.2 Information Processed. The process engineering organization will develop the process flow diagrams that support the mission analyses and functions and requirements that are provided by the systems engineering function. The process engineering functions will work closely during the early stages of the project definition with the systems engineering, technology, and characterization functions to establish the technical and safety bases for the project and to assemble the necessary data/information for the design and construction activities to process.

These early process development activities may generate trade or engineering studies, initiate technical studies that need to be addressed by the technology organization, and identify data needs that must be addressed by the characterization organization. The objective is to establish the basic process flow diagrams and data packages that describe and specify the process requirements. This information will be used to establish the technical baseline for the project. This technical baseline will be used as part of the information provided to subcontractors in support of design and construction. The process engineering functions will define feed and product characteristics for the various process streams that will allow decisions to be made relative to product, waste, or process stream specifications. These specifications

will be used to evaluate process subsystem performance specification. Acceptable process boundary conditions will be defined. Defining acceptable secondary waste stream characteristics with organizations that will receive the waste will allow process-related decisions to be made relative to the need for and/or degree of secondary waste treatment that will be required. Process parameters will be recommended in conjunction with technology organization for process control parameters. Based upon the type and quantity of special nuclear material that are identified for the various waste/process streams, a safeguards and accountability strategy will be defined and implemented. A significant amount of data collection and processing may be required to support the safeguards and accountability functions.

4.2.3.3 Information Packaged. The information products resulting from the process engineering activities include:

- Process engineering management plan
- Functions and requirements (lower levels)
- Process flow diagrams
- Process models
- Mass balance models
- Review and analysis of characterization data
- Trade studies, SD/SE Documents
- Product, waste stream, and process specifications
- Product performance models
- Function hierarchy and descriptions.

4.2.3.4 Information Released. The process engineering products follow standard WHC review, clearance, and release processes.

4.2.3.5 Information Management Infrastructure. Establishing and recording the process engineering activities and products will be accomplished by a combination of hardcopy documentation supported by electronic applications. The electronic solutions implemented to support the general project data management, and document management functions should be sufficient to meet the general process engineering documentation requirements.

The special information manipulation functions required by the process engineering organization are associated with the various source term, process, and product modeling requirements. There are a wide variety of commercially available systems that are available. Many systems have been used on other projects at the Hanford Site. The subproject design and technology organizations also have need of computer modeling support. Many of the personnel working within the project or for subcontractors will be looking for this type of modeling support. There could be significant cost and performance savings if modeling requirements are reviewed on a project basis for the potential of optimization of software selection. There will be many instances where a specific modeling application cannot be adapted for use in other project areas, such as for modeling ignition theory. However, some mass balance and process flow models could be used by both the process engineering and design subfunctions if a minimal degree of coordination and model selection is exercised.

4.2.3.6 Recommendations. The process engineering function should adopt the general information architecture established for the information and document management of the project. Also a general modeling requirements assessment should be conducted for the project so that potential common software applications can be identified, and if necessary, modeling software be recommended to project subcontractors so that there is intercompany compatibility.

4.2.4 Technology

The applied technology function is responsible for management of the SNFP technology acquisition activities and integration with the design and support functions, the systems engineering process, and the systems acquisition strategy to assure that the SNFP's technology needs are met in a timely and cost-effective manner. The Technology Acquisition Plan (TAP) is prepared by the Applied Technology Office as the basis for management of the resources allocated for resolution of technical issues in support of the SNFP mission. It includes the definition of the SNFP technical information needs, the strategy for acquiring this information, plus the scope, deliverables, and schedule for the tasks to be performed under the TAP. In addition, the TAP addresses a technical risk management basis, safety basis, valid process alternatives, and validation of systems engineering and Path Forward assumptions.

In this context, the purposes of the TAP are to:

- Identify, on an ongoing basis, technical issues that could impact the design or safety approval of the Path Forward and their relationship to the project schedule and to the systems acquisition strategy.
- Define the baseline technology acquisition tasks including scope, schedule, and deliverables needed to resolve these issues.
- Establish the strategy for acquisition of the necessary information through existing activities such as the Characterization Program, other DOE programs, acquisition of commercial capabilities, or additional SNFP tasks.
- Assess programmatic risks and identify the technology acquisition activities, if any, that should be undertaken to mitigate these risks.

The TAP, together with the Characterization Program and the systems acquisition strategy, is intended to address the full scope of the project's technical information needs. The TAP depends on the Characterization Program to provide the necessary data on physical and chemical characteristics and behavior of the fuel and sludges in K Basins. The TAP also includes areas not covered by the Characterization Program (e.g., behavior of MCO materials during wet-fuel staging, stabilization, and dry storage), preliminary design inputs that will be replaced with quantitative data from the Characterization

Program, evaluation of alternative technologies, assessment of technical and programmatic risks, and definition of the technology acquisition scope to be passed to the system suppliers.

4.2.4.1 Information Acquired. The requirements for technical information needed to support the SNFP mission will change as the project evolves. For example, preliminary information/enabling assumptions will be required in the preconceptual phase, more definitive information will be needed in the conceptual design phase, and validated design basis information will be needed in the detailed design and safety analysis phase. In addition to these varying information needs, there are multiple sources of technical information, both internal and external to the SNFP. These sources include the SNFP characterization program and activities funded by other DOE programs, existing commercial capabilities, international sources, and inspections, tests, or analyses designed specifically to address SNFP issues. Finally, the technology acquisition plans must be well integrated with the overall SNFP systems acquisition strategy to establish the scope of the technology acquisition activities to be passed to suppliers and to minimize delays or claims due to untimely or inadequate technical information from the project.

Information to support the technology acquisition function will come from a wide variety of sources including:

- Literature review
- Review of existing SNF projects and/or facilities elsewhere in the U.S. and abroad
- Technical input from the SNFP technology support organization
- Data from the SNFP characterization organization
- Review of regulatory requirements and input from the systems engineering and regulatory organizations
- Review of the Project Management Plan and all topical support Plans that establish the project mission and functions and requirements
- Trade and engineering studies conducted by this and other project elements.

4.2.4.2 Information Processed. The Applied Technology Project Office responsible for technology acquisition supports the development of the process flow diagrams, the mission analyses, and functions and requirements, and the technical bases established by systems engineering function. The technology organization will work closely during the early stages of the project definition with the systems engineering, process engineering, and characterization functions to establish the technical and safety bases for the project and to assemble the necessary data/information for the design and construction activities to process. These technology activities may generate technical studies, initiate engineering reports that need to be addressed by

the process engineering organization, and identify data needs that must be addressed by the characterization organization. The objective is to establish the basic process flow diagrams and data packages that describe and specify the process requirements. This information will be used to establish the technical baseline for the project. This technical baseline will be used as part of the information provided to subcontractors in support of design and construction. The technology organization will provide the technical bases for defining the feed and product characteristics for the various process streams, and allow decisions to be made relative to product, waste, or process stream specifications. These specifications will be used to evaluate process subsystem performance specification. Acceptable process boundary conditions will be defined. Defining acceptable secondary waste stream characteristics with organizations that will receive the waste will allow process-related decisions to be made relative to the need and degree or secondary waste treatment that will be required. Process parameters will be recommended in conjunction with the process engineering organization to establish process control parameters.

4.2.4.3 Information Packaged. The information products resulting from the direct technology acquisition activities include:

- Technology acquisition plan
- Technology assessment plan
- Technology reviews
- Technical databook (TDB)
- SNFP baseline document Input
- Path Forward technical bases
- Safety technical bases support documentation
- Process flow diagrams review
- Process and phenomena models
- Mass balance models
- Review and analysis of Characterization Data
- Technical Studies, SD/SE Documents
- Product, waste stream, and process specifications technical bases
- Product performance models
- Function Hierarchy and Descriptions.

4.2.4.4 Information Released. The TAP is a topical plan that supports the SNFP Management Plan. This is a record document that will be updated annually to provide the programmatic input to the multiyear program planning, and to provide annual guidance for the technology acquisition task funding and prioritization. The tasks that are directed and ultimately funded each year based upon the TAP guidance will generally be documented in technical or trade study reports. There will be additional sublevel planning documents of a more technical nature that establish the risk-based issues and strategies that the Applied Technology Organization will pursue in establishing the technical and safety bases for the project. There will be test planning documents that establish the strategies for issue closure via testing, process verification testing, process and safety model validation, and the bases for operational demonstration test programs. The technical reports may be record documents when establishing or communicating the direct input to the technical or safety baseline for the project. Typically, a document entitled "Technical Databook"

will be used to establish the general SNFP technical bases. This document will be a cleared document used to establish a foundation for the communication of technical information to outside stakeholders, outside contractors (technical consultant, A-E's), intra-DOE complex support organizations, and intra-SNFP organizations.

4.2.4.5 Information Management Infrastructure. Many of the processes of establishing and recording the technology acquisition activities will be accomplished by a combination of a hardcopy document supported by electronic applications. The electronic solutions implemented to support the general project data management and document management functions should be sufficient to meet the general documentation requirements.

The special information manipulation functions required by the technology acquisition activities or the Applied Technology Project organization are associated with the various source term, process phenomena (corrosion, ignition theory, gas generation, hydride formation), process, and product modeling requirements. There is a wide variety of commercially available systems that are available for process and mass balance modeling. Many systems have been used on other projects at the Hanford Site. The subproject design and technology organizations also have need of computer modeling support. Many of the personnel working within the project or for subcontractors will be looking for this type of modeling support. Some of the product and phenomena modeling requirements will involve computer modeling programs of a proprietary nature that are available only through a subcontractor or that may need to be developed. As with process engineering, there could be significant cost and performance savings if modeling requirements are reviewed on a project basis for the potential of optimization of software selection. Every effort should be made to use existing commercially available or existing specially developed modeling systems where available.

4.2.4.6 Recommendations. The technology organization should adopt the general information architecture established for the information and document management of the project. Also, a general modeling requirements assessment should be conducted for the project so that potential common software applications can be identified, and, if necessary, modeling software can be recommended to project subcontractors to ensure intercompany compatibility.

