DOLORES ARCHAEOLOGICAL PROGRAM TECHNICAL REPORTS

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Laboratory Operations - 1978

by

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Under the supervision of
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ABSTRACT

The University of Colorado and the Bureau of Land Management (BLM) jointly manage the laboratory and analytical operations of the Dolores Archaeological Program (D.A.P.). The BLM has responsibility for receiving material and data, for conservation of material, and for the provision of permanent storage. The University of Colorado processes the material after it has been received, and is responsible for analysis. This report, which covers the 1978 analysis year (summer 1978 through spring 1979), provides the background behind the development of the laboratory procedures and describes the current Laboratory Flow System. The status of laboratory operations is also reported. Appendixes describe the Laboratory Flow System in detail and document the steps in laboratory processing. Examples of laboratory forms are included.

INTRODUCTION

Laboratory and analytical operations of the Dolores Archaeological Program (D.A.P.) are jointly managed by a U.S. Government agency (the Bureau of Land Management [BLM]) and the archaeological contractor (the University of Colorado). The official responsibilities of each party are defined in two contractual documents: the Work Statement portion of government contract number 8-07-40-S0562 between the Bureau of Reclamation (B.O.R.) and the Regents of the University of Colorado and a Memorandum of Understanding between the B.O.R. and the Bureau of Land Management. Essentially, under these agreements, the University of Colorado is responsible for processing materials after receiving and analysis, while the Bureau of Land Management is responsible for receiving materials and data, for conservation, and for permanent storage.

Archaeological fieldwork commenced in June 1978; however, due to the lack of a suitable facility and to delays in staff hiring, effective implementation of laboratory operations was not possible until September 1978. During this month a government procured laboratory facility became available as a work site and the University of Colorado hired a laboratory staff, including a laboratory supervisor, to oversee processing of materials. The first task undertaken by the staff was the formulation and implementation of a system for handling materials and samples from the time of field collection to placement in the curation facility. The task was completed during the last part of September 1978. The system has continuously undergone onsite evaluation since its inception, and efficiency in handling materials and samples has been maintained at a better-than-acceptable level. Work is currently progressing on

processing the materials and data from seven prehistoric sites (Sites 5MT2151, 5MT2191, 5MT2193, 5MT2198, 5MT202, 5MT2235, and 5MT4475) excavated in 1978. To date, the materials from all sites have been processed; work is continuing on processing the samples and checking the field forms necessary for laboratory operations. It is expected that this work will be completed by the start of the 1979 field season.

MANAGEMENT OF THE LABORATORY

Operations of the Dolores Project Cultural Resources Mitigation Program laboratory are jointly managed by the Contractor, the University of Colorado, and by the Bureau of Land Management, a U.S. Government agency. In 1978, consideration was given to developing an efficient Laboratory Flow System within the existing framework of the Memorandum of Understanding (M.O.U.) between the Bureau of Reclamation and the Bureau of Land Management (signed 27 April 1978). Specific responsibilities for steps within the Laboratory Flow System were outlined in a Supplement to the M.O.U. issued 17 August 1978. The pertinent part of the text of this Supplement to the M.O.U. reads as follows:

> Bureau of Land Management will:
> 1. Be responsible for operation of the Archaeological Processing Laboratory, specifically the recording, documentation, storage, and retrieval systems which are accomplished in the Laboratory and which include:
>   a. Supervise the receipt of data [and] material into the laboratory
>   b. Stabilize material in need of field conservation.
>   c. Operate the storage and retrieval function (e.g., records, papers, photographic materials, as well as artifacts).
>   d. Operate the inventory control aspects of the ADP System.
> 2. Be responsible for the custody of all data and materials, except when receipted for by the contractor, from the time of inventory through accessioning to the Anasazi Heritage Center.
> 3. Be responsible for conservation of special artifacts as necessary.
> 4. Conduct the field laboratory operations at all times in a manner which is responsive to the needs and schedules associated with the Dolores Project Cultural Resources Mitigation Program.
> 5. Designate the Montrose District Manager as the person responsible for execution of the functions ascribed to the BLM in this supplement agreement.
>
> BLM and BR jointly agree to:
> 1. Develop a system for recording, documentation, storage and

retrieval of data and materials that will serve the needs of both agencies over the short and long term.

2. Develop detailed project specific procedures for the operation of all aspects of the Archaeological Field Processing.
3. Meet annually to assess, for budgetary needs, the manpower and funding requirements for operation and maintenance of the field laboratory.
4. Periodically conduct joint evaluations of the functions and actions of both agencies in the operation of the Archaeological Field Processing Laboratory and related functions.
5. Functional responsibilities as diagrammed on Attachment I (Figure 2.1).

Within the context of the above outline the Contractor's Laboratory Supervisor and the Government's Acting Laboratory Supervisor (later the Government's Curator) developed and implemented a system for laboratory operations. The supplement quoted above was reworked several times during the reporting period in order to reflect improvements made after testing and evaluating the Laboratory Flow System (Figure 2.2).

The work statement for the D.A.P. (that is, the contractual agreement between B.O.R. and the University of Colorado) specifies the responsibilities of the archaeological contractor in more detail. Section 7.3.2 of the document states that the Contractor will ". . . wash and label artifacts, prepare samples for further analysis, rough-sort lithics and ceramics, and stabilize materials as necessary."

Section 8.1.2.1 provides that B.O.R., through the Contractor, will:

1. Wash and, as necessary, label artifacts.
2. Prepare radio-carbon, dendrochronological, soil, pollen, and faunal samples for further analysis. This preparation will include soil flotation.
3. Perform a rough sort of lithic and ceramic artifacts by typology and material.
4. Stabilize metal and organic materials as necessary using appropriate chemical techniques.

All of the procedures mentioned above have been incorporated as parts of the Laboratory Flow System, using techniques and methods current with state-of-the-art archaeological laboratory procedures.

Figure 2.1 Functional Responsibilities Chart, original version, showing assignment of responsibilities in the Laboratory Flow System as outlined in the Memorandum of Understanding and the Supplement to the M.O.U.

FUNCTIONAL RESPONSIBILITIES

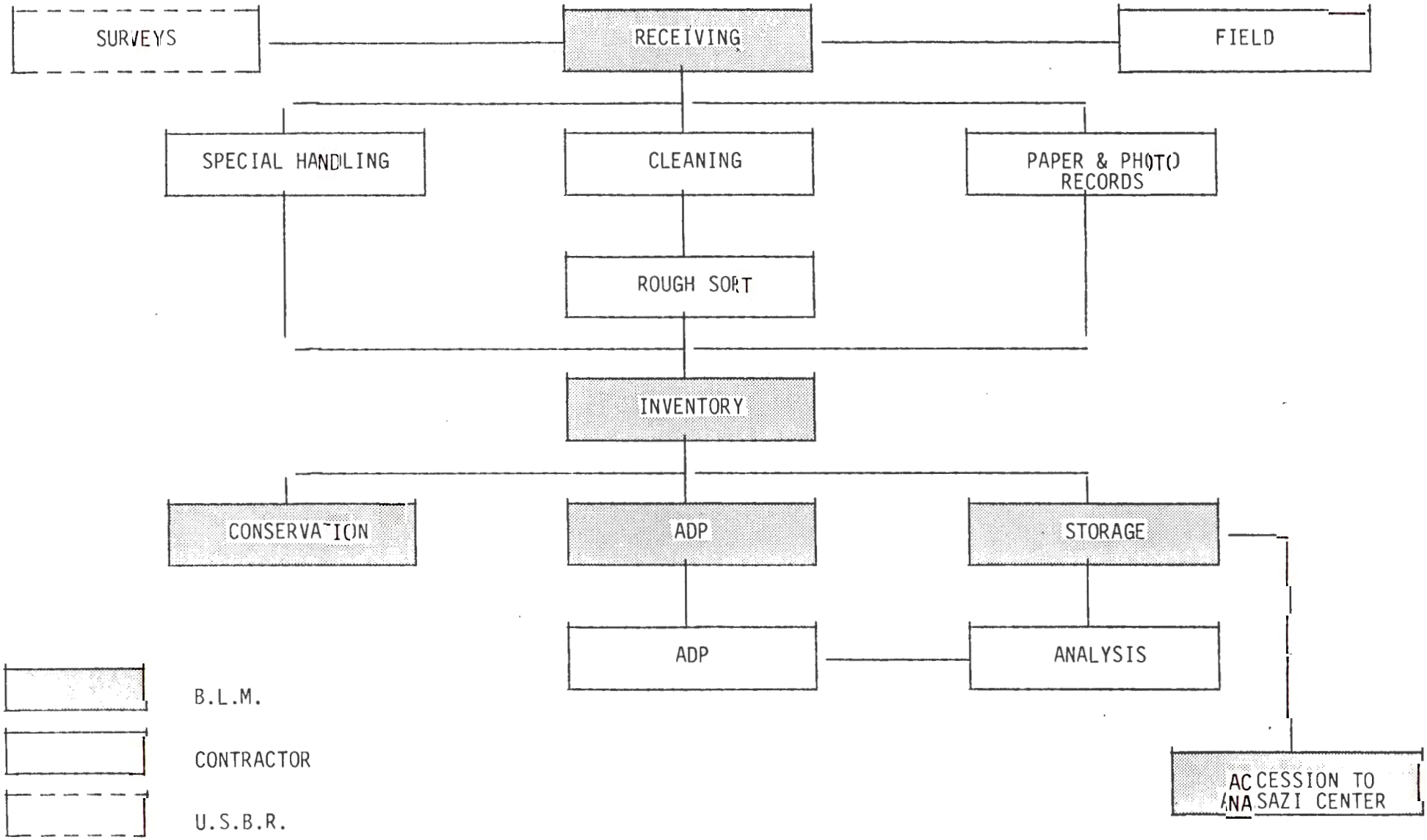
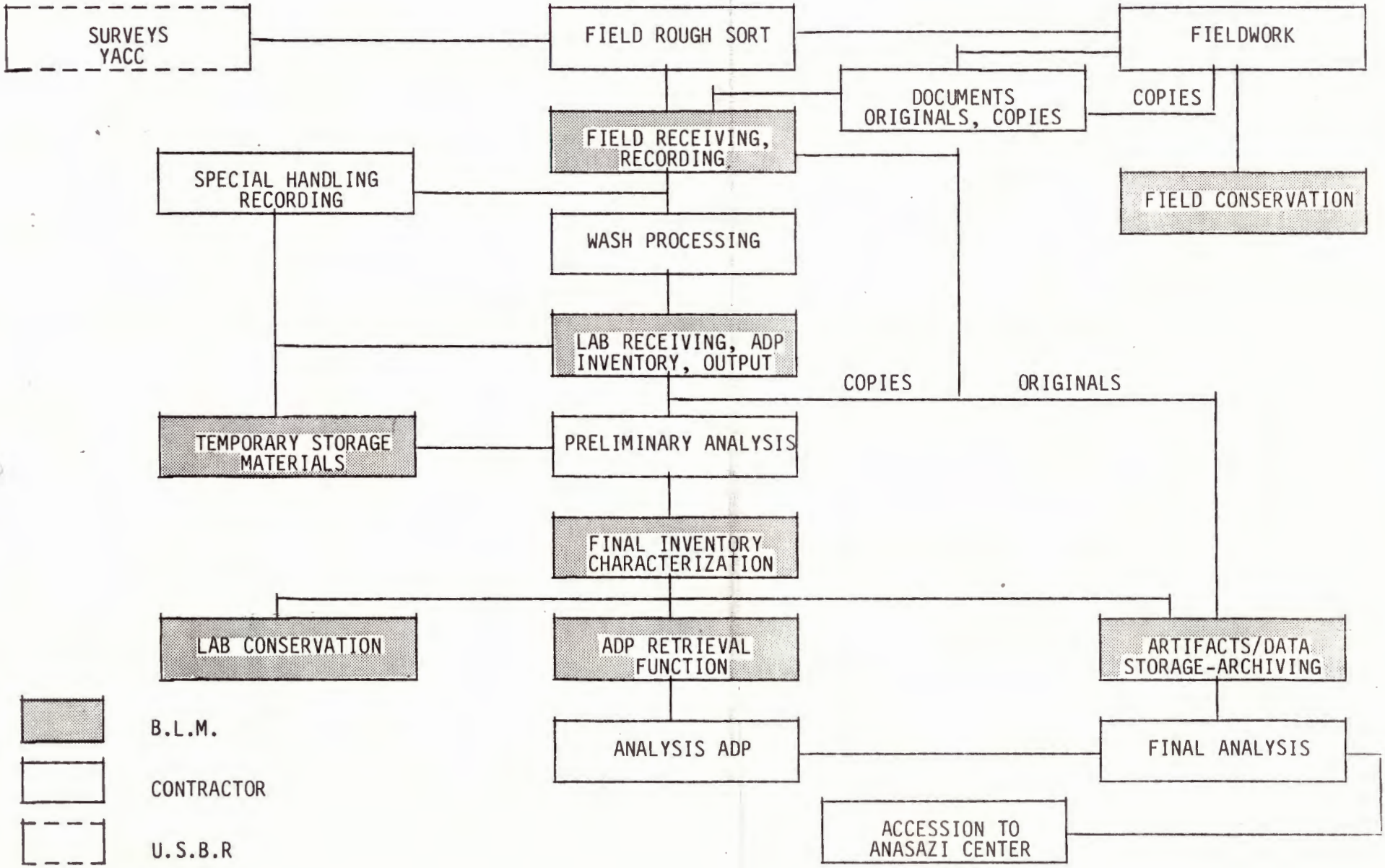


