OUTLINE OF SAMPLE MANAGEMENT PLAN

FOR THE

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS

DRAFT

by

Los Alamos National Laboratory

INTRODUCTION

The purpose of the Nevada Nuclear Waste Storage Investigations (NNWSI) is to evaluate the Yucca Mountain area in the southwest corner of the Nevada Test Site (NTS) for a geologic repository for nuclear waste. Numerous samples of soil, water, gas, and rock will be collected during the site characterization phase. Analyses of these samples will form the basis for determining site suitability. This document outlines a plan for managing these samples for NNWSI.

The Department of Energy (DOE) recently entered into an agreement with the Nuclear Regulatory Commission (NRC) for an exchange of NNWSI site-specific samples. In preparation for this exchange, the Waste Management Project Office has developed this sample-management plan that 1) delineates the basic features of a viable sample exchange process, 2) insures that NNWSI samples are not degraded, and 3) assures that in providing such samples to the NRC, NNWSI's exploration program is not detrimentally affected. This plan also addresses immediate and long-term sample-management needs of the NNWSI and includes provisions for long-term preservation of samples in the best preservation state possible.

The major elements of the sample management plan outlined here are as follows: 1) a dedicated sample storage facility with access to the samples controlled by a staff following prescribed and documented procedures, 2) a sample use policy board (SUPB) that would make recommendations to DOE/NV concerning the allocation and distribution of samples to investigators based on current and anticipated programmatic needs and regulatory requirements, and 3) a modestly-sized record management system to track samples, to help document compliance with quality assurance procedures, and to document the data that result from analyses of the samples. The NRC is only one of many potential requestors for NNWSI samples; therefore, sample exchange procedures are written in such a way as to accommodate all requests. This sample management plan addresses 13 key items concerning current and future sample curation procedures and recommendations.

1) Current storage and preservation environment of NNWSI samples
2) Proposed long-term sample storage and preservation environment
3) Research activities needed

4) Rationale for classification of samples for archive, destructive testing, and nondestructive testing
5) Labeling, marking, and sample distribution
6) Sample allocation
7) Current and future facility needs
8) Security considerations
9) Quality assurance procedures
10) Record management system
11) Sample return policy
12) Comprehensive descriptive core log
13) Recommendations

1. CURRENT STORAGE AND PRESERVATION ENVIRONMENT OF NNWSI SAMPLES

The principal types of samples collected for the NNWSI program include drill core and cuttings, water samples, and gases. A variety of DOE contractors are involved in the collection and testing of these samples and no one facility houses splits of all these samples.

NNWSI drill core and cuttings samples are presently stored in the main Core Library at Mercury, Nevada. The Core Library is operated by the U.S. Geological Survey (USGS). Samples are stored at this location so that they are convenient to researchers in a monitored environment. Though considered full, the main Core Library is able to accommodate NNWSI samples by the temporary movement of low priority weapons programs samples to outlying storage buildings as the need arises. Current plans are for NNWSI sample storage to continue at the main Core Library until a permanent NNWSI sample storage facility can be prepared.

The main Core Library is well insulated and has central heating and evaporative cooling, but because of poor humidity control, the air tends to be humid during summer and dry during winter. All core is stored on metal racks. The Core Library has a permanent staff that includes a full-time manager, secretary, and warehousemen. This staff is responsible for storing samples from both weapons testing and NNWSI activities. The staff follows Quality Assurance procedures for site preparation, transfer, receiving and handling, and on-site storage of NNWSI samples.

Most core samples are stored without special preservation in heavily waxed trays in cardboard boxes containing up to 10 ft of core. The boxes are marked with well designation, consecutive box number, and core footage contained. Up to 10% of the large core pieces (6" or larger) are wrapped in heavy aluminum foil and waxed to preserve the original moisture content. Additional "natural state" core samples prepared at the wellhead are placed in iron or stainless steel cylinders filled with nitrogen. The nitrogen displaces atmospheric gases that might react with the core samples. These samples are immediately sent to researchers at the National Laboratories and are never stored at the Core Library. Cuttings samples are stored in covered cardboard boxes, each marked with well designation, consecutive tray number, and sampling interval. Accurate records document the removal of core and cuttings from the Core Library. These records, which are kept by the manager of the Core Library, show which individuals and organizations remove samples from the library, and the date that samples are returned. These records do not indicate why samples are removed from the Core Library. The USGS, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and Sandia National Laboratories are the most frequent users of core and cuttings. These samples are used for stratigraphic, mineralogic, petrologic, physical property, and sorption studies. Very little of the removed sample is destroyed through destructive testing, although many of the samples become modified through the course of the testing (e.g. rock crushing, thin section preparation, sorption studies). The USGS is the only sample user to return samples to the Core Library on a regular basis.