4.2.5 Characterization

Characterization data is generated when SNF samples are analyzed by analytical laboratories. Characterization data include data about the sample itself (where it came from, date sampled, size of sample, etc.) and physical and chemical properties of the sample (e.g., Ph, amount of various radionuclides, amount of various chemicals, etc.). Besides understanding the composition of an actual sample, characterization data can also be used (along with other data) to estimate characteristics and compositions of the fuel elements and canisters the samples represent.

Several other programs at the Hanford Site also manage characterization data. The TWRS stores tank characterization data and tank inventory estimates in its Tank Characterization Database (TCD). The Environmental Restoration Contractor stores environmental characterization data in the Hanford Environmental Information System (HEIS). While neither of these systems is designed to store SNF characterization data, extensive work has been done to design data structures, processes, and access mechanisms. The SNFP should leverage the work done on these two systems and can benefit from the lessons learned during their development and deployment. Modification of the TCD to meet the SNFP's characterization data needs would be straightforward and can be investigated as an option for managing SNF characterization data.

4.2.5.1 Information Acquired. Most analytical laboratories can report characterization result data electronically. The SNFP should make every effort to have this data delivered electronically. Experience has shown that it takes at least 20 times the staff resources to key in and verify data from paper compared to loading and verifying data received electronically. Some data such as sampling conditions, data quality objectives, and the exact location from which the sample was taken probably will not be coming from the laboratory. Processes must be established so this data is effectively captured and added to the database.

4.2.5.2 Information Processed. The volume of SNF characterization data is expected to exceed the project's capacity to manage it on paper. Electronic solutions to characterization data management vary from the implementation of a sophisticated database like the TCD to the management of the data using spreadsheet software like Excel. Some methods of information analysis can be performed simply using desktop applications like spreadsheets. More complex information analysis may involve statistical analysis software and simulation models. Electronic data interchange methods may need to be developed to support the movement of data into such tools. In some cases, the most important component of the analysis is what happens in the analyst's head rather than what the computer does. In these cases, the hardware and software should be viewed as a tool to support that analysis process rather than as the primary tool for the analysis.

4.2.5.3 Information Packaged. Once characterization data is stored in a database, users can gain access to it in various ways. Besides standard database query forms and languages, World Wide Web technology, such as that used by the TDB, can be used for online access. If needed by project members, routine reports can be generated and distributed, but it is recommended that most reports be generated based on user demand and distributed electronically. Some reports can be generated electronically for inclusion in reports and documents.

Another consideration of information packaging is the ability to move the characterization data from the database into other software tools where it can be visualized, analyzed, and modeled. With current software technology, moving data between applications (e.g., from databases to spreadsheets) on the same computer is relatively straightforward. To move data between computers, it may be necessary to develop electronic data interchange standards and conventions.

4.2.5.4 Information Released. The issue of when various types of users will be granted access to data also needs to be addressed. Some users will need access to data as soon as it is loaded into the database. In some cases, early analysis of the data is needed. Others need access to perform verification functions. The SNFP must decide whether access by other users (e.g., regulators) should be delayed until the data has been inspected and verified. This security issue is one that will affect how complex the database management software must be.

4.2.5.5 Information Management Infrastructure. If SNF characterization requirements do not justify the development of a database like the TCD, developing a multi-user, PC-based database using database software such as Microsoft Access, Paradox, or FoxPro should be considered. This database could be made available via a PC server to a wide user community. Storage of characterization data using a spreadsheet is not recommended because spreadsheets have difficulty dealing with complex data structures, and sharing the data across the wider user community is difficult.

4.2.5.6 Recommendations. SNF characterization data requirements should be analyzed to assess how sophisticated an approach to data management is needed.

The SNFP should leverage the lessons learned in implementing TCD and HEIS. Much of the TCD structure, data loading capability, software, sample numbering, and data management processes appear to be applicable to SNF characterization data.

4.2.6 Subprojects

The SNFP is composed of several subprojects that, when successfully completed, will fulfill the overall SNFP mission. The earlier topics in Section 4.2 dealt with some of the key SNFP functional subelements such as process engineering, technology, and characterization. This section addresses the IM needs and processes of the composite set of the SNFP subprojects:

- K Basins Projects
  - K Basins Upgrades
  - Fuel Retrieval
  - Sludge Retrieval
  - Debris Removal
  - MCO loading
  - Vacuum Drying
- Multi-Canister Overpack
- Transportation
- Canister Storage Building
- Fuel Conditioning Facility.

These projects have been combined for discussion because the information requirements of these entities are a microcosm of the larger SNFP IM requirements. Each of these subprojects has the same functional requirements as the larger project. These smaller projects, although linked through

configuration and interface requirements, will need to function largely as if they were independent projects. Most of the SNFP cross-cutting functions discussed earlier will be needed within the given subproject functions as well. Therefore, the functional performance for the cross-cutting elements needs to independently meet the information, documentation, and schedule needs of each individual subproject. This establishes an IM requirement that the information generated for the project as a whole also needs to be able to be partitioned and support the individual needs of the subprojects. The following sections describe the generic IM processes required to support these SNFP subproject elements.

4.2.6.1 Information Acquired. Documentation and data supplied by the SNFP cross-cutting functional subelements such as technology, process engineering, characterization, regulatory/safety, and systems engineering, will establish the technical and safety bases, the configuration management, issues management, functions and requirements, process flow sheets, and other project baseline information.

Each subproject will need to acquire or generate additional information or databases to complete the design and construction processes within its mission. This additional information could come from a variety of sources, including the following:

- Literature review
- Review of existing SNF interim storage projects and/or facilities elsewhere in the U.S. and abroad
- Subproject-specific support by the Applied Technology Project Office
- Subproject-specific data from the SNFP characterization organization
- Subproject-specific review of regulatory requirements and input from the systems engineering and regulatory organizations
- Review of the project management plan and all topical support plans that establish the project mission, functions, and requirements
- Trade and engineering studies conducted by this and other subproject elements.

4.2.6.2 Information Processed. The subproject organizations will further develop the subproject level process flow diagrams that support the mission analyses and functions and requirements that are provided by the systems engineering function. The subproject organization will work closely during the early stages of the project definition with the process engineering, systems engineering, technology, and characterization functions to establish the technical and safety bases for the subproject and to assemble the necessary data/information for the design and construction activities to

proceed. These early process development activities may generate trade or engineering studies, initiate technical studies that need to be addressed by the technology organization, and identify data needs that must be addressed by the characterization organization. The objective is to establish the basic process flow diagrams and data packages that describe and specify the process requirements. This information will be used to establish the technical baseline for the subproject. This technical baseline will be part of the information provided to subcontractors to support design and construction. The subproject will be responsible to define feed and product characteristics for the various process streams that will allow decisions to be made relative to product, waste, or process-stream specifications. These specifications will be used to evaluate process subsystem performance specification. Acceptable process boundary conditions will be defined. Defining acceptable secondary waste-stream characteristics with organizations that will receive the waste will allow process-related decisions to be made relative to the need and degree of secondary waste treatment that will be required. Process parameters will be recommended in conjunction with the technology organization for process control parameters. Based on the type and quantity of special nuclear material identified for the various waste/process streams, a safeguards and accountability strategy will be defined and implemented. A significant amount of data collection and processing may be required to support the safeguards and accountability functions.

4.2.6.3 Information Packaged. Many of the information and data packages for the SNFP will also be required at the subproject level. These include the following:

- Subproject management plan
- Subproject process engineering management plan
- Subproject baseline document
- Subproject functions and requirements
- Subproject process flow diagrams
- Subproject process models
- Subproject mass balance models
- Subproject review and analysis of characterization data
- Subproject trade studies, SD/SE documents
- Subproject product, waste stream, and process specifications
- Subproject product performance models
- Subproject function hierarchy and descriptions
- Subproject regulatory and safety documentation.

4.2.6.4 Information Released. The subprojects will have much the same review authorization and release requirements as the SNFP as a whole.

4.2.6.5 Information Management Infrastructure. Many of the processes for establishing and recording the subproject activities will be accomplished by a hard-copy document supported by electronic applications. The electronic solutions implemented to support the general project data management and document management functions should be sufficient to meet the general documentation requirements.

The special information manipulation functions required by the subproject process engineering, technology, and regulatory support functions will be a subfunction of the overall project organization. The systems that are acquired to support the SNFP as a whole for these activities will support the subprojects as well. The subprojects will require the additional information processing and interface of a coordinated and consistent computer-based design program. Multiple architect-engineer (A-E) subcontractors and subsystem suppliers will be providing design drawings generated by computer. Many issues associated with compatibility, consistency, and design drawing configuration requirements need to be addressed. A wide variety of computer-aided drafting or drawing (CAD) software is available. The latest versions are not always available to all users. The project should review the available CAD systems, and review A-E preferences and trends to establish a recommendation for CAD system requirements within the project. (What systems are needed by project staff to be able to interface with outside systems.) This may require some system/technology upgrade. An SNFP policy will be needed to establish contracting requirements for all the SNFP subcontractors that will result in design media that are compatible with the recommended site CAD systems or approach.

4.2.6.6 Recommendations. The subproject functions should adopt the general information architecture established for the information and document management of the SNFP. A general CAD requirements assessment should be conducted for the project so that potential common software applications can be identified, and if necessary, software be recommended to project subcontractors to ensure inter- and intracompany compatibility.

5.0 TRANSITION PLAN

The transition plan presents recommended activities that can lead to a more effective IM environment for the SNFP. Some improvements have already been made or initiated, while others could be initiated immediately. The recommendations cover activities of varying duration and complexity. They need to be validated and prioritized by the IMSC.

5.1 FISCAL YEAR 1995 ACCOMPLISHMENTS

A number of IM topical areas were identified by the SNFP or the IMSC in the early stages of this IM planning project. In some cases, immediate actions were initiated to resolve problems. The following summary lists actions already accomplished or under way in FY 1995. Work in many of these areas continues into FY 1996.