Figure 2.2 Functional Responsibilities Chart, revised version, showing revised and more detailed assignment of responsibilities within the Laboratory Flow System.


SURVEYS
YACC
FIELD ROUGH SORT
FIELDWORK
DOCUMENTS
ORIGINALS, COPIES
COPIES
FIELD RECEIVING,
RECORDING
SPECIAL HANDLING
RECORDING
FIELD CONSERVATION
WASH PROCESSING
LAB RECEIVING, ADP
INVENTORY, OUTPUT
COPIES
ORIGINALS
TEMPORARY STORAGE
MATERIALS
PRELIMINARY ANALYSIS
FINAL INVENTORY
CHARACTERIZATION
LAB CONSERVATION
ADP RETRIEVAL
FUNCTION
ARTIFACTS/DATA
STORAGE-ARCHIVING
B.L.M.
CONTRACTOR
U.S.B.R
ANALYSIS ADP
FINAL ANALYSIS
ACCESSION TO
ANASAZI CENTER

LABORATORY OPERATIONS

During the first two months of the reporting period, the laboratory was operated by an employee of B.O.R. Due to the lack of a laboratory facility and to the inexperience of the Young Adult Conservation Corps (Y.A.C.C.) crew, very little effective work was accomplished during this two-month period. Materials and samples collected were boxed and set aside for processing until a permanent laboratory facility could be provided by the government agency. Some washing of materials took place during this period, but due to use of improper techniques, the work had to be redone at a later date.

The B.O.R. employee in charge of laboratory operations resigned near the end of this two-month period, and no effective laboratory work was accomplished from then until the Contractor's Laboratory Supervisor arrived 31 August 1978. During the first half of August, the Supplement to the Memorandum of Understanding was written and signed in order to provide a framework within which to develop a Laboratory Flow System. Rental of a laboratory building also provided space and facilities within which to accomplish the laboratory work.

The Government's Acting Laboratory Supervisor also arrived at the end of August and worked with the Contrator's Laboratory Supervisor to structure laboratory operations. The highest priority was given to developing a Laboratory Flow System for use in handling the materials and samples which continued to be collected during the Contractor's fieldwork. This effort occupied a major portion of the time of the Contractor's Supervisor for September and October. Simultaneously with the development of the design of the Laboratory Flow System, some aspects of the system were

implemented by the Contractor's Laboratory Supervisor in order to utilize the crew of six B.O.R. Young Adult Conservation Corps crewpersons. The receiving and washing functions of the Laboratory Flow System were thus implemented early in September, while other portions of the system were not implemented until much later.

Training the Y.A.C.C. crewpersons required a major input of time as there was a 50 percent turnover rate of employees from September through the entire reporting year. The Contractor's Laboratory Supervisor assigned a high priority to training the crew as the Laboratory Flow System was developed. The Government's Acting Laboratory Supervisor, temporarily filling four official positions, had little time to spend on day-to-day laboratory operations.

By the end of October 1978, a draft of the Laboratory Flow System was circulated to the D.A.P. administrative personnel for comment and suggestion. Since the system had been designed to fit within the framework of the Contractor's ongoing field recovery program, field personnel were also invited to comment on the system. Once each function of the Laboratory Flow System had been implemented, the efficiency of each individual process was monitored in order to evaluate the soundness of the design. This evaluation process continued throughout the reporting year, and several modifications of the original Laboratory Flow System were made in order to increase overall efficiency. An outline of the Laboratory Flow System as it stood at the end of the reporting period is presented as Appendix A.

Through the months of September and October, the Contractor's Laboratory Supervisor and the Government's Acting Laboratory Supervisor had compiled a listing of secondary problem areas which needed work in the

context of overall laboratory operations. These were dealt with as secondary priorities through the remainder of the reporting year. Once the Laboratory Flow System had been implemented, more time was devoted to solving these problems and incorporating the solutions into the overall schedule of laboratory operations. The list of secondary problem areas included security, maintenance, pest control, supplies, and staffing.

By 1 November 1978, after the design for the Laboratory Flow System had been developed, the Contractor's Laboratory Supervisor and the Government's Acting Laboratory Supervisor also devoted time to the Laboratory Operations Manual. This document, included as Appendix B to this report, is intended to provide a detailed outline of procedures employed by the D.A.P. archaeological field laboratory. The version of the Laboratory Operations Manual in use throughout the reporting year (5 June 1978 through 28 February 1979) is contained in this report. Laboratory procedures are expected to change as current techniques develop and better techniques are found; the Laboratory Operations Manual is viewed as a dynamic document and is written on loose-leaf pages so that it can be updated whenever any improvements are made in procedures. The Laboratory Operations Manual was completed before the end of the reporting period.

One of the most crucial areas addressed during this reporting period was the development of a working relationship with the Government's laboratory personnel. Whenever more than one major hierarchy is involved, problems can develop quite easily at the level of day-to-day operations as different directions are reflected in the work priorities of the two staffs. If the cultural resource mitigation efforts are to be most effective, both the Contractor and the Government must make a conscious effort to be aware of the potential difficulties, especially with the

addition in the last month of the reporting period of three persons to the Government's laboratory staff. A major goal for the next reporting period will be the development and maintenance of a working relationship between the Contractor's staff and the Government's staff.

By the end of the reporting period, the Contractor had developed and implemented a full-service archaeological field processing laboratory, as outlined in the Work Statement portion of the B.O.R.-University of Colorado contract. Refinement of the Laboratory Flow System and updating of the Laboratory Operations Manual will continue through the term of the Contractor's cultural mitigation efforts.

FRAMEWORK FOR DEVELOPMENT OF A LABORATORY FLOW SYSTEM

As mentioned earlier, the months of September and October were largely devoted to development of the Laboratory Flow System. The Contractor's field recovery operations had begun on 5 June 1978, and the rudiments of a field recording system formed the framework for developing the program laboratory operations.

The crew chiefs are responsible for defining meaningful units of provenience at the individual sites. Each provenience unit identified for collection is assigned a Field Specimen (F.S.) number. The F.S. number, chosen from the consecutive series beginning at 000001 at each site, is part of the label for every bag or container of materials or samples collected from that provenience unit.

In order to coordinate the laboratory and field operations a standard format for labelling all materials and samples collected in the field was established (Appendix A, Figure A.1; Appendix B, Figure B.1). Each of the nine spaces is completed by the field personnel before submission of any materials or samples to the laboratory. This original label then permanently remains with the materials or samples as a record of the original field provenience information.

In the field, excavators are responsible for preliminary identification of cultural materials and assignment of materials to one of a set of material-identification classes. These classes, jointly established by field and laboratory personnel, are as follows: Ceramics, Flaked Lithics, Nonflaked Lithics, Human Bone, Nonhuman Bone, Vegetal, Shell, Historic, Other Organic, Other Inorganic, and Indeterminate.