Water samples for the NNWSI are collected primarily by the USGS and Los Alamos National Laboratory to determine the isotopic and chemical composition of the ground water under Yucca Mountain. Because water samples are out of equilibrium with their environment and contain unstable constituents, some water quality measurements are made immediately at the well head. Some samples are sent either to Denver or Los Alamos for more thorough chemical or isotopic analyses. These analyses are generally done immediately after samples are received because of problems in preserving waters in their natural state. Generally enough sample is collected for duplicate analyses, should the need arise, and consequently most of the sample is consumed during destructive testing. Once the sample user is satisfied that the results of

his testing is correct, the remaining sample is usually discarded. Quality Assurance procedures control the sampling, field analyses, field treatment, and laboratory analytical techniques. A record of the sample collectors and the number and types of samples taken are kept in a logbook by the USGS. Two investigators at Los Alamos are known to keep archival water samples. One person has preserved water filtered through 0.05 micrometer Nuclepore filters in Pyrex glass containers that are sealed with silicone-greased stopcocks. These samples are collected and stored under a nitrogen atmosphere inside the Pyrex container. The Pyrex containers have been stored without excluding light. Although the samples were carefully collected, some have been observed after a time to contain iron precipitates or algal growth. Another investigator has saved 50 ml of samples of water, which also have been filtered through 0.05 micrometer Nuclepore filters. These samples are stored in 50 ml Becton Dickinson Vacutainer vials, which have been sterilized, coated with silicone, and evacuated by the manufacturer. The Vacutainers are sealed with rubber septa. Samples of this type have been used for anion analyses.

Gas samples have been collected and analyzed as part of the NNWSI spent fuel storage demonstration program. These samples have been analyzed both by REECo and by off-site contractors. No gas sample archival storage is performed, as far as we know.

2. PROPOSED LONG-TERM SAMPLE STORAGE AND PRESERVATION ENVIRONMENT

NRC regulations governing repository design for all potential waste emplacement sites in the country require that the option of waste retrieval be kept open throughout the period of waste emplacement (30 years) and thereafter until completion of a performance confirmation program (50 years after beginning of emplacement process). The performance confirmation program will examine whether the geologic and hydrologic response to excavation and waste emplacement is consistent with earlier tests and models. This program will require that samples preserving the repository's initial conditions be available for re-examination and for further testing. Therefore, the long-term storage and preservation environment for NNWSI samples should be designed to preserve samples in as natural a state as possible for at least 50-100 years.

Eventually, two independent archives of NNWSI samples should be maintained at separate locations to ensure that the entire sample collection is not lost in a manmade or natural catastrophe or through a terrorist act. One repository should be maintained as a permanent archive from which no samples are taken under normal circumstances. This collection of samples will provide a basis for comparing the original chemical and physical conditions at Yucca Mountain to future conditions long after repository closure and decommissioning, thus providing future generations a means to monitor the repository environment and to evaluate the possibility that waste leakage has occurred. The facility housing the permanent archive collection could be designed to accommodate permanent archival samples from all DOE waste-related programs throughout the country. The other repository would contain the working collection of samples, which would be accessible to qualified researchers. This repository would contain NNWSI samples only and should be located near Yucca Mountain. Locating the working collection near Yucca Mountain minimizes the damage or loss of samples that usually accompanies their transportation and takes advantage of the security network in place for the NTS.

To ensure that the two collections are as alike as possible, core samples should be split longitudinally so that samples in both collections approximate mirror images. Cuttings could be randomly split by footage. Provisions for preserving representative samples of intact core 1-3 meters long must be made so that studies requiring complete sections of core can be made in both ongoing and future investigations. Water and gas samples should also be preserved for future reference and duplicate samples should be collected so that representative samples can be included in the permanent archive and working collections.

NNWSI sample storage facilities should be controlled environments with limited access. The trained staff should perform all sample collection, transportation, receiving, storage, and shipping activities. All methodology followed by the staff should adhere to strict quality control procedures, and the history of each sample should be carefully documented. A full-time Quality Assurance specialist should be assigned to monitor the daily operations of each facility and to insure that samples are properly documented. The environment of the vault area should be controlled for temperature, humidity, and dust.

Access to samples should be limited to facility staff and approved researchers. Facility staff should assist and supervise the activities of researchers. Visiting researchers should be able to examine the core. Facility staff or approved researchers should be allowed to handle the core. Samples selected for study by researchers should be removed from the collection only by facility staff.

Proper core curation begins with the initial planning of the hole before it is drilled and should ensure that special sample acquisition needs are put into drilling procedures. The trained staff of the sample storage facility should be responsible for the collection and processing of samples at the well head and should document the drilling procedures at the time of sample collection. In some cases, special preservation techniques should be applied to samples as soon as they are recovered from the ground.

The preservation systems adopted by the NNSWI sample management system must balance the needs of the many researchers using the samples for petrological, chemical or physical property studies. Techniques designed to preserve the sample for one parameter may destroy or obscure another. For example, waxing core to preserve moisture content impedes visual examination of core for stratigraphic relations. Also, the wax could act as a medium for bacterial growth over time, changing oxidation conditions within the core. In water samples the practice of acidifying a sample prevents precipitation of dissolved ions on the walls of the sample container; however, this also drastically changes the pH of the sample. From these examples it is evident that one or two preservation techniques will not address the needs of all researchers.

An alternative approach is to apply selected preservation procedures to well chosen, representative samples from each drill hole. Before specific preservation techniques can be recommended, a NNWSI multidisciplinary panel of scientists should identify those natural state parameters that are critical for preservation. This panel should evaluate the effectiveness of present techniques for long-term preservation and recommend research where the longevity of these techniques is questionable.

In some cases special preservation techniques are unnecessary. Many fundamental properties of the rock such as fabric, mineralogy, and elemental abundances should be invariant over periods of centuries without the need for special preservation.

3. RESEARCH ACTIVITIES NEEDED

The requirement that NNWSI samples be preserved in a natural state for a period of 50-100 years implies that samples taken from the subsurface have not been altered by drilling or sample processing. Research is needed to examine how drilling procedures and sample processing affect selected chemical and physical properties of the rock. Core samples, for example, are often immersed in mud and water introduced during drilling and are washed so that they can be photographed. In some samples this may affect the amount and type of moisture present in the rock.