- The SNFP IMSC was formed.
- The IMPP created a high-level plan for the SNFP IM activities.
- The computer "nationalization" process is under way to provide PC capabilities to those who need them.
- ESOE software upgrades are under way.
- A compiled SNFP document set on the pedigree of K Basin Fuels was scanned into ISEARCH.
- A BCSR file server was loaned to the SNFP for the Home Page and TDB.
- The SNFP TDB was implemented and made available to some users.
- Processes are in place to maintain the TDB contents using WHC engineering change notices.
- A SNFP Internet Home Page was established.
- The technical feasibility of linking the Home Page to the RMIS and the ISEARCH was demonstrated.
- Computing equipment including computers, software, and HLAN connections were provided for Fluor-Daniel staff.
- Procurement verbiage for subcontracts and statements of work was put in place.
- Commitment management automation was addressed.
    - The HATS is now available and being used.

  - Some users are trained in the AMS but more work is needed.

- Document management issues were addressed.

  - The SNFP document management plan was written

  - The decision was made to use the RMIS/ISEARCH for storing images of both record and nonrecord material using a common database and common processes.

  - The decision was made to manage project files with a centralized index and decentralized files. Some material will be managed centrally.

  - Correspondence control issues are being investigated.

5.2 RECOMMENDATIONS

The recommendations presented include both quick hits and longer term recommendations. The quick hits in the following sections are marked with an asterisk. Some recommendations are based on coordination with related activities, and some are fully funded by other sources. Others will require some SNFP funding. The recommendations are divided into the following categories:

- Information Management Steering Committee
- Process improvement
- Technical data management
- SNFP Home Page and TDB
- Document management.

The recommendations are numbered sequentially overall with an "R" in front of each number. Each is described according to customer, capability provider, justification, timeframe, approach, status, and affected activities. Note that some of the recommendations do not have all items filled in. The timeframe, customer, and capability provider were based on the information available to the IMPP team on the current SNFP or WHC environment. Where these items are not filled in, they depend on identification or prioritization by the IMSC.

The recommendations result from either the architecture principles (Section 2.0) or of an examination of the functional and cross-functional areas presented in Section 4.0. All of the recommendations can be associated with one or more principles. This relationship to the principles is shown in Appendix D, and is one criterion that can be used for prioritizing the recommendations. Most of the recommendations are also related to specific IM topics of concern to SNFP management early during the IMPP (see Appendix E).

5.2.1 Information Management Steering Committee

R1. IMSC Roles. Use the IMSC to adopt standards and set SNFP IM priorities. The IMSC, as a cross-functional team, can best evaluate the risks and costs of IM activities, and determine appropriate standards.

Customer: SNFP Management

Capability Provider: IMSC

Justification: Funding for IM activities is limited. A process is needed to assure that those IM activities that are funded are agreed to and represent the best investment for the entire Project. This can also help prevent duplication of effort. The adoption and use of standards can accelerate the integration of new IM capabilities for SNFP.

Timeframe: Ongoing; start in FY 1996

Approach: Make this responsibility part of the IMSC charter.

Status: The IMSC meets regularly and has begun to look at prioritization of the recommendations listed in this document.

Affected Activities: All SNFP IM activities.

R2. IM Responsibilities and Authorities. Assign IM responsibilities and associated authority to appropriate SNFP data stewards (organizations, individuals, or cross-functional teams). A data steward is any person or group who creates, maintains, uses, or supports data. The decision should be made as to which IM functions are centralized and which are decentralized, and how all functions should be coordinated. Some responsibilities are an integral part of the business process and must be distributed to the business process owners. Other functions can best be managed by organizations or teams external to the SNFP. The responsibilities must be understood by SNFP management and the responsible organizations.

Customer: SNFP Management

Capability Provider: IMSC

Justification: Without directly assigning responsibility, duplication of effort or gaps in IM may occur.

Timeframe: FY 1996

Approach: Assign responsibility for this delegation to IMSC. Communicate to staff.

Status:

Affected Activities: All SNFP IM activities.

R3. IMSC Technical Planning and Coordination. Technically plan and coordinate IM activities for the IMSC. The planning should take advantage of IM infrastructure available and lessons learned from other IM activities within WHC and the site.

Customer: IMSC

Capability Provider: Ed Wells and members of IMPP team

Justification: Technical planning and coordination is needed to ensure that SNFP IM technical directions are sound and consistent with Hanford Sitewide IM directions.

Timeframe: Ongoing

Approach: Sponsor a continuing planning and coordination project that includes the development of an information architecture for SNFP.

Status: The IMPP started work on quick hit activities in FY 1995, and provided recommendations for FY 1996 and future activities to the IMSC.

Affected Activities: All SNFP IM activities

R4. Data Management Plan. Develop a data management plan for the SNFP to be added as a chapter to *Data Management Plans for Hanford Site Business Functions* (RL-94-94). The *Hanford Federal Facility Agreement and Consent Order* requires Hanford Site business functions to have data management plans.

Customer: Carla Hages

Capability Provider: WHC/CDM

Justification: RL has requested that an SNFP chapter be added to the current (1994) set of plans. The 1994 version contained only a recognition of the SNF function within the "Deactivate Facilities/Nuclear Material Management" chapter. The plan can also be used within the project to document current practices and promote effective management of data resources.

Timeframe: An updated RL-94-94 is to be submitted to RL by August 1, 1996.

Approach: WHC/CDM will draft the plan based on the IMPP and other documents, with validation by SNFP management.

Status: Much of the basis for a data management plan has already been identified as a result of the IMPP effort.

Affected Activities:

5.2.2 Process Improvement

R5. Commitment Management.* Use the HATS and the AMS to provide a standard computer-based commitment management process across all of the SNFP. This includes the processes as well as effective use of the tools.

Customer: Carla Hages

Capability Provider: WHC/CDM

Justification: The need was identified as specific problem to the IMPP.

Timeframe: First quarter FY 1996

Approach: Develop new processes as needed and implement existing processes for managing commitments and actions. Ensure that all users understand the data, and provide additional training (including the corrective action management process) and assistance if necessary.

Status: The HATS and the AMS tools are already implemented, and the HATS is in use by SNFP. Some additional training and development and implementation of processes are still needed.

Affected Activities: All those who track SNFP commitments.

R6. Issues Management. Define an IM process for issues management. Examine the needs for issues identification and management and the relationship to commitment management.

Customer: Carla Hages

Capability Provider: WHC/CDM

Justification: The need was identified as specific problem to the IMPP.

Timeframe: FY 1996

Approach: Determine whether issues management can be implemented using commitment tracking processes and software (i.e., HATS and AMS). The data needed is the same or very similar, providing an opportunity to leverage what already exists. If appropriate, make necessary changes to the commitment management process to accommodate issues identification and management.

Status:

Affected Activities: Commitment management.

R7. Data Stewardship Training.* Perform data stewardship training/workshops for appropriate staff. The data stewards will be those identified as responsible in Section 5.2.1.2. The training will provide SNFP staff with an understanding of data management processes and provide information on data stewardship responsibilities.

Customer: Carla Hages and SNFP data stewards

Capability Provider: WHC/CDM

Justification: Staff need to know what is involved in managing data appropriately and effectively.

Timeframe: First quarter FY 1996

Approach: Conduct stewardship training workshops within the SNFP organizations to increase knowledge and understanding of data management processes and responsibilities. Determine what additional IM capability training is needed.

Status: The training is available.

Affected Activities: Assignment of IM responsibilities

R8. Decision Bases. Provide decision makers with the capability to trace back to information used in making those decisions. IM capabilities can help provide an easily accessible baseline of facts and support the analysis process used for making decisions.

Customer: All SNFP

Capability Provider:

Justification: Over time, it is difficult to trace back to the bases on which decisions were made.

Timeframe:

Approach: Investigate how document management, the TDB, and other IM tools can be applied to locate, access, and analyze the information used as the basis for decisions. Determine what capabilities can be provided easily and quickly to facilitate traceability within the timeframe of the SNFP.

Status: Most information used in making decisions today is managed manually. In some cases, the information on which decisions were based may be difficult or impossible to find.

Affected Activities:

R9. Collaborative Work Environment. Use IM capabilities to create a collaborative work environment. The project structure of a small team with external support must rely on effective communication and feedback. Relevant information needs to be readily accessible and sharable among all project participants.

Customer: All of SNFP

Capability Provider:

Justification: Software products such as Lotus Notes, Windows for Workgroups, and Marmot can improve the efficiency of a geographically diverse team.

Timeframe:

Approach: Pick an effort to pilot the use of collaborative software and document lessons learned. Investigate how workflow systems can be used to enable multiple reviewers to make and share comments and work on comment resolution.

Status: Collaborative software has been piloted in other areas at the Hanford Site.

Affected Activities: Collaborative SNFP efforts such as document generation and review.

R10. Budget and Schedule Technical Upgrades.* Improve network reliability and replace low-end workstation hardware for budget and schedule staff.

Customer: Seeley Magnani

Capability Provider: BCSR

Justification: Workstations are barely adequate for tasks. Network failures require fixing data two to three times per week.

Timeframe: Immediately

Approach: Meet with service providers to define needs and develop solution. Replace 386 and low-end 486 workstation hardware with high-end workstations as soon as possible. Use the nationalization program as needed. Accelerate improvements in network connections between scheduling and budget work locations and servers necessary to do routine work.

Status: The nationalization program is in place and can be used immediately to provides upgrades that would at least serve as an interim solution until top-of-the-line processors can be procured.

Affected Activities: SNFP budget and scheduling activities.

R11. Budget and Schedule Process Improvement. Analyze the SNFP internal budget and schedule activities to determine whether process improvements can be made. Recommend improvements as appropriate.

Customer: Jeff Denning and Seeley Magnani

Capability Provider:

Justification: Rapid response time and unpredictable demands create incremental work for managers and support staff.