In the field, excavators are also responsible for assigning a sample number (consecutive within each site and within each sample type) to every sample which is collected. The standard sample types, which reflect the need of the various task specialists and crew chiefs for chronological and environmental information, as well as the requirements of the Research Design, are as follows: Archaeomagnetic Samples, Bulk Soil Samples, Radiocarbon Samples, Dendrochronological Samples, Pollen Samples, Stratigraphic Columns, and Sediment Samples.

A sample type and sample number are a part of the standard bag label of every sample that enters the laboratory. Routing through the Laboratory Flow System is determined by the sample type assigned in the field, and each sample receives appropriate processing.

IMPLEMENTATION OF THE LABORATORY FLOW SYSTEM

Implementation of the Laboratory Flow System did not follow the outline contained in Appendix A due to the backlog of a large number of samples and several thousand bags of materials collected during the first three months of the Contractor's mitigation efforts. First priority was given to processing the samples for analysis and washing the materials as needed. Modifications were temporarily made in the Laboratory Flow System to accomodate this need for flexibility.

The system was implemented on a site-by-site basis, since the materials and samples had been stored in the laboratory according to site. (Implementation of the Laboratory Flow System as designed would have required the materials to have been boxed day-by-day upon entry into the laboratory.) Site 5MT2191, a small excavated site, was chosen to test the basic flow of the laboratory system. As the materials and samples from this site moved through the stages of processing, problems were identified and solved through experimentation.

On the basis of this test run with a small site, no major changes in the initial Laboratory Flow System were suggested. Subsequently the materials and samples from the remaining six excavated sites from the 1978 fieldwork and the materials and samples collected from the inventory survey were also passed through the Laboratory Flow System. Processing of the materials collected during 1978 fieldwork was complete by the end of the reporting period; processing of the samples collected during the 1978 fieldwork continued into the next reporting period, as outlined in greater detail later in this report.

Some minor revisions in the details of the system were made during the course of the reporting year, e.g., a computer entry function in Step 1 was eliminated. The original system called for entry of initial inventory data from the Laboratory Record Forms (Appendix A, Figure 2.A.3; Appendix B, Figure 2.B.4) on a daily basis. However, due to substantial revision of inventory information during Steps 3 and 4, computer entry in Step 1 represented wasted effort.

Other revisions were made after discussion between the Contractor's Laboratory Supervisor and the Government's Acting Laboratory Supervisor. It was agreed that the Contractor should assume some of the Government's responsibilities on a temporary basis, until the Government's laboratory staff was brought to a full level. The Contractor agreed to temporarily perform Steps 1 and 2 and part of Step 4. Gradually through the course of the reporting period the Government has resumed responsibility for Steps 1 and 2, as outlined in Figure 2.2. Through the end of the reporting period the Contractor retained responsibility for a portion of Step 4; this responsibility should revert to the Government with the advent of the 1979 field season.

The original Laboratory Flow System design did not contain the continuous inventory checks described in Appendix A. Upon implementation of the system it quickly became apparent that these inventory checks were essential in order to pinpoint discrepancies occurring in the inventory-control function. Searches for missing materials and samples could then be focused in the area where the materials or samples had first disappeared. Every major step of the Laboratory Flow System is now characterized by some form of inventory check, in order to maintain rigorous control throughout.

PROBLEM AREAS ADDRESSED

During this reporting period a variety of problems were addressed in the context of establishing a schedule of laboratory operations and procedures. In the six months following the beginning of regular laboratory operations, the problem areas listed below have been addressed and solutions incorporated as part of the Contractor's laboratory operations.

Security

Development of a security program for the laboratory was begun. Joint action between the Government and the D.A.P. brought a representative of the County Sheriff to the laboratory. He generated a memorandum recommending adequate security precautions for the facility. This memorandum has been acted upon by the Government and the D.A.P. and has been submitted to B.O.R. for review and implementation.

Maintenance

The laboratory does not provide optimum conditions for operation of the delicate scientific equipment which is in use there; consequently, efforts have been made to control dirt and dust in the building. Specific steps which have been taken include use of sweeping compound, weekly sweeping of the floor, use of floor mats at all entrances and in heavily used passageways, and strict enforcement of a policy of covering all instruments when not in use.

Safety

Specific steps which have been taken to emphasize safety include inauguration of weekly safety meetings to pinpoint specific safety hazards, weekly safety checks, monthly safety reviews, and monthly fire

drills; establishment of fire safety procedures; and installation of fire extinguishers.

Pest Control

A regular pest-control program is required to prevent damage to the materials and samples in the laboratory. Steps taken to resolve this problem include use of a professional extermination service and establishment of an in-house extermination program.

Supplies and Equipment

Three months in advance, each task specialist is asked for a list of supplies required for a four-month period. This gives adequate time for all of the supplies to be assembled before they are actually needed and eliminates work slowdowns due to inadequate supplies.

Staffing

The Contractor's Laboratory Supervisor is responsible for providing guidelines to the D.A.P. administration regarding personnel needs in the laboratory. This list is provided at least three months before each four-month work period. This provides for advance planning for laboratory work.

Public Information

It is the responsibility of the D.A.P. as a federally funded program to inform the public of the nature of its work and to offer itself as an educational resource. Public tours and communication with local schools have been initiated.

CURRENT STATUS OF LABORATORY OPERATIONS

By the end of the reporting period, 28 February 1979, processing of all materials collected during 1978 fieldwork had been completed. The details of work accomplished from June 178 to February 1979 are summarized in Tables 2.1-2.8. Preliminary analysis has been initiated for some of the materials collected; the remaining materials are scheduled for preliminary analysis during the next reporting period.

Processing of dating and environmental samples collected during the 1978 field season was not completed during the reporting period. A summary of the work completed on samples is also contained in Tables 2.1-2.8. Analytical procedures for each type of sample have been designed; these are summarized below.

Dating

Dendrochronological Samples

For dating information, the Contractor relies most heavily on the dendrochronological samples. All samples collected during the 1978 excavations hae been forwarded to the Laboratory of Tree-Ring Research, University of Arizona. Dating information has been received from the Laboratory on most of the samples collected and the information has been forwarded to the crew chiefs for inclusion in the fieldwork reports (see individual site reports included in D.A.P. Contractual Reports, Volume I, Field Investigations-1978).

Archaeomagnetic Samples

All samples collected during the 1978 fieldwork have been forwarded to Dr. J. Eighmy at Colorado State University's Laboratory of Public

Table 2.1 States of Laboratory Processing, Site 5MT2151

	Wash	Special Handling	Temp-orary Stor.	Initial Preliminary Analysis	Completed Preliminary Analysis	Perma-nent Stor.	Sent off	Returned
Flaked Lithics								
Nonflaked Lithics								
Ceramics								
Vegetal								
Nonhuman Bone								
Human Bone								
Other Organic								
Other Inorganic								
Shell								
Historic								
Dendrochronological								
Radiocarbon								
Pollen								
Archaeomagnetic								
Stratigraphic								
Sediment Samples								
Other Material Source								
Bulk Soil								

Table 2.2 States of Laboratory Processing, Site 5MT2191

	Wash	Special Handling	Temp-orary Stor.	Initial Preliminary Analysis	Completed Preliminary Analysis	Perma-nent Stor.	Sent off	Returned
Flaked Lithics								
Nonflaked Lithics								
Ceramics								
Vegetal								
Nonhuman Bone								
Human Bone								
Other Organic								
Other Inorganic								
Shell								
Historic								
Dendrochronological								
Radiocarbon								
Pollen								
Archaeomagnetic								
Stratigraphic								
Sediment Samples								
Other Material Source								
Bulk Soil								

Table 2.3 States of Laboratory Processing, Site 5MT2193

	Wash	Special Handling	Temporary Stor.	Initial Preliminary Analysis	Completed Preliminary Analysis	Permanent Stor.	Sent off	Returned
Flaked Lithics								
Nonflaked Lithics								
Ceramics								
Vegetal								
Nonhuman Bone								
Human Bone								
Other Organic								
Other Inorganic								
Shell								
Historic								
Dendrochronological								
Radiocarbon								
Pollen								
Archaeomagnetic								
Stratigraphic								
Sediment Samples								
Other Material Source								
Bulk Soil								

Table 2.4 States of Laboratory Processing, Site 5MT2198

	Wash	Special Handling	Temp-orary Stor.	Initial Preliminary Analysis	Completed Preliminary Analysis	Perm-anent Stor.	Sent off	Returned
Flaked Lithics								
Nonflaked Lithics								
Ceramics								
Vegetal								
Nonhuman Bone								
Human Bone								
Other Organic								
Other Inorganic								
Shell								
Historic								
Dendrochronological								
Radiocarbon								
Pollen								
Archaeomagnetic								
Stratigraphic								
Sediment Samples								
Other Material Source								
Bulk Soil								

Table 2.5 States of Laboratory Processing, Site 5MT2202

	Wash	Special Handling	Temp-orary Stor.	Initial Preliminary Analysis	Completed Preliminary Analysis	Perm-anent Stor.	Sent off	Returned
Flaked Lithics								
Nonflaked Lithics								
Ceramics								
Vegetal								
Nonhuman Bone								
Human Bone								
Other Organic								
Other Inorganic								
Shell								
Historic								
Dendrochronological								
Radiocarbon								
Pollen								
Archaeomagnetic								
Stratigraphic								
Sediment Samples								
Other Material Source								
Bulk Soil								

Table 2.6 States of Laboratory Processing, Site 5MT2235

	Wash	Special Handling	Temp-orary Stor.	Initial Preliminary Analysis	Completed Preliminary Analysis	Perm-anent Stor.	Sent off	Returned
Flaked Lithics								
Nonflaked Lithics								
Ceramics								
Vegetal								
Nonhuman Bone								
Human Bone								
Other Organic								
Other Inorganic								
Shell								
Historic								
Dendrochronological								
Radiocarbon								
Pollen								
Archaeomagnetic								
Stratigraphic								
Sediment Samples								
Other Material Source								
Bulk Soil								

Table 2.7 States of Laboratory Processing, Site 5MT4475

	Wash	Special Handling	Temp-orary Stor.	Initial Preliminary Analysis	Completed Preliminary Analysis	Perm-anent Stor.	Sent off	Returned
Flaked Lithics								
Nonflaked Lithics								
Ceramics								
Vegetal								
Nonhuman Bone								
Human Bone								
Other Organic								
Other Inorganic								
Shell								
Historic								
Dendrochronological								
Radiocarbon								
Pollen								
Archaeomagnetic								
Stratigraphic								
Sediment Samples								
Other Material Source								
Bulk Soil								

Table 2.8 States of Laboratory Processing, Survey

	Wash	Special Handling	Temp-orary Stor.	Initial Preliminary Analysis	Completed Preliminary Analysis	Perm-anent Stor.	Sent off	Returned
Flaked Lithics								
Nonflaked Lithics								
Ceramics								
Vegetal								
Nonhuman Bone								
Human Bone								
Other Organic								
Other Inorganic								
Shell								
Historic								
Dendrochronological								
Radiocarbon								
Pollen								
Archaeomagnetic								
Stratigraphic								
Sediment Samples								
Other Material Source								
Bulk Soil								

Archaeology. Dating information from the archaeomagnetic samples is expected during the next reporting year.