The longevities of present day preservation techniques (e.g., waxing core) are poorly known and should be assessed by research that parallels the NNWSI sample storage program. This research is needed not only to monitor the preservation state of the NNWSI sample collection on a periodic basis, but also to develop new techniques for long-term preservation. Multiple techniques of sample preservation will have to be developed to preserve as many chemical and physical parameters as possible.

Water samples in particular will pose significant preservation problems, and it is probably safe to say that no long-term preservation techniques are known. Precipitation, algal growth, and adsorption of ions by container walls are all common problems encountered in stored samples by solution chemists. Some areas for research in preservation applications include freezing samples and sterilizing samples by radiation.

A Sample Use Policy Board (SUPB), a multidisciplinary panel made up of scientists from the DOE, USGS, and National Laboratories, should coordinate all research activities and determine which activities receive funding priority. The SUPB should evaluate the effectiveness of research programs and direct the application of new preservation techniques to appropriate NNWSI samples.

4. RATIONALE FOR CLASSIFICATION OF SAMPLES FOR ARCHIVE, DESTRUCTIVE TESTING, AND NONDESTRUCTIVE TESTING

The sample archive provides the NRC with samples representative of Yucca Mountain before repository construction for its performance confirmation studies. The archive also provides future generations with a complete suite of samples with which to compare the results of their tests for repository

leakage. For these reasons, the archival collection should be as complete as possible.

No NNWSI samples should be destroyed before first knowing the following information:

- need for sample or split of sample to be preserved in sample archive,
- uniqueness of the physical or chemical parameters preserved in the sample,
- sample needs of all NNWSI and NRC investigators, and
- benefits gained from destructive rather than nondestructive testing.

In order to validate the site, DOE and NRC researchers must have the option of performing destructive testing on any samples deemed critical for site characterization and related licensing activities. Interested researchers outside the NNWSI should not have access to these critical samples until all licensing issues are resolved with NRC. However, these outside researchers should be allowed access to nonessential samples if removal of these samples does not interfere with ongoing waste program studies. Permission for destructive or nondestructive testing should be weighed on a case by case basis by the SUPB, which should consider the benefits gained from destructive versus nondestructive testing and the uniqueness of the sample to the collection.

All researchers should be urged to use as little sample as possible for their studies especially in cases where the quantity of available sample is small. Because of their limited quantity, specially preserved samples should not be made available unless researchers can justify to the SUPB the need to use these particular samples and adequately explain the importance of their work. In all cases, samples not destroyed by the analytical process should be returned to the NNWSI sample collection. Returned samples should be accompanied by a detailed account of what happened to them at the researcher's facility. For example, were the samples merely crushed during rock physics experiments, or were the samples tested for soluble uranium by acid leaching? A record of these procedures will alert other researchers to the possibility that the samples may have been altered chemically or physically and allow them to assess the usability of the samples for other studies.

5. LABELING, MARKING, AND SAMPLE DISTRIBUTION

Scientists from the NRC, DOE, USGS, the National Laboratories, and various subcontractors will need to obtain samples for testing in support of NNWSI activities. Paramount to the records collection effort is the need to have a uniform method for labeling the identity of each sample, maintaining records of each sample's status, and tracking the samples that are distributed. Current procedures for identification are diverse and unique to each organization. Methods of identification and distribution must be provided so that samples are identified in a standard manner that will be maintained from sample collection, through distribution, to sample return to archival storage.

To accomplish this task, procedures must be standardized to include a method of labeling with a unique identifier that cannot be duplicated for a period of 100 years. Such a system should include who collected the sample, the drill hole or location, sample type, depth or footage, and sample split. The issuance of unique numbers would be controlled by the curator. The issuance would be recorded in a log or status document.

At times, samples will be shipped to various facilities for testing. Handling procedures should include the use of approved work plans, methods of maintaining special environments, and methods for return of the samples to curatorial control. Distribution procedures should include work plans that delineate the method of distributon, the use of approved carriers (UPS, Federal Express, etc.), shipping instructions, and internal transfer mechanisms.

6. SAMPLE ALLOCATION

A proposed system for NNWSI sample request, approval, transmittal, and return is shown schematically in Figs. 1-4. All sample requests should be reviewed by the SUPB, which should be made up of members from each of the major NNWSI participants representing the disciplines of geology, geophysics, geochemistry, and rock mechanics. Approval for sample requests should consider how the request leads to completion of NNWSI site characterization issues or potential licensing issues, as well as the availability and uniqueness of the sample. Meetings to consider sample requests should be held at a minimum of monthly intervals, at least until characterization and

licensing studies end. All requests should be submitted to DOE/NV as written proposals detailing the purpose of the proposed work, number and types of samples needed, minimum amount of sample needed for testing, specific sample footages or sample numbers requested, types of tests to be performed, anticipated changes in sample integrity due to proposed procedures, date of anticipated sample return, and expected date of report describing results of tests. Priority should be given to sample requests by the DOE, USGS, National Laboratories, NRC, and their subcontractors involved in the characterization, licensing, and construction of the Yucca Mountain Waste Storage Facility. Multiple requests for the same sample or requests for samples in limited supply should be arbitrated by the SUPB, which would decide the relative importance and possible benefits of each request. The SUPB should have the authority to require that investigators work as part of a consortium whenever the quantity of sample is too small to meet future demand.