Timeframe:

Approach: Convene a cross-functional SNFP team to work with an IM core analytical team. The team will use an extension of the methods in this plan to describe the current architecture and recommend improvements. Document the data flow for developing, integrating, and maintaining the SNFP budgets and schedules to isolate procedures and tools dictated by external processes (e.g., WHC MCS) from the SNFP internal activities so that areas under internal control can be analyzed. Determine if the information retained, data flow, and tools are optimal to support internal processes given current SNFP programmatic, company, and project constraints.

Status: BCSR and SNFP personnel discussed the concepts in September 1995.

Affected Activities: WHC reengineering and BMS proposal are being developed.

5.2.3 Technical Data Management

R12. Technical Data Management Tools and Processes. Determine if the SNFP engineers have the electronic tools and processes they need to acquire, validate, maintain, and distribute SNFP technical data.

Customer:

Capability Provider:

Justification: Data is a valuable asset to the SNFP and needs to be managed appropriately. This effort can improve electronic data acquisition and sharing across the SNFP, focus data development efforts, reduce redundant efforts to define and locate data, and support regulatory traceability.

Timeframe:

Approach: Convene a cross-functional engineering team and apply the process used in the IMPP. Document the data, data flow, and data management methods used in the SNFP engineering activities. Develop an engineering data management plan that considers:

- Ensuring traceability and maintenance of data used
- Existing and future data sets
- Data Sources--technical literature, statement of work, SNFP program, and internally developed data
- Data quality
- Guidelines for documentation and configuration management.

Status: BCSR and an SNFP technical data management team discussed the concepts in Spring 1995.

Affected Activities:

R13. Modeling Software. Develop an integrated plan for managing modeling software used for the SNFP characterization and engineering activities. This plan should also address the requirements for project subcontractors to ensure intercompany compatibility.

Customer: Peter Shen

Capability Provider:

Justification: Redundancy can be eliminated or avoided by leveraging modeling efforts through coordination and common software.

Timeframe:

Approach: Convene a cross-functional engineering team to assess and recommend modeling and software approaches. Identify software needs to complete the Path Forward, regardless of whether work is performed in house or by contractors. Assess currently identified software tools and supporting platforms for adequacy. As needed, develop a plan for acquiring and integrating capabilities for optimal SNFP use.

Status:

Affected Activities: Technical Data Management.

R14. Characterization Data Management. Cost-effective methods of managing, protecting, and disseminating the SNFP characterization data are needed. The volume of the data is expected to exceed the capacity of the project to manage it on paper. Therefore electronic solutions need to be considered.

Customer: Characterization

Capability Provider: PNL

Justification: Characterization data is a valuable and expensive project resource needed by many staff.

Timeframe:

Approach: Analyze the SNFP characterization data requirements and develop plans for meeting them. Assess approaches used by the TWRS and environmental restoration/remediation. Lessons learned in implementing TCD and HEIS can be leveraged, because much of the data and processes appear to be similar to SNF characterization data.

Status:

Affected Activities: Characterization data managers and users.

R15. Regulatory Commitment Tracking. Establish a regulatory commitment tracking system for the SNFP. The system will support regulatory compliance

and must fit into the framework of information and document management established for the SNFP.

Customer: Jack Garvin, Kent Daschke

Capability Provider: Technical Resources, Inc. (TRI) study with BCSR/PNL/WHC support.

Justification: The SNFP needs a computer-based system to document and status the regulatory compliance strategies and commitments against the driving regulations and standards documents.

Timeframe: By December 1995

Approach: Establish requirements and recommend a solution based on an evaluation of commitment tracking systems currently available at the Hanford Site, as well as other systems currently in use within DOE or commercial industry.

Status: The SNFP regulatory organization is sponsoring a study that will establish the requirements for the SNFP regulatory commitment tracking, assess the technology available within the DOE complex and the commercial nuclear reactor industry, and recommend a preferred system.

Affected Activities: S/RID, SNFP systems engineering regulatory compliance.

R16. Compatible Software Versions of Drawing Packages.* Develop a plan for achieving and maintaining compatibility of drawing packages with subcontractors.

Customer: Larry Nilsen

Capability Provider:

Justification: It is important (and cost-effective) that contractors and subcontractors interchange drawing products using compatible versions of software.

Timeframe:

Approach: Through contracting mechanisms and statements of work, coordinate with subcontractors to make sure products are delivered in an electronic form that the SNFP can use without losing information. Upgrade software versions of drawing packages if necessary to achieve compatibility.

Status:

Affected Activities:

5.2.4 SNFP Home Page and Technical Databook

R17. SNFP Home Page.* Establish processes for deploying and maintaining the SNFP Home Page.

Customer: Carla Hages

Capability Provider: PNL and BCSR

Justification: Although the Home Page is available for use, the necessary processes have not yet been defined.

Timeframe: Early FY 1996

Approach: Identify SNFP steward and develop needed processes.

Status: Hanford and SNFP Home Pages exist. A point of contact has been identified.

Affected Activities:

R18. SNFP Home Page Integration with RMIS and ISEARCH.* Provide user access to RMIS and ISEARCH directly from the SNFP Home Page and TDB. Make provisions for control of unreleased information.

Customer: Carla Hages

Capability Provider: PNL and BCSR

Justification: While using the Home Page or the TDB, users will be able to retrieve, view, and print ISEARCH images.

Timeframe:

Approach: Develop and deploy technology to enable this integration.

Status: Proof of concept work is under way.

Affected Activities: Home Page and TDB users.

R19. Technical Databook Implementation and Deployment. Complete implementation and deployment of the TDB and turn over to BCSR for maintenance.

Customer: Paul Scott

Capability Provider: PNL and BCSR

Justification: A change management facility is needed.

Timeframe: First quarter FY 1996

Approach: Complete the change management software and deploy. Install on more users' computers. Hand off maintenance to BCSR. Assign responsibilities and determine the processes necessary for SNFP to manage the TDB, including the decisions regarding what information needs to be available.

Status: An initial version of the TDB is in use with another version to be deployed soon.

Affected Activities:

5.2.5 Document Management

R20. RMIS and ISEARCH Deployment. Through document service centers, continue to deploy RMIS and ISEARCH to provide image storage of record and nonrecord material.

Customer: All of SNFP

Capability Provider: BCSR

Justification: WHC has policies and procedures in place for releasing and managing documents. These should be followed by the SNFP.

Timeframe: First quarter FY 1996

Approach: Use existing technology and processes to meet project needs. Central WHC document management functions provide the technology and processes for records management, document distribution, and document preservation.

Status: An SNFP document management plan has been written.

Affected Activities: All SNFP processes.

R21. Advanced Information Retrieval. Participate in the Information Delivery Architecture initiative to investigate how to apply additional IM technology for full text document searching and information retrieval.

Customer: All

Capability Providers: BCSR and PNL

Justification: Online access makes documents and other information more readily accessible to the SNFP community.

Timeframe: FY 1996-FY 1997

Approach: Apply Internet technology, SGML, and PNL-developed technology in conjunction with RMIS/ISEARCH.

Status:

Affected Activities:

R22. Electronic Document Generation.* Through pilot efforts, analyze costs and benefits of electronic document management, including electronic generation, packaging, and release.

Customer: Carla Hages

Capability Provider:

Justification: As a fast-track project, the SNFP is looking for opportunities to reduce costs and improve efficiency.

Timeframe: FY 1996

Approach: Choose pilots from multiple options such as file server share areas, tracking and tagging via the SGML (e.g., end-point criteria work), etc., and apply to an effort like the SNFP EIS. Evaluate the success of the pilots and determine future direction for SNFP.

Status: BCSR is developing an overall Hanford Site information delivery architecture that will support electronic document management.

Affected Activities:

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APPENDIX A

ARCHITECTURE PRINCIPLES

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This appendix describes in detail the principles on which the candidate IM architecture for the SNFP is based. The principles are listed in Section 2. Architecture principles describe the rules by which an organization structures, uses, manages, and controls its processes, resources, products, and services. They may deal with business processes, management control, technology, applications, or the information itself. The principles provide direction and information for IM decisions.

The following information is provided for each principle:

- A short title
- A statement of the principle, i.e., the rule to be applied
- The relative priority indicated as high, medium-high, medium, or low
- The rationale explaining the benefits to be delivered and why this principle is important to the architecture
- The implications of what the principle means for IM. The implications are an indication of what actions need to be taken.

P1. Optimize for Fast-Track

Statement: The SNFP accepts the requirement that it be conducted as a fast-track project and has adopted the following "subprinciples" toward success:

- Build on the foundation established by the Path-Forward recommendations.
- Establish adequate fuel conditions (end product state) for interim storage with a defensible technical basis.
- Minimize the number and complexity of process steps.
- Use simple, proven, and commercially available equipment where possible.
- Implement defense-in-depth safety principles.
- Minimize the need for complex engineered safety features to make the safety case.
- Minimize construction and modifications at K Basins.
- Implement parallel processing lines where required to maintain throughput.

Priority: High

Rationale:

- The Path Forward recommends an expedited baseline.
- IM must support the principles and the accelerated path.

Implications:

- IM Enhancements and modifications must be realized quickly. (Example: quick hits already initiated.)
- The architecture must provide effective and efficient IM capabilities that allow project personnel and other stakeholders to access and use information quickly and easily (e.g., on-line access to databases, documents, and records).
- Use simple, proven, and commercially available information technology and software applications where possible.

P2. Ensure Relevant Information is Accessible to Meet Project Requirements

Statement: Relevant information needs to be readily accessible to the SNFP functional elements and external entities to accomplish the work. Users will be able to find out what information is available and relevant, access it using routine processes, and use it within their business processes with minimum effort or misinterpretation.

Priority: High

Rationale:

- The information necessary and sufficient to answer the questions of the intended audience must be provided (e.g., for engineering studies).
- The information needed can generally be found, but not always easily.
- Sometimes, in the effort to make information readily available, documents contain too much information. Over time, the volume of documentation snowballs, making it increasingly difficult to address new problems in historical context.