PROBLEM AREAS REQUIRING FURTHER WORK DURING THE PRESENT YEAR

Several areas are in need of further work before 5 June 1979.

1. A working relationship with the Government's laboratory personnel must be maintained. The Contractor will continue to operate the laboratory jointly with the Government, obtaining agreement on all changes in procedure and initiation of new procedures.

2. The full Laboratory Flow System must be in operation when the 1979 field season commences. Plans have been made to implement the system, and personnel have been designated to handle the key aspects. The Government now has a nearly complete complement of personnel and will undertake its full responsibility as regards the Laboratory Flow System.

3. The Government's Collections Manager and the Contractor's Laboratory Supervisor have completed the Laboratory Operations Manual; review will continue prior to the beginning of the field season.

4. Now that the Government's archivist position has been filled, the Contractor and the Government will jointly develop inventory systems to deal with the handling of paper records (including field notes, photograph material, and maps). The concensus is that this system should be developed as quickly as possible.

5. A security program for the laboratory must be developed. The Contractor and the Government are awaiting the decision of B.O.R. regarding recommendations concerning an adequate security program for the laboratory. This problem has a high priority.

6. Specific personnel for key laboratory positions must be designated. The Contractor's Laboratory Supervisor is attempting to fill two permanent Assistant Laboratory Supervisor positions and two permanent

Laboratory Crew Leader positions by 1 June 1979.

7. Working conditions must be improved. Space within the laboratory facility is limited in form and extent. Improvement in efficient use of the space available and increases in assigned space are strong considerations for the succeeding priod.

APPENDIX A

THE LABORATORY FLOW SYSTEM

Step 1

Materials and samples enter the laboratory, according to field provenience and material type, at the end of each day of excavation and collection; these are labelled as shown in Figure 2.A.1. The materials and samples, accompanied by a Field Inventory Form (Figure 2.A.2) for each site, are collected by the Government's receiving staff. This task group compares the bags from each site with the Field Inventory Form in order to determine whether all materials and samples have arrived. The receiving staff completes a Laboratory Record Form (Figure 2.A.3; Appendix B, Figure 2.B.4) for every field provenience (F.S.) number from every site to document materials and samples for which the Government assumes inventory responsibility.

The major goals of Step 1 are establishment of an initial inventory and a check of provenience information for consistency within each F.S. number assigned.

Step 2

The Government's receiving staff assigns each bag either to washing or to special handling. The latter may include special packaging for shipment, checks of provenience information, or re-identification of material class.

Some materials require immediate treatment to prevent further degradation. Materials in need of such treatment may be identified in the field or in the laboratory. They are given to the Government Collections Manager for treatment after special handling.

The major goal of Step 2 is the channelling of materials and samples through the Laboratory Flow System.

SITE #_____ FS#_____

PROV._____

_____

_____

MATER._____ BAG #_____

METHOD_____ DATE_____

COLL. BY_____ SPEC. INSTRU._____

Figure 2.A.1 Standard bag label for field description of provenience information for materials and samples collected.

DOLORES ARCHAEOLOGICAL PROGRAM
FIELD INVENTORY

SITE #:_____
DATE:_____
INITALS:_____

F.S.	MAT/SAMPLE	# BAGS	F.S.	MAT/SAMPLE	# BAGS

LAB USE ONLY:
CHECKED IN BY:_____ INPUT BY:_____ OK'd BY:_____

Figure 2.A.2 Field Inventory Form, completed in the field listing all materials and samples submitted to the Processing Laboratory on a given day.

Dolores Project Laboratory
LAB RECORD FORM

Site Number_____ F.S.#_____ Record Number_____

Provenience_____

Initials_____ Date Open_____ Date Closed_____

Type	Number	Received	Stored	Processed	Sorted	Remarks

Figure 2.A.3 Laboratory Record Form, updated daily in the laboratory by the Government's receiving staff to show summary of all materials and samples received from a particular F.S. number.

The major goal of Step 2 is the channelling of materials and samples through the Laboratory Flow System.

Step 3

The Contractor's washing and special-handling staffs receive material from the Government and process it appropriately. The special-handling staff completes a Laboratory Flow Sheet (Figure 2.A.4) for each F.S. number. The Laboratory Flow Sheet tracks materials and samples through the laboratory, maintaining a record of the physical location of each bag of material, and providing information concerning the stage of processing to which each bag has progressed.

The major goals of Step 3 are the preparation of materials for analysis as specified by the task specialist who will analyze the material, provision of a check of provenience information for consistency within each F.S. number, conservation by the Government where needed, and provision of a check on inventory control.

Step 4

All material and samples are returned to the Government's Collections Manager, who assigns temporary storage locations. The material is held until it is called for by the appropriate task specialist or sent to permanent storage.

Major goals of Step 4 are provisions of a check on inventory control, revision of initial inventory data, and assignment of a recorded temporary storage location.

Step 5

When task specialists request material for analysis, a Loan Form (Figure 2.A.5) is filled out to provide a record of the transfer of material. Upon receipt of the material the task specialist performs an

. igure 2.A.4 Laboratory Flow Sheet, updated in the laboratory on a daily basis by the Contractor's special handling staff to show the status of all materials and samples regarding progress through the Laboratory Flow System.

DAP LABORATORY LOAN FORM

LOAN TO: NAME _____ AFFILIATION _____ PAGE ____ OF ____

INITALS _____ ADDRESS _____ PHONE ( ) _____

MATERIAL OR SAMPLE	SITE #	FS #	# BAGS	DATE OUT	DATE IN	REMARKS

SIGNATURE OF LOANEE _____

Figure 2.A.5 Laboratory Loan Form, completed in the laboratory by the Government's Collections Manager to show which party has accepted responsibility for materials or samples after they have been checked out of temporary storage.

inventory check of the material and assumes responsibility for the material listed on the Laboratory Loan Form.

The major goals of Step 5 are provision of a check on inventory control and transfer of responsibility for the materials and samples listed on the Loan Form from the Government to the Contractor.

Step 6

Task specialists and crews perform preliminary analyses. The major goals of Step 6 are to provide preliminary analysis information to field personnel for completion of fieldwork reports and to assign catalogue numbers to lots and individual pieces of material for their identification during subsequent analysis and curation.

Step 7

Task specialists return material to the Government's Collections Manager, accompanied by a Post Preliminary Analysis Inventory Form (Figure 2.A.6). The Loan Form completed in Step 5 is appropriately ammended. This provides a record of the transfer of responsibility for the material.

Major goals of Step 7 are provision of checks on inventory control and transfer of responsibility for materials.

Step 8

The Government's Collections Manager assigns a permanent storage location to all material and samples which reach this point. A record is made of the permanent storage location on the Post Preliminary Analysis Inventory Form (Figure 2.A.6), and the record is entered into the computer file.

The major goal of Step 8 is assignment of a permanent storage location for curation control.

POST PRELIMINARY ANALYSIS INVENTORY

SITE #_______ MATERIAL_________________ INITIALS________ PAGE____ OF____

FS #	CAT. IT. #	PL #	PHOTO	PROT.	PN.		MORPHO USE FORM

Figure 2.A.6 Post Preliminary Analysis Inventory Form, completed by the task specialists during preliminary analysis and submitted to the Government's Collections Manager with all materials going to permanent storage.

Step 9

When task specialists so request, the Contractor's Laboratory Supervisor asks the Government's Collections Manager to remove certain lots of material from permanent storage for intensive analysis. The transfer procedure is the same as in Step 5.

The major goals of Step 9 are provision of checks on inventory control, transfer of responsibility, and recovery of selected materials for intensive analysis.

Step 10

Return of material mentioned in Step 9 follows the procedure in Step 7.

Major goals of Step 10 are provision of checks on inventory control, transfer of responsibility, and retrieval.

APPENDIX B

LABORATORY OPERATIONS MANUAL

by

Paul J. Farley and Karen Laitner

This manual describes in detail the standard laboratory procedures of the Dolores Project Cultural Resources Mitigation Program archaeological field laboratory. It serves both as an informational document for those interested in the laboratory operations and as an instruction manual for training laboratory workers in the specifics of the Laboratory Flow System.

According to the Memorandum of Understanding between B.O.R. and the BLM, operation of the archaeological field laboratory is the joint responsibility of the BLM and B.O.R.'s Archaeological Contractor, the University of Colorado. This Laboratory Operations Manual is a joint effort on the part of the Contractor's Laboratory Supervisor and the Government's Acting Laboratory Supervisor.

Specific responsibility for all phases of analysis falls to the Contractor. The Government is responsible for all inventory and curation functions of the Laboratory Flow System. Jointly the Contractor and the Government have developed the concepts incorporated into the Laboratory Flow System and in this manual, present detailed project-specific procedures for the operation of all aspects of the archaeological field laboratory.

