

Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada

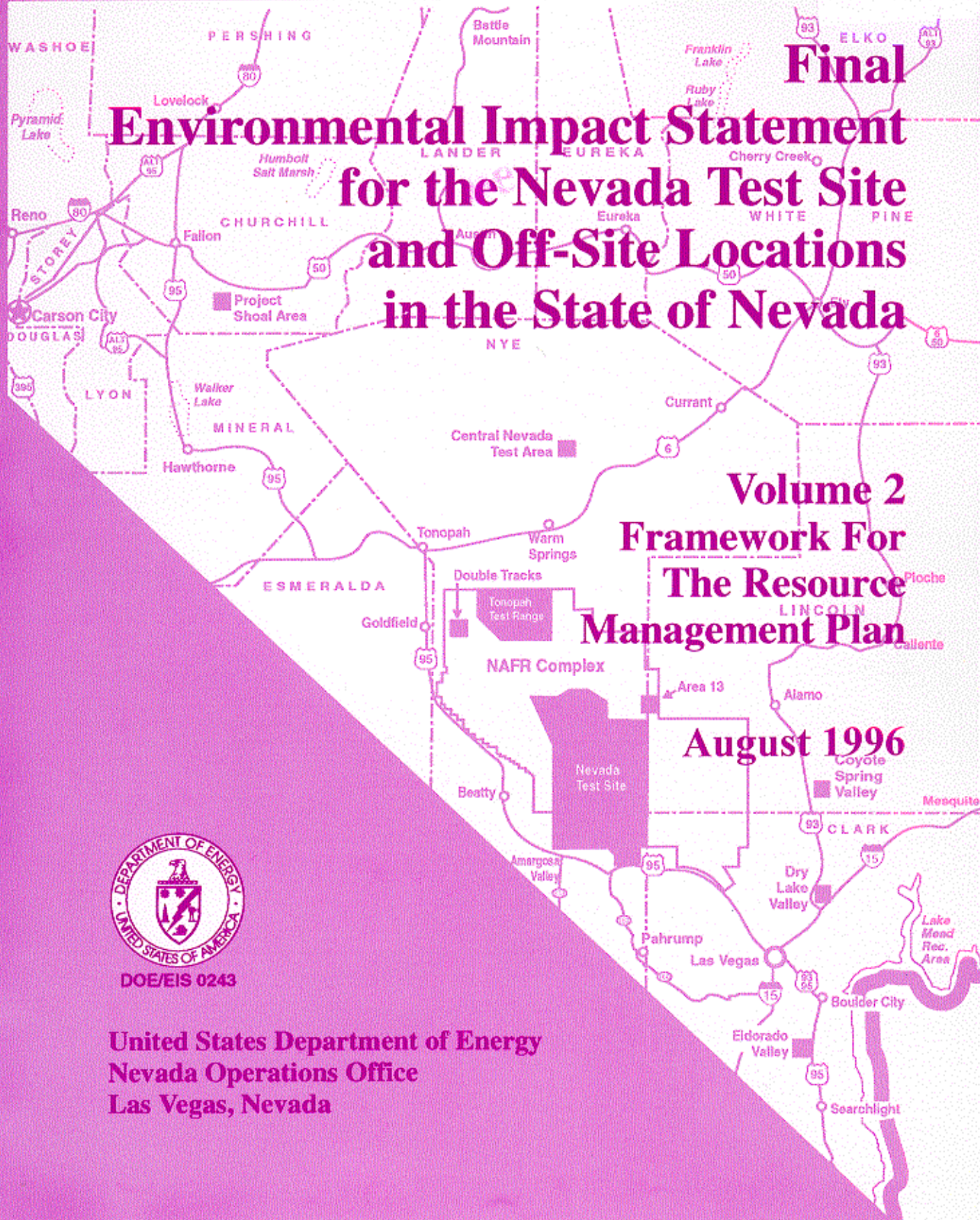
Volume 2 Framework For The Resource Management Plan

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United States Department of Energy
Nevada Operations Office
Las Vegas, Nevada



**Final
Environmental Impact Statement**

**for
the Nevada Test Site and Off-Site Locations
in the State of Nevada**

Volume 2

**U.S. Department of Energy
Nevada Operations Office
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List of Acronyms and Abbreviations

DOE	U.S. Department of Energy
DOE/NV	U.S. Department of Energy, Nevada Operations Office
EIS	Environmental Impact Statement
km ²	square kilometer
mi ²	square mile
NTS	Nevada Test Site
RMP	Resource Management Plan

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CHAPTER 1 INTRODUCTION

1.1 Purpose

The purpose of this document is to publicize how the U.S. Department of Energy Nevada Operations Office (DOE/NV) proposes to develop and use a *Resource Management Plan* for the Nevada Test Site (NTS) so the public could comment on and assist in the following activities:

- Developing the methods for creating and using the plan
- Identifying the values people place on manmade and natural resources found on the NTS
- Developing the goals the DOE/NV will use to guide the conservation and use of those resources
- Identifying the management actions needed to meet constraints and resource management goals
- Incorporating the principles of ecosystem management into land and resource management on the NTS.

This framework for the *Resource Management Plan* was developed in conjunction with the Environmental Impact Statement for the Nevada Test Site and off-site locations in the state of Nevada (NTS EIS) to take advantage of the extensive data collection and public participation activities associated with the National Environmental Policy Act. After public input was received during the comment period for the Draft NTS EIS, DOE/NV revised this description of the *Resource Management Plan* and published it with the NTS Final EIS. This revision includes the goals DOE/NV has developed for managing resources and land-use constraints. It also includes the final plans for developing the *Resource Management Plan*. These plans will guide DOE/NV as it develops a *Resource Management Plan* in the coming years.

1.2 Background

For over 40 years, the NTS has been used primarily to test nuclear weapons. Because of recent commitments by the United States government to impose a moratorium on future tests of nuclear weapons, there are now opportunities to use the NTS for other purposes. This site has numerous resources, including 3,496 square kilometers (km²) (1,350 square miles [mi²]) of land, a well-developed infrastructure, a skilled workforce, and a well-studied cultural, physical, and biotic environment. These resources make the NTS attractive for many new projects designed to support the missions of the U.S. Department of Energy (DOE) and other agencies, and to stimulate the economy of the region.

Yet, even at a remote facility the size of the NTS, there are constraints on the number and type of new projects that can be developed. For example, most NTS areas are safe, but some land on the NTS is unsafe for most future uses because of land subsidence or radiation contamination caused by past nuclear weapons tests or waste disposal activities. Some areas are reserved for ongoing missions, while other areas are too steep or remote for most uses. There also are limits to the number of long-term projects that can be supported by the existing infrastructure or that can occur without affecting the long-term health of the ecosystem on the NTS. These constraints can be minimized and public benefit can be enhanced by carefully designing and managing projects so that they have the minimum possible adverse impact on existing natural and manmade resources on the NTS.

1.3 Policy and Procedures

DOE has established policies and assigned responsibilities for planning and developing DOE sites (DOE Order 430.1). This order requires all sites to establish a planning process and document the results of that process. The DOE/NV has developed and refined its technical site information (RSN, 1994) to the point where it accurately depicts

existing and planned facilities and infrastructure. DOE Order 430.1 falls short of defining a system for managing both the natural and manmade resources of a site and for ensuring that the selection, location, and design of future projects are compatible with ongoing uses, existing resources, and public concerns. The DOE realizes that such comprehensive plans are necessary and has developed a land- and facility-use management policy (O'Leary, 1994). The results of the past two years of planning, and the resulting recommendations are presented in "Charting the Course: The Future Use Report," (DOE, 1996).

Planning for all future uses of the NTS will incorporate this policy. To improve land-use and resource management planning on the NTS and to take the first step in complying with this policy, the DOE/NV is developing a *Resource Management Plan* for the NTS. The *Resource Management Plan* will use the technical site information as a starting point and will ultimately gather other ongoing management and planning activities under one comprehensive plan. The *Resource Management Plan* will not be used to identify or select future

**U.S. DEPARTMENT OF ENERGY
LAND- AND FACILITY-USE MANAGEMENT POLICY**

It is the Department of Energy's policy to manage all of its land and facilities as valuable national resources. Our stewardship will be based on the principles of ecosystem management and sustainable development. We will integrate mission, economic, ecologic, social, and cultural factors in a comprehensive plan for each site that will guide land and facility decisions. Each comprehensive plan will consider the site's larger regional context and be developed with stakeholder participation. This policy will result in land and facility uses that support the Department's critical missions, stimulate the economy, and protect the environment.

NTS RESOURCE MANAGEMENT PLAN GOAL

The goal of the Resource Management Plan is to establish a process for managing resources to ensure long-term diversity and productivity of affected ecosystems and sustainable use of land and facilities on the NTS. The process will be based on the principles of ecosystem management and be developed with the participation of surrounding land managers and other interested parties. The DOE/NV will use this process to assess the impact of existing facilities and activities, and evaluate the selection, design, location, and impact of proposed facilities and activities. The plan will identify the criteria for evaluating the compatibility of these activities with human health and safety, ongoing missions, existing infrastructure, cultural and natural resources, public values, and other resource issues and constraints.

missions for the NTS; those tasks are the subject of other strategic planning efforts. For example, the Community Reuse Organization has been formed to plan and execute economic development initiatives and act as the community's single voice to the DOE/NV for economic development. As new missions are proposed for the NTS, the DOE/NV will use the *Resource Management Plan* to identify the available resources and the constraints on the use of those resources. The purpose and use of the *Resource Management Plan* is described in the following goal.

The principles of ecosystem management, which is an approach to sustain the production of natural resources and the ecosystems on which those resources depend, will be used as guidance to ensure the long-term productivity of resources on and around the NTS. Some important principles of this approach considered in the plan are the maintenance of biodiversity, goal-oriented planning and management, consideration of ecological units and timeframes, improved communication and coordination with other parties, use of an integrated

and interdisciplinary team, and adaptive management. Chapter 3 contains more details of how DOE/NV proposes to implement ecosystem management as part of the *Resource Management Plan*.

Stakeholder comments and the principles of ecosystem management and sustainable development will assist in the development of goals for the management of resources on the NTS. The DOE/NV will then identify management actions that should be taken to achieve those goals. These management actions will be incorporated into land and resource management procedures and comprehensive planning analyses. The DOE/NV will use these procedures and planning systems to aid in the selection and design of new proposed projects and the evaluation of the impacts of existing and proposed activities on the ecosystems and resources on the NTS.

Land-use planning and resource management are the responsibility of the landlord program office at each DOE site. At the NTS, the Defense Program

performs these functions through the Office of the Assistant Manager for Technical Services at the Engineering Division. The Defense Program will also take the lead in resolving conflicts among program offices at the NTS. Responsibility for monitoring the environment on the NTS also lies with the Assistant Manager for Technical Services at the Environmental Protection Division. Coordination of the DOE/NV National Environmental Policy Act process is the responsibility of the National Environmental Policy Act Compliance Officer, who works within the Environmental Protection Division. Figure 1-1 shows the organizational relationship of these DOE/NV offices. The DOE/NV has granted permission for the exclusive use of a portion of the NTS to the Yucca Mountain Site Characterization Office. Land-use planning and resource management in this area will be coordinated in accordance with the memorandum of agreement between the DOE/NV and Yucca Mountain Site Characterization Office (DOE/NV, 1994a).

1.4 Relation to the Nevada Test Site Environmental Impact Statement

Although this description of the *Resource Management Plan* was initiated and published in conjunction with the Draft NTS EIS, the *Resource Management Plan* will take longer to complete than the NTS EIS. Therefore, the *Resource Management Plan* will not be available as a

planning or analysis tool for this EIS. In the future, however, it will be an integral part of the National Environmental Policy Act process on the NTS. Figure 1-2 shows the steps DOE/NV will take beyond the Record of Decision to integrate the *Resource Management Plan* with future environmental review processes. The DOE is committed to completing the *Resource Management Plan*, which is estimated to take approximately 2 years. After completion, the *Resource Management Plan* will be used to identify conflicts among the selected alternative and the resource management goals, preferred land uses, and resource constraints developed and identified in the *Resource Management Plan*. It is a regulatory requirement of the DOE (10 CFR 1021) to review a NTS EIS of multifacility sites at least every 5 years and to make these evaluations by means of a National Environmental Policy Act review. This review will evaluate any potential conflicts between the *Resource Management Plan* and the existing NTS EIS and will be the basis for determining whether (1) the existing NTS EIS should be supplemented, (2) a new NTS EIS should be prepared, or (3) no further National Environmental Policy Act documentation is required. In addition to supporting reviews of the NTS EIS, the *Resource Management Plan* will also be used as a tool in future programmatic and site-specific National Environmental Policy Act reviews to identify the

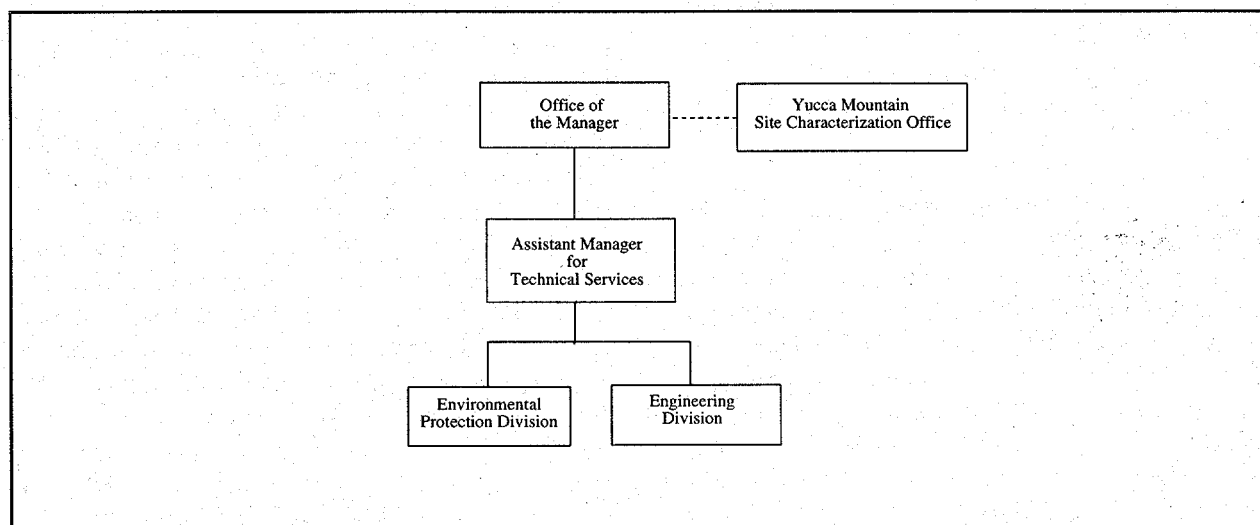


Figure 1.1 Partial organization chart for the DOE/NV

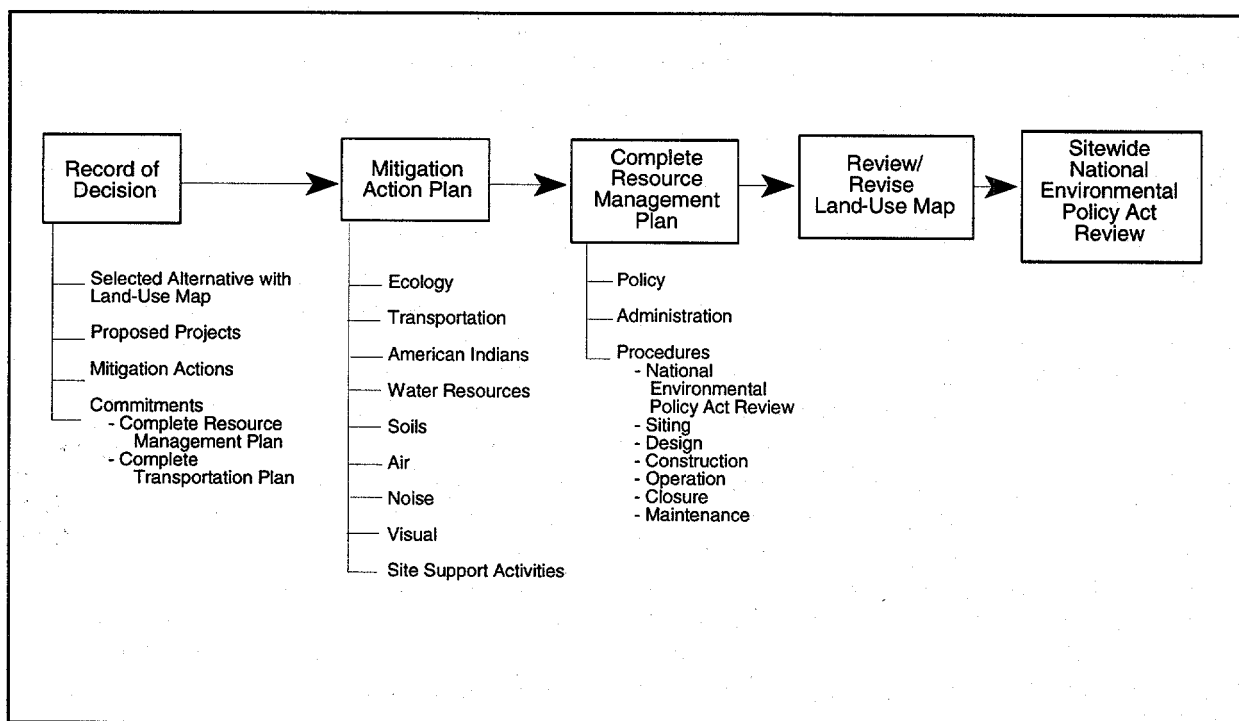


Figure 1-2. National Environmental Policy Act/Resource Management Plan 5-year interface

best location and design of new projects and to aid in resource and cumulative impact analysis for the NTS.¹

1.5 Relation to Other Agency Resource Management Plans

This *Resource Management Plan* will differ in some ways from management plans commonly produced by federal land and resource managing agencies such as the U.S. Bureau of Land Management, U.S. Forest Service, or U.S. Fish and Wildlife Service. These agencies' plans tend to address natural resource consumption and unreconciled conflict issues. In contrast, natural resources are not the primary management focus of the DOE's NTS missions. The primary resources required by the DOE NTS missions are the site support activities and large, remote areas found on the NTS. Existing site support activities and their relation to land use on the NTS are

an important consideration; therefore, these manmade resources will constitute a significant aspect of the *Resource Management Plan*. The *Resource Management Plan* also will consider natural resources and will be used during land-use planning to balance the development and use of manmade resources with the wise stewardship of natural resources. The DOE also intends that the development of the *Resource Management Plan* will result in a set of land-use planning tools to be used in new project planning and siting. Because of the significantly differing missions and consequent planning needs, the DOE/NV's Resource Management Plan process will vary from those typically produced by other federal agencies.