Implications:

- Information must be stored, organized, managed, and made accessible in a consistent and logical way. A project infrastructure must exist to support this activity.
- Information can be lost over time because of the document revision process. Document management processes must be designed to ensure that early decisions are not lost if current document revisions are all that are readily accessible.
- Cross-referencing, robust indexes to related information, and automated storage and retrieval capabilities can help SNFP personnel locate, trace, and reuse the SNFP knowledge base.

Examples of the issues and kinds of information needed follow.

- Relevant information is needed to support SNFP technical information and allow the Project to determine the environment in which decisions were made.
- Regulatory information is needed that identifies and tracks regulatory requirements applicable to the SNFP, and ensures and documents that compliance.
- SNFP commitment, action items, and critical project activities must be available and visible to SNFP management.

- SNFP-approved budgets and schedules need to be accessible and costs accurately tracked to ensure effective resources management.

P3. Conduct SNFP Using a Small Project Team with External Organizational Support

Statement: Much of the functional performance of the Project will be through outside contracts and matrixed organizations.

Priority: High

Rationale:

- Project mission is accomplished by many different organizations. Some of these organizations are only loosely connected, but all must interact effectively.
- The current trend at the Hanford Site is toward outsourcing.

Implications:

- It cannot be assumed that WHC standards and culture will automatically be applied to SNFP activities.
- The project structure requires specific emphasis on effective and efficient communication of SNFP information among all participants. (See Principle #15.)
- All internal and external suppliers and users must be committed to support the necessary communication of information among all project participants.

P4. Leverage Off What Others Have Done

Statement: SNFP will use successes and lessons learned about IM processes, standards, systems, etc., from other projects wherever possible and appropriate.

Priority: High

Rationale:

- Because SNFP is following an accelerated schedule, IM projects must be accomplished quickly.
- Funding is tight, and learning or development is costly and time-consuming.

Implications:

- Existing technologies and systems on- and offsite should be evaluated for application to SNFP needs.
- Communications with other Hanford Site projects, centralized WHC functions, other DOE sites, and other external entities (e.g., utilities) should be established to learn about successes and failures.
- The SNFP must be flexible to adapt existing capabilities for SNFP use (e.g., RMIS for project files).

P5. Organize to Balance Autonomy and Integration

Statement: Organizations within the SNFP have autonomy to select contractors, methods, and tools to accomplish their assigned functions. To ensure integration of specific design elements and operational effectiveness, the SNFP establishes cross-functional, cross-organizational teams. In addition, a certain level of integration is needed to support functions common across the entire project. A balance of responsibilities and authority must be defined to ensure both autonomy and the required integration.

Priority: Medium-high

Rationale:

- SNFP is a project with multiple subprojects.
- Flexibility is needed to do the job in the most cost-effective way.
- Cross-project information is needed for SNFP management to make decisions for the entire project.
- Autonomy may result in independent, but redundant IM solutions.

Implications:

- Methods to effectively integrate data from separate processes are needed.
- Standards should be established and followed to control redundancy (e.g., for IM tools and software applications).
- A cross-functional, cross-organizational IM team is needed to provide guidance and direction in managing SNFP information. (The IMSC was formed in June 1995 to accomplish this objective.)

P6. Provide Traceability to Preserve Institutional Memory

Statement: Traceability of information inputs and decision bases will be provided to preserve institutional memory. The institutional memory will include the basis on which decisions were made.

Priority: Medium-high

Rationale:

- The Hanford Site is suffering the impacts of turnover, loss of staff, retirement, use of subcontractors, and increasing documentation requirements. These trends are expected to continue.
- A baseline of accurate facts and associated metadata is needed to make and support decisions.
- An accessible information base for decisions helps them to survive future challenges.

Implications:

- A process or method for preserving memory is needed.
- IM capabilities are needed that allow decision makers to trace their decisions back to the information used in making the decisions.
- IM capabilities to support decision-making should be easy to use, accessible, and support the analysis process.
- Metadata should be retained.

P7. Use WHC Information Technology Infrastructure When Known and Appropriate

Statement: The SNFP will use the standard WHC IT infrastructure components, including network, hardware, software, services, and processes, where known, available, and cost effective.

Priority: Medium-high

Rationale:

- Standard architecture and compatible infrastructure components are available for use within the SNFP.
- Use of a standard infrastructure can help the SNFP select and put into service new IT capabilities and integrate them into the user domain.
- Current SNFP workstation capabilities may not be compatible with the Site infrastructure. The capabilities span a variety of technologies that employees brought to the project.

Implications:

- The WHC infrastructure should be used where appropriate to bring standard, supported capabilities to the SNFP end user.
- Information about the WHC IT architecture standards and standard products supported must be communicated to users to inform them of standards and available IT capabilities.
- Following a standard infrastructure can be a constraint to meeting specific end-user needs; individual needs should be accepted and accommodated so that all users have access to basic IM capabilities and resources.

P8. Apply WHC Document Management System and Processes for SNFP Use

Statement: Documents should be identified and managed to Site requirements by organizations contracted to perform engineering support functions or by WHC-level techniques that capture them through procedural means (e.g., correspondence control procedures). The SNFP needs to optimize and apply WHC processes for records management, data management, and document control, while customizing the processes where necessary to meet their unique needs.

Priority: Medium-high

Rationale:

- The types of information that need to be controlled and archived have not been completely identified and documented for the SNFP.
- Document management processes must be established and followed, so that loss of configuration control or record information (with associated liability) does not occur.
- Effective document management processes have been established centrally for WHC.

Implications:

- The SNFP needs to use what is available and effective. Only where this does not meet their needs, should they look at customizing systems and processes.
- Training and orientation must be provided so that potential users are aware of existing capabilities and processes.
- Controlled and record information needs to be defined and identified.
- When the controlled information has been identified, information using and producing procedures will need to be extended.
- Additional or new technologies (e.g., imaging) to support document management need to be identified.

P9. Value and Preserve Metadata

Statement: Metadata (i.e., data about data) will be valued and preserved.

Priority: Medium-high

Rationale:

- Metadata describing the data's content, quality, source, pedigree, meaning, values, features, etc., can be critical for engineering and making decisions.
- Metadata has many uses, including organizing and maintaining an organization's investment in data, providing information to aid data transfer, and increasing understanding of and trust in data.
- To ensure that plans and decisions can be reevaluated in the future, knowing the contextual information (or metadata) related to issues, decisions, and actions taken, including the associated premises and considerations is important.

Implications:

- Processes and mechanisms are needed to ensure that the metadata are captured along with the data.
- Users need to be educated as to the value of and need for metadata.
- The metadata needed to support business processes and decisions must be defined.
- Metadata should be used to enable data-sharing and information-locator services.

P10. Use a Formal Decision Process for Deployment of IM Technology

Statement: A decision process for deploying IM technology needs to be implemented and used. Decisions relative to technologies need to be based on cost-benefit analyses. The actual costs must be weighed against the SNFP IM principles such as preservation of institutional memory and improved communications, along with management of risks associated with safety, security, and regulatory requirements. The SNFP will provide optimum IM support by providing needed capabilities while minimizing expenditures.

Priority: Medium-high

Rationale:

- IT can be used to provide more efficient systems and processes.
- New computer hardware, software, or upgrades must be considered to address safety, health, and critical issues.
- The risks and costs of using paper vs. electronic forms of data and data management methods must be weighed.
- Short-term cost-benefit of return on investment may be critical because the project is on a fast track. Currently, there is no standard way to show the cost/benefits of acquiring new technology.

Implications:

- The value of electronic methods (including multimedia) of data management, document dissemination, configuration management, etc., should be evaluated, minimizing the use of paper-based methods.
- Considerations for new technologies need to consider the minimum requirements for the project, as well as a longer term interest in developing tools that can make follow-on projects or activities more effective.
- WHC infrastructure, standards, and central programs (e.g., computer nationalization) are available at little or no cost, and should be used where appropriate to optimize SNFP IM capabilities.
- Cost-benefit analyses must be performed.

P11. Support IM Training

Statement:
Management must support necessary and sufficient training so that SNFP staff can use IM capabilities on a regular and routine basis to optimize their effectiveness.

Priority: Medium-high

Rationale: Training (including familiarization and orientation) is essential to ensure both awareness and knowledge of IM capabilities.

Implications:

- Training in IM capabilities and systems must be available.
- User support for existing IM capabilities must be provided.
- IM systems and applications must be documented.
- Training plan templates could be developed.
- Informal training, such as "brown-bag" sessions, should be considered for minimal impact to work schedules.

P12. Coordinate Centralized and Decentralized IM Processes

Statement: Authority and responsibility must be defined and coordinated for SNFP IM processes. Some processes are most effective when managed centrally, while others should be decentralized and assigned to the appropriate organizations. Implement links between the organizations to ensure that all aspects can function together where needed.

Priority: Medium-high

Rationale:

- A lack of effective communications and coordination inhibits locating and sharing information.
- Information must be managed to meet specific needs, but also be accessible and readily usable to others who need it.
- All aspects of IM must work together to be most effective.
- Without a coordinated approach, individual organizations often devise their own methods of managing the data they create or depend on, with limited consideration given to making that data available to others who need it.
- Ready access to historical information may be lost unless all aspects of IM are coordinated.

Implications:

- The management of data must be distributed to those who create it or have responsibility for decisions regarding it.
- IM processes should be identified and metadata for responsibilities, interfaces, requirements, etc., developed.
- The centralized and decentralized IM processes could vary somewhat for different business processes. For a business process, a determination should be made on the distribution and responsibilities for the IM processes. Examples of IM processes that are typically most effective when centralized or decentralized follow:

Centralize	Decentralize
• Infrastructure	• Ownership of data resources
• Priorities	• Responsibilities for IM
• Standards	• Ownership of processes
• Access to data resources	
• Interface control	
• Nationalization	

P13. Make Appropriate, Cleared Information Available to Stakeholders

Statement: Stakeholders (regulators, Indian Nations, public, etc.) will be provided ready access to relevant, cleared information in an appropriate form. Protection for the data's integrity must be assured.