FIELD PREPARATION FOR LABORATORY OPERATIONS

The first sorting of materials occurs in the course of field recovery operations, and serves as the initial stage of the laboratory operations. Inventory in the field and the initial inventory in the laboratory are based on the F.S. number proveniencing system used during the Contractor's field operations. All materials and samples are labelled in the field according to a standard format and handled as outlined below. The site directors and the locality supervisors are responsible for completion of these steps.

1. Each material type and each special sample from each provenience unit are bagged separately on a daily basis.

2. Most materials can be packaged in paper bags stamped with the program's standard bag label (Table 2.B.1, Figure 2.B.1). Field personnel are provided with copies of the instructions for completion of bag labels. Vulnerable materials or oversized materials are provided with adequate support and padding.

3. On a daily basis all materials and samples collected in the field are listed on a Field Inventory Form (Figure 2.B.2). A Field Inventory Form is completed daily for every site which has collected materials and/or samples. Field personnel are provided with copies of the instructions for completion of Field Inventory Forms (Table 2.B.2).

4. On a daily basis materials and samples from each site are submitted to the laboratory, accompanied by the Field Inventory Form.

5. When an F.S. number (provenience unit) is completed in the field, the F.S. number is circled on the Field Inventory Form for that day, to

Table 2.B.1 Directions for Field Labelling of Materials and Samples (Page 1 of 2)

Space #1: This space contains the Smithsonian designation for the site.

FORMAT:	05	MT	04475
	(State Code)	(County Code)	(Site Number)
	two digits	two letters	five digits

Space #2: This space contains the field specimen number for this provenience.

FORMAT: 000001 (zeroes are optional in this space
six digits when they occur at the left side)

Space #3a: Study Unit Type - a longhand description as it appears on the coding format for the F.S. Form
Study Unit Number - FORMAT: 000001
six digits

(Some examples of formats for this space include):

Room 3
Pitstructure 1
Non-structural Unit 2
Excavation Unit 1
1X1 098-066

Space #3b: Left Side: Horizontal Subdivision
(Some examples of formats for this space include):

Locus 11
Segment 2
West Half
098-066

Right Site: Vertical Subdivision
(Some examples of formats for this space include):

Stratum 2
Level 2
Surface 3
Full Cut

Space #3c: Left Side: "FEATURE" and feature number
FORMAT: Feature 12

Right Side: Horizontal and Vertical Subdivision of the feature
(Some examples of formats for this side include):

West Half
Northeast quarter, Stratum 1
Full Cut

Table 2.B.1 Directions for Field Labelling of Materials and Samples (Page 2 of 2)

Space #4: Material Identification Class abbreviation OR Sample Type and Number

CER	Ceramics, prehistoric	AM	Archaeomagnetic
NHB	Nonhuman Bone	BS	Bulk Soil
FL	Flaked Lithic	CF	Radiocarbon
NFL	Nonflaked Lithic	DD	Dendrochronological
VEG	Vegetal	EB	Ethnobotanical
HB	Human Bone	MS	Material Source
INORG	Other Inorganic	PC	Pollen Core
ORG	Other Organic	PN	Pollen
OTHER	Other	SC	Stratigraphic Column
		SS	Sediment
		BT	Botanical
		FM	Film

Space #5: Consecutive number noting that this is the nth bag of this Material Identification Class OR Sample Number being sent in from this F.S. number

Space #6: Collection Method - see coding format for the F.S. Form and the appropriate abbreviations

Space #7: Date: FORMAT:

01	01	80
Month	Day	Year
two digits	two digits	two digits

Space #8: Four-letter initials for the person responsible for excavation of the F.S. number. This is usually the crew chief. The excavator's initials may show up below those of the crew chief.

Space #9: Special instructions to the laboratory or to the analyst dealing with the material. Mark special items with orange tape.

(Some examples of formats for this space include):

Do Not Wash
Fragile
Conservation Immediately

SITE #_____ FS#_____

PROV._____

_____

_____

MATER._____ BAG #_____

METHOD_____ DATE_____

COLL. BY_____ SPEC. INSTRU._____

Figure 2.B.1 Standard bag label for field description of provenience information for materials and samples collected.

DOLORES ARCHAEOLOGICAL PROGRAM
FIELD INVENTORY

SITE #: _____
DATE: _____
INITALS: _____

F.S.	MAT/SAMPLE	# BAGS	F.S.	MAT/SAMPLE	# BAGS

LAB USE ONLY:
CHECKED IN BY:_____ INPUT BY:_____ OK'd BY:_____

Figure 2.B.2 Field Inventory Form; completed in the field listing all materials and samples submitted to the Processing Laboratory on a given day.

Table 2.B.2 Directions for Completing Field Inventory Forms

Space #1: Site Number: Smithsonian designation.

FORMAT: 05 (State) two digits — MT (County) two digits — 04475 (Site Number) five digits

Space #2: Date: FORMAT: 01 (Month) two digits — 01 (Day) two digits — 80 (Year) two digits

Space #3: Work Leader: Four-letter initials of the crew chief.

Space #4: Provenience (From Provenience section of the bag label.)

Space #5: F.S. Number: FORMAT 000001 six digits (zeroes optional here when they occur at left side)

Space #6: Material Identification Class OR Sample Type and Number

CER	Ceramic, prehistoric	AM	Archaeomagnetic
NHB	Nonhuman Bone	BS	Bulk Soil
FL	Flaked Lithic	CF	Radiocarbon
NFL	Nonflaked Lithic	DD	Dendrochronological
VEG	Vegetal	MS	Material Source
HB	Human Bone	PN	Pollen
INORG	Other Inorganic	SC	Stratigraphic Column
ORG	Other Organic	FM	Film
OTHER	Other		

Space #7: Number of bags of material recorded on this line. Leave blank lines where a sample is recorded.

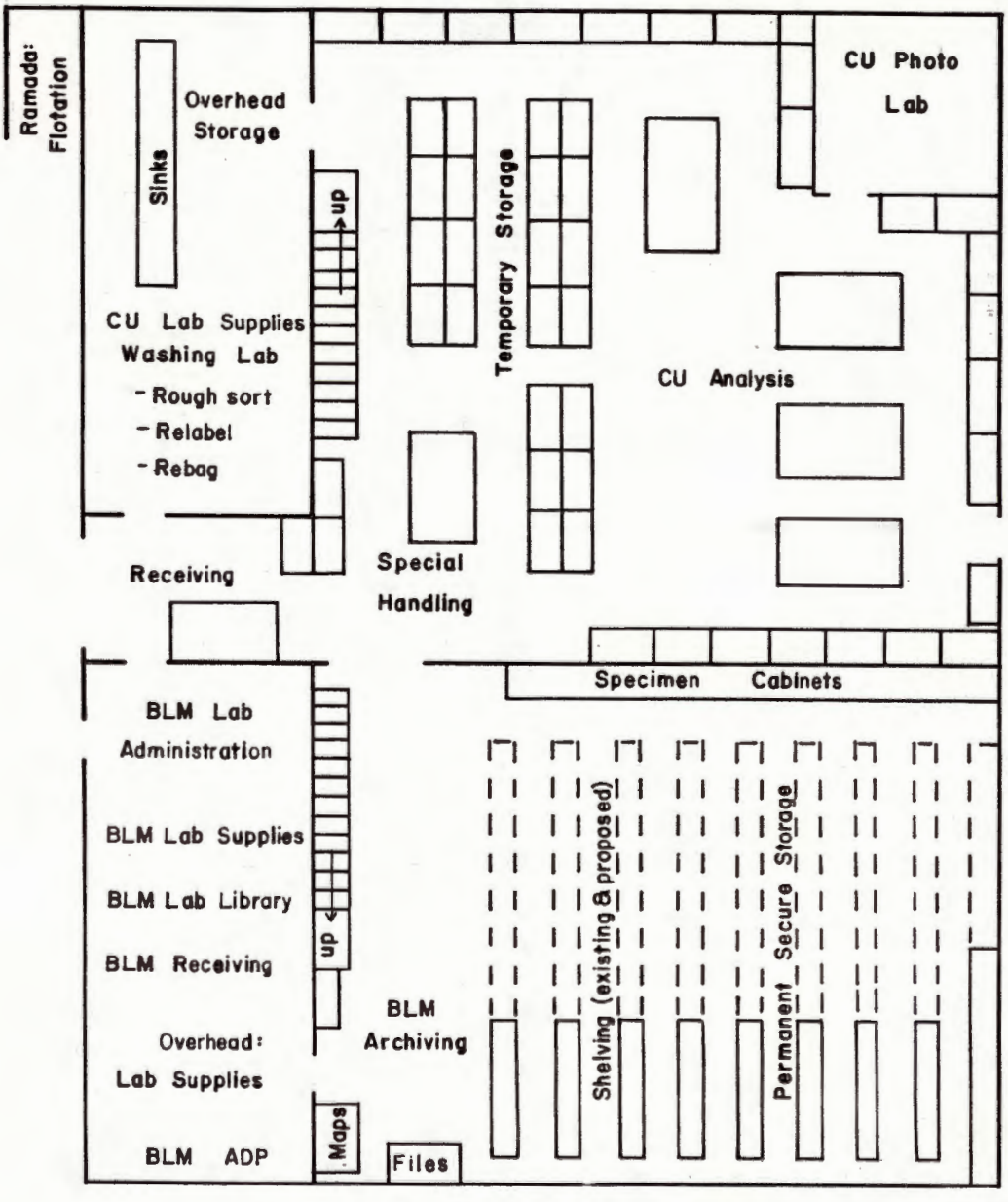
signal the laboratory that processing of the materials and samples submitted from that provenience unit may begin.

RECEIVING

Operation of the receiving section of the Laboratory Flow System is the responsibility of the Government's Acting Laboratory Supervisor. The receiving area is located at the entrance to the laboratory facility (Figure 2.B.3), and the field personnel daily deposit their materials and samples there. The receiving area has the capacity to adequately handle the estimated load of 400 to 600 bags of materials and samples. A 4 by 8 ft table provides work space; a depository is provided for the daily Field Inventory Forms. Materials and samples are processed through the receiving area on a daily basis, according to the outline below. The receiving function provides the initial inventory of the Laboratory Flow System, enabling personnel to keep track of all materials and samples as they pass through the system.