Requests from investigators outside the NNWSI also should be submitted as written proposals to the SUPB. In addition to evaluating the merits of the proposed testing and its impact on ongoing and future NNWSI investigations, the board should evaluate the requester's professional background as well as his institutional affiliations to verify his capability to perform the work proposed. Once a sample request is recommended for approval by the SUPB, the request and a notification of board approval should be forwarded to DOE/NV. Final approval of the sample request should be made by DOE/NV. If the request receives final approval it is then sent to the manager of the NNWSI sample storage facility for action.

7. CURRENT AND FUTURE FACILITY NEEDS

As outlined earlier, present facility needs are largely accommodated by creating room for waste samples at the main Core Library in Mercury by moving other NTS samples to outlying storage areas. The Core Library is the best available storage site for NNWSI samples at the NTS at the present time and the Core Library staff has ably maintained the NNWSI collection in very good condition. However, the Core Library was not designed to meet the stringent requirements that will be imposed on storage and preservation of future NNWSI samples. The Core Library personnel handle samples for the waste program and

the weapons testing program; this system has worked well because requirements for sample handling and storage have been similar for both programs. As the Nuclear Waste Policy Act matures and licensing issues become identified, the program requirements for storage and handling of NNWSI samples will differ in significant ways from the weapons testing program.

The Core Library is not a controlled environment. For instance, individual researchers visiting the site are allowed to remove core from boxes for examination and to take splits of the samples without direct supervision by the library's staff. Once the USGS completes a stratigraphic log of the hole, NNWSI researchers are allowed to collect their samples on a first come, first served basis without consideration of future siting issues or licensing issues. Procedural changes are essential before authorization to remove samples from the Core Library is granted. The facility itself is not environmentally controlled for dust or humidity. Major physical upgrades of the main Core Library at Mercury to satisfy the long-term requirements of the waste program seem unjustified, given the temporary nature of sample storage at the facility.

Future facilities needs should be similar for both the working collection and the permanent archive collection. Both collections should be housed in dedicated facilities for the storage of waste-related samples only. This would avoid two or more sets of rules that facility staff would have to implement for sample handling and storage from multiple programs. These facilities should be manned by full-time staffs whose sole responsibility is the maintenance and care of NNWSI samples. The size of the facilities will depend largely upon the amount of core to be stored, because other sample types require less space. The permanent facilities should have reliable systems for regulating temperature, humidity, and dust.

The permanent sample storage facilities should be designed for a building life of 50-100 years or at least until the NRC performance confirmation program is completed. Provisions to preserve the archive collection for even longer periods of time can be addressed as the performance confirmation program is ending. The building should be compartmentalized into the following areas, which are isolated from each other, to maintain a controlled environment:

- shipping and receiving area
- sample processing area
- vault area for storing samples
- viewing rooms and research areas
- office facilities
- record management center
- clean room for handling water and gas samples
- areas for special preservation requirements

Warehouse #1 (Bldg. 4221, Area 25), located 12 miles east of Yucca Mountain in Jackass Flats, has been suggested by the USGS as a candidate for the permanent NNWSI sample storage facility. Warehouse #1 is an all-metal building with a spacious, open interior. Its proximity to Yucca Mountain and protection by the Nevada Test Site security network enhance the desirability of the site. The building is well insulated, fireproof, and has a floor area of 14,000 sq. ft. This facility could easily accommodate all NNWSI samples both in hand and planned. An empty warehouse of similar size and construction is located adjacent to Warehouse #1 within the same fenced compound should the need arise for more storage area. Currently, Warehouse #1 houses core from weapons testing work on pallets stacked in tiers of three. Permanent storage of NNWSI samples would require removal of the weapons core and conversion of the present pallet racks to shelving units, easily accomplished by adding shelving components to the racks. Warehouse #1 has the necessary equipment for heating the storage racks, but it requires repair. The warehouse has no air conditioning, humidity, or dust control systems; and these need to be installed. The warehouse does not have a permanent staff because of its intermittent activity. Renovation of the warehouse into the compartmentalized and environmentally controlled facility envisioned above will require major changes in the existing building. If Warehouse #1 is to become the permanent storage site for the working collection of samples, feasibility studies should assess whether the facility can be modified to meet the requirements of the NNWSI long-term curation needs.

8. SECURITY CONSIDERATIONS

Curation facilities must be able to meet unique, heretofore unestablished, protection measures. The facility must be able to withstand large seismic events (both natural and manmade), vandalism, and terrorism as well as natural hazards. At the same time, the facility should provide controlled access for scientific endeavors and public viewing. These goals can be accomplished by establishing and implementing procedures to control access through the use of physical controls and access lists. Security measures can further be enhanced by training curation personnel and sample users in the proper methods of sample handling, storage, and shipping.

9. QUALITY ASSURANCE PROCEDURES

Quality assurance procedures will provide assurance that all samples are properly handled during acquisition, shipping, storage, archiving, and distribution. No such comprehensive quality assurance programs exist at present for NNWSI geologic samples. A group of five quality assurance procedures that would fulfill these requirements are:

(1) Sample Acquisiton Procedure

This document should include:

(a) methods for acquiring samples of surface outcrops, spring waters, drill core, well waters, or gases, and precautions to be observed to avoid contamination;

(b) procedures for marking or labeling samples in the field; and

(c) procedures for packing the samples and shipping them to the sample storage facility.

(2) Receiving and Storage Procedure

This document should describe:

(a) the methods for logging samples received at the sample storage facility and for verifying the accuracy of sample-identification labels;

(b) the methods for storing samples, including the maintenance of proper environmental controls to insure the preservation of sample integrity; and

(c) the method for entering sample data into the record management system to assure record and data retrievability.