1.6 Public Participation

The public and other interested parties (for example, business and environmental organizations; state and local governments; and federal agencies) will have a key role in the development and use of the *Resource Management Plan*. DOE/NV also recognizes that tribal governments have a key role,

¹See Chapter 1, Introduction, of Volume 1 of the NTS EIS for further discussion of National Environmental Policy Act reviews relevant to the NTS.

and will continue consultations with the Consolidated Group of Tribes and Organizations during development of the *Resource Management Plan*. The DOE/NV has been and will continue seeking and using input from interested parties. As part of the public participation process for the NTS EIS, the DOE sought comments on how to involve interested parties in the development of the *Resource Management Plan*. Involvement could take the form of public meetings, focus groups, cooperation with the Community Advisory Board for NTS programs, and so on. The DOE/NV solicited suggestions about the goals to be used to guide resource use on the NTS and, in the future, will engage interested parties in identifying the management actions needed to achieve those goals. The public and interested parties will also be asked to participate in the National Environmental Policy Act process (which is where conflicts between alternate uses of resources will be identified and evaluated) and in periodic reviews of the *Resource Management Plan*. In addition, the DOE/NV will communicate, cooperate, and develop partnerships with surrounding land owners and managers as part of its effort to use an ecosystem approach to managing resources.

1.7 American Indian Participation

The following concepts of American Indian participation in the development of the *Resource Management Plan* have been proposed by the EIS American Indian Writers Subgroup. Although they have not been approved by the Consolidated Group of Tribes and Organizations or tribal governments, they provide a framework from which to begin. In this respect, DOE/NV will continue to consult with the Consolidated Group of Tribes and Organizations regarding American Indian participation.

American Indian ethnic groups whose aboriginal territories included the NTS lands have accumulated centuries of knowledge on the resources present at this site. Through continued use, Indian people developed a profound understanding of the cycles of resource renewal and natural transformation of the landscape, the relationships between plants, animals, minerals, water, air, and landforms that form the ecosystem,

and the spiritual and healing power of this land. Elders describe their relationship with the NTS lands:

When you come to this land you feel at home, it gives you a peaceful feeling, the land, the mountains, the birds. Like when I cross over the mountains and see Owens Valley. In the old times the people used to come together and have social gatherings and pow-wows. When we came together here [at Gold Meadow] in 1993 it was the first time after at least 50 years that the three ethnic groups had the opportunity to get together. It felt very peaceful to be back home among Indian people. This opportunity for tribal elders to return to this holy place was an important pilgrimage after being kept forcefully away from this land for all those years. It was a special gift for tribal elders who still remembered Gold Meadow, and for the younger people who experienced this pilgrimage with us.

American Indians can contribute this knowledge to the development of a comprehensive and culturally sensitive Resource Management Plan for the NTS by:

- *Assisting DOE/NV in the development of methods of identification, inventory, and preservation of American Indian resources*
- *Sharing values and perceptions that Indian people place on the resources at NTS*
- *Broadening and refining the goals that DOE/NV will use to guide the conservation and culturally appropriate use of those resources*
- *Identifying American Indian priorities and constraints on resource management goals*
- *Bringing American Indian views on traditional ecosystems so that the principles of ecosystem management can be incorporated into the Resource Management Plan in a culturally sensitive manner. Ultimately, the goal of American Indian participation in the Resource*

| *Management Plan is to develop a long term*
| *co-management plan for the cultural resources*
| *present at the NTS.*

| **1.8 Contents of This Document**

| Chapter 2 in this document contains a description of
| how the DOE/NV proposes to develop and
| implement the *Resource Management Plan*.
| Chapter 3 contains a description of how ecosystem
| management will be used to guide the development

| and implementation of this plan. Chapter 4
| provides a list and explanations of the draft goals
| the DOE proposes to use as guidance for land-use
| planning and the management of resources on the
| NTS and presents preliminary map products that
| document NTS resources and constraints.
| Chapter 5 contains references. Chapter 6 provides
| examples of the mapping tools DOE/NV can use to
| display data associated with the *Resource*
| *Management Plan*.

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CHAPTER 2

DEVELOPMENT OF THE RESOURCE MANAGEMENT PLAN

The first section of this chapter describes the eight steps the DOE/NV proposes to take to develop and implement the *Resource Management Plan*. The first two steps, information review and development of resource management goals, have been initiated. The results obtained to date for Steps 1 and 2 may be modified. Steps 3 through 8, which deal with management actions and land-use development, are being initiated based on public comment. To assist the public in understanding how the *Resource Management Plan* will be developed, this chapter contains examples of how the *Resource Management Plan* may be developed for the issues of biological resources and existing missions.

2.1 Proposed Steps

Step 1. Review Information and Identify Resources. Descriptions of the NTS and its resources were reviewed to identify which resources should be considered in this *Resource Management Plan* and understand how they should be managed. The Draft NTS EIS and documents cited in that NTS EIS were the primary sources of information reviewed for this step. Because comprehensive and current information was available in the Draft NTS EIS, it was not necessary to write additional documents summarizing or describing the resources on the NTS to complete Step 1.

A major component contributing to the success of this *Resource Management Plan* will be the identification of all the important resource issues and constraints on the NTS that should be considered during land- and facility-use planning and ecosystem management. For the *Resource Management Plan* to adequately consider public concerns, all resources on the NTS that are of value to the public must be identified. For the *Resource Management Plan* to be useful for selecting, designing, and locating activities, the attendant resource requirements, and design and location constraints, must be identified. Therefore, part of the first step in developing the *Resource Management Plan* will be to identify the resource issues to be considered. Table 2-1 is the list of

resource issues developed as a result of input received during the public comment period for the Draft NTS EIS.

Step 2. Develop Management Goals for Resource Issues and Constraints. The DOE/NV proposes to use a goal-oriented approach in this *Resource Management Plan*. To do this, management goals will be developed for each resource issue. These goals will be used to identify actions needed for wise resource use and sound ecosystem management, while maintaining the critical mission of the NTS in national security. The goals then will be used to evaluate the effects of the DOE/NV activities on NTS resources. Thus, the next step in creating this *Resource Management Plan* is to develop management goals for each of the resource issues listed in Table 2-1. These goals will reflect the following:

- The DOE/NV's commitments to complete its primary missions on the NTS
- The DOE/NV's commitments for managing and conserving resources
- The values that the public places on those resources
- The strategies the DOE/NV will use to minimize impacts of constraints on land use
- The principles of ecosystem management (see Chapter 3).

Chapter 4 contains the goals that the DOE/NV has developed for the resource issues listed in Table 2-1. These goals are based on laws, regulations, the DOE/NV policies, and the comments received during review of the Draft EIS. Although the DOE/NV will be committed to these goals, the goals may be amended or augmented should constraints or conditions change. The DOE/NV will use the *Resource Management Plan* to point out conflicts between the goals and

Table 2-1. Proposed list of resource issues to be considered in the *Resource Management Plan*

Resource Issue	Definition
Existing Missions	Ongoing projects and the land, water, site support activities, facilities, and other resources they require.
Site Support Activities and Facilities	Existing use of buildings, roads, utility distribution systems, and other manmade facilities.
Health and Safety	Radiation, chemical contamination, ground subsidence, and other factors that could endanger the public or personnel using a facility or site.
Land	Constraints dictated by land-withdrawal orders and other legal land-use agreements; soil characteristics, topography, floodplains, faults, and other natural features.
Water	Quality and quantity of surface and subsurface water.
Cultural and American Indian Resources	Use and preservation of historic properties, traditional cultural properties, rock art; archaeological sites, other artifacts, and traditional use of plants and animals.
Biological Resources	Long-term viability of plants, animals, and the abiotic factors they depend on (such as soil).
Air	Maintenance of air quality.
Geological and Mineral Resources	Extraction and use of geological resources of economic or scientific value.
Airspace	Use of restricted airspace.
Socioeconomics	Relationship among resource uses and local and regional socioeconomic conditions and economic development.

proposed activities. Programmatic and site-specific National Environmental Policy Act review processes will address any conflicts between a proposed action and the *Resource Management Plan* goals and will analyze resource and cumulative impacts of the action and its alternatives for the public and the decisionmaker.

Step 3. Develop Management Actions to Reach the Goals. The third step in developing this *Resource Management Plan* will be to identify and list the management actions that the DOE/NV will take during land-use planning and resource management to meet the goals for each resource issue and constraint. These actions will be developed through consultation with the Consolidated Group of Tribes and Organizations; coordination and cooperation with the Yucca Mountain Site Characterization Office; nearby federal land managers such as the U.S. Air Force,

U.S. Bureau of Land Management, National Park Service, and U.S. Fish and Wildlife Service; state resource management agencies such as the Division of Wildlife, the Division of Water Resources, the Division of Minerals, and the Division of Forestry; and other interested parties such as the NTS Community Advisory Board. On issues related to economic development and its effect on the NTS and surrounding communities, the DOE/NV will consult with the Community Reuse Organization. To effectively complete Step 3 of this process, the DOE/NV will endeavor to expand existing working relationships and to enter into other agreements with public agencies, business and environmental organizations, and other interested parties. Section 1.6 discusses the DOE/NV's intent to involve others in the development of the *Resource Management Plan*. Section 2.2 contains examples of possible management actions for two resource issues.

Step 4. Identify, Collect, Analyze, and Summarize Data Needed to Implement the Management Actions. Each management action will then be reviewed to determine if additional information is needed to implement the action. For example, some management actions may require a further understanding of ecological processes, interrelationships, and long-term impacts. Actions needing additional information will be prioritized by the DOE/NV based on the impact of delaying implementation of that action, the time required to obtain the information, and the cost of acquiring the information. If necessary, cost/benefit analyses or risk assessments will be conducted to identify the management actions and corresponding information needs that have the greatest impact on achieving a goal and, therefore, should receive the highest priority. The DOE/NV will then collect and analyze the data, beginning with the management actions evaluated as having the highest priority.

Step 5. Develop the Land-Use Planning Tools. Suitable management actions developed in Step 3, and associated data acquired in Step 4, that can be evaluated and displayed spatially (mapped), will be incorporated into a computerized geographic information system or other mapping tool. Much of this information already is available and is contained in the Nevada Test Site Technical Site Information (RSN, 1994). Examples of the types of actions and data to be mapped are plant and animal habitats to be protected, land and other resources reserved for ongoing missions, and facilities available for future uses (refer to Chapter 6, Plates 1 through 20). If the geographical information system format must be used for other data, the DOE/NV will coordinate through the National Geospatial Data Clearinghouse, as required (White, 1994), to ensure cooperative efforts with federal, state, and local governments, and the private sector.

The mapping tools will then be used to develop a land- and facility-use classification system for the NTS. This system will characterize the compatibility of the current use and condition of lands and facilities with future uses. For example, areas that are essential for the viability of a species, have irreplaceable cultural resources, or that have high risks to humans may be classified as incompatible with all other future uses. Land and

facilities that are used occasionally for ongoing missions or have some other partial restrictions required to meet a goal defined in Step 2 will be classified as compatible with some other uses. The types of acceptable uses will be identified and added to the classification system. Land and facilities that are not being used and have no restrictions will be classified as compatible with all future land uses. This classification system then will be incorporated into land-use classification maps and decision-support or planning programs. These tools will be used during land-use planning to identify suitable locations for proposed activities.

Management actions that cannot be mapped will be incorporated into the DOE/NV policies, requirements, or procedures. Examples of this type of action are the amount of water to be withdrawn from wells and the requirement to search areas for threatened or endangered species and systematically inventory cultural resources prior to disturbing land. These requirements will be followed during development and operation of activities and will be used as guidelines during land-use planning.

Step 6. Implement the Resource Management Plan During Land-Use Planning. When implemented, the *Resource Management Plan* will be used to aid in the selection and design of proposed new projects and the evaluation of the impacts of existing and proposed activities on the ecosystem and resources on the NTS. Resource and cumulative impact analysis will be formally evaluated as part of the National Environmental Policy Act review process. The first step will occur when new projects are proposed for the NTS. The planning tools and classification system identified in Step 5 will be used to determine whether there are sufficient land, facilities, and other resources on the NTS required for the activity. If suitable land and sufficient resources are available, the planning tools will be used to aid in selecting suitable locations and designs. This information then will be used during the National Environmental Policy Act review process to evaluate the consequences to resources on the NTS. Alternatives that create conflicts between resource uses and the management goals for those resources will be identified so the public can comment on those conflicts and decisionmakers will be informed about

the consequences of proposed actions and alternatives on resources. Decisions on the selection and siting of projects will be documented in the NTS Technical Site Information as is currently done for planned improvements.

Step 7. Monitor Resources and Adaptively Manage. Some of the decisions the DOE/NV will make during development of management actions will be based on a limited understanding of the interactions between natural and manmade systems on the NTS. Therefore, the DOE/NV will monitor impacts on resources that may be negatively affected by an activity. That monitoring will be designed to determine whether the goals for each resource are being met. The DOE/NV already conducts extensive environmental monitoring on the NTS and will continue to use these efforts to monitor the effects of decisions made through the *Resource Management Plan*. If unacceptable impacts, as defined by the goals, are detected during monitoring, activities will be re-evaluated for resolution by decisionmakers per Step 6. If unacceptable impacts are not detected, the DOE/NV may consider increasing the use or impact on a resource so long as that increase does not violate one of the goals. To ensure that limited funding for monitoring is spent wisely, risk or impact assessments may be conducted to identify the resources at the greatest risk and the activities that are placing them at risk.

Step 8. Periodically Review and Update the Plan. The decisions made during the development of the *Resource Management Plan* will be summarized in a document or series of documents that list the goal(s) for each resource, the recommended management actions, the maps or the DOE/NV processes developed to implement those actions, and the monitoring needs and management decisions required by those actions. These documents will be updated in two phases. First, if unacceptable impacts are identified during monitoring (Step 7) and are a result of ineffective or incorrect management actions, those actions and associated maps and decision support tools will be modified immediately. Second, the entire plan will be reviewed by the DOE/NV about every 5 years. During that review process, the public will be asked to identify resource issues and constraints not

already included in the plan, evaluate the goals developed for new and previously identified resource issues and constraints, and identify and evaluate management actions. If necessary, the documents and associated planning tools and processes will then be modified.

2.2 Examples

Example 2-1 shows how the *Resource Management Plan* may be developed for biological resources. The proposed goal developed in Step 2 reflects the principle of ecosystem management described in Section 3.3.1 concerning conservation of biodiversity. The management action listed under Step 3 involves protection of the habitat necessary to ensure that an endemic plant species remains viable. Because the distribution of the plant used in this example is well known, no additional information would be obtained during Step 4. Therefore, the habitat of this species to be protected could be entered into a mapping system and a land-use classification for that habitat would be developed in Step 5. If activities then occur that affect populations of this plant, the DOE/NV may need to monitor populations of the plant and adaptively manage as part of Steps 7 and 8.

Example 2-2 shows how the *Resource Management Plan* may be developed to manage impacts on existing missions. The proposed goal used in the example reflects a priority for and commitment to ongoing missions. The example of a management action identifies the need for identifying and reserving the space required for ongoing projects.

2.3 How American Indian Participation May Be Incorporated into the *Resource Management Plan*

The following steps for American Indian participation in the development of the *Resource Management Plan* have been proposed by the EIS American Indian Writers Subgroup. Although they have not been approved by the Consolidated Group of Tribal Organizations or tribal governments, they provide a framework from which to begin. In this respect, DOE/NV will continue to consult with the Consolidated Group of Tribes and Organizations regarding implementation of these proposed steps.