Priority: Medium

Rationale:

- Tri-Party Agreement regulations require that regulators be given access to certain project information.
- Project concerns include providing adequate protection for raw, uncleared, or unofficial information.

Implications:

- Automated processes, along with applicable policies, procedures, and standards, are needed for accessing, storing, exchanging, and protecting operational data and information.
- A support infrastructure is needed to enable customers to understand, access, and use data appropriately to meet their needs.
- Standards for information release need to be determined. The standards must address the metadata to be included.

P14. Integrate IM into the Normal Business Process

Statement: IM must be an integral part of normal business processes rather than a separate function. This includes data capture and acquisition, access to data resources, electronic communication, configuration management of the data produced and used in the process, and training and support.

Priority: Medium

Rationale:

- Information supports the business process, and the management of the information includes the products, services, and procedures of a business function, as well as the automated components.
- Project staff spend a significant amount of time performing IM activities in support of their primary work.
- IM technologies that are incorporated as part of the business process can often provide more effective and efficient ways to do business.

Implications:

- If IM is not integrated into business processes, it is often treated as an ancillary activity that receives little attention when time or money is tight. This leads to incomplete and insufficient data that is inadequate to project needs.
- IM should be addressed in the project management plan.
- Management must be involved in IM.
- IM capabilities can and should be implemented to make the IM activities more effective and efficient (less time-consuming).

P15. Communicate Project Information to all Participants

Statement: A reliable process will be implemented and used that allows for effective, efficient, and appropriate communication of project information to project staff, subcontractors, DOE, regulators, oversight committees, matrixed organizations, the public, and other stakeholders.

Priority: Medium

Rationale:

- The project structure is based on a small SNFP team with extensive work and support coming from external sources (e.g., subcontractors, matrixed organizations).
- SNFP information has multiple sources and delivery points.
- There is a continuing need for communication of SNFP information and for processes that enable that communication.
- Current communications are often not effective or do not occur because processes are not well established or implemented.

Implications:

- A reliable IT network and associated capabilities can help support, facilitate, and enhance communications. Capabilities to consider include bulletin boards (physical and electronic), imaging, and readily accessible databases and information repositories.
- Standard forms and formats for information exchange are needed to ensure efficient and effective completion of SNFP information tasks.
- All internal and external suppliers and users of information must be aware of the capabilities and standards, and how to access and apply them.
- Costs can be reduced by avoiding paper consumption and duplicating costs, providing ready access, and eliminating the need for recycling.

P16. Challenge External Controls

Statement: SNFP is subject to controls established by WHC, DOE, and Federal, State, and local regulations and agreements. These controls govern the SNFP's ways of doing business and its products. The project will challenge external controls that impede achieving its cost and schedule objectives without adding safety, quality, or cost/schedule value.

Priority: Medium

Rationale:

- Because the SNFP is a fast-track project, the impact of regulations and requirements on the project schedule must be weighed carefully and challenged where necessary to meet project milestones.
- Changes in requirements could have a significant impact on the cost and schedule of the project.
- The project is moving toward risk-based management.

Implications:

- IM requirements and standards (imposed by sources external to the project) should be evaluated against the SNFP architecture and challenged where necessary to ensure that project objectives are met.
- Inhibiting regulations and controls will be questioned and overturned, over time, but not with complete certainty. The SNFP must continue to follow the rules as they exist while working to change them, or consciously accept the legal risks of noncompliance.
- Established processes for applying for exemption from standards or requirements should be used where they exist.
- Decisions to reduce bureaucracy (management and administrative requirements) must consider the technical and managerial impact to the project as well as the cost and schedule effects.

P17. Design Business Processes and IM Capabilities Together

Statement: The design of business processes and IM capabilities must be integrated. Efforts to improve or redesign business processes must be made to meet the needs of the business, as well as considering current technology that could enhance or improve the business process. The availability of new IT will not drive application development. However, process design/redesign should recognize the contribution available from IT.

Priority: Medium

Rationale:

- IM capabilities that are implemented and designed outside the context of a project business process often are not accepted by the project, require significant rework, or cause project processes to be changed. Any of these consequences costs additional funds and inconvenience.
- Computer applications and technology support are often an integral part of a business process.
- IM technologies that are incorporated as part of the business process can often provide more effective and efficient ways to do business.

Implications:

- Develop processes that ensure that both IM and the SNFP participate in the design of both business processes and IM capabilities.
- The design of the IM capabilities should support the business processes used by different SNFP functional elements, providing consistency in the data while allowing flexibility to meet varying needs.
- IM capability design must not be allowed to get ahead of or be done in isolation from business process design.

P18. Track and Manage IM Costs

Statement: IM costs will be tracked and managed to meet DOE and WHC requirements.

Priority: Low

Rationale:

- DOE believes that visibility of IM costs is needed to effectively manage and control them.
- When IM is integrated into the business process, costs also tend to be merged and difficult to isolate.
- Boeing's costs are summarized in SMS WBS 6.4; other IM costs are in ADSs and other places.

Implications:

- A requirement to track and manage IM costs is expected from DOE.
- "IM costs" must be defined before they can be tracked and managed.
- Company requirements and guidance can be followed to achieve this principle.
- A process and responsibilities must be established within the SNFP for tracking and managing costs (e.g., What is the role of the IMSC in this issue?).
- Tracking and managing IM costs may not add value for the SNFP. This principle and associated activities should be evaluated against the SNFP architecture and objectives for value provided and challenged if necessary. (See Principle 16.)

APPENDIX B

PRINCIPLES MATRIX

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Many of the SNFP principles discussed in Section 2 and Appendix A are related to other principles and may overlap. This occurs because the principles cover different views or aspects of the project such as business processes, management control, technology, applications, or the information itself. A given principle may result in implications for another principle or enter into the rationale.

Table B-1 shows which principles are related to other principles. The rows of the table are labelled with the principle number and a significant keyword to make the mapping easier to understand. The columns contain only the principle number. The following list of principles is also provided as an aid to reading the table. The key word(s) used in the table are shown in bold type in the following list.

P1. Optimize for **Fast Track**
P2. Ensure Relevant Information is **Accessible** to Meet Project Requirements
P3. Conduct SNFP Using a **Small** Project **Team** with External Organizational Support
P4. **Leverage** Off What Others Have Done
P5. **Organize** to Balance Autonomy and Integration
P6. Provide **Traceability** to Preserve Institutional Memory
P7. Use WHC Information Technology **Infrastructure** When Known and Appropriate
P8. Apply WHC **Document** Management System and Processes for SNFP Use
P9. Value and Preserve **Metadata**
P10. Use a Formal Decision Process for Deployment of IM **Technology**
P11. Support IM **Training**
P12. Coordinate Centralized and Decentralized **IM Processes**
P13. Make Appropriate, **Cleared Information** Available to Stakeholders
P14. Integrate IM into the Normal **Business Process**
P15. **Communicate** Project Information to all Participants
P16. Challenge **External Controls**
P17. **Design** Business **Processes** and IM Capabilities Together
P18. Track and Manage IM **Costs**

Table B-1. Relationships between Principles.

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18
P1. Fast Track																X		
P2. Accessible Info						X			X				X					
P3. Small Team															X			
P4. Leverage							X	X										
P5. Organize												X						
P6. Traceability		X							X									
P7. Infrastructure				X				X		X		X						
P8. Document				X			X											
P9. Metadata		X				X												
P10. Technology							X										X	
P11. Training															X			
P12. IM Processes					X		X							X				
P13. Cleared Info		X																
P14. Business Process												X					X	
P15. Communicate			X								X							
P16. External Controls	X																	
P17. Design Processes										X				X				
P18. Costs																		

APPENDIX C

APPLICATION RESOURCES USED BY SNFP

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The automated systems used by SNFP are listed in Table C-1. They are divided into two groups. The first contains the systems that are owned and managed by organizations or individuals within SNFP. They are systems that, in general, were developed for specific SNFP purposes. The second contains company- or sitewide systems, used by SNFP, that are managed by another organization within WHC or another Hanford Site contractor.

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Table C-1. Applications Used by SNFP.

SysId	Acronym	System Name	Purpose	Status	Contact	Org
APPLICATIONS OWNED BY SNFP						
11910	KBOP	K Basins Operating Procedures	Track operating procedures status from release to records holding.	Op	KR Morris	V1420000
11146	MAC	Material Accounting System	Tracks the movement of non-irradiated and irradiated fuel through various formats and locations through the Hanford Site.	Op	KR Morris	V1420000
11907	KB ORSTAT	K Basins Occurrence Reports & Status Information	Track occurrence reports status, PPG ratings, and completion of reports containing corrective actions	In Dev	SL Sorenson	V1400000
11466	SAMPLE	Sample Tracking Program	Track status and movement of samples. Sample tracking system for K Basins NPDES/environmental and operational samples.	Op	CD Lucas	V1420000
11914	SNFIS	Spent Nuclear Fuel Integrated Schedule	Provide an integrated resource-loaded schedule to support SNFP. There are no plans to electronically transfer cost account data to FDS.	Op	KG Squires	V0000000
11537	SSP	Standby Surveillance Procedures	Track, update, and report monthly the status of SSPs for testing and calibration of equipment. 100K Operations.	Op	RS Shipp	V1210000

SysId	Acronym	System Name	Purpose	Status	Contact	Org
	TDB	Technical Databook	The Technical Databook is a relational database intended to make design bases available in appropriate format, with pedigrees and related reference material.	In Dev	PA Scott	V0000000