1. Each bag (or other container) of materials or each sample is checked against the Field Inventory Form.
    a. If the bag is not listed on the Field Inventory Form, see Step 3.
    b. The provenience information on the bag is compared with the provenience information on the Field Inventory Form. If there is a discrepancy, see Step 3.
    c. The provenience information on the bag is compared with the provenience information on the Laboratory Record Form (Figure 2.B.4, Table 2.B.3) for that provenience unit. If there is a discrepancy, see Step 3.

Figure 2.B.3 Plan view of laboratory facility.



FLOOR PLAN OF DAP LABORATORY

Figure 2.B.3 Plan view of laboratory facility.

Dolores Project Laboratory
LAB RECORD FORM

Site Number_____ F.S.#_____ Record Number_____

Provenience_____

Initials_____ Date Open_____ Date Closed_____

Type	Number	Received	Stored	Processed	Sorted	Remarks

Figure 2.B.4 Laboratory Record Form, updated daily in the laboratory by the Government's receiving staff to show summary of all materials and samples received from a particular F.S. number.

Table 2.B.3 The Laboratory Record Form

Space #1: Site Number: Smithsonian designation.

FORMAT: 05 (State) two digits — MT (County) two digits — 00001 (Site Number) five digits

Space #2: F.S. Number: FORMAT: 000001 six digits (zeroes optional here when they occur at left side)

Space #3: Page: Numbered consecutively within each F.S. number.

Space #4: Provenience: Format from the bag label.

Space #5: Initials: Four-letter initials of the crew chief.

Space #6: Date Open and Date Closed:

FORMAT: 01 (Month) two digits — 01 (Day) two digits — 78 (Year) two digits

Space #7: Type: Material Identification Class OR Sample Type and Number

CER	Ceramics	AM	Archaeomagnetic
NHB	Nonhuman Bone	BS	Bulk Soil
FL	Flaked Lithics	CF	Radiocarbon
NFL	Nonflaked Lithics	DD	Dendrochronologial
VEG	Vegetal	MS	Material Source
HB	Human Bone	PN	Pollen
INORG	Other Inorganic	SC	Stratigraphic
ORG	Other Organic		
OTHER	Other		

Space #8: Number: Number of bags listed with this entry.

Space #9: Received: Four-letter initials of the receiving person.

Space #10: Date: FORMAT: (as above)
Date of receipt of materials or samples in this entry.

2. If a bag is listed on the Field Inventory Form, but is not found in the receiving area, the Field Inventory Form is returned to the crew chief for appropriate action.

3. If there is any conflict between the bag label and the Field Inventory Form, or between the bag label and the Laboratory Record Form, the bag is returned to the crew chief for correction.

4. When all discrepanices, if any, involving a bag label have been corrected, each bag of materials or each sample is listed on the Laboratory Record Form for that provenience unit. If no materials or samples have previously been submitted to the laboratory from the provenience unit, a new Laboratory Record Form is generated.

5. On a daily basis, bags containing washable materials will be turned over to the Contractor's Laboratory Supervisor for washing. The material identification classes of Ceramics, Flaked Lithics, and Nonflaked Lithics are considered to be routinely washable, except for special artifacts identified in the field as nonwash items.

6. On a daily basis bags containing nonwash items are turned over to the Contractor's Laboratory Supervisor for special handling. The material-identification classes of Nonhuman Bone, Human Bone, Shell, Other Organic, Other Inorganic, Vegetal, and Other are considered to be routinely nonwash items, as well as special artifacts from other classes identified in the field as nonwash items.

7. On a daily basis all bags of samples are turned over to the Contractor's Laboratory Supervisor for processing.

8. As each provenience unit is completed, the receiving personnel complete a Laboratory Flow Sheet for each provenience unit (Figure 2.B.5, Table 2.B.4).

Figure 2.B.5 Laboratory Flow Sheet, updated in the laboratory on a daily basis by the Contractor's special handling staff to show the status of all materials and samples as regards progress through the Laboratory Flow System.

Table 2.B.4 Directions for Completing the Laboratory Flow Sheet (Page 1 of 2)

Space #1: Site Number: Smithsonian designation.

FORMAT:	05	MT	00001
	(State)	(County)	(Site number)
	two digits	two digits	five digits

Space #2: F.S. Number: FORMAT: 000001 (zeroes optional here when six digits they occur on left side)

Space #3: Page: Numbered consecutively within each F.S. number.

Space #4: Provenience: Format from the bag label.

Space #5: Initials: Four-letter initials of the crew chief.

Space #6: Date Open and Date Closed:

FORMAT:	01	01	78
	(Month)	(Day)	(Year)
	two digits	two digits	two digits

Space #7: Material or Special Sample:
Material Identification Class OR Special Sample Type

CER	Ceramics	AM	Archaeomagnetic
NHB	Nonhuman Bone	BS	Bulk Soil
FL	Flaked Lithics	CF	Radiocarbon
NFL	Nonflaked Lithics	DD	Dendrochronological
VEG	Vegetal	MS	Material Source
HB	Human Bone	PN	Pollen
INORG	Other Inorganic	SC	Stratigraphic Column
ORG	Other Organic		
OTHER	Other		

Space #8: W/NW: Checkmark to indicate whether this bag was designated wash or non-wash in the receiving section.

Space #9: # Bags Originally: how many bags of this material identification class or for this special sample were originally received into the laboratory.

Space #10: #Bags Combined: how many bags of this material identification class or for the special sample remained after processing had been completed.

Space #11: Wash Process or Nonwash Process: code indicating type of processing used on the materials or samples in this entry.

Table 2.B.4 Directions for Completing the Laboratory Flow Sheet (Page 2 of 2)

Space #12:	Conservation Needed/Complete: bags of materials in need of conservation are identified in the receiving function and details are included here concerning the type of conservation used and the date of application.
Space #13:	Temporary Storage: code for the temporary storage location to which the materials or samples in this entry are assigned.
Space #14:	Preliminary Analysis/Loan: date and initials for the loan of the materials or samples in this entry to a task specialist for preliminary analysis.
Space #15:	Preliminary Analysis Done: date for return of the loan of the materials or samples in this entry from the task specialist.
Space #16:	Code for the permanent storage location to which the materials or samples in this entry are assigned.

9. On a daily basis the receiving personnel will identify and list those provenience units marked on the Field Inventory Forms as closed, and give this list to the Contractor's Laboratory Supervisor, accompanied by the Laboratory Flow Sheet for each of those completed provenience units.

10. Each set of paper records is checked into the laboratory as received, and a Laboratory Paper Records Receiving Form (Figure 2.B.6, Table 2.B.5) is completed by the receiving personnel.

DAP LAB PAPER RECORDS RECEIVING FORM

SITE NO._____ FS NO._____ PAGE_____ OF_____

NON-SITE_____

FORM	DATE COMPLETED	REC'D	DATE REC'D	STORED

Figure 2.B.6 D.A.P. Lab Paper Records Receiving Form.

Table 2.B.5 Directions for Completing the Laboratory Paper Records Receiving Form

Space #1: Site Number: Smithsonian designation.

FORMAT:

05	MT	00001
(State)	(County)	(Site number)
two digits	two digits	five digits

Space #2: F.S. Number: FORMAT: 000001 six digits (zeroes optional here when they occur at left side)

Space #3: Page: numbered consecutively within each F.S. number.

Space #4: Nonsite: longhand description completed when the forms are not site-specific forms.

Space #5: Form: longhand description of the type of forms being entered.

Space #6: Date Completed: last entry of information onto the forms themselves.

FORMAT:

01	01	78
(Month)	(Day)	(Year)
two digits	two digits	two digits

Space #7: Received: four-letter initials of the crew chief or responsible person.

Space #8: Date received: (format as above) date of receipt of forms in this entry.

Space #9: Stored: coded storage location for these forms.

WASHING

Operation of the washing section of the Laboratory Flow System is the responsibility of the Contractor's Laboratory Supervisor. The washing area is located in the front (southern) section of the laboratory facility (Figure 2.B.3) adjacent to the receiving area and the special handling area. Materials for washing are delivered daily to the washing area from the receiving area. The washing area has the capacity to temporarily store approximately 1500 bags of material awaiting processing. One 4 by 8 ft table and three 3 by 6 ft tables provide work space. Materials are processed, as outlined below, through the washing area according to the lists of closed F.S. numbers which are received daily from the receiving personnel. As materials are washed they are passed on to the Government's Acting Laboratory Supervisor.

1. On a daily basis the washing personnel place materials received into a temporary storage location in the washing area. The materials remain there until the provenience unit is closed.
2. On a daily basis the washable materials from the provenience units listed as closed in the field are retrieved from their temporary storage locations in the washing area and the materials are washed.
3. During washing the material-class identifications made in the field are checked and any necessary corrections are made. If materials have been missorted in the field they are placed into the correct bag, or, if no bag exists for the material-identification class, a new bag is generated in the laboratory.
4. When a new bag is generated in the laboratory, the Government's Acting Laboratory Supervisor and the crew chief are notified and the

appropriate changes are made on the Field Inventory Form, the Laboratory Record Form, and the Laboratory Flow Sheet.

5. The original label, with complete information, is cut out of the paper bag; the remainder of the paper bag is discarded and the original label remains with the materials permanently.

6. Lithic materials, both flaked and nonflaked, are washed with surgical scrub brushes which have artificial bristles, using tap water at ground temperature.

7. Ceramic materials are soaked three to five minutes in a bath of muriatic acid (28 percent hydrochloric acid) and tap water at ground temperature. The solution is approximately 0.5 percent, making the acidity less than 0.2 percent. This bath attacks alkaline soil bonds and makes the dirt easier to remove. The materials are then scrubbed with surgical brushes and finally soaked for five minutes in tap water at ground temperature to remove any traces of the acid.

8. After the materials have dried thoroughly, where feasible, bags of materials belonging to the same material-identification class and the same provenience unit are combined to form a smaller number of bags. All of the original bag labels are retained within the bags for the permanent record.

9. The materials are rebagged in clear plastic bags of appropriate sizes and thicknesses. At the time of rebagging, a copy is made of the original bag label on a 3 by 5 in index card, so that the totality of the label information is clearly visible.