Example 2-1. How the *Resource Management Plan* might be developed for biological resources

Step 1. Review Information and Identify Biological Resources on the NTS.

The Draft NTS EIS and references cited in that document were reviewed to develop an understanding of biological resources on the NTS. Plants, animals, and the abiotic factors they require (e.g., soil) were identified as important resources.

Step 2. Proposed Goal for Biological Resources.

Manage habitat and ecosystem processes to support viable populations of native plants and animals, including state and federal endangered, threatened, and candidate species.

Step 3. Example of Management Actions That Reflect the Goal.

Regulate disturbances within the known locations of Beatley milkvetch (*Astragalus beatleyae*), a plant endemic to the northwest corner of the NTS and surrounding land on Nellis Air Force Range Complex. This species is a candidate for listing under the Endangered Species Act.

Step 4. Identify, Collect, Analyze, and Summarize Data Needed To Meet the Goals.

The distribution of Beatley milkvetch on the NTS is well known. Additional information is not needed to implement this recommendation.

Step 5. Develop the Land-Use Planning Tools.

The habitat to be protected will be mapped and incorporated into the planning tools.

Step 6. Implement the *Resource Management Plan* During Land-Use Planning.

The planning tools and procedures developed during Step 5 will be used to evaluate the suitability of proposed activities, select the location of suitable activities, and evaluate the effects of proposed and existing activities on biological resources.

Step 7. Monitor Resources and Adaptively Manage.

If activities occur that might impact populations of Beatley milkvetch, those populations would be monitored and the damaging activity modified based on the results of that monitoring, provided that the activity could be modified and is not an element critical to the primary mission of the NTS.

Step 8. Periodically Review and Update the Plan.

The goal, management actions, maps, procedures, and monitoring information will be reviewed about every 5 years to ensure they still are relevant, acceptable to stakeholders, complete, and accurate.

Example 2-2. How the *Resource Management Plan* might be developed for existing missions

Step 1. Review Information on Existing Missions on the NTS.

The Draft NTS EIS, references cited in that document, and the NTS Technical Site Information were reviewed to develop an understanding of the existing missions on the NTS. Existing missions were proposed (see Table 2-1) as important resources on the NTS and as possible constraints on land use by new missions.

Step 2. Proposed Goal for Existing Missions.

Ensure new uses for the NTS do not interfere with critical operations of existing missions or create additional costs for those missions.

Step 3. Examples of Management Actions that Reflect the Goal.

Action 1. Prohibit incompatible development in areas required by existing missions.

Action 2. Reserve the amount required for each existing mission from the total amount of subsurface water available on the NTS.

Step 4. Identify, Collect, Analyze, and Summarize Data Needed to Meet the Goals.

Action 1. Determine the area required for each existing mission and identify all uses of those areas that are incompatible with the missions.

Action 2. Determine the water required for each mission and the source of that water.

Step 5. Develop the Land-Use Planning Tools.

Action 1. Determine and map the land required for each mission and develop an associated database of compatible and incompatible uses for that land.

Action 2. Develop a process that will ensure that the required amount of water is reserved for each project and incorporate this process into the DOE/NV requirement documents.

Step 6. Implement the *Resource Management Plan* During Land-Use Planning.

The planning tools and procedures developed during Step 5 will be used to evaluate the suitability of proposed activities, select the location of suitable activities, and evaluate the effects of proposed and existing activities on current missions.

Step 7. Monitor Resources and Adaptively Manage.

Monitoring and adaptive management may not be required for these management actions.

Step 8. Periodically Review and Update the Plan.

The goal, management actions, maps, procedures, and monitoring information will be reviewed about every 5 years to ensure they are still relevant, acceptable to stakeholders, complete, and accurate.

We use the proposed steps of development of the Resource Management Plan to offer a framework for American Indian participation:

Step 1. Review Information and Identify Resources. Since 1987 the DOE/NV has worked with the CGTO to identify American Indian resources first at Yucca Mountain and currently at the NTS. Systematic studies of American Indian resources include archaeological sites, traditional cultural properties, and plant resources in Pahute and Rainier Mesas. These studies demonstrate not only how important this land and its resources are for Indian people but also how valuable traditional knowledge can be for developing the Resource Management Plan. Other American Indian resources present at the NTS that need to be systematically investigated are:

- animals
- minerals
- rock art
- water
- air
- soils
- landforms.

Currently, American Indian participation in the protection and management of resources at the NTS is not limited to compliance with Section 106 of the Historic Preservation Act, but includes 10 years of consultation with DOE/NV, including the American Indian Religious Freedom Act (AIRFA) compliance program, the Native American Graves Protection and Repatriation Act (NAGPRA) compliance program, and the direct participation of American Indians in the writing of sections for the NTS EIS. Consultation that may be implemented in the future, specifically that relate to the Resource Management Plan, will be successful if it is built on past and present relationships between DOE/NV and the Consolidated Group of Tribes and Organizations.

Step 2. Develop Management Goals for Resource Issues and Constraints. Throughout the years of nuclear testing and other defense-related operations conducted at the NTS, American Indians were extremely concerned by the American government's lack of regard for the tragic effects that these activities had on cultural and

environmental resources and the minimal response to public concerns on these activities. The CGTO is concerned that alternative NTS missions and activities--defense-related or not--may continue to negatively impact Indian resources at the NTS. The goal of the CGTO is to participate as a partner in the development of strategies that the DOE/NV could use to minimize or even completely eliminate impacts to their critical resources.

Step 3. Develop Management Actions to Reach the Goals. The CGTO is concerned that the current Draft Framework for the Resource Management Plan has excluded the sovereign nations from the drafting of the list of management actions that the DOE/NV may take during land-use planning and resource management. The CGTO expects that its member tribes and organizations be invited to coordinate and cooperate with the DOE/NV to reach this goal. A critical issue that must be addressed in the future is the socioeconomic impact that NTS activities have had on neighboring tribal lands. The CGTO considers that an expansion of the DOE/NV's existing working relationships and a negotiation of agreements with neighboring tribal governments is essential for developing a positive and effective co-management strategy.

Step 4. Identify, Collect, and Summarize Data Needed to Implement the Management Actions. A comprehensive and culturally sensitive Resource Management Plan should include systematic identification and data collection on American Indian resources and on contemporary issues of concern for tribal governments, such as health and safety, environmental justice, socioeconomic impacts, and risk assessment of nuclear waste transportation. The current working relationship between the DOE/NV and the CGTO includes the identification and partial data collection on American Indian cultural resources. However, issues of concern for the contemporary well-being of Indian people have yet to be addressed. American Indians would like to participate in the identification, collection, and summary of data needed to implement management actions.

Step 5. Develop the Land-Use Planning Tools. American Indian resources should be systematically incorporated into the evaluation of management

actions and mapping of data collected through Step 4. At least one member organization of the CGTO, the Kaibab Southern Paiute Tribe, is currently developing a multi-media management plan for their own resources along the Colorado River Corridor, including resource identification, data collection, field monitoring, and long-term education programs on the conservation management of resources by tribal people. In the near future, American Indians will have the technical knowledge and tools to actively collaborate with the DOE/NV in the development of land-use planning tools. An agreement which includes the DOE/NV's sponsorship of technical training of Indian people on this step would greatly accelerate learning and improve collaborative efforts.

American Indians would like to be invited to examine, discuss, and provide recommendations on suitable land uses and compatibility between future land-use alternatives and cultural concerns of Indian people. It is important for the DOE/NV to understand that, in the American Indian point of view, "land-disturbing activities" are not limited to construction or land restoration, but include well drilling, waste disposal, opening of the NTS to public use, and other alternative programs and actions being considered in this EIS.

Step 6. Implement the Resource Management Plan During Land-Use Planning. American Indian governments would like the DOE/NV to engage in government-to-government consultation during the selection and design of new projects, so that Indian people can evaluate in detail and follow closely the development and progress of projects that can potentially affect their traditional resources. American Indians consider the selection of suitable locations for new projects a critical step in all NTS proposed programs and activities and thus would like to be directly involved during the evaluation, decisionmaking, and implementation stages.

Step 7. Monitor Resources and Adaptively Manage. An American Indian monitoring program is currently in place and has been sponsored by the DOE/NV since 1993. This monitoring program is currently limited to archaeological research at the site. Indian tribes would like to expand the monitoring program to

other ground-disturbing activities that may affect wildlife, forestry, water, air, soils, and minerals of importance to Indian people. Ideally, a training program to provide American Indians with background knowledge and monitoring skills would complement traditional knowledge on ecosystems and would help implement a culturally sensitive monitoring strategy that is positive and feasible for both the DOE/NV and tribal governments. Expanding the American Indian monitoring program to include other resources and training Indian monitors would greatly enhance the DOE/NV's ability to identify, collect, and summarize the data needed to implement the Resource Management Plan (Step 4).

A long term goal of the CGTO has been to achieve comanagement of the NTS. Comanagement is a term that seems to best describe the relationship between the DOE/NV and the CGTO who have come together over the past 10 years to jointly identify and suggest mitigation recommendations to protect American Indian cultural resources. This co-management relationship must be identified and addressed in detail during the implementation of the Resource Management Plan. Tribal governments would like to continue having the opportunity to voice their concerns whenever culturally and socially unacceptable proposals are being evaluated by the DOE/NV.

Step 8. Periodically Review and Update the Plan. American Indians are not just one more resource within the NTS lands, nor are they independent stakeholders. Tribal governments are sovereign nations which, under President Clinton's mandate (American Indian Policy, DOE, 1994), must be addressed in a government-to-government consultation. Tribal governments would like the opportunity to follow-up the development and implementation of the Resource Management Plan, engage in formal consultation whenever new programs and activities are being evaluated, and participate in land-use management strategies, including mapping and inventory of resources, monitoring, and risk assessment evaluations. Maintaining communication between the DOE/NV and tribal governments will ensure that the Resource Management Plan is responsive to cultural concerns and the well-being of Indian people.

CHAPTER 3

ECOSYSTEM MANAGEMENT

By signing the Land- and Facility-Use Management Policy, the Secretary of Energy has added the DOE to the list of federal agencies that have accepted ecosystem management as the appropriate approach for managing federal lands. This chapter describes how ecosystem management will be incorporated into the *Resource Management Plan* and used during land-use and resource management on the NTS. The first section defines ecosystem management and compares this management philosophy with past resource management practices on the NTS. The second section briefly describes some characteristics of the environment on the NTS that influence how ecosystem management will be applied. The third section describes the principles of ecosystem management to be implemented at the NTS and how those principles will be incorporated into the *Resource Management Plan*. Finally, an American Indian Ecosystem perspective is presented.

3.1 What is Ecosystem Management?

The concept of ecosystems (i.e., dynamic and interrelating communities of organisms and the physical environments with which they interact) and the ecosystem approach to managing natural resources (i.e., protecting or restoring important ecosystem components such as function, structure, and composition by considering all components, including humans, as part of an interrelated system) have been discussed for many years. Recently, however, an increase in conflicts between uses of resources and the concern for loss of biodiversity (i.e., the variety of plants, animals, and other living organisms found in an area; the genetic differences among those organisms; and the communities and ecosystems within which they occur) have prompted land managers to attempt to incorporate these ideas into policy. Ecosystem management means different things to different people. The following definitions give an indication of the range of ideas about ecosystem management and why it should be implemented.

Ecosystem management is the integration of ecological, economic, and social principles to manage biological and physical systems in a manner that safeguards the long-term ecological sustainability, natural diversity, and productivity of the landscape. The primary goal of ecosystem management is to conserve, restore, and maintain the ecological integrity, productivity, and biological diversity of public lands (U.S. Fish and Wildlife Service, 1994).

... the process of seeking to produce (i.e., restore, sustain, or enhance) desired conditions, uses, and values of complex communities of organisms that work together with their environments as integrated units (Salwasser and Pfister, 1994).

... a rational allocation of land use that maintains the physical integrity of our environment and the biotic diversity that we would normally find there (Shaffer, 1994).

These definitions include several points that are important for the management of natural resources on the NTS. First, the primary goal of ecosystem management is to improve or maintain the diversity and integrity of ecosystems so production of desired resources will be sustained for current and future generations. Some of the desired natural resources on and around the NTS being considered in this *Resource Management Plan* are water, wildlife, unpolluted air, and undisturbed land. Second, any actions planned for using, conserving, or impacting natural resources should be developed and evaluated in the context of the natural systems within which they occur. Otherwise, the ramifications may not be evaluated at the appropriate temporal or spatial scale, and detrimental side effects may not be identified. Therefore, when the DOE/NV plans to use a natural resource, such as water or land, that action will not be evaluated simply as a short-term use of one product from a simple system. Instead, an integrated approach will be implemented to evaluate how those uses will impact the diversity, long-term productivity, and resilience of a complex and interrelated system

that includes biotic and abiotic components. Third, these evaluations must also consider the social and economic values placed on ecosystems and their resources by local, regional, and national stakeholders. Finally, ecosystem management is a philosophical approach to managing human activities and natural resources within the bounds of local and regional ecological, economic, and social systems. It is not a specific set of management practices that can be applied in the same manner to all situations. Therefore, the set of practices established to implement this management approach on the NTS will differ from those established at other locations.

The need to switch from traditional resource management practices to the ecosystem management approach has come primarily from situations where there are serious conflicts between multiple uses of land and resources. The traditional approach to resource management in these multiple-use situations has been for each agency or division within an agency to focus on the production or use of the resource for which it was responsible with little integrated effort to consider the sustainability of impacted ecosystems. Ecosystem management is being viewed as a more scientifically and socially valid method for maintaining sustainable natural resources and the ecosystems they require while resolving conflicts among conflicting resource uses (U.S. Fish and Wildlife Service, 1994; Kaufmann et al., 1994).

Why should a management approach that has been considered primarily for multiple-use situations be used on the NTS where multiple use of resources is not mandated or considered? One reason is that the DOE/NV requires, and will continue to require, the use of natural resources, such as water, air, and land, to complete its missions. Therefore, the long-term value of the NTS to the DOE/NV will depend on the wise use of land and the maintenance of the ecosystem. Also, many of the resources on the NTS, whether currently required by the DOE/NV (e.g., water and air) or not (e.g., wildlife and vegetation), have social, cultural, religious, and economic value to others. Also, the large-scale ecosystems on the NTS extend far beyond the site's boundaries, and some DOE/NV activities could impact valued resources located beyond those

boundaries. The DOE/NV, therefore, cannot simply manage or consider only those resources required or located within the site's boundaries. To ensure that the DOE/NV's resource needs continue to be met and to ensure that the social and economic values held by others are considered, the DOE/NV must integrate ecological, economic, and social principles to maintain the ecosystems producing those resources. This approach will ensure that the NTS and the surrounding areas will remain valuable national resources no matter how they may be used in the future. For these reasons, the DOE's Land- and Facility-Use Management Policy requires integrating mission with ecologic factors and incorporating ecosystem management into its site management.

How does ecosystem management differ from past management of lands and natural resources on the NTS? In some ways it differs very little. For example, the DOE/NV already has policies for cataloging and protecting diverse species on the NTS. Also, the DOE/NV usually has evaluated and mitigated the impacts of its activities on natural resources within the context and scope of the ecosystem in the NTS. However, in at least two ways, ecosystem management differs a great deal from past management practices. First, the DOE/NV has never had an explicitly stated set of goals to guide the conservation and management of NTS resources. In part because of this, there has often been little consideration for biological diversity and ecosystem integrity by the DOE/NV when planning and implementing programs on the NTS. Second, there has been no program to identify and integrate social values for resources on the NTS other than those values reflected in the programs implemented on the site. Because these steps are an important part of the *Resource Management Plan*, this plan will be the primary tool for implementing NTS ecosystem management.

3.2 Characteristics of the Environment on the Nevada Test Site That Influence Ecosystem Management

The following are some characteristics of the environment on the NTS that will influence how ecosystem management will be developed and implemented. It is important to understand the

characteristics of the site to understand why the DOE/NV has chosen to emphasize the principles of ecosystem management that follow.

3.2.1 Knowledge of Ecosystems on the Nevada Test Site

The natural environment on the NTS probably has been better studied than any other large site in Nevada. A thorough inventory of the plants and vertebrate animals was conducted in the 1960s and has continued to the present time (Beatley, 1976; O'Farrell and Emery, 1976; Castetter and Hill, 1979; Medica, 1990). Special attention has been given recently to understanding the distribution and abundance of those plant and animal species that are rare, have a limited range, or are protected by the Endangered Species Act (EG&G/EM, 1991; Blomquist et al., 1992; Rautenstrauch et al., 1994; Blomquist et al., 1995). Studies also have been conducted to better understand factors causing the distribution and abundance of some of the dominant plants and animals on the NTS (e.g., Beatley, 1969 and 1974). During the 1970s, part of the International Biome Program was conducted in the Mojave Desert portion of the NTS to study the ecological processes in this region. In the southwest corner of the NTS, detailed studies have been conducted to characterize the environment and monitor the impacts of the Yucca Mountain Site Characterization Project (Green et al., 1991, Angerer, et al., 1994). The DOE/NV also has sponsored many studies to better understand and monitor the impacts of radiation and other impacts on the ecosystem (Friesen, 1992).