(3) Record Management System for Geologic Samples

This procedure should describe a complete system of archiving and records and data for the sample storage facility. The system should include:

(a) a description of what samples have been collected and are stored at the facility;

(b) which samples have been released, to whom, for what purpose, and their current status;

(c) comprehensive geophysical, stratigraphic, and mineralogic logs of core holes; and

(d) results of chemical or physical tests on samples released.

The procedure should describe the methods for retrieving and disseminating information from the computerized data system.

(4) Security Procedures for the Sample Library

This document should outline the requirements for assuring that the sample storage facility will provide permanent safe storage for geologic samples. It should include a description of the provisions for:

(a) protection against unauthorized access (physical controls, access lists, etc.);

(b) protection against natural hazards (environmental controls and fire, flood, and earthquake protection); and

(c) assuring that only trained and certified personnel are involved in sample handling, storage, and shipping procedures.

(5) Sample Release Procedure

This document should describe how qualified experimenters may obtain samples from the sample storage facility. It should contain a description of the requirements which the experimenters must adhere to in their tests, including

(a) Prompt return of samples after testing, whenever possible;

(b) Prompt reporting of both raw data and analyses in a form suitable for inclusion in the record management system; and

(c) Proper safeguarding of samples in their possession.

10. RECORD MANAGEMENT SYSTEM

A record management system should be a valuable part of the sample curation program for:

- assuring compliance with quality assurance procedures,
- keeping track of the location of samples, and
- recording information about sample analyses.

The computer hardware requirements for such a system are modest, because the primary function is record keeping. An important consideration is the protection of the records in the system from loss or alteration. Many business systems have similar requirements, which have led to the hardware and software protection systems currently in use. These should be readily adaptable for this curation program. For convenience, read-only access to the records should be available from remote locations. High speed data transfer will not be required. Therefore, dial-up telephone access will be satisfactory.

Two types of records will be entered into the record management system. One type will consist of descriptive information; for example, sample identification number, sample location, quality assurance compliance documents, and other information that will not change with time, but which may require additions to keep the records current. The second type of record consists of the results of testing and sample analysis. Experience within the NNWSI program has shown that some preliminary data values change with more detailed analyses. Consequently, caution must be exercised concerning the results that are entered into the record management system. The best solution to this problem appears to be restricting the entry of testing results until the data have been reviewed and accepted for publication or for official external distribution by the laboratory performing the work. The record management system at the sample storage facility should be compatible with and linked to the existing NNWSI data information system at Sandia National Laboratories.

11. SAMPLE RETURN POLICY

Samples should be distributed for authorized research with the investigator's concurrence that samples are to be returned to the NNWSI curator after the investigator has concluded his work. The returned samples

will be identified according to the uniform NNWSI labeling system. Documentation of all procedures affecting the samples will be maintained by the investigator while the samples are in his possession and will be furnished to the curator when the samples are returned.

12. COMPREHENSIVE DESCRIPTIVE CORE LOG

The time of sample distribution should be decided by the SUPB. Unless there are extenuating circumstances, distribution will not occur until the core samples are photographed and a comprehensive stratigraphic log has been completed. The descriptive core log should be available to the SUPB at the time sample requests are being reviewed for distribution.

13. RECOMMENDATIONS

The following recommendations are guidelines for a comprehensive NNWSI sample management plan. Specific recommendations are made for sample storage facilities, sample preservation, record management, and sample management. These recommendations are:

Sample Storage Facilities

- Long-term NNWSI sample storage take place at two facilites to insure the entire collection is not destroyed by a man made or natural catastrophe.
- The long-term sample storage facilities be controlled for access to the samples and for environment (temperature, humidity, and dust).
- The sample storage take place at dedicated facilities with full-time staffs.
- Studies be initiated to evaluate the feasibility of modifying Warehouse #1 in Jackass Flats for use as the permanent sample storage facility for the NNWSI working collection.

Sample Preservation

- Representative samples be preserved in a "natural state" for a period of at least 50 to 100 years.
- A multidisciplinary panel of scientists be convened to choose critical chemical and physical parameters for preservation and to evaluate current preservation techniques.
- Research funded to monitor the progress of NNWSI sample preservation and to develop new techniques for long-term preservation.

Record Management

- Strict quality assurance/control procedures be implemented to document the sample history and insure uniform handling and storage.
- A record management system be implemented to keep track of samples, document compliance with quality assurance procedures, and compile data resulting from testing the samples.

Sample Management

- Requests for samples by researchers be reviewed by a sample-use policy board made up of representatives of the DOE, USGS, and National Laboratories.
- Procedural changes be implemented to better supervise researchers presently using the Core Library and to review the long-term needs of the NNWSI before sample allocation.