SysId	Acronym	System Name	Purpose	Status	Contact	Org
WHC OR SITE APPLICATIONS USED BY SNFP						
10593	AMS	Activity Management System	Provide a project-wide tool, available for use by all project personnel, to support the day-to-day activities of the project and individuals.	Op	KC Christensen	P2500000
11901	CCMAIL	cc:Mail System	Database sets up the appropriate user environment including connections to network resources and puts the user into cc:Mail. This database includes all users on the Hanford site for all companies and many offsite users who work for companies contracted to Hanford.	Op	DJ Magruder	N8400000
10760	CVI	Certified Vendor Information	Provides a mechanism to track all vendors associated with packages of work. Provides detailed information on items provided by vendors and usually references on blueprints.	Op	GB Vondruska	N7700000
10872	EPDS	Environmental Planning Data System	Integrates multiple environmental and waste management planning and/or financial data groupings. The EPDS suite of applications includes PTS, ADS40, CMM, BCC, and MVT.	Op	JE Tarcza	PF220000

SysId	Acronym	System Name	Purpose	Status	Contact	Org
10909 -16	FDS	Financial Data System (8 modules)	Budget preparation, cost accumulation, performance measurement, and capital and general accounting for WHC.	Op	SL Koreis	PB700000
11770	HATS	Hanford Action Tracking System	Corrective-action tracking system for Hanford Site (replaced QUEST).	Op	TM Lutter	P2500000
11022	HPC	Hanford PeopleCORE	Central repository of data related to people associated with Hanford Site. The information is disseminated to those with a need for location, company, and employee information.	Op	PL Blowers	P2500000
11745	IPIMS	Integrated Project Information Management System	IPIMS is a Paradox (4.0) database that collects information about projects from a number of source databases - schedule, permitting, budget, milestones, etc. It provides an automated way of relating information so the user can find out all there is to know about a specific project.	Op	ER Kuhn	YK630000
11092	ISEARCH	Information Services Electronic Archiving	Records archival and retrieval.	Op	CL Davis	N7500000

SysId	Acronym	System Name	Purpose	Status	Contact	Org
11102	JCS - ADP	Job Control System - Automated Data Processing	Provides ADP support to implement the requirements of WHC-CM-1-8 to manage maintenance work.	Op	DM Payne	J5100000
(DOE-HQ)	ORPS	Occurrence Report Processing System	A DOE-Headquarters system that tracks occurrences at all DOE sites. All DOE operations and field offices enter occurrence reporting information directly.	Op	DJ Connell	YA000000
11911	RBAD	Requirements-Based Assessment Database	RBAD is the repository for Phase 1 assessment information in support of the standards/requirements identification documents developed across the site. Each facility/activity will be responsible for maintaining its assessment status. As new and revised requirements are introduced, the database will be updated to reflect the change in requirements and new assessment information will be entered.	Op	MR Witherspoon	M8A10000
11415	RLPS	RL Property System	Provides property management and property accounting function in an integrated system for all Hanford Site contractors.	Op	BJ Miller	PB600000

SysId	Acronym	System Name	Purpose	Status	Contact	Org
11407	RMIS	Records Management Information System	Maintains inventory of all inactive records stored in RHA including retention and disposal dates, retiring organization, box. Retrieval of Hanford Site record material.	Op	CL Davis	N7A00000
11953	SARIS	Statutory and Regulatory Information Systems	Provides text search and retrieval capability from an online database that contains current statutory and regulatory requirements of DOE, NRC, and EPA.	Op	RE Mahan	PNL
11495	SHARE	Search Hanford Accessible Reports Electronically	Provides immediate access to documents containing information relevant to an inquiry using sophisticated full-text search and retrieval capabilities by indexing each word in every document. System is available for multiple data sources and applications, but is currently used for ORPS, ALARA Lessons Learned, and QUEST, HATS, and CICS records.	Op	MK Britton	P2500000
11514	SOF	Soft Reporting	Primary network reporting mechanism across the Site for major applications.	Op	KA Crace	N3800000

SysId	Acronym	System Name	Purpose	Status	Contact	Org
11189	TMX	Training Matrix	For management use to identify and track all required training for all personnel working within WHC areas.	Op	L Reed	JC410000

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APPENDIX D

RELATIONSHIP BETWEEN RECOMMENDATIONS AND PRINCIPLES

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The recommendations listed in Section 5.0 support and lead to the realization of the architecture principles. The principles are listed in Section 2.0, and discussed in detail in Appendix A. A summary list of the recommendations follows in Table D-1. Those marked with an asterisk have been identified as quick hits. The relationship between the recommendations and the principles is shown in Table D-2. The principles are listed in order of priority, as determined by the IMSC, and can therefore also be used as a guide to the prioritization of the recommendations. The quick hits identified may be another consideration for prioritization, because they can generally be accomplished in less than 6 months.

Table D-1. Recommendations List.

R1. IMSC Roles.
R2. IM Responsibilities and Authorities.
R3. IMSC Technical Planning and Coordination.
R4. Data Management Plan.
R5. Commitment Management.*
R6. Issues Management.
R7. Data Stewardship Training.*
R8. Decision Bases.
R9. Collaborative Work Environment.
R10. Budget and Schedule Technical Upgrades.*
R11. Budget and Schedule Process Improvement.
R12. Technical Data Management Tools and Processes.
R13. Modeling Software.
R14. Characterization Data Management.
R15. Regulatory Commitment Tracking.
R16. Compatible Software Versions of Drawing Packages.*
R17. SNFP Home Page.*
R18. SNFP Home Page Integration with RMIS and ISEARCH.*
R19. Technical Databook Implementation and Deployment.
R20. RMIS and ISEARCH Deployment.
R21. Advanced Information Retrieval.
R22. Electronic Document Generation.*

Table D-2. Relationship of Recommendations to Principles.

Principles	Recommendations																					
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22
P1. Fast-Track		x							x													
P2. Accessible Info					x			x	x		x	x		x			x	x	x	x		
P3. Small Team	x	x							x											x		
P4. Leverage			x	x	x	x					x		x	x	x	x		x		x		
P5. Organize	x	x	x						x			x	x	x	x	x						
P6. Traceability			x					x	x					x	x				x			
P7. Infrastructure	x		x		x					x		x	x			x	x	x		x	x	
P8. Document			x															x	x	x	x	x
P9. Metadata			x					x														
P10. Technology	x	x	x							x		x	x									x
P11. Training			x		x		x													x		
P12. IM Processes		x	x				x															
P13. Cleared Info	x			x					x			x					x	x				
P14. Business Process		x	x		x	x	x	x			x				x							
P15. Communicate	x			x					x			x		x			x	x	x			
P16. External Controls	x														x							
P17. Design Processes			x								x				x						x	x
P18. Costs	x										x											

APPENDIX E

SNFP INFORMATION MANAGEMENT TOPICS

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At the beginning of the Information Management Planning Project, 16 information management topics of concern to senior SNFP management were identified. Each of these topics can be related to one or more principles. They are also related to the recommendations in this document. Table E-1 briefly describes the original topics and shows their relationship to both the principles and the recommendations. Some of the topics are high level and correlate closely to a principle, while others may be at a lower level of detail or an example of an area of concern that has led directly to one or more recommendations.

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Table E-1. SNFP Information Management Topics vs. Related Principles and Recommendations.

TOPICAL AREA/SCOPE	RELATED PRINCIPLES	RECOMMENDATIONS
1. Documentation Management Engineering document control, records management, project libraries, correspondence management, information release, and related management processes related to documents	P4. Leverage Off What Others Have Done P8. Apply WHC Document Management System and Processes for the SNFP Use	**R20. RMIS and ISEARCH Deployment.** Through document service centers, continue to deploy RMIS and ISEARCH to provide image storage of record and non-record material. Provides technology and processes for **records management**, document distribution, and **document preservation**. Utilize existing technology and processes to meet project needs.
2. Regulatory Requirements Traceability Track applicable regulatory requirements and changes affecting work procedures, SNFP decisions, recordkeeping, and reporting. (Good business practice and requirement of Defense Nuclear Facilities Safety Board)	P14. Integrate IM into the Normal Business Process P16. Challenge External Controls P17. Design Business Processes and IM Capabilities Together	**R15. Regulatory Commitment Tracking.** Establish a regulatory commitment tracking system. Need computer-based system to track regulatory compliance strategies against driving regulations. Establish requirements and recommend a solution based on DOE or commercially available compliance tracking software.
3. Commitment Tracking Manage milestones and other commitments. Provide visibility of significant commitments and permit decentralized management of internal actions.	P2. Ensure Relevant Information is Accessible to Meet Project Requirements P4. Leverage Off What Others Have Done P12. Coordinate Centralized and Decentralized IM Processes P14. Integrate IM into the Normal Business Process P17. Design Business Processes and IM Capabilities Together	**R5. Commitment Management.*** Utilize a computer-based commitment management process across all of SNFP. Develop new processes to complete deployment of HATS and AMS.

TOPICAL AREA/SCOPE	RELATED PRINCIPLES	RECOMMENDATIONS
4. Information Sharing Knowledge of what information is available and ability to access it efficiently. Reduced reporting effort and improved quality from reuse of previously approved electronic document components.	P2. Ensure Relevant Information is Accessible to Meet Project Requirements P13. Make Appropriate, Cleared Information Available to Stakeholders P15. Communicate Project Information to all Participants	**R20. RMIS and ISEARCH Deployment.** Through document service centers, continue to deploy RMIS and ISEARCH to provide image storage of record and non-record material. Provides technology and processes for records management, **document distribution**, and document preservation. Utilize existing technology and processes to meet project needs. **R18. SNFP Home Page Integration with RMIS and ISEARCH.*** Make it possible for users to access RMIS and ISEARCH directly from the SNFP Home Page and TDB. While using the Home Page or the TDB, users will be able to retrieve, view, and print ISEARCH images. Develop and deploy technology to enable this integration.
5. Information Technology Architecture Standards for computing hardware and software such as word processors and spreadsheets, planning for network and server capacity. ESOE, Nationalization, Internet technologies.	P4. Leverage Off What Others Have Done P7. Use WHC Information Technology Infrastructure When Known and appropriate	**R10. Budget and Schedule Technical Upgrades.*** Improve network reliability and replace low-end workstation hardware for budget and schedule staff. Workstations are barely adequate for tasks. Network failures require fixing data 2-3 times per week. Meet with service providers to develop solution. Utilize the nationalization program and accelerate improvements in network connections between scheduling and budget work locations and servers necessary to do routine work. **R21. Advanced Information Retrieval.** Participate in the Information Delivery Architecture initiative to investigate how to apply additional IM technology to full text information retrieval. Online access makes documents more readily accessible to the SNFP community. Apply Internet technology, SGML, and PNL-developed technology in conjunction with RMIS/ISEARCH. **R1. IMSC Roles.** Use the IMSC to **adopt standards** and set SNFP IM priorities. The IMSC, as a cross-functional team, can best evaluate the risks and costs of IM activities, and determine appropriate standards. **R17. SNFP Home Page.*** Establish processes for deploying and maintaining the SNFP Home Page. Although the Home Page is available for use, the necessary processes have not yet been defined.