Although the environment at the NTS has been well studied, there are some aspects of the environment that are not well understood. For example, comprehensive inventories of many invertebrate taxa on the NTS have not been conducted. An understanding of the population dynamics and key ecological processes and interrelationships is lacking for many species. The long-term impacts of some DOE/NV activities on the ecosystem are not well understood. Therefore, future ecosystem studies should focus on the ecosystem components and functions likely to be affected by the DOE/NV activities.

3.2.2 Impacts of Past Activities

Although large parts of the NTS have been affected by human activities, the majority of this site remains relatively undisturbed. Most of the disturbances are concentrated in the bottom of Yucca Flat, Frenchman Flat, and Jackass Flats and on parts of Pahute and Rainier Mesas. Much of the rest of the NTS, including large areas in the central western part of the site, has few permanent disturbances and little human activity.

No species are known to have been destroyed at the NTS since the DOE/NV and its predecessors began using this site in the 1940s. However, DOE/NV activities have reduced the available habitat for some species, especially those found in the valley bottoms mentioned above. Also, the encroachment of exotic plants onto the NTS has changed the structure and probably some of the ecological processes such as nutrient cycling throughout much of the site. Although exotic plants probably were not introduced directly as a result of the DOE/NV activities, the spread of some of these species may have been accelerated by the DOE/NV's land-disturbing activities.

3.2.3 Surrounding Land

The NTS is surrounded by very large tracts of relatively undisturbed land. Most of this land is managed by federal agencies such as the Department of Defense (DoD), U.S. Bureau of Land Management, and U.S. Fish and Wildlife Service; many of which have ecosystem management policies that must be considered during development and implementation of the *Resource Management Plan*. There are also some private lands and land that belongs to American Indian tribes near the NTS.

3.2.4 Geographic Range of Ecosystems on the Nevada Test Site

Biotic communities and landscape patterns similar to those found on the NTS can be found far beyond the boundaries of this site. The transition zone between the Mojave and Great Basin deserts, along which the NTS lies, extends west from the NTS into California and east into Utah. Although there are

regional differences in the relative abundance of species within this band of transition, and no doubt some genetic differences also, the general pattern of species abundance is similar.

Because of this, there are few rare species or species with limited geographic ranges on the NTS. No plant species are endemic to the NTS, though a few, such as Beatley milkvetch and Beatley phacelia (*Phacelia beatleyae*), are found in a few places off the NTS. All vertebrate animal species on the NTS (including the desert tortoise, the only threatened or endangered species common on the NTS) have ranges that extend far beyond the site. Too little work has been done to determine if there are any invertebrates unique to the NTS or the immediately adjacent areas.

3.2.5 Use of Natural Resources on the Nevada Test Site

Few of the natural resources on the NTS are directly used for economic, recreational, or other social benefits. Water and land are the only natural resources consistently required by the DOE/NV activities. Grazing, timber harvesting, and mining are not permitted on the NTS. Wildlife currently can be viewed only by those permitted to work on or visit the site. Animals on the NTS can be hunted only if they travel off the site. Individuals of a few species, such as doves, waterfowl, and mule deer may move off the NTS and be available for hunting, but these individuals probably contribute very little to hunting opportunities in the region. Because natural resources on the NTS have few direct uses, less attention has been given to their management than in areas such as national forests where multiple use of natural resources is mandated. In addition, defining social values for natural resources on the NTS is more difficult than in areas where their use can be measured directly.

3.3 Principles of Ecosystem Management

This section describes principles or themes of ecosystem management that apply to resource management on the NTS. It includes descriptions of how those principles will be incorporated into the *Resource Management Plan* and other programs conducted by the DOE/NV to monitor and manage natural resources on the NTS.

3.3.1 Maintain Biological Diversity

Maintenance of biodiversity is one of the primary reasons for implementing ecosystem management on any site (CEQ, 1993). The DOE/NV will incorporate this principle by selecting and striving to achieve goals for biological resources in the *Resource Management Plan* that reflect this principle. The proposed goal in Section 4.7 for the management of biological resources—to maintain habitat and ecosystem processes needed to support viable populations of all native plants and animals, including state and federal endangered, threatened, and candidate species—reflects the DOE/NV's commitment to maintain biodiversity and ecosystem integrity. It is based on maintaining viable populations and the ecosystem processes, structure, and abiotic and biotic components required by those populations. Although this proposed goal may be modified based on input by stakeholders, the final version will include a similar commitment. As described in Chapter 2, this goal will be used to identify necessary management actions and compatible land uses for maintaining diversity.

3.3.2 Use a Goal-Oriented Approach To Identify Desired Outcomes

One of the keys to the success of ecosystem management is to base that management on long-term horizons and goals that describe desired ecosystem conditions, incorporate human values, and are developed with full participation of all interested parties (Grumbine, 1994; DOI, 1994b; GAO, 1994). The *Resource Management Plan* will be based on a goal-oriented approach. An early step in developing that plan will be to solicit and incorporate opinions from those interested in how the plan should be developed and how resources should be managed. These opinions will be used to develop goals for the management of resources that incorporate public values and describe the desired ecosystem conditions and resource production to be achieved.

3.3.3 Base Management on Ecological Units and Timeframes

For the DOE/NV to successfully implement an ecosystem approach to managing natural resources, the agency must evaluate impacts of its activities and develop mitigation and other management actions at appropriate spatial and temporal scales. The appropriate scale depends on the type of impact and the ecosystem components being affected or considered. In general, these scales are larger and longer than the boundaries and planning periods often considered by the DOE/NV in the past when evaluating impacts or managing resources. As described in Sections 3.2.3 and 3.2.4, the boundaries of the large-scale ecosystem pattern found on the NTS extend far beyond the NTS and include land owned and managed by many individuals and agencies. Similarly, the timeframes within which ecosystems respond and adapt to changes are seldom the same timeframes the DOE/NV has used for planning. The DOE/NV normally develops plans for 5- or 10-year periods. In contrast, some components of desert ecosystems, such as shrubs and other perennial vegetation, change (Shreve, 1942; Beatley, 1976; Webb et al., 1988) and recover from disturbances (Wells, 1961; Wallace et al., 1980; Webb and Wilshire, 1980; Carpenter et al., 1986; Angerer et al., 1994) over much longer periods.

This principle will be incorporated into the *Resource Management Plan* by selecting management goals and actions at appropriate scales, regardless of the planning schedules or boundaries of the NTS. For example, the first goal listed in Section 4.5 for the management of water resources—maintain an adequate water supply for existing uses on the NTS while ensuring a long-term sustainable supply of water for the NTS and the surrounding ecosystem—will require the DOE/NV to consider the impacts of groundwater pumping over an area much larger than the NTS. The DOE/NV will also have to consider the consequences of its actions on future water supplies, which will require predicting impacts on water availability over a very long period. Example 2.1 includes an example of management actions that will require consideration of impacts and activities beyond the NTS.

3.3.4 Improve Communication and Cooperation with Interested and Affected Parties

To develop a meaningful goal-oriented approach and to manage at spatial scales larger than the NTS, the DOE must improve communication and coordination with adjacent land managers and other interested and affected parties (U.S. Interagency Ecosystem Management Task Force, [IEMTF, 1995a, b]). For example, the DOE/NV will strive to better integrate management of shared resources; improve methods for collecting, sharing, and using scientific information; develop better lines of communication with the public; and develop partnerships with interested parties. Some of those partnerships already exist, such as a five-party agreement between the DOE/NV, U.S. Bureau of Land Management, DoD (Nellis Air Force Range Complex), U.S. Fish and Wildlife Service, and Nevada Division of Wildlife. Others will need to be developed with additional agencies, tribes, and private citizens. The DOE/NV realizes that this is a change in the way resources on and around the NTS have been managed and is committed to taking a leadership role in bringing together the necessary parties to ensure that DOE/NV's and other agencies' management goals are achieved.

3.3.5 Adopt an Integrated, Interdisciplinary Approach To Land Management

Ecosystems are complex natural systems with interrelated biotic and abiotic components. A change in one of those components may cause inadvertent impacts to other components. Understanding and managing such a system, therefore, requires the consideration of all components and their relationships. To do this, the DOE/NV will need to develop an integrated framework for planning, evaluating, and monitoring projects and their impact on the ecosystem.

The *Resource Management Plan* will provide part of the framework for developing this integrated, interdisciplinary approach to land management. The resources considered in the *Resource Management Plan* represent important components of the ecosystem, including natural, biotic components; abiotic components, such as water and air; and

manmade components, such as the facilities, infrastructure, and activities. To ensure that the management goals for all of these resources are achieved simultaneously, the interactions between these ecosystem components will have to be considered during the planning phase for all activities. Because an understanding of these interactions is beyond the scope of any one discipline or area of study, the DOE/NV will use an interdisciplinary team to make these evaluations.

To judge the compatibility of proposed activities with the goals established for this *Resource Management Plan*, the DOE/NV also will have to predict the impacts of those activities on the environment. Unfortunately, there are few ecosystem-based models available to make such predictions. Therefore, the DOE/NV will have to develop them as part of this *Resource Management Plan*. Because collecting required data and developing the models can be expensive, models may be developed only for those resources of greatest importance or most likely to be affected. Risk assessments or cost benefit analyses may be used to identify those models of greatest importance.

3.3.6 Use Adaptive Management

Adaptive management is a common-sense approach to monitoring impacts and managing resources. It involves three steps: monitoring; using the information collected during monitoring to develop a better understanding of the ecological, economic, and social systems on and around the NTS; and adapting management practices in response to that information.

Monitoring is a crucial step in the *Resource Management Plan* because the predictions of impacts and selection of suitable land uses that will result from the plan will be based on an incomplete understanding of the ecosystem on the NTS. As described in Step 7 of Section 2.1, this monitoring will focus on ensuring that the goals of the plan are being met. The proposed goal for biological resources concerns the maintenance of biodiversity and viable plant and animal populations. To ensure this goal is met, changes in biodiversity will be monitored. The appropriate hierarchical levels

chosen for monitoring diversity (e.g., genetic, species, community, or landscape) will depend on the type of impacts that occur, the scale at which those impacts occur, and the species or groups of species at greatest risk. In addition, the abundance or other characteristics of populations at greatest risk will also be monitored to ensure they remain viable.

The DOE/NV needs to develop a better understanding of how its activities affect the ecosystem so they can better predict and avoid adverse impacts. Much of this can be done by developing the monitoring program as a set of studies designed to test whether specific activities affect resources (Walters and Holling, 1990; Kessler et al., 1992). In addition, the DOE/NV should conduct research to develop a better understanding of ecosystem processes and components most affected by human activities and to develop better predictive models.

All information gathered while monitoring and studying the environment must then be applied via the *Resource Management Plan* to more effectively manage resources and land use. To do this effectively, the *Resource Management Plan* must be adaptable. As described in Steps 7 and 8 of Section 2.1, the *Resource Management Plan* will be a "living" plan that can be modified quickly. When warranted, management actions and the planning tools used to implement those actions will be rapidly updated. In addition, the DOE/NV will periodically conduct public review of the goals and management actions to ensure they consider current public opinion.

3.3.7 American Indian Ecosystem Perspectives

The following American Indian ecosystem perspectives have been proposed by the EIS American Indian Writers Subgroup. Although they have not been approved by the Consolidated Group of Tribes and Organizations or tribal governments, they provide a framework from which to begin. In this respect, DOE/NV will continue to consult with the Consolidated Group of Tribes and Organizations regarding implementation of the *Resource Management Plan*.

Ecosystem management is a term that is being used in the current Framework for the Resource Management Plan in response to recent federal guidelines. Indian people have a unique view of ecosystems and culturally established procedures for using them in a sustainable manner. These cultural ways, which could be called ecosystem management strategies, have been developed out of thousands of years of experience living on and learning from the NTS ecosystems. The Indian ecosystem approach reflects what is being called cultural landscapes elsewhere in cultural resource management (Stoffle et al., 1996).

The meaning of a natural ecosystem is a key issue within the Indian view of ecosystem management. According to traditional ecosystem management perspectives, natural ecosystems contain Indian people interacting with the physical environment, plants, and animals. After thousands of years of interacting with American Indians, the plants, animals, and physical resources of the NTS have adjusted to this relationship. Indian people believe that the land is to be used in a culturally appropriate manner or it will become infertile. "Talk to it" is what Indian people say. The plant to be picked, the animal to be hunted, the mineral to be mined, the water to be drunk, all need to be talked to so they understand why they are being used and so they can willingly give themselves over

to the service of Indian people. In return, the picked plant comes back thicker, the animal herd is stronger, the mineral deposits are used in religious ceremonies, and the water satisfies one of its purposes. The view of a natural landscape containing Indian people interacting with the landscape is already expressed in previous NTS EIS comments as well as in previous NTS documents (Stoffle et al., 1990).

Defining a Native American Ecological Unit is a critical issue for implementing an ecosystem management strategy that includes cultural resources. Indian people often accept geographically unique units like hydrological basins as reflecting traditional adaptive units. However, these geographically unique units are bound together into larger culturally based units. Ultimately it is culture not natural geography that reflects the mind of Indian people's adaptation. Cultural-geographic units identified by past studies are the (1) local use area, (2) district, and (3) holy land or nation. Additional cultural-geographic units are the (1) regional landscape, (2) ecoscape, (3) story-scape, and (4) landmarks (Stoffle et al., 1996). The American Indian Writers Subgroup would like the Resource Management Plan to consider using Native American cultural-geographic units as part of the base management plan.

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CHAPTER 4 RESOURCE MANAGEMENT GOALS

This chapter contains the goals for the management of resources and land-use constraints that the DOE is proposing to include in this *Resource Management Plan*. They are based on public comment, laws, regulations, and the DOE's policies for the management of these resources and constraints. These goals are general, qualitative statements summarizing the DOE's commitments for managing resources. In the future, they may be revised to include more specific, quantitative information that can be used to identify limits on resource uses and conflicts between alternate uses and goals. They will be used to evaluate the effects of the DOE/NV activities on resource issues and to identify management actions needed for wise resource use and sound ecosystem management. Also included are brief explanations of why the DOE chose these goals; constraints on the use or management of the resources imposed by laws, regulations, mission requirements, and prior DOE commitments; limitations on the DOE's ability to achieve the goals; and, when available, map products documenting the DOE's knowledge of NTS resources and constraints.

There will be times when mission requirements and/or goals for resources conflict and cannot be achieved simultaneously. These conflicts will be identified and proposed resolutions evaluated during the National Environmental Policy Act review process and discussed in the appropriate Environmental Assessment or EIS. Possible solutions that may be considered include canceling a proposed mission, modifying a proposed mission to reduce impacts on a resource, modifying existing missions, or not achieving a goal. Of course, goals based on federal, state, and county laws and regulations, and human health and safety, will always be adhered to. As part of the National Environmental Policy Act review process, interested parties will then be able to comment on the conflicts and proposed resolutions. Decisionmakers within the DOE or other appropriate agencies will then select a resolution based on costs, benefits, and public comments.

4.1 Existing Missions

The DOE/NV identified two goals to ensure the success of existing missions on the NTS:

- Ensure new uses of the NTS do not interfere with critical operations of existing missions or create additional costs for those missions
- Manage existing missions in a way that most effectively and efficiently uses the resources of the NTS.

The first goal was selected to ensure that the land and other resources required for ongoing missions are reserved for those missions, and that the siting and operation of new missions, does not jeopardize the success of those missions. If alternative uses such as industrial, commercial, or recreational are accepted for the NTS to promote economic development or other needs of interested parties, those uses will then be treated as existing missions. Resource requirements for those uses will be identified and reserved. Currently, conflicts with existing missions are minimized through the Site Development Planning and Operations Permit processes. The second goal was chosen to ensure that existing missions are operated in a safe and prudent manner that does not jeopardize new missions.

4.2 Site Support Activities and Facilities

The maintenance of the infrastructure and facilities on the NTS is critical to the success of ongoing missions on the NTS and for sustaining the value of this site as a premier outdoor laboratory. The following goals will ensure that ongoing missions are supported and the potential for future missions is maintained:

- Support existing NTS missions by maintaining existing infrastructure and facilities

- Accommodate expanded uses of the NTS through proactive planning and development of new or expanded infrastructure
- Site new facilities to take maximum advantage of existing site support activities and facilities.

The DOE/NV's ability to maintain and expand site support activities will be constrained by availability of funding. The third goal was chosen to minimize the environmental and economic impacts of having to develop a new, redundant infrastructure and facilities. Currently, the use of existing site support activities and facilities is managed through the Site Development Planning and Operations Permit processes and by NTS Standard Operating Procedure 4304 (DOE/NV, 1994b).

The DOE has developed several map products through the use of a geographic information system to assist the infrastructure planning effort. Plate 1 provides a representation of the NTS road network; other maps identifying facility and other infrastructure features are currently under development.

4.3 Health and Safety

Worker and public health and safety are top priorities for the DOE on the NTS. Consideration of safety requirements and risks during the siting of new facilities, as required by the following goal, will minimize those risks.

- Site new facilities in areas that comply with applicable safety regulations and have minimal radiation and other safety risks.