Expanding upon these guidelines a Sample Management Plan Committee should be formed to: 1) draft a comprehensive Sample Management Plan (SMP) for all NNWSI samples, and 2) develop an Implementation Plan outlining the steps necessary for initiating the SMP. The Sample Management Plan Committee should include members from each of the major NNWSI participants representing the following disciplines:

DOE	NNWSI management issues
USGS	Hydrology
	Geology
LLL	Waste Package
Sandia	Rock mechanics
	Repository design
	Performance assessment
LANL	Geochemistry
	Exploratory shaft

This Committee should first prepare and develop specific issues and information needs for the SMP. Some of the information needs to be addressed by the Committee include:

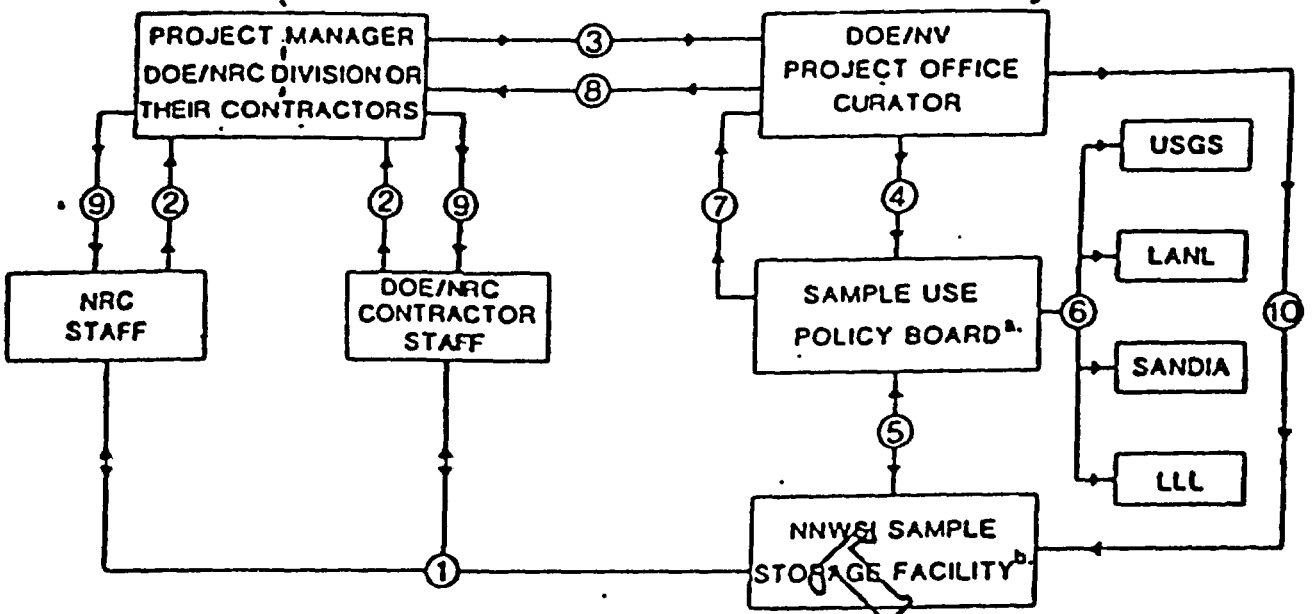
1) an inventory of all NNWSI samples collected, where they reside, and an evaluation of their condition (intact, modified, or destroyed during testing),
2) an inventory of NNWSI test results,
3) evaluations of NNWSI sample preservation needs and the suitability of current preservation techniques,
4) specifications for NNWSI sample storage facilities, and
5) evaluation of Warehouse #1 in Jackass Flats for suitability as a NNWSI sample storage facility.

The Committee Chairman should identify the roles and responsibilities of each of the committee participants. Parts of the SMP and Implementation Plan can be developed concurrently. Since an important aspect of the SMP is a systematic exchange of NNWSI site specific samples with requesters such as the NRC, both the SMP and Implementation Plan should be prepared as soon as possible. The draft of a DOE/NRC sample exchange agreement has been signed by the DOE and is under final review by the NRC. Therefore the following milestones are proposed for the SMP and Implementation Plan:

DRAFT

Milestones

Sample Management Plan	August 1, 1984
Implementation Plan	October 1, 1984



[a] see Fig. 2 for flow diagram of decision process.
[b] see Figs. 3 and 4 for flow diagrams for sample shipping and receiving

Fig. 1. REQUEST AND APPROVAL PROCEDURES

1. User (in this example DOE/NRC staff or contractors, but could be non-NNWSI researchers) determines sample availability by dialing the record management system at the sample storage.
2. Requester sends written proposal for samples to DOE/NRC (or contractor's) project manager for review and approval. Copy of proposal filed and signature sheet attached to proposal for proper routing and monitoring of proposal's progress.
3. Reviewed and approved proposal sent by DOE/NRC (or contractor's) project manager to DOE/NV. DOE/NV acknowledges receiving the proposal by memo to DOE/NRC (or contractor's) project manager. Copy of proposal filed.
4. DOE/NV project office sends proposal to sample use policy board for consideration (see Fig. 2. for decision process.)
5. Sample use policy board interacts with manager of the sample storage facility to determine availability and abundance of requested samples.
6. Sample use policy board may interact with TPO's of DOE contractors involved in NNWSI studies to determine if the samples are needed for ongoing studies.
7. Sample use policy board makes recommendation on proposal to DOE/NV project office.
8. DOE/NV project office makes final decision on request and notifies DOE/NRC (or contractor's) project manager of its decision. If the decision is negative, the DOE/NV gives the reasons why the request is denied. If approved, the DOE/NV supplies the DOE/NRC (or contractors) with shipping instructions and special handling instructions for use with the samples.
9. The DOE/NRC (or contractor's) project manager notifies the request originator of the DOE/NV action on the request.
10. If the request is approved the DOE/NV project office forwards the request to the manager of the sample storage facility for action. The manager of the sample storage facility should not act of the request unless all necessary signatures are in place.