10. The Laboratory Flow Sheets are updated on a daily basis by the Contractor's Laboratory Supervisor. The type of processing used by the Contractor is recorded and the combined number of bags is recorded.

11. The washed, relabelled, and rebagged materials are turned over to the Government's Acting Laboratory Supervisor for assignment of a temporary storage location.

12. The Laboratory Flow Sheets are directed to the special handling section for completion.

SPECIAL HANDLING

Operation of the special handling section of the Laboratory Flow System is the joint responsibility of the Government's Acting Laboratory Supervisor and the Contractor's Laboratory Supervisor. The Government's Acting Laboratory Supervisor is responsible for necessary stabilization of deteriorating material and the Contractor's Laboratory Supervisor is responsible for all other parts of special handling. The special handling area is located near the center of the laboratory facility, adjacent to the washing area, the receiving area, and the preliminary analysis area (Figure 2.B.3). The special handling area has the capacity to hold approximately 400 bags of materials and samples as they await processing. Materials and samples are processed through the special handling area on a daily basis according to the outline below. The work space consists of three 4 by 8 ft tables and three 3 by 6 ft tables.

1. On a daily basis the special handling personnel place materials and samples received into a temporary storage location in the special handling area. The materials and samples remain there until the provenience unit is closed.
2. On a daily basis the nonwash items from the provenience units listed as closed in the field are retrieved from their temporary storage location in the special handling area and the materials and samples are processed.
3. During special handling the material-class identifications made in the field are checked and any necessary corrections are made. If materials have been missorted in the field, they are placed into the

correct bag, or, if no bag exists for the material-identification class, a new bag is generated in the laboratory.

4. When a bag is generated in the laboratory, the Government's Acting Laboratory Supervisor and the crew chief are notified and the appropriate changes are made on the Field Inventory Form, the Laboratory Record Form, and the Laboratory Flow Sheet.
5. Radiocarbon samples are opened and checked for dampness. Wet or damp samples are dried under controlled conditions.
6. Bulk soil samples are directed to the processing equipment located under the ramada outside. Complete bulk soil sample processing details are given in another section.
7. The original label, with complete information, is cut out of the paper bag; the remainder of the paper bag is discarded and the original label remains with the materials permanently.
8. Any items which appear fragile or which appear to be or are in danger of deteriorating are referred to the Government's Acting Laboratory Supervisor for conservation assessement. Conservation is carried out as needed.
9. All materials are packaged according to their nature; padding of cotton or styrofoam is used where appropriate.
10. During packaging, bags of materials belonging to the same material-identification class and the same provenience unit are combined to form a smaller number of bags. All of the original bag labels are retained within the bags of materials for the permanent record.
11. The materials are rebagged in clear plastic bags of appropriate sizes and thicknesses. At the time of rebagging, a copy is made of the original bag label on a 3 by 5 in index card.

12. The Laboratory Flow Sheets are updated on a daily basis by the Contractor's Laboratory Supervisor. The type of processing used by the Contractor is recorded and the combined number of bags is recorded.

13. The Laboratory Flow Sheets are updated on a daily basis by the Government's Acting Laboratory Supervisor to reflect the conservation procedures and activities for that day.

14. The washed, relabelled, and rebagged materials and samples are turned over to the Government's Acting Laboratory Supervisor for assignment to a temporary storage location.

15. The Laboratory Flow Sheets are turned over to the Government's Acting Laboratory Supervisor for formation of a temporary storage inventory.

PROCESSING OF BULK SOIL SAMPLES

Bulk soil processing (flotation) equipment referred to here is described in Litzinger [1].

Step 1 A double-knit polyester fabric used for the collection of the light fraction from the bulk soil sample is cut into 12 by 18 in pieces, to fit the catch frames used. The individual pieces are weighed to the nearest tenth of a gram and the weight is recorded on each individual piece of cloth. The weight is also recorded on the Bulk Soil Processing Flow Sheet (Figure 2.B.7).

Step 2 Every sample is weighed prior to removal of the 1 L volume which will be processed. The weight is recorded in grams on the original bag label, together with the volume of the sample processed and the initials of the supervisor. This information is recorded on the Bulk Soil Processing Flow Sheet.

Step 3 One liter dry volume is measured from each bulk soil sample and packaged in a plastic bag with the sample identification number marked on it. The remainder of the sample is discarded. The 1 L sample is weighed and wrapped in a piece of the fabric described above. The weight of the 1 L sample is recorded on the fabric with the fabric weight, and on the Bulk Soil Processing Flow Sheet.

Step 4 The 55 gal barrel is placed so that the recessed section for the spillway of the box is above the level of the sink. The barrel is filled with water to a level just below the bottom of the recessed section, and the box is placed into the barrel with its bottom screen attached. The box is secured against leakage

Figure 2.B.7 Bulk Soil Processing Flow Sheet.

BULK SOIL FLOW SHEET

SITE: _____ B.S. #: _____

F.S. #: _____ SAMPLE #: _____

DATE SAMPLE TAKEN: _____

PERSON TAKING SAMPLE: _____

TOTAL SAMPLE VOLUME:	_____ ML	_____ ML	_____ ML	_____ ML
TOTAL SAMPLE WEIGHT:	_____ GM	_____ GM	_____ GM	_____ GM
PROCESSED VOLUME:	_____ ML	_____ ML	_____ ML	_____ ML
PROCESSED WEIGHT:	_____ GM	_____ GM	_____ GM	_____ GM
PROCESSOR:	_____	_____	_____	_____
DATE PROCESSED:	_____	_____	_____	_____
PROCESSING TIME:	_____ MIN	_____ MIN	_____ MIN	_____ MIN
CLOTH WEIGHT:	_____ GM	_____ GM	_____ GM	_____ GM
SORTING TIME:	_____ MIN	_____ MIN	_____ MIN	_____ MIN
SORTER:	_____	_____	_____	_____
DATE SORTED:	_____	_____	_____	_____

FRACTIONS GENERATED:

FL	_____	_____	_____	_____
NFL	_____	_____	_____	_____
CER	_____	_____	_____	_____
VEG	_____	_____	_____	_____
ORG	_____	_____	_____	_____
INORG	_____	_____	_____	_____
NHB	_____	_____	_____	_____
HB	_____	_____	_____	_____
OTHER (SPECIFY)	_____	_____	_____	_____
SEDIMENT	_____	_____	_____	_____
HEAVY RESIDUE	_____	_____	_____	_____
Samples since water change	_____	_____	_____	_____
Samples since sediment removed	_____	_____	_____	_____

COMMENTS:

by sealing the edges with rubber tubing between the barrel and the box, around the edge of the recessed section.

Step 5 When a sample is to be processed, the fabric for that sample is tacked to the edges of the catch frame and the catch frame is set into the tank so that water and materials running down the spillway of the box will be caught in the fabric. The sample is poured into the box. The hose-showerhead apparatus is lowered into the barrel so that the showerhead is below the screen at the bottom of the box and the water pressure is turned on. Water and bubbles are forced upwards through the screen and the barrel fills to a point where the water pours over the spillway. Lighter materials are thus carried over the spillway and are retrieved in the fabric as the water passes through the fabric. Water and bubbles are run through the barrel for a minimum of five minutes for each sample, or longer if the water passing over the spillway remains dirty.

Step 6 The water pressure is turned off and the box is removed from the barrel. The screen at the bottom of the box is detached and the heavy fraction of the sample is tapped out onto a labelled sheet of newspaper to dry. The light-fraction cloth is gathered from the catch frame and is hung up to dry.

Step 7 After every 20 samples, the water in the barrel is changed and the sediment in the bottom is cleaned out.

Step 8 The Bulk Soil Processing Flow Sheet is updated with the processing time and the initials of the processor.

Step 9 The light-fraction fabric with the materials enclosed is packaged for transfer to the botanical task specialist when it is dry.

Step 10 When the heavy fraction has dried, sorting begins. The sort procedure involves picking out cultural materials from the heavy fraction and generating a bag for each material-identification class found in each sample. The Bulk Soil Processing Flow Sheet is updated for this sorting.

Step 11 The materials recovered in the bulk soil processing are given to the Government's Acting Laboratory Supervisor for temporary storage.

TEMPORARY STORAGE

Operation of the temporary storage section of the Laboratory Flow System is the responsibility of the Government's Acting Laboratory Supervisor. The former apple crates which are used for temporary storage line all of the walls of the laboratory facility. Eighty-six of these apple crates have been assigned a temporary-storage-location number. Materials and samples will remain in temporary storage locations until they are called for by one of the task specialists. As materials are placed into a temporary storage location, the final bag inventory is generated from the Laboratory Flow Sheets, and this updated bag inventory information is entered into the computer files.

1. As processing of the materials and samples from each closed provenience unit is completed, the materials and samples and the accompanying Laboratory Flow Sheet are used to generate the final bag inventory and to assign temporary storage locations.
2. When materials or samples are requested for analysis, the Government's Acting Laboratory Supervisor checks the materials or samples out appropriately, by completion of a Laboratory Loan Form (Figure 2.B.8, Table 2.B.6). Completion of this form transfers responsibility for the materials or samples as is outlined on the form.

DAP LABORATORY LOAN FORM

LOAN TO: NAME _____ AFFILIATION _____ PAGE ____ OF ____

INITALS _____ ADDRESS _____ PHONE ( ) _____

MATERIAL OR SAMPLE	SITE #	FS #	# BAGS	DATE OUT	DATE IN	REMARKS

SIGNATURE OF LOANEE _____

Figure 2.B.8 Laboratory Loan Form, completed in the laboratory by the Government's Collections Manager to show which party has accepted responsibility for materials or samples after they have been checked out of temporary storage.

Table 2.B.6 Directions for Completion of the Laboratory Loan Form

Space #1: Name: full name of the person(s) or laboratory to whom the loan is being made.

Space #2: Affiliation: institution with which the loanee is associated.

Space #3: Page: numbered consecutively within each loan transaction.

Space #4: Initials: four-letter initials of the person or laboratory.

Space #5: Address: complete address for the loanee.

Space #6: Phone: telephone number for the loanee.

Space #7: Material or sample: listing of the material identification class or sample type and number being loaned in this transaction.