This goal will also eliminate the costs of adapting new facilities to minimize risks associated with inherently unsafe sites. Health and safety requirements are defined in the DOE directives and are considered in the design criteria for each construction effort.

Areas of the NTS which pose health or safety risks include those associated with past nuclear activities. Plate 2 shows the locations of past nuclear tests. Plate 3 shows manmade radiation exposure rates, and Plate 4 shows the total terrestrial exposure rate.

4.4 Land

Use of the NTS is controlled by public land withdrawals and other legal constraints. The DOE developed the following goals to comply with legal restrictions and to minimize construction costs:

- Site new facilities to ensure compliance with public land withdrawals, Memorandum of Understanding, and other legal constraints on use of real estate
- When possible, site new facilities in, or as close as possible, to previously disturbed lands in order to preserve and protect undisturbed land
- When possible, site new facilities in areas with suitable soil, slope, drainage, and other natural features.

The first goal was developed to ensure that those restrictions are considered. The legally acceptable uses for all lands on the NTS will be identified and incorporated into land-use planning. Land withdrawals pertaining to the NTS are discussed in Volume 1 of the NTS EIS.

The second goal will promote the long-term protection of natural resources on the NTS. Because vegetation in the desert ecosystem on the NTS takes a long time to return to its predisturbance state (Angerer et al., 1994), one of the best ways to protect natural environments is to minimize disturbances. The ability to achieve this goal may be constrained by the operational requirements of specific activities.

There are numerous locations on the NTS that have steep slopes, unstable soil, or other natural features that will require expensive modification of facilities constructed on those locations. The third goal was selected to require the consideration of those constraints during land-use planning and to minimize construction costs. The ability to achieve this goal will be constrained by the land-use requirements of each project or facility. For example, a monitoring station or other facility that must be located in a specific, remote section of the NTS will be designed and constructed to fit that

site, even if there are additional construction costs for adapting the facility to the site. Engineering constraints such as these are considered in the design criteria for each construction effort.

Plates 5 and 6 show the topography and surface drainage, respectively, of the NTS. In addition to natural hazards, areas of the NTS have been permanently disturbed as a result of underground nuclear testing. Plate 7 shows the areas within Yucca Flat where land use is constrained by the presence of nuclear explosion craters.

4.5 Water

The following goals were selected to ensure the quality and quantity of surface and subsurface water:

- Maintain an adequate water supply for existing uses on the NTS while ensuring a long-term sustainable supply of water for the NTS and the surrounding ecosystem
- Maintain the quality of those waters that are presently clean enough to be in compliance with state and federal standards.

The first goal was selected to ensure that a balance is achieved between current use of water on the NTS and future sustainable use on the NTS and in the surrounding region. The DOE will strive to achieve the second goal to ensure that available water will be suitable for all future uses and to comply with the Clean Water Act, the Safe Drinking Water Act, and the Nevada Water Pollution Control Law. The DOE/NV currently manages a system of groundwater production and monitoring wells in compliance with applicable state and federal regulations. Withdrawal of water by the DOE/NV on the NTS is exempt from Nevada water laws when water is used to support primary mission activities.

4.6 Cultural and American Indian Resources

To ensure preservation of cultural resources on the NTS, the DOE selected the following goal:

- Identify and protect American Indian, historic, and other cultural resources on the NTS and preserve the historic, cultural, and scientific values they represent, in conformance with all laws and DOE policies, and with the results of consultation with the Consolidated Group of Tribes and Organizations.

This goal was selected to ensure that the DOE complies with all appropriate laws and regulations regarding cultural resources, and to incorporate the results of ongoing consultations with American Indians into the DOE/NV's land-use planning process. The ability to achieve this goal will be constrained by the requirements of ongoing missions and safety considerations on the NTS. Currently, the DOE/NV holds regular working meetings with the Consolidated Group of Tribes and Organizations and, when needed, special studies and visits to the NTS are conducted. These consultations have resulted in 58 mitigation recommendations for protection of cultural resource sites (DRI, 1994). Section 110 of the National Historic Preservation Act requires federal agencies to establish a preservation program to protect and preserve all historic properties, including National Historic Landmarks, and to provide a process for nominating properties to the National Register of Historic Places. The preservation program must ensure that agreements on how adverse effects on National Register properties will be considered are developed and implemented through consultation with local governments, Indian tribes, the State Historic Preservation Office (SHPO), and interested public. Section 106 of the National Historic Preservation Act also requires federal agencies to consult with SHPO as well as the Advisory Council on Historic Preservation when evaluating the effects of their actions on historic properties. American Indian participation in the protection and management of resources at the NTS is not limited to compliance with Section 106 of the Historic Preservation Act, but includes 10 years of consultation with DOE/NV, including the AIRFA compliance program, the NAGPRA compliance program, and the direct participation of American Indians in the writing of sections for the NTS EIS. Consultation that may be implemented in the future, specifically that related to the *Resource Management Plan*, will be successful if it is built on

past and present relationships between the DOE/NV and the Consolidated Group of Tribes and Organizations. The DOE/NV expects to continue these consultations throughout the development and implementation of the *Resource Management Plan* to ensure American Indian participation in managing cultural resources on the NTS.

4.7 Biological Resources

Maintenance of biodiversity and ecosystem integrity is one of the important principles of ecosystem management. To achieve this principle, the DOE selected the following goal:

- Maintain habitat and ecosystem processes needed to support viable populations of all native plants and animals, including state and federal endangered, threatened, and candidate species.

This goal will be achieved by managing human activities that influence the habitat, community structure, and ecosystem processes that are important to each species. By achieving this goal, the DOE will ensure that its activities do not jeopardize the continued existence of any populations of plants or animals on or near the NTS or cause any species to be listed as threatened or endangered under the Endangered Species Act. The goal also ensures compliance with that section of the Endangered Species Act that requires federal agencies to carry out programs for conserving threatened and endangered species. Currently, the DOE/NV consults with the U.S. Fish and Wildlife Service, per Section 7 of the Endangered Species Act to ensure that its actions are not likely to jeopardize the continued existence of any listed species or will not adversely affect critical habitat. In order to comply with the Endangered Species Act at the NTS, the DOE/NV Order 54XC.1B (DOE Order NV54XC.1B, 1994) provides guidance for the protection of threatened, endangered, proposed, and candidate species, and NTS Standard Operating Procedure 5418 (DOE/NV, 1994c) guides the conduct of preconstruction surveys. The DOE/NV monitors the natural environment as part of the Basic Environmental Compliance and Monitoring Program.

Plate 8 shows the distribution of plant species, which in 1995 were designated as candidates for listing under the Endangered Species Act on the NTS. Tortoise sightings and the extent of tortoise habitat are shown on Plate 9. Plates 10 through 16 show areas of land and habitat disturbances on the NTS resulting from historic operations.

4.8 Air

To ensure compliance with applicable air-quality regulations, maintenance of air quality on the NTS, and minimal impact on future missions and the ecosystem, the DOE identified the following goal:

- Ensure that the current air quality attainment designation found on the NTS is maintained so that humans, existing and new missions, and biological resources on and around the NTS are not negatively affected.

Currently, the DOE/NV coordinates with the State of Nevada Division of Environmental Protection, Air Quality Bureau, and implements a permitting program regarding air quality for its facilities at the NTS.

4.9 Geological and Mineral Resources

The DOE selected the following goals regarding the extraction and use of geological and mineral resources on the NTS:

- Minimize impacts to unique geological resources and economically important mineral resources and provide access to the scientific community for the study of those unique resources when possible
- Make economically important geological resources available with minimum adverse impact on the DOE's missions.

The first goal focuses on the conservation and study of unique resources, such as type sections, rare fossils, and the Timber Mountain Caldera National Natural Landmark, and on the prevention of damage to economically important mineral resources through inadvertent actions related to the DOE's missions on the NTS. The second will allow

mining of important geological resources, such as gravel, and allow the possibility of mineral exploration on the NTS. Plates 17 through 20 show subsurface nuclear test locations as an example of how three-dimensional mapping could be used to display geological information. Use of geological resources is not currently permitted on the NTS and, if permitted in the future, will be constrained by the security and safety requirements of the DOE missions, health and safety concerns, land-use agreements, and other regulations.

4.10 Airspace

The following goal was chosen to maximize the effectiveness of restricted airspace over the NTS and surrounding lands:

- Coordinate airspace requirements with surrounding land-management agencies and make restricted airspace available for uses compatible with the DOE's missions.

Currently airspace over the NTS is classified as restricted by the Federal Aviation Administration and controlled by the U.S. Air Force. As missions on the NTS change, the use of airspace will be

evaluated for other possible uses, such as increased military training flights.

4.11 Socioeconomics

The following goal was chosen to ensure that the impact on surrounding areas is considered when making land-use decisions:

- Manage resources and missions in a manner that considers the local and regional social and economic values and stimulates the local and regional economy.

Land-use decisions made for the NTS will affect surrounding communities in such areas as transportation, law enforcement, emergency management, procurement, and economic development. This goal was chosen to ensure that the impact on surrounding communities is considered when making land-use decisions. To the extent consistent with its mission, the DOE/NV will cooperate with land-use plans of local governments such as Nye County and other surrounding counties. On issues related to economic development and its effects on the NTS and its surrounding communities, the DOE/NV will also talk with the Community Reuse Organization.

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**CHAPTER 5
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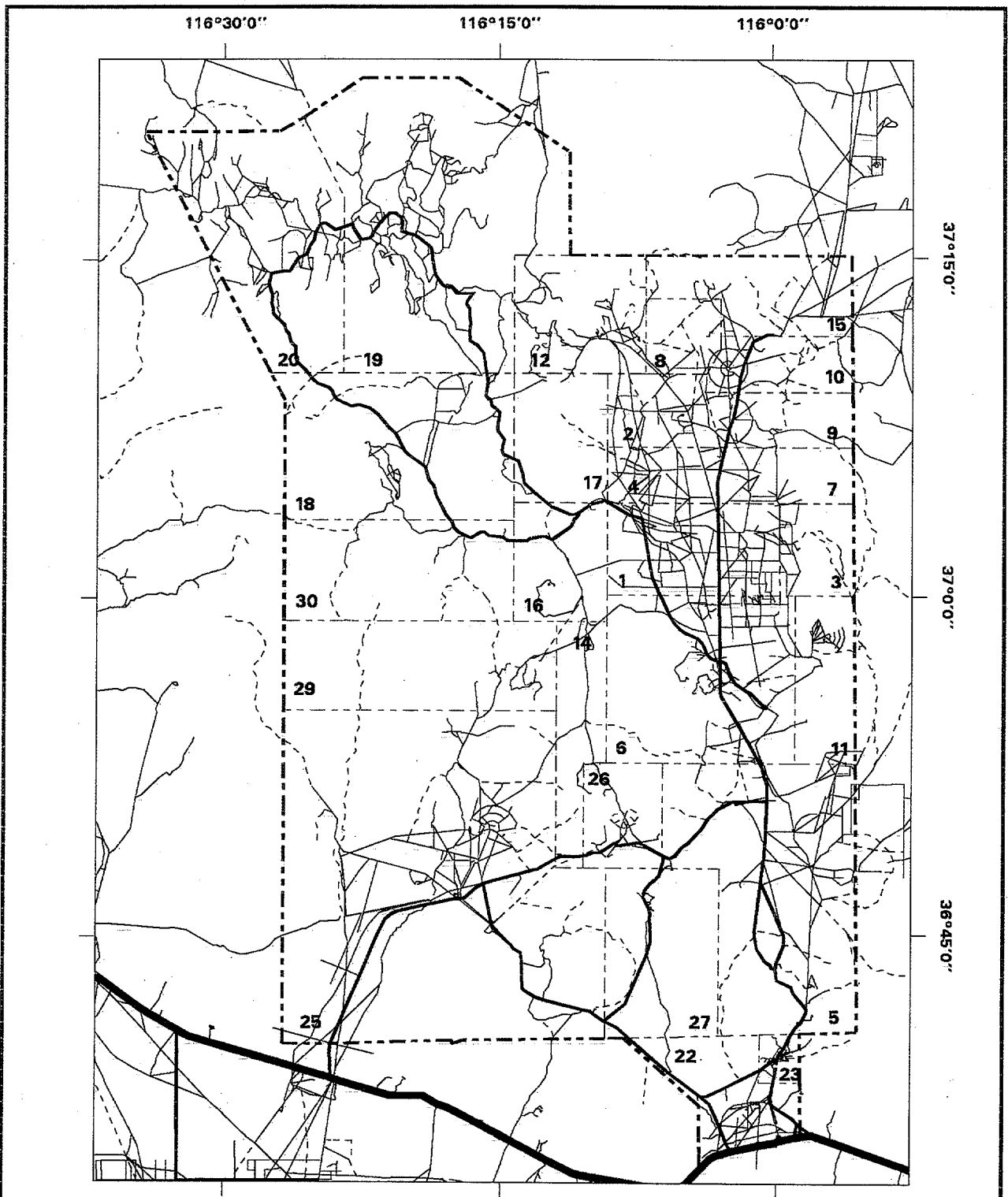
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**CHAPTER 6
PLATES**

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-  Primary Road
-  Light Duty Road
-  Unimproved Road
-  Trail

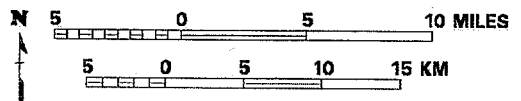
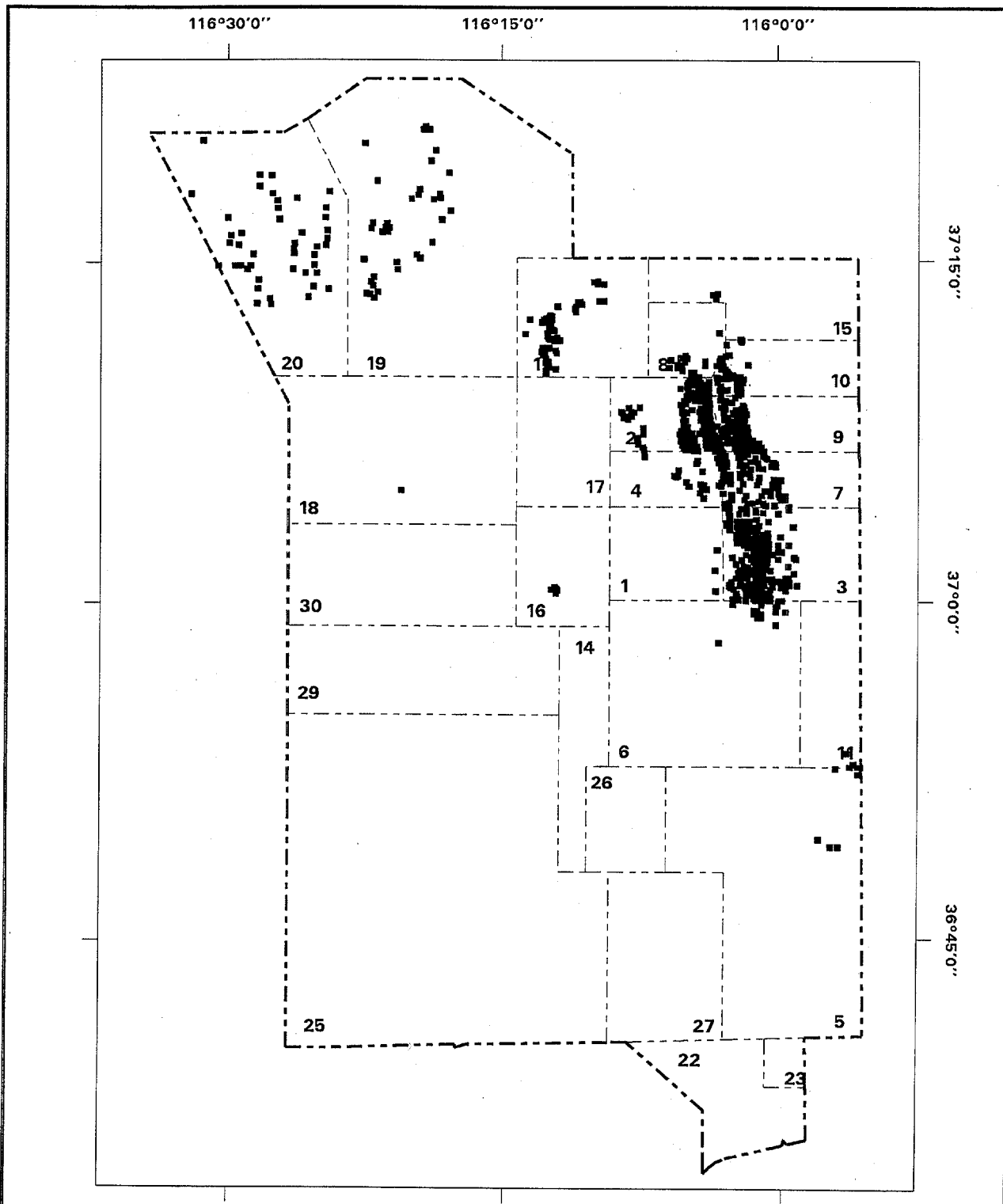


Plate 1: Roads.