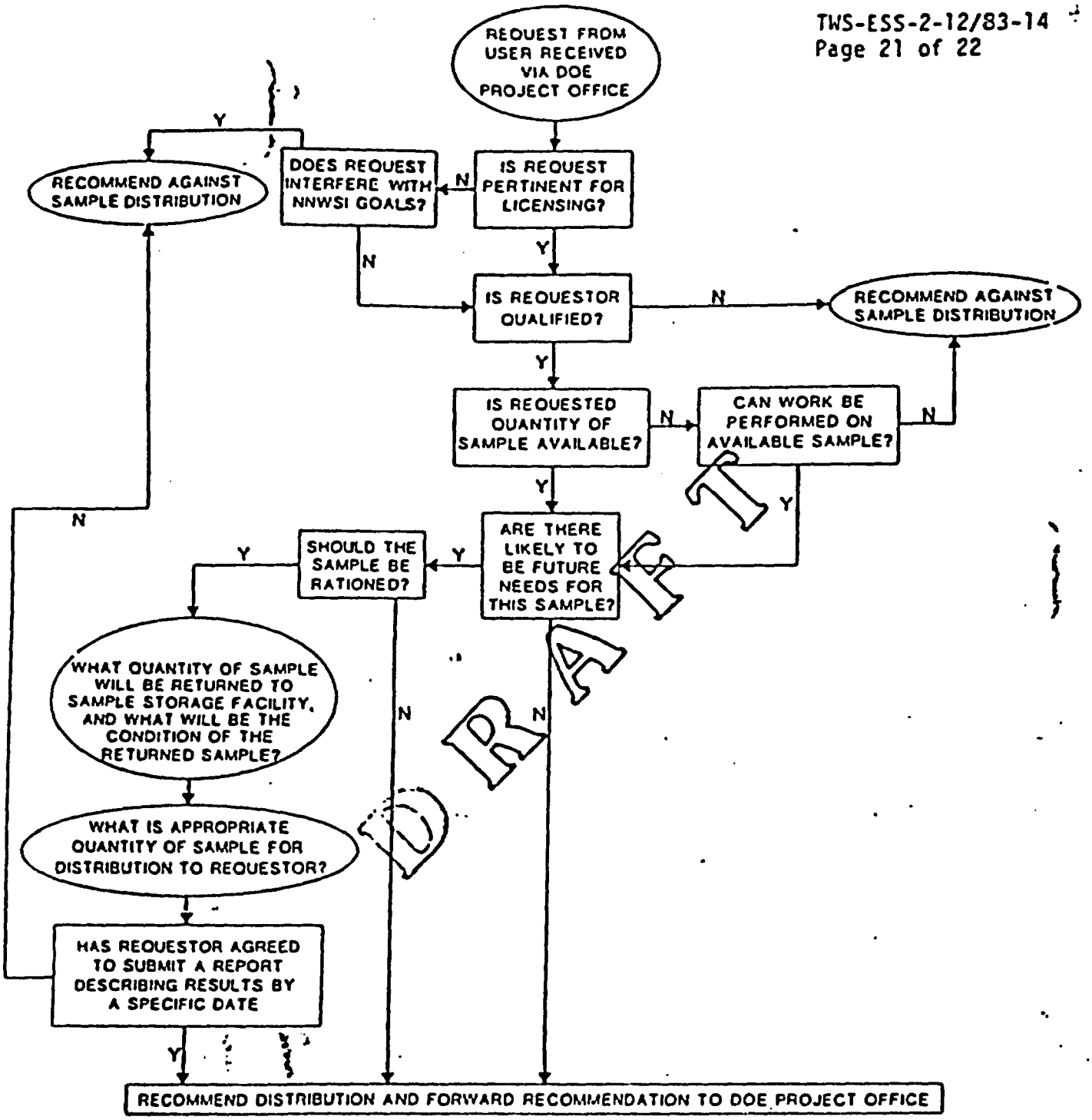


FIG. 2. FLOW DIAGRAM SHOWING DECISION PROCESS BY SAMPLE USE POLICY BOARD.