TOPICAL AREA/SCOPE	RELATED PRINCIPLES	RECOMMENDATIONS
6. Job Control System Slow processing and reporting by JCS at K Basins, potential for deployment of commercial work-management products.	P2. Ensure Relevant Information is Accessible to Meet Project Requirements P14. Integrate IM into the Normal Business Process P17. Design Business Processes and IM Capabilities Together	
7. Issues Management Systematic way to surface and address issues derived from technical needs, stakeholder concerns; or internal problems.	P2. Ensure Relevant Information is Accessible to Meet Project Requirements P6. Provide Traceability to Preserve Institutional Memory P14. Integrate IM into the Normal Business Process P17. Design Business Processes and IM Capabilities Together	**R6. Issues Management.** Define an IM process for issues management. Examine the needs for issues management (including identification) and the relationship to commitment management. Determine whether issues management can be implemented using commitment tracking processes and software (i.e., HATS and AMS). The data needed is the same or very similar, providing an opportunity to leverage what already exists. If appropriate, make necessary changes to the commitment management process to accommodate issues identification and management.

TOPICAL AREA/SCOPE	RELATED PRINCIPLES	RECOMMENDATIONS
8. Technical Data Management Effective management of engineering design data under aggressive SNFP schedules.	P2. Ensure Relevant Information is Accessible to Meet Project Requirements P4. Leverage Off What Others Have Done P17. Design Business Processes and IM Capabilities Together	**R12. Technical Data Management Tools and Processes.** Determine if the SNFP engineers have the electronic tools and processes they need to acquire, validate, maintain, and distribute SNFP data. Convene a cross-functional engineering team and apply processes used in the IMPP. Document the data, data flow, and data management methods used in the SNFP engineering activities. Develop an engineering data management plan. **R14. Characterization Data Management.** Cost-effective methods of managing, protecting, and disseminating the SNFP characterization data are needed. Characterization data is a valuable and expensive project resource needed by many staff. Analyze the SNFP characterization data requirements. Assess approaches used by the TWRS and environmental restoration/remediation. Lessons learned in implementing TCD and HEIS can be leveraged, since much of the data and processes seems to be similar to SNF characterization data. **R19. Technical Databook Implementation and Deployment.** Complete the change management software and deploy. Install on more users' computers. Hand off maintenance to BCSR. Assign responsibilities and determine the processes necessary for SNFP management of the TDB, including the decisions regarding what information needs to be available.

TOPICAL AREA/SCOPE	RELATED PRINCIPLES	RECOMMENDATIONS
9. Application Software Integration and validation of engineering and computational software, along with configuration management of input data, software versions, and results.	P7. Use WHC Information Technology Infrastructure When Known and appropriate P14. Integrate IM into the Normal Business Process	**R13. Modeling Software.** Develop an integrated plan for modeling software for the SNFP characterization and engineering activities. This plan should also address recommendations for project subcontractors so that there is intercompany compatibility. Identify software needs to complete the Path Forward, regardless of whether work will be performed in-house or by contractors. Assess currently identified software tools and supporting platforms for adequacy. As needed, develop a plan for acquiring and integrating capabilities for optimal SNFP use. **R16. Compatible Software Versions of Drawing Packages.*** Subcontractors may be delivering drawing products using versions of software WHC does not have. Procure upgrades and coordinate with subcontractors to make sure products are delivered in an electronic form that the SNFP can use without losing information.
10. Decision Tracking Maintaining, tracking, and associating the documents and data leading to project technical decisions.	P2. Ensure Relevant Information is Accessible to Meet Project Requirements P6. Provide Traceability to Preserve Institutional Memory P9. Value and Preserve Metadata P14. Integrate IM into the Normal Business Process P17. Design Business Processes and IM Capabilities Together	**R8. Decision Bases.** Provide decision makers with the capability to trace back to information used in making those decisions. IM capabilities can help provide an easily accessible baseline of facts and support the analysis process for making decisions. Investigate how document management, the TDB, and other IM tools can be applied to locate, access, and analyze the information used as the basis for decisions.

TOPICAL AREA/SCOPE	RELATED PRINCIPLES	RECOMMENDATIONS
11. Data Management Roles and Responsibilities Managing access control, integrity, and availability of data with regard for the requirements of the company and other project participants.	P11. Support IM Training P12. Coordinate Centralized and Decentralized IM Processes	**R2. IM Responsibilities and Authorities.** Assign IM responsibilities and associated authority to appropriate SNFP organizations or cross-functional teams. The decision should be made as to which IM functions are centralized or decentralized, and how all functions should be coordinated. Some responsibilities are an integral part of the business process and must be distributed to those who create it. Other functions can best be managed by organizations or teams external to the SNFP. The responsibilities must be understood by SNFP management. Without directly assigning responsibility, there may be duplication of effort or gaps in IM. **R4. Data Management Plan.** Develop a data management plan for the SNFP to be added as a chapter to *Data Management Plans for Hanford Site Business Functions* (RL-94-94). The Tri-Party Agreement requires Hanford Site business functions to have a data management plan. RL has requested that an SNFP chapter be added to the current (1994) set of plans. The 1994 version contained only a recognition of the SNF function within the "Deactivate Facilities/Nuclear Material Management" chapter. The plan can also be used within the project to document current practices and promote effective management of data resources. **R7. Data Stewardship Training.*** Training will provide SNFP staff with an understanding of data management processes and provide information on data stewardship responsibilities. Staff need to know what is involved in managing data appropriately and effectively. Conduct stewardship training workshops within the SNFP organizations to increase knowledge and understanding of data management processes and responsibilities. Determine additional IM capability training needed.

TOPICAL AREA/SCOPE	RELATED PRINCIPLES	RECOMMENDATIONS
12. Automation of Manual Efforts Reduction of labor and inconsistencies by automating data collection and delivery processes.	P10. Use a Formal Decision Process for Deployment of IM Technology P17. Design Business Processes and IM Capabilities Together	**R9. Collaborative Work Environment.** Use information management capabilities to create a collaborative work environment. Software products such as Lotus Notes can improve the efficiency of a geographically diverse team. Pick an effort to pilot the use of collaborative software and document lessons learned. **R22. Electronic Document Generation.*** Through pilot effort(s), analyze costs and benefits of electronic document management, including electronic generation, packaging, and release. As a fast-track project, the SNFP is looking for opportunities to reduce costs and improve efficiency. Choose pilot(s) from multiple options such as file server share areas, tracking and tagging via the SGML (e.g., end point criteria work), etc., and apply to an effort like the SNFP EIS. Evaluate the success of the pilot(s) and determine future direction for SNFP.
13. Duplicative Efforts and Procedures Increase effectiveness by integrating related processes and by reducing the variety of support software packages such as those used for action tracking, spreadsheet, and word processing.	P5. Organize to Balance Autonomy and Integration P10. Use a Formal Decision Process for Deployment of IM Technology	**R11. Budget & Schedule Process Improvement.** Analyze the SNFP internal budget and schedule activities to determine whether process improvements can be made. Recommend improvements as appropriate. Rapid response time and unpredictable demands can create incremental work for managers and support staff.
14. Information Supplier Standards Standard formats for electronically delivered information to reduce translation and conversion efforts.	P2. Ensure Relevant Information is Accessible to Meet Project Requirements P7. Use WHC Information Technology Infrastructure When Known and appropriate P15. Communicate Project Information to all Participants P17. Design Business Processes and IM Capabilities Together	* Procurement Verbiage for subcontracts and statements of work was put in place in FY95. The intent was to reduce the variety of software formats used for electronic information deliverables.

TOPICAL AREA/SCOPE	RELATED PRINCIPLES	RECOMMENDATIONS
15. Tracking and Managing Information Management Costs Enable improved management of IRM budgets to reduce IRM costs and competitive and redundant development efforts.	P18. Track and Manage IM Costs	**R1. IMSC Roles.** Use the IMSC to adopt standards and set SNFP IM priorities. The IMSC, as a cross-functional team, can best evaluate the risks and **costs of IM activities**, and determine appropriate standards. Funding for IM activities is limited. A process is needed to assure that those IM activities that are funded are agreed to and represent the best investment for the entire Project. This can also help prevent duplication of effort.
16. Validation and Prioritization of Information Management Projects SNF IMSC charter responsibilities for approval and setting of priorities for IM projects.	P5. Organize to Balance Autonomy and Integration P10. Use a Formal Decision Process for Deployment of IM Technology	**R1. IMSC Roles.** Use the IMSC to adopt standards and set **SNFP IM priorities**. The IMSC, as a cross-functional team, can best evaluate the risks and costs of IM activities, and determine appropriate standards. Funding for IM activities is limited. A process is needed to assure that those IM activities that are funded are agreed to and represent the best investment for the entire Project. This can also help prevent duplication of effort. **R3. IMSC Technical Planning and Coordination.** Technical planning should take advantage of IM infrastructure available and lessons learned from other IM activities within WHC and the site. Technical planning and coordination is needed to assure that SNFP IM technical directions are sound and consistent with Hanford IM directions.