■ Events

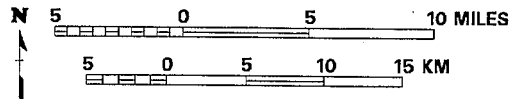


Plate 2: Events.

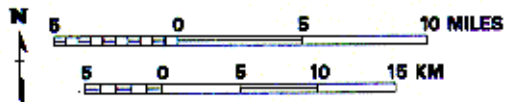
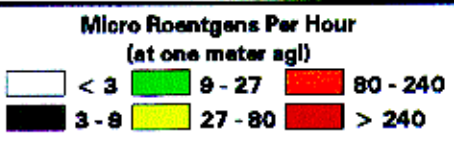
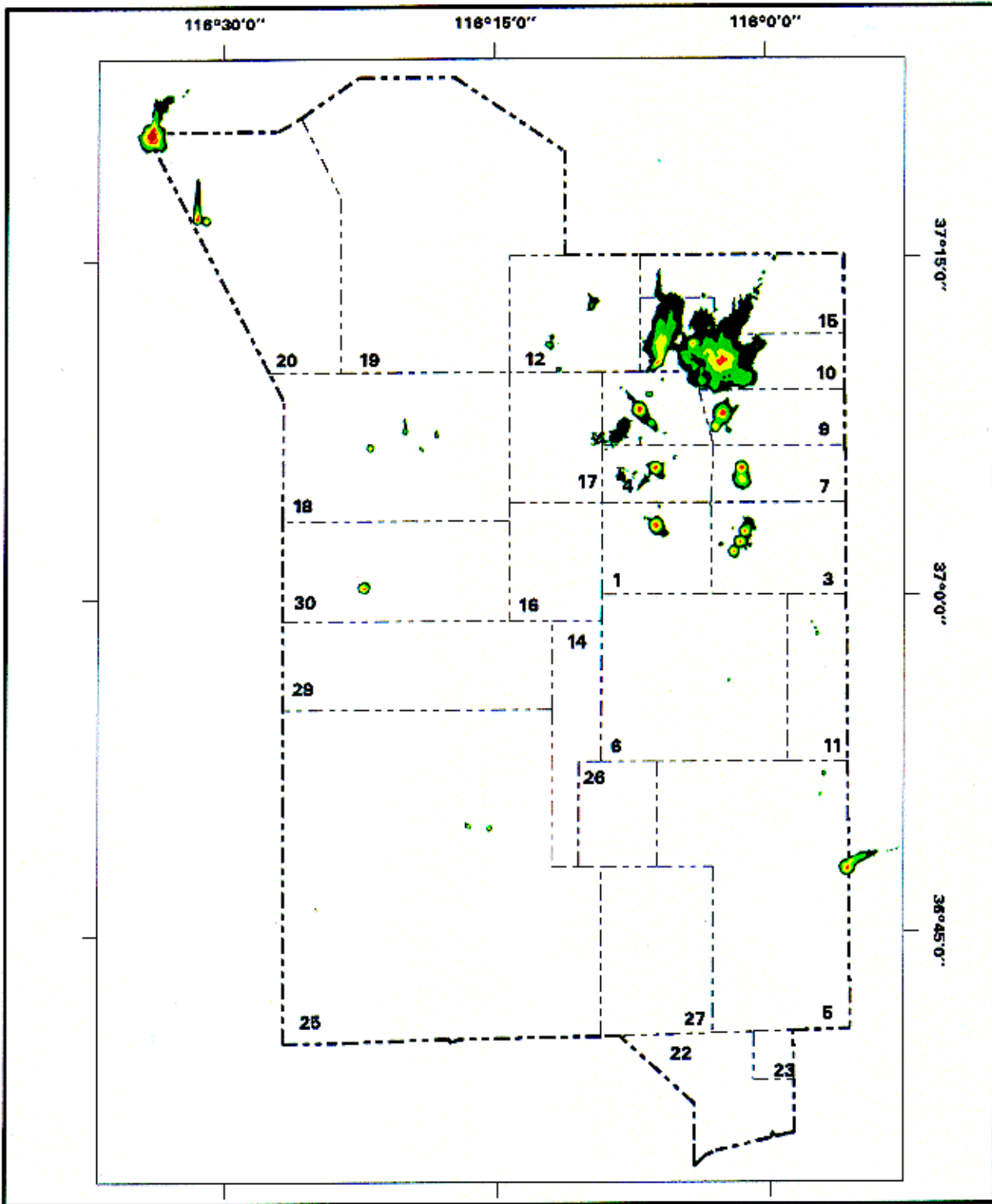
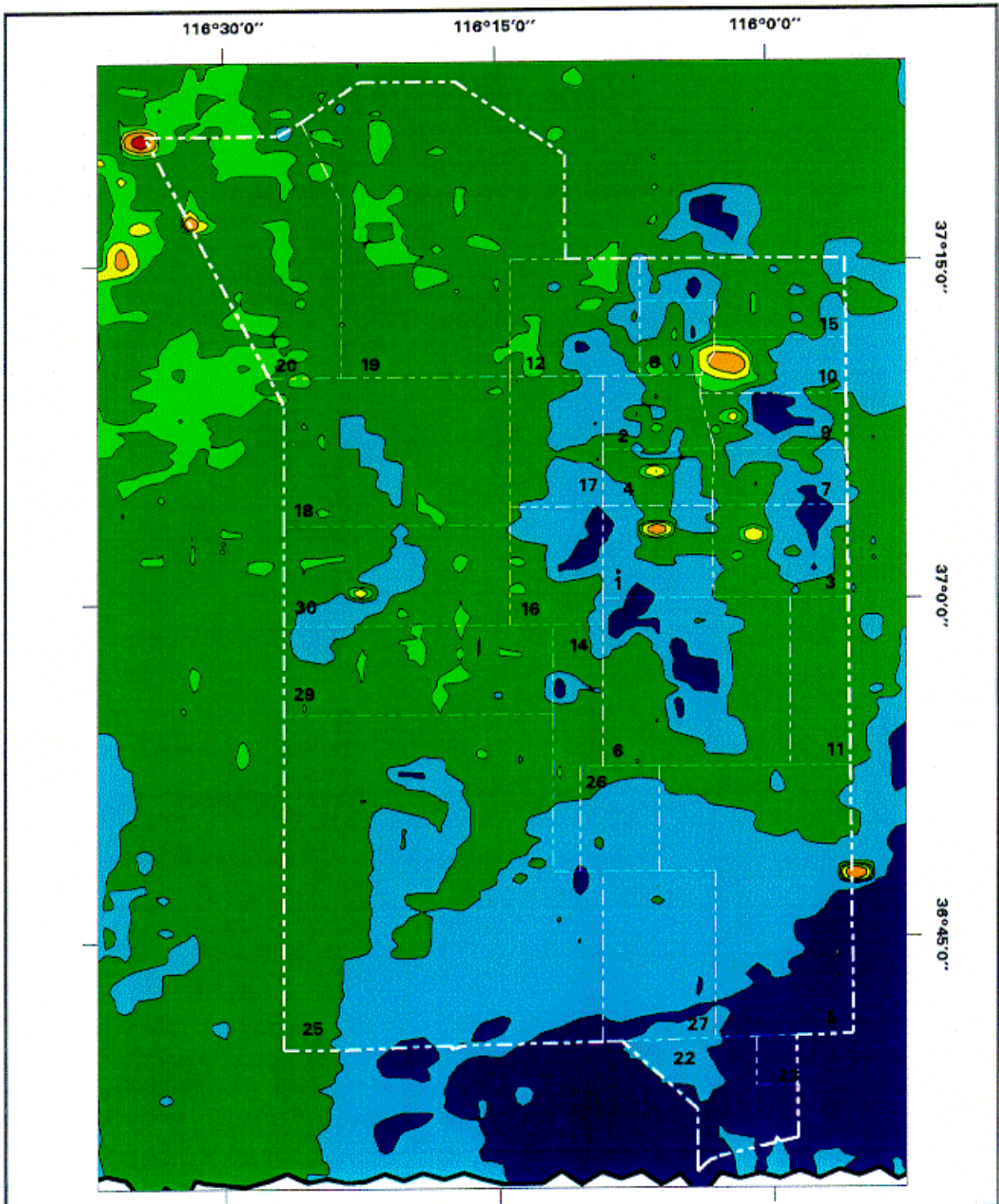



Plate 3: 1994 Radiation Survey - Man Made Exposure Rate.

DOE/REL NTS-95-053.1



Micro Roentgens Per Hour
(at one meter agl)



 Survey Boundary

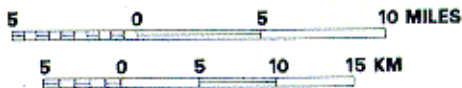
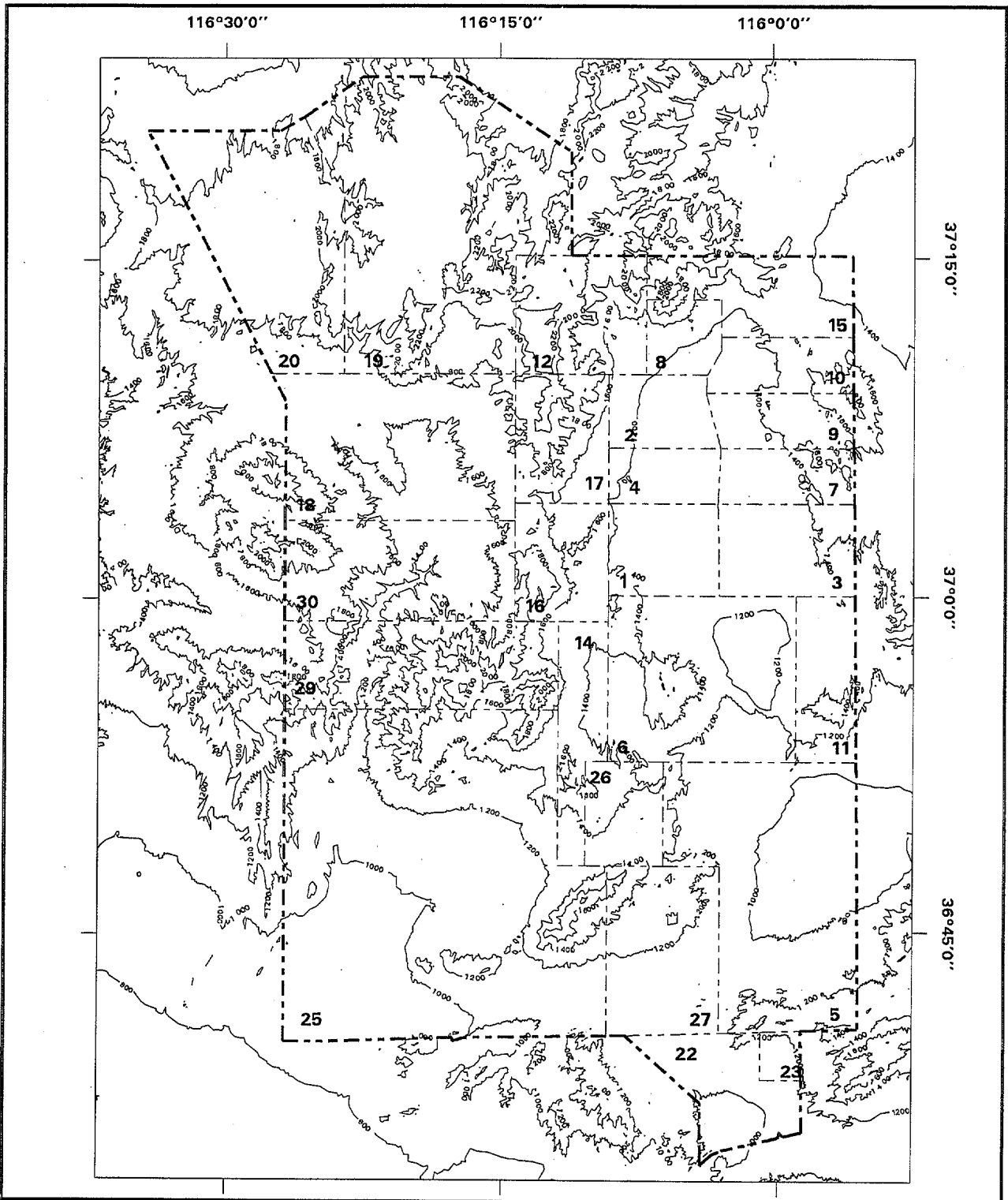


Plate 4: 1992 Radiation Survey - Terrestrial Exposure Rate.

DOE/REL NTS-95-054.1



 200 Meter Elevation Contour

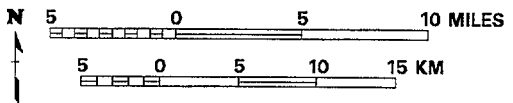
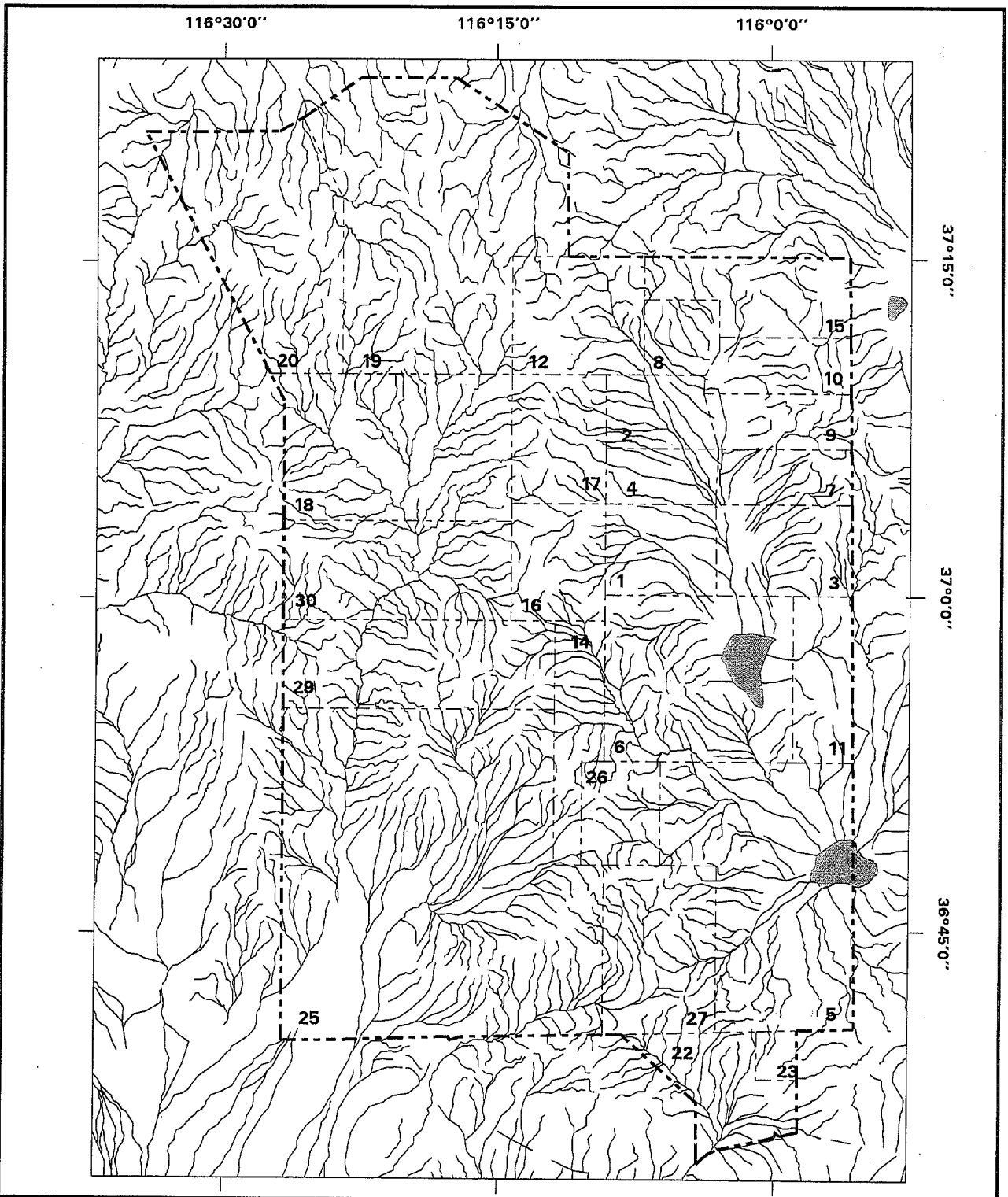




Plate 5: Topography.



 Intermittent Stream
 Dry Lake

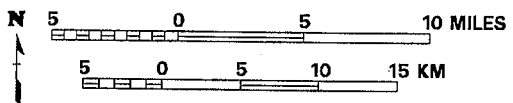


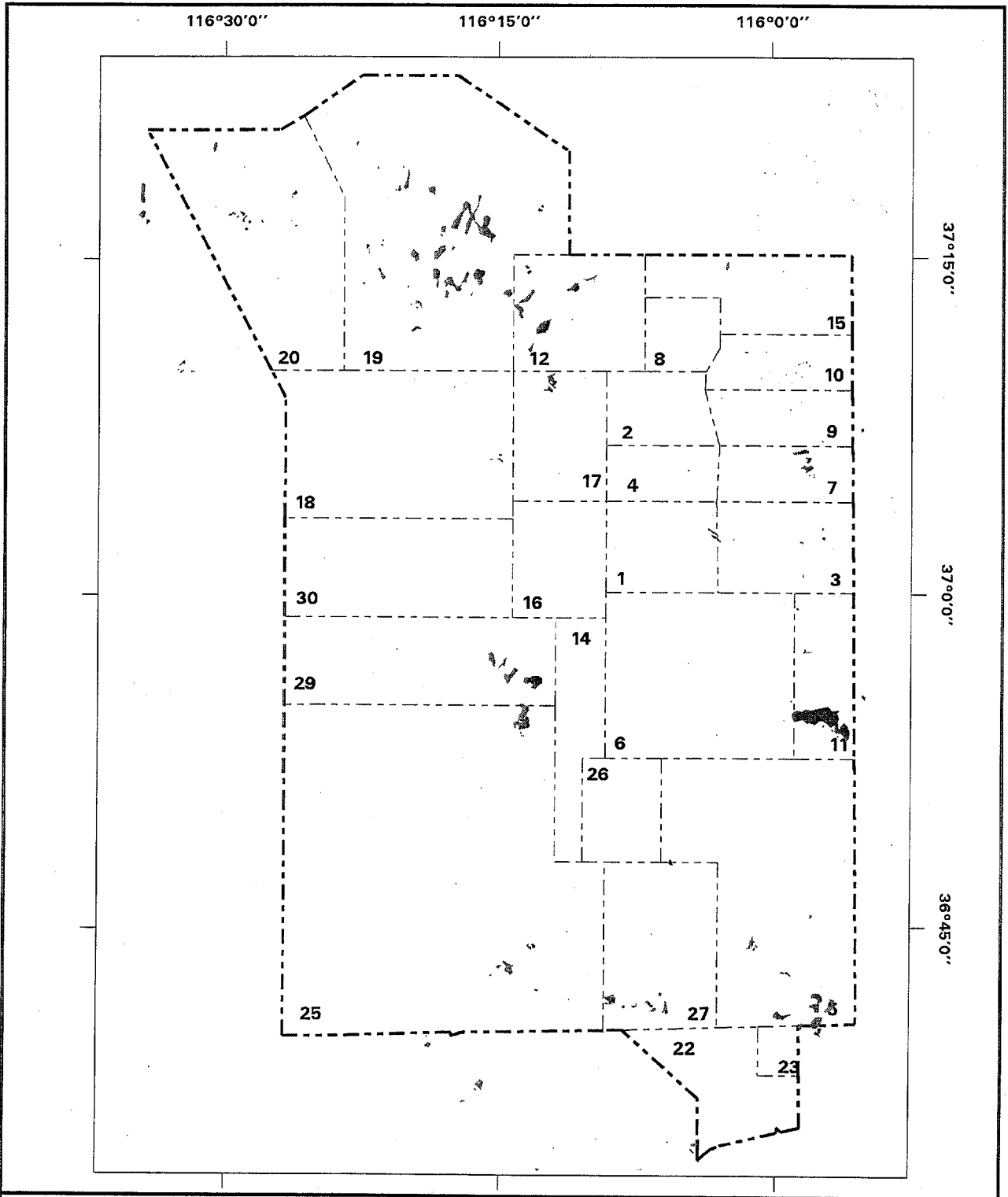
Plate 6: Surface Drainage.



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Plate 7: Aerial View of the Many Craters within Yucca Flat.

DDE/RSLS PHOTO 6613-208



 Candidate Plant Species

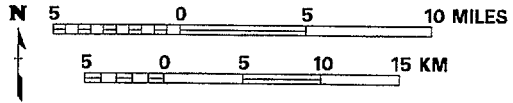
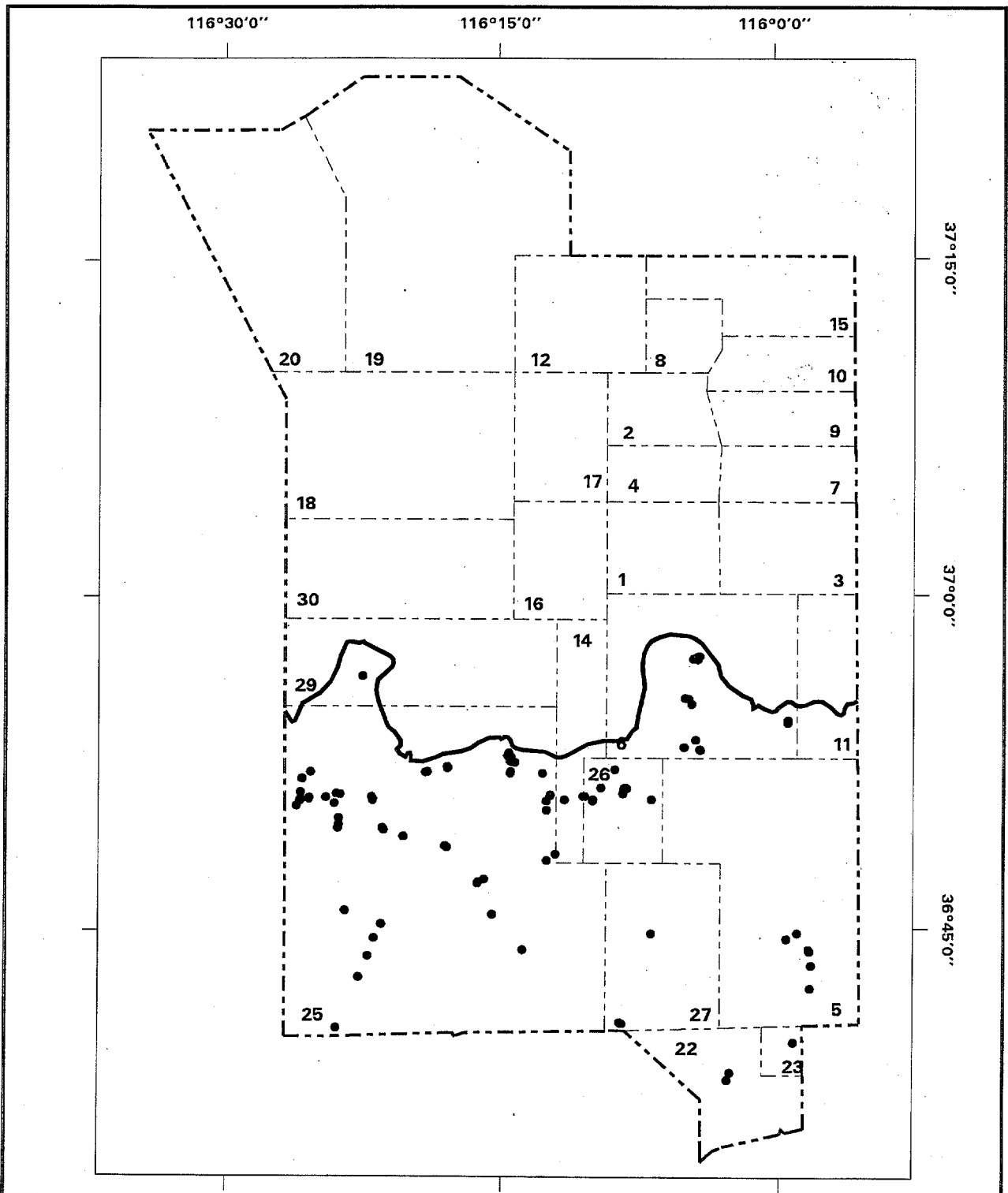


Plate 8: Distribution of Candidate Plant Species.



• Tortoise Sighting
 ~ Approximate Northern Extension
 of the Desert Tortoise

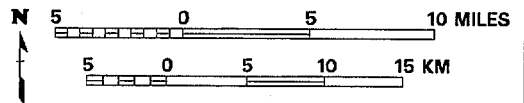
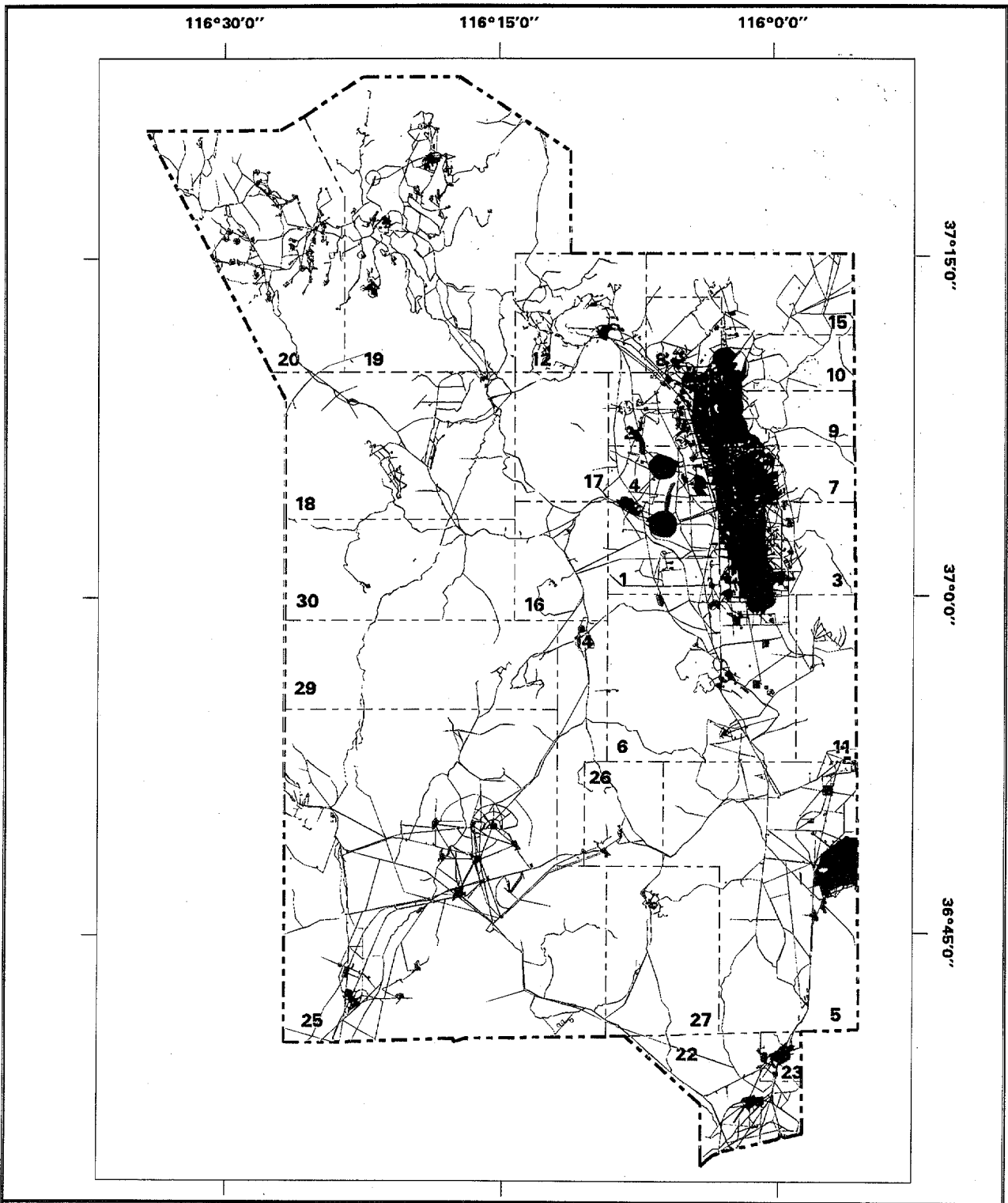


Plate 9: Tortoise Sightings.



 Surface Disturbance

Note: Disturbance information shown is preliminary.

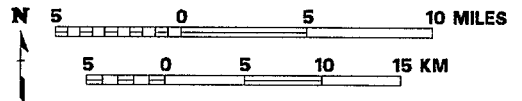


Plate 10: Surface Disturbances.

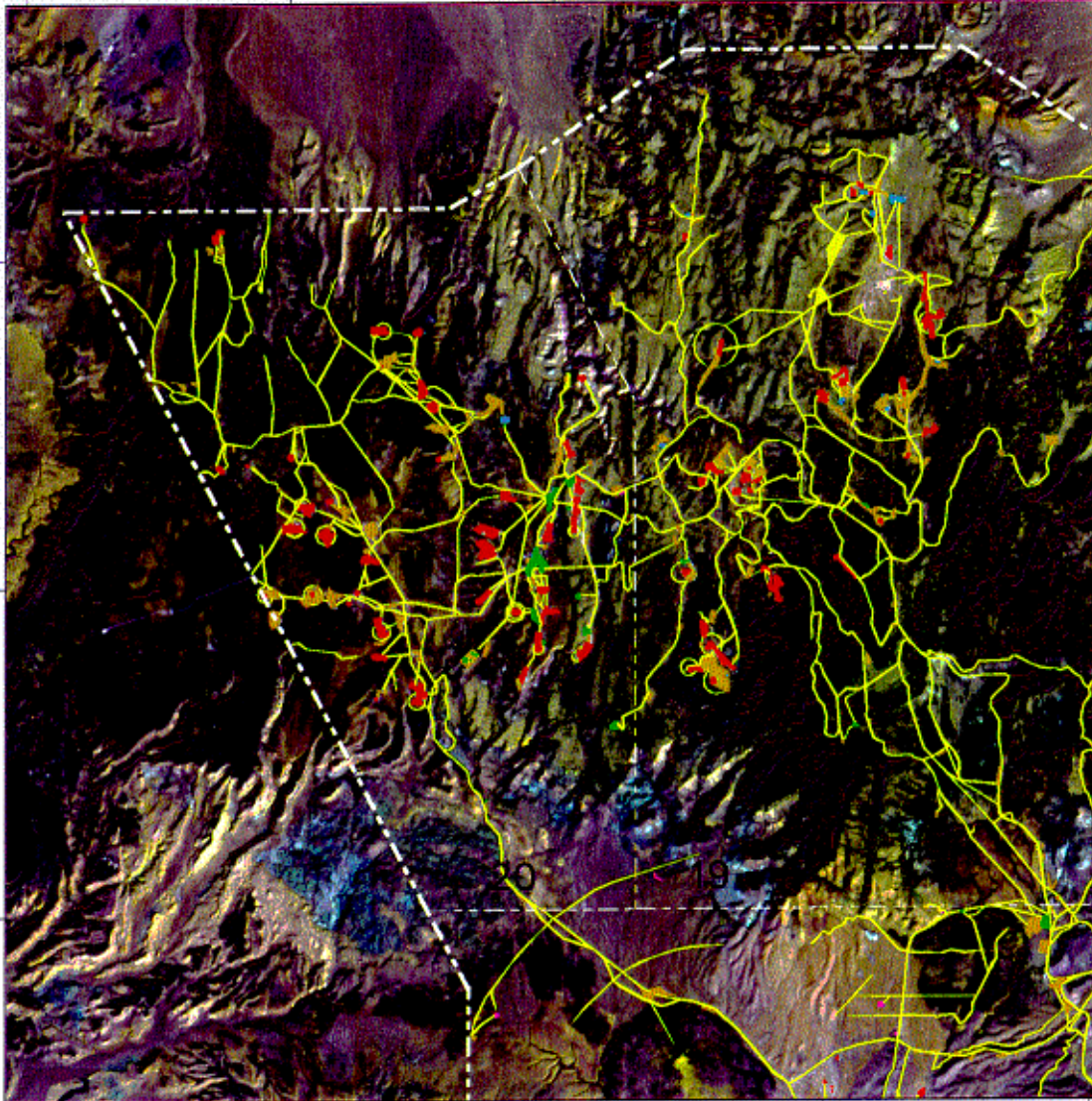
116°35'0"

116°30'0"

116°25'0"

116°20'0"

116°15'0"



37°20'0"

37°15'0"

37°10'0"



- | | |
|---|--|
|  Facility Related |  Earthen Structure |
|  Suspected Event Related |  Road or Linear Feature |
|  Scrape or Clearing |  Unknown Type |

Note: Disturbance information shown is preliminary.

Location Map

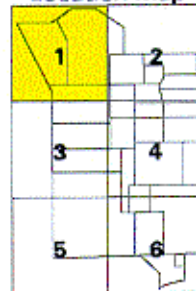


Plate 11: Surface Disturbances - Sheet 1 of 6.

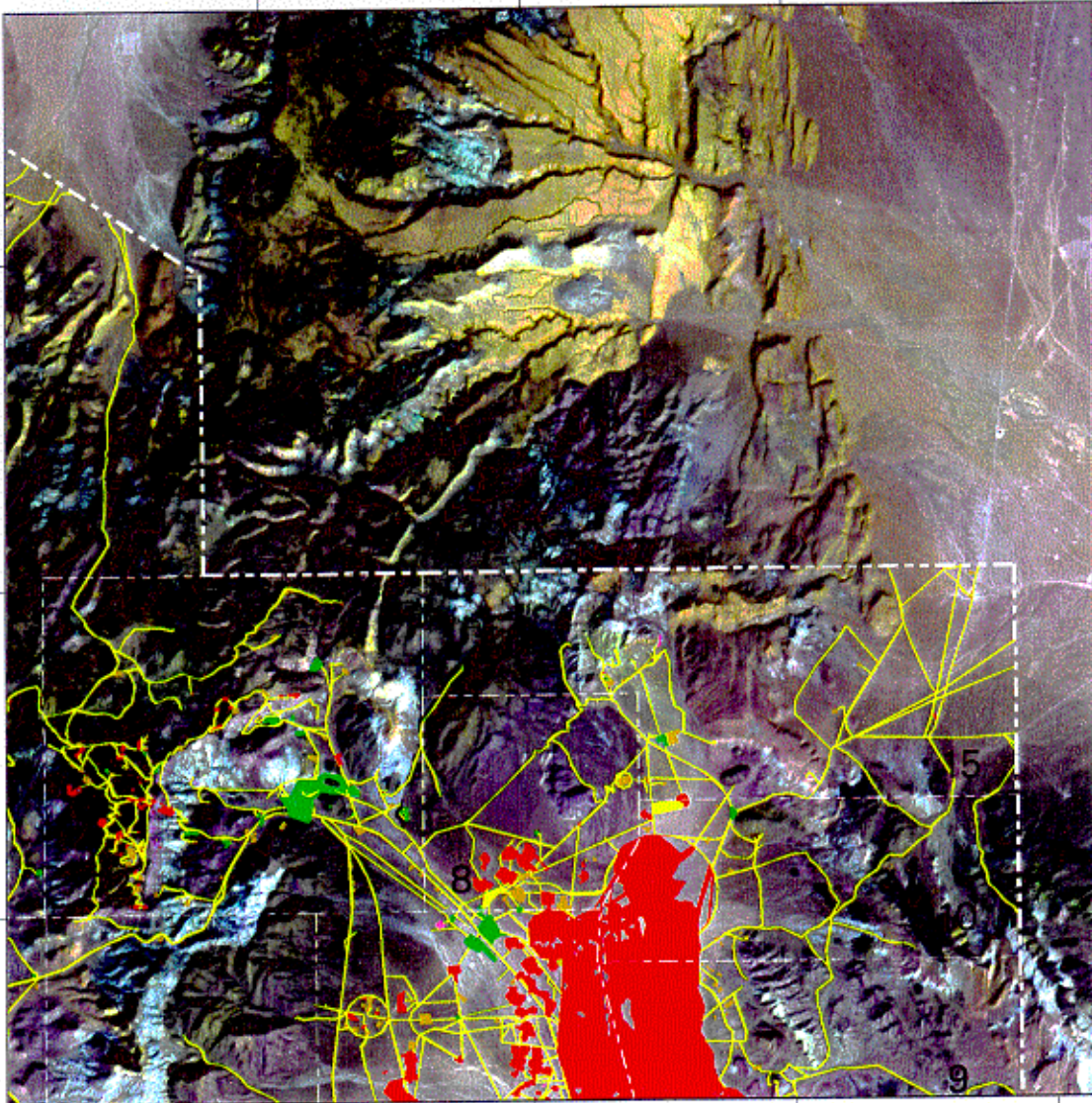
DOE/RGL NTS-95-044.2

116°10'0"

116°5'0"

116°0'0"

115°55'0"



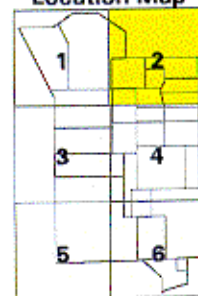
2 0 2 4 MILES

2 0 2 4 6 8 KM

- | | |
|---|--|
|  Facility Related |  Earthen Structure |
|  Suspected Event Related |  Road or Linear Feature |
|  Scrape or Clearing |  Unknown Type |

Note: Disturbance information shown is preliminary.

Location Map



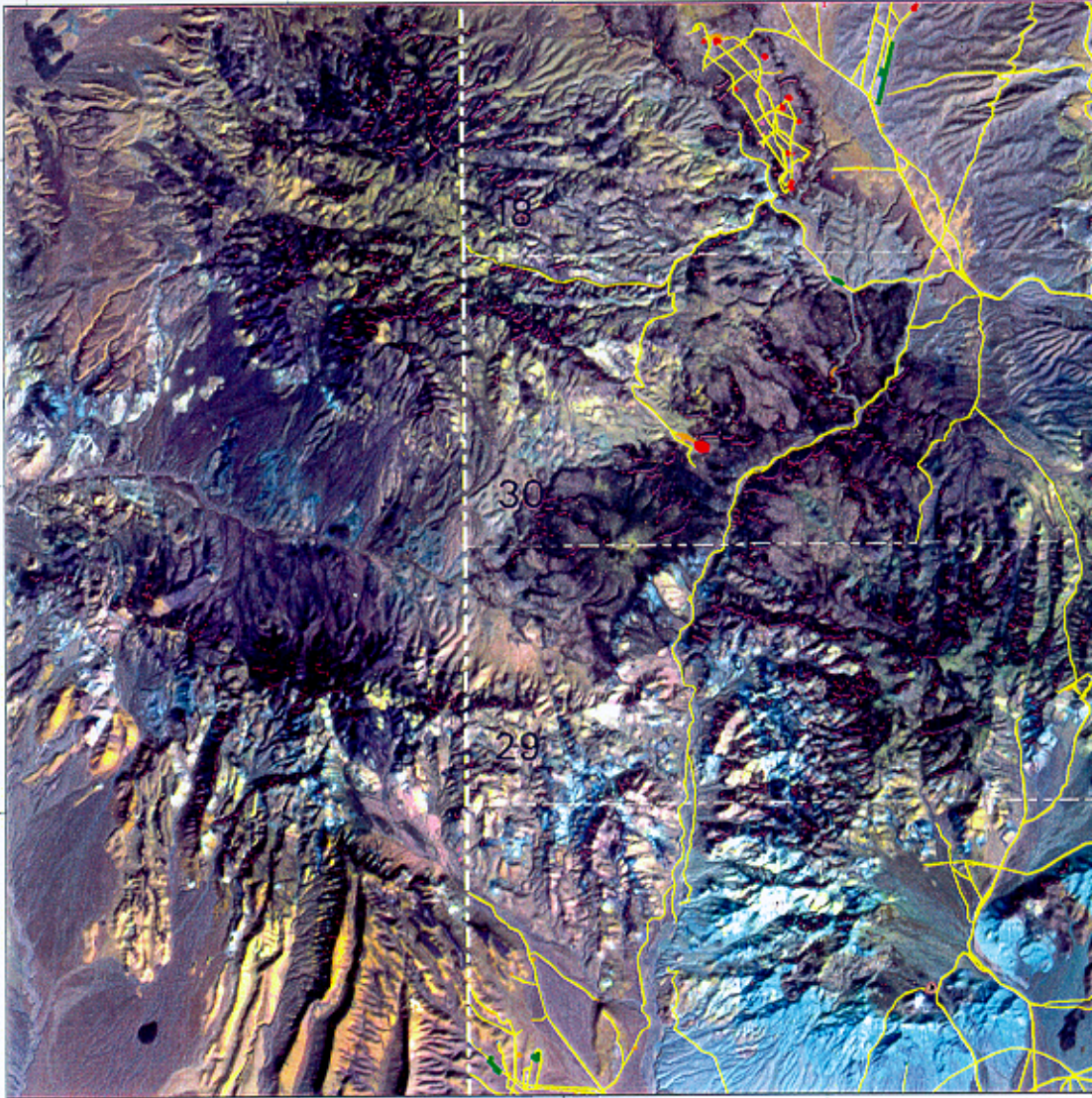
116°35'0"

116°30'0"

116°25'0"

116°20'0"

116°15'0"



37°5'0"

37°0'0"

36°55'0"

2 0 2 4 MILES

2 0 2 4 6 8 KM

- | | |
|---|--|
|  Facility Related |  Earthen Structure |
|  Suspected Event Related |  Road or Linear Feature |
|  Scrape or Clearing |  Unknown Type |

Note: Disturbance information shown is preliminary.

Location Map

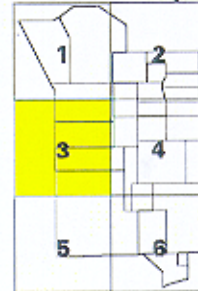


Plate 13: Surface Disturbances - Sheet 3 of 6.

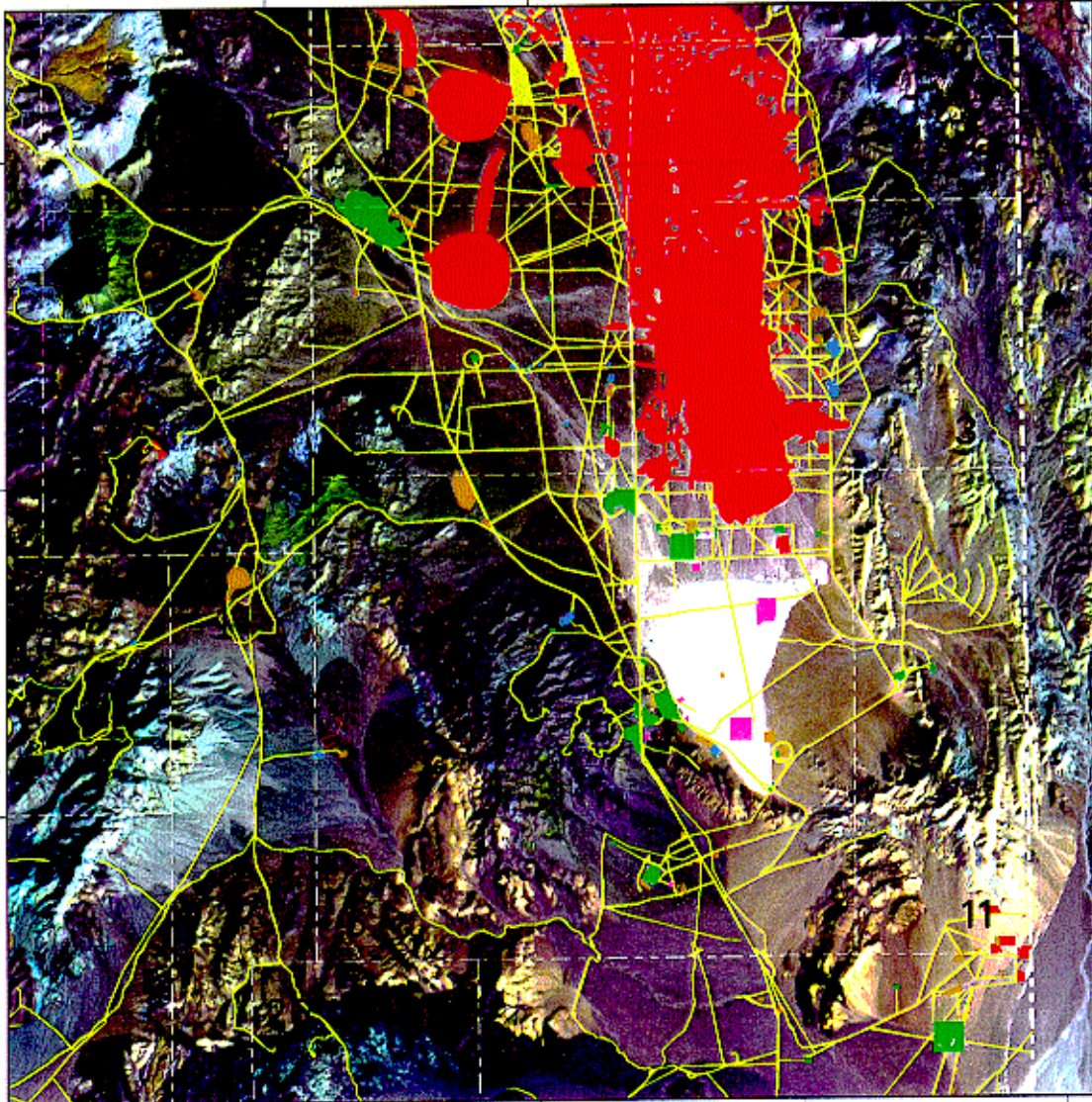
DOE/RGL NTS-95-046.2

116°10'0"

116°5'0"

116°0'0"

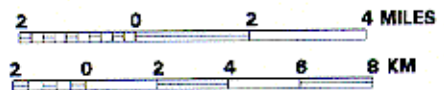
115°55'0"



37°5'0"

37°0'0"

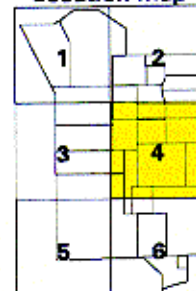
36°55'0"



- | | |
|---|--|
|  Facility Related |  Earthen Structure |
|  Suspected Event Related |  Road or Linear Feature |
|  Scrape or Clearing |  Unknown Type |

Note: Disturbance information shown is preliminary.

Location Map



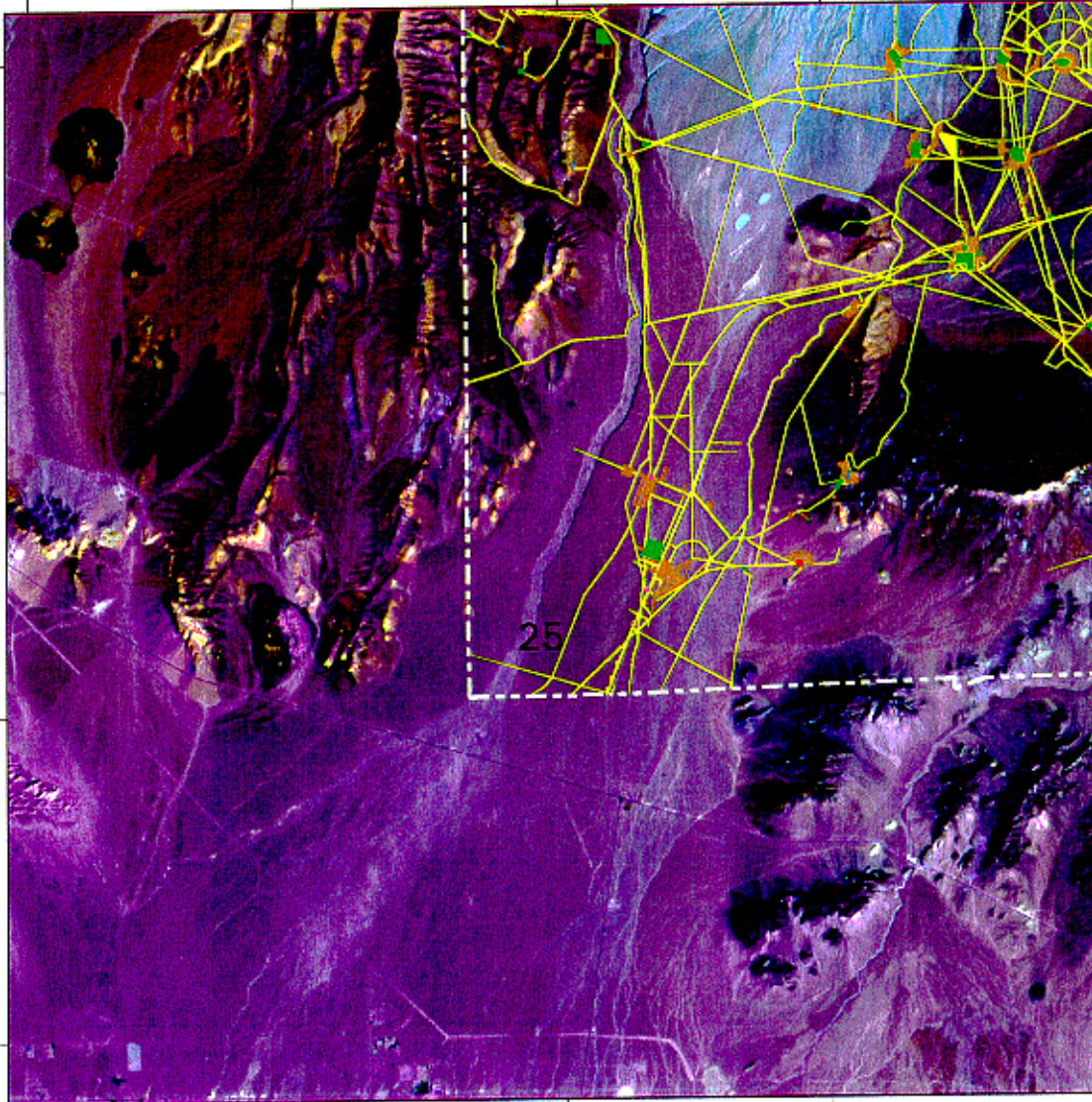
116°35'0"

116°30'0"

116°25'0"

116°20'0"

116°15'0"



36°50'0"

36°45'0"

36°40'0"

36°35'0"

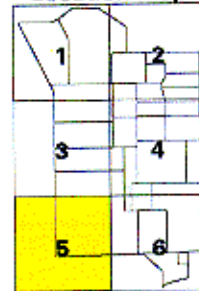
2 0 2 4 MILES

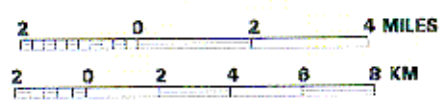