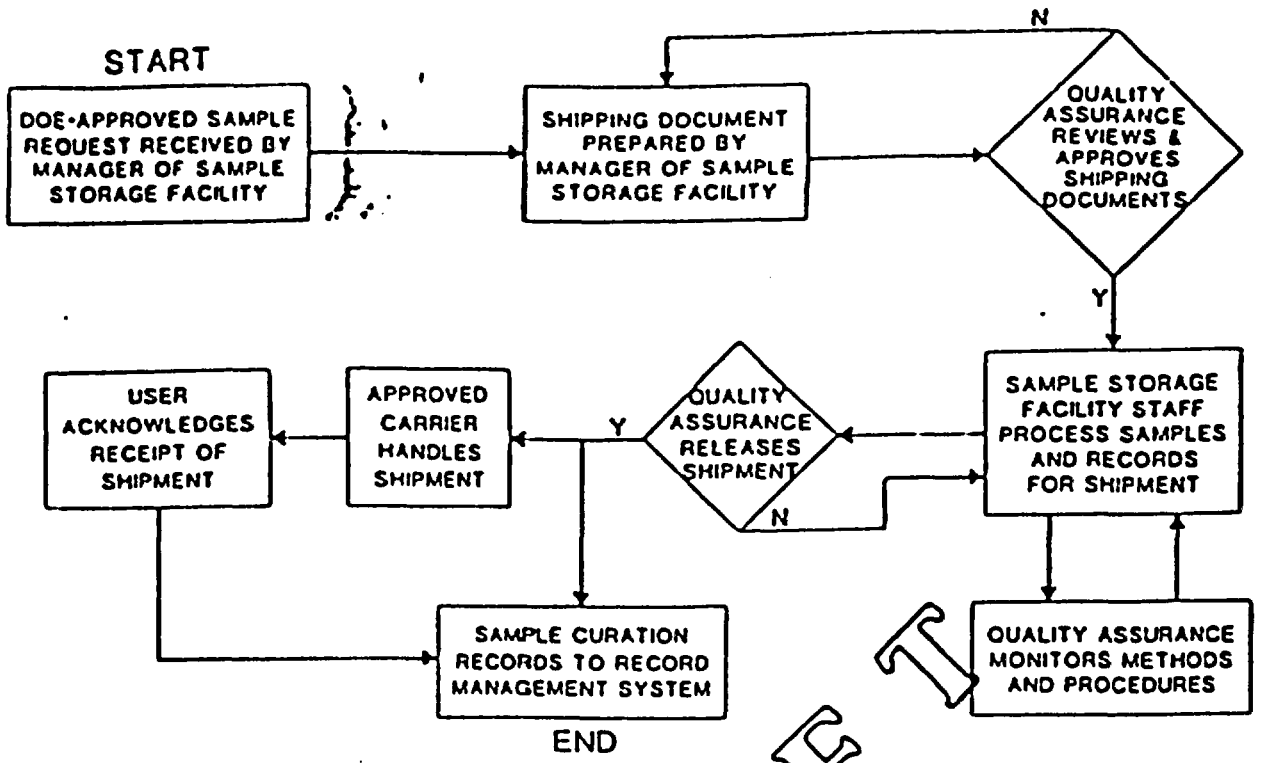


FIG. 3. FLOW DIAGRAM FOR SHIPPING REQUESTED SAMPLES TO USERS.

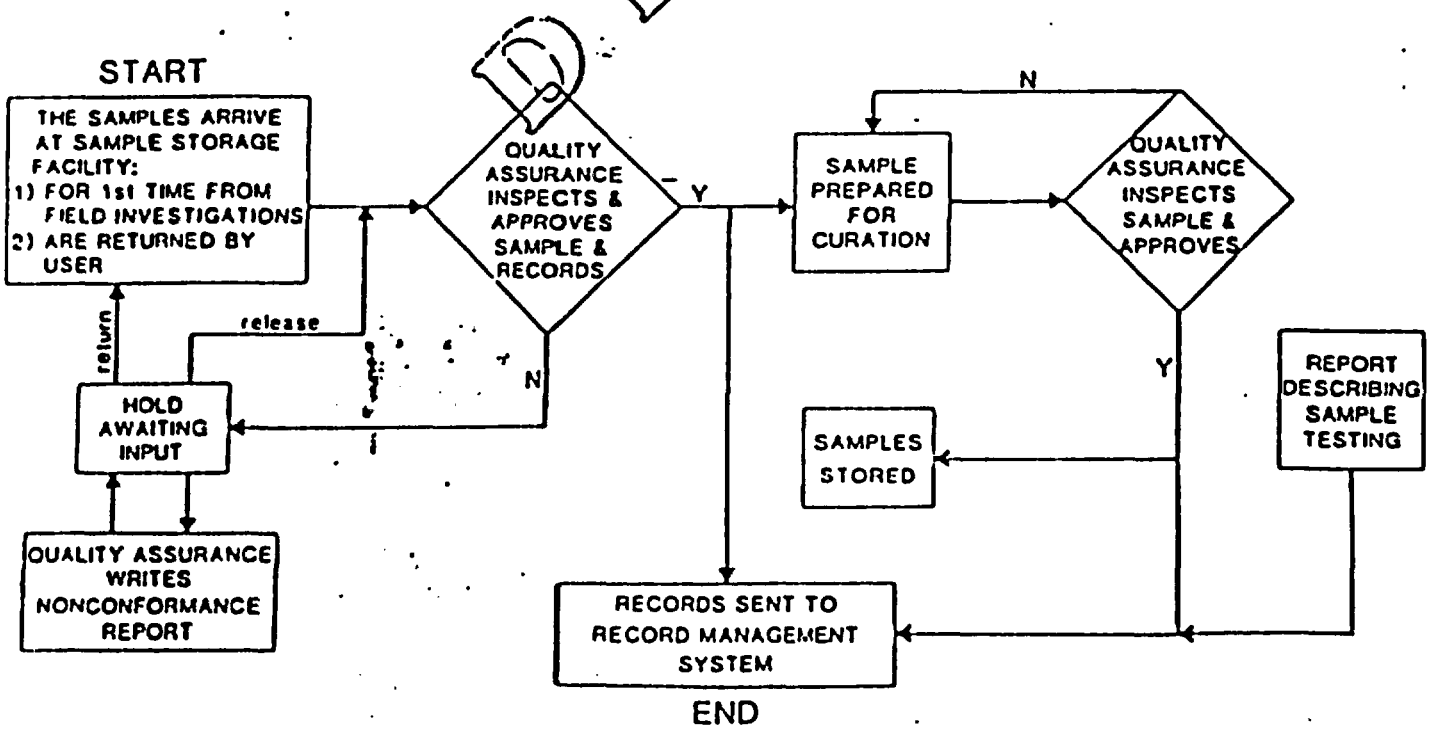


FIG. 4. FLOW DIAGRAM FOR RECEIVING NNWSI SAMPLES AT THE SAMPLE STORAGE FACILITY.