Space #8: Site number: Smithsonian designation

05	MT	00001
(State)	(County)	(Site number)
two digits	two digits	five digits

Space #9: FS number: FORMAT: 000001 (zeroes optional when they occur at left side)
six digits

Space #10: Number of bags: how many bag of this material identification class or this sample type are recoreded in this entry.

Space #11: Date out and date in: FORMAT:

FORMAT:	01	01	78
	(Month)	(Day)	(Year)
	two digits	two digits	two digits

PRELIMINARY ANALYSIS

Operation of the preliminary analysis section of the Laboratory Flow System is the responsibility of the Contractor, delegated to individual task specialists and consultants. Preliminary analysis for ceramics, flaked lithics, and nonflaked lithics takes place in the laboratory facility. The rear section of the laboratory facility is devoted to these preliminary analyses. Outlined below are found those sections of preliminary analysis which are followed as general steps by all task specialists and consultants. For specific procedures followed in the analyses refer to the report by the individual task specialists and consultants. The final inventory is composed of individual or lot descriptions of all materials collected.

1. All materials collected in the field are placed into a descriptive system, either as individual items or as members of a lot of items with common characteristics.
2. In the process of description every item or lot is assigned a catalogue item number. This catalogue item number becomes a part of the catalogue number for the item or lot (Table 2.B.7).
3. A Post Preliminary Analysis Inventory Form is completed by the task specialists and consultants (Table 2.B.8, Figure 2.B.9).
4. After preliminary analysis all materials are returned to the Government's Acting Laboratory Supervisor and the Laboratory Loan Form is ammended to show their return.
5. The Post Preliminary Analysis Inventory Form is returned to the Government's Acting Laboratory Supervisor and is used to generate the computer-based final inventory system for retrieval and curation.

Table 2.B.7 Format for Labelling Materials and Samples with Catalogue Number

F.S. Number (six digits)

Sample Type (two digits - see values below)

Sample Number (four digits)

Material Identification Class (two digits - see values below)

Point Location Number (four digits)

Catalogue Item Number (four digits)

An example of a catalogue number written in this format:
05MT02191.33.0.0.0.1.6

A period separates each variable within the catalogue number. All leading zeroes within an individual variable can be dropped. This example describes a lot of sherds, catalgoue item number 0006, not assigned a point location number, and not coming from a special sample, from F.S. #33 in site 05MT02191.

Sample Type Values:

00 - Not Applicable
01 - Archaeomagnetic Samples
02 - Radiocarbon Samples
03 - Dendrochronological Samples
04 - Material Source Samples
05 - Pollen Cores
06 - Pollen Samples
07 - Stratigraphic Columns
08 - Sediment Samples
09 - Bulk Soil Samples
10-99 Unassigned

Material Identification Class Values:

00 - Not Applicable
01 - Ceramics
02 - Nonhuman Bone
03 - Flaked Lithics
04 - Nonflaked Lithics
05 - Shell
06 - Vegetal
07 - Human Bone
08 - Other Inorganic
09 - Other Organic
10 - Other
11-99 Unassigned

POST PRELIMINARY ANALYSIS INVENTORY

SITE #_______ MATERIAL________________ INITIALS_______ PAGE___ OF___

FS #	CAT. IT. #	PL #	PHOTO	PROT.	PN.		MORPHO USE FORM

Figure 2.B.9 Post Preliminary Analysis Inventory Form, completed by the task specialists during preliminary analysis and submitted to the Government's Collections Manager with all materials going to permanent storage.

Table 2.B.8 Directions for Completing the Post-Preliminary-Analysis Inventory Form

Space #1: Site Number: Smithsonian designation.

FORMAT: 05 (State) two digits | MT (County) two digits | 00001 (Site number) five digits

Space #2: Material: material identification class or sample type and number.

Space #3: Initials: Four-letter initials of the task specialist or consultant.

Space #4: Page: numbered consecutively within this transmittal to permament storage.

Space #5: FS Number: FORMAT: 000001 six digits (zeroes optional here when they occur on left side)

Space #6: Catalogue Item Number: assigned consecutively within the material identification class and within the provenience unit.

FORMAT: 0001 four digits

Space #7: Point Location Number: from the labelled provenience.

FORMAT: 00001 four digits

Space #8: Photographed: checkmark for those items or lots which have been photographed.

Space #9: Protein Analysis: checkmark for those items or lots which have been designated for protein analysis.

Space #10: Pollen Analysis: checkmark for those litems or lots which have been sampled for pollen.

Space #11: Morpho-Use Form: longhand translation of the coding for the variable Morpho-Use Form from the lithics preliminary analysis (used only by lithics specialist).

PERMANENT STORAGE

Operation of the permanent storage section of the Laboratory Flow System is the responsibility of the Government's Acting Laboratory Supervisor. The northern two-thirds of the eastern half of the laboratory facility forms the permanent storage section and is bounded by a mesh fence. Access is limited by two locked doors, one opening to the special handling section and one opening to the Government's office space (Figure B.3). Some shelving has been erected, and space has been planned for additional shelving to be installed shortly (Figure 2.B.10). As materials and samples are sent to the permanent storage section, accompanied by the Post Preliminary Analysis Inventory Forms, all items and lots are assigned to a permanent storage location. The final inventory, generated by the Post Preliminary Analysis Inventory Forms, will be accompanied in the computer record by the storage location of each item and lot. For specific details of accession to the Heritage Center, reference should be made to the Government's Heritage Center Plan.

1. Materials and samples are received from the task specialists and consultants accompanied by the Post Preliminary Analysis Inventory Form and are evaluated as to the appropriate type of storage.
   a. Fragile materials are assigned a location in the sealable specimen cabinets.
   b. Valuable materials are assigned a location in the lockable storage cabinets.
   c. Other materials and samples are assigned a location on the open metal shelving.
2. After checking, the Post Preliminary Analysis Inventory Forms are

Figure 2.B.10 Permanent storage area map (not to scale).

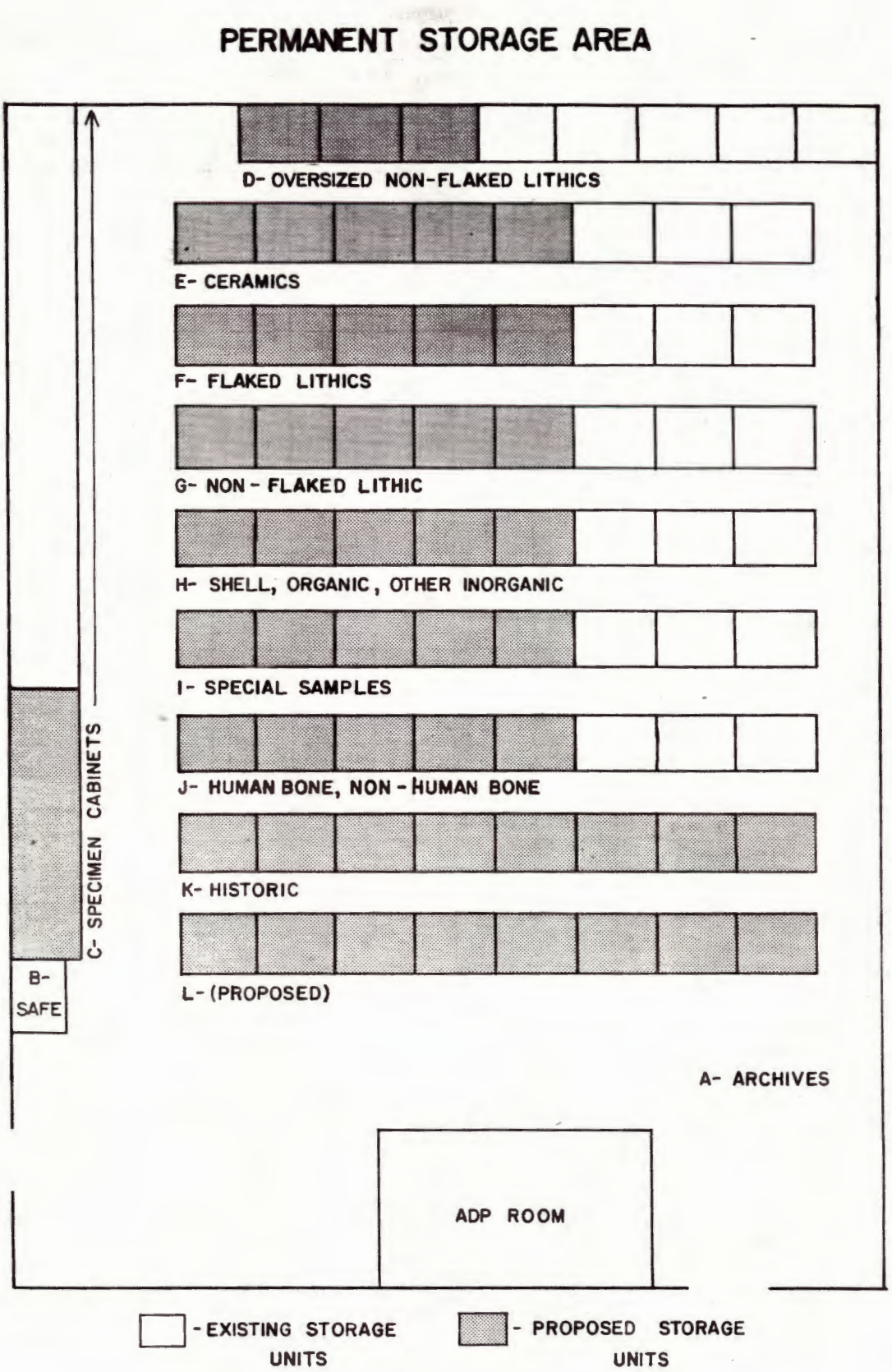


Figure 2.B.10 Permanent Storage area map.

used for input of a computer-based inventory system; the inventory system is based on the complete program catalogue number (Table 2.B.7).

REFERENCES CITED

[1] Litzinger, William A. 1982. Botanical Studies. In Analysis: 1978. Dolores Archaeological Program Technical Reports II(2). Final report submitted to the U.S. Bureau of Reclamation, Salt Lake City, Upper Colo. Region, in compliance with Contract No. 8-07-40-S0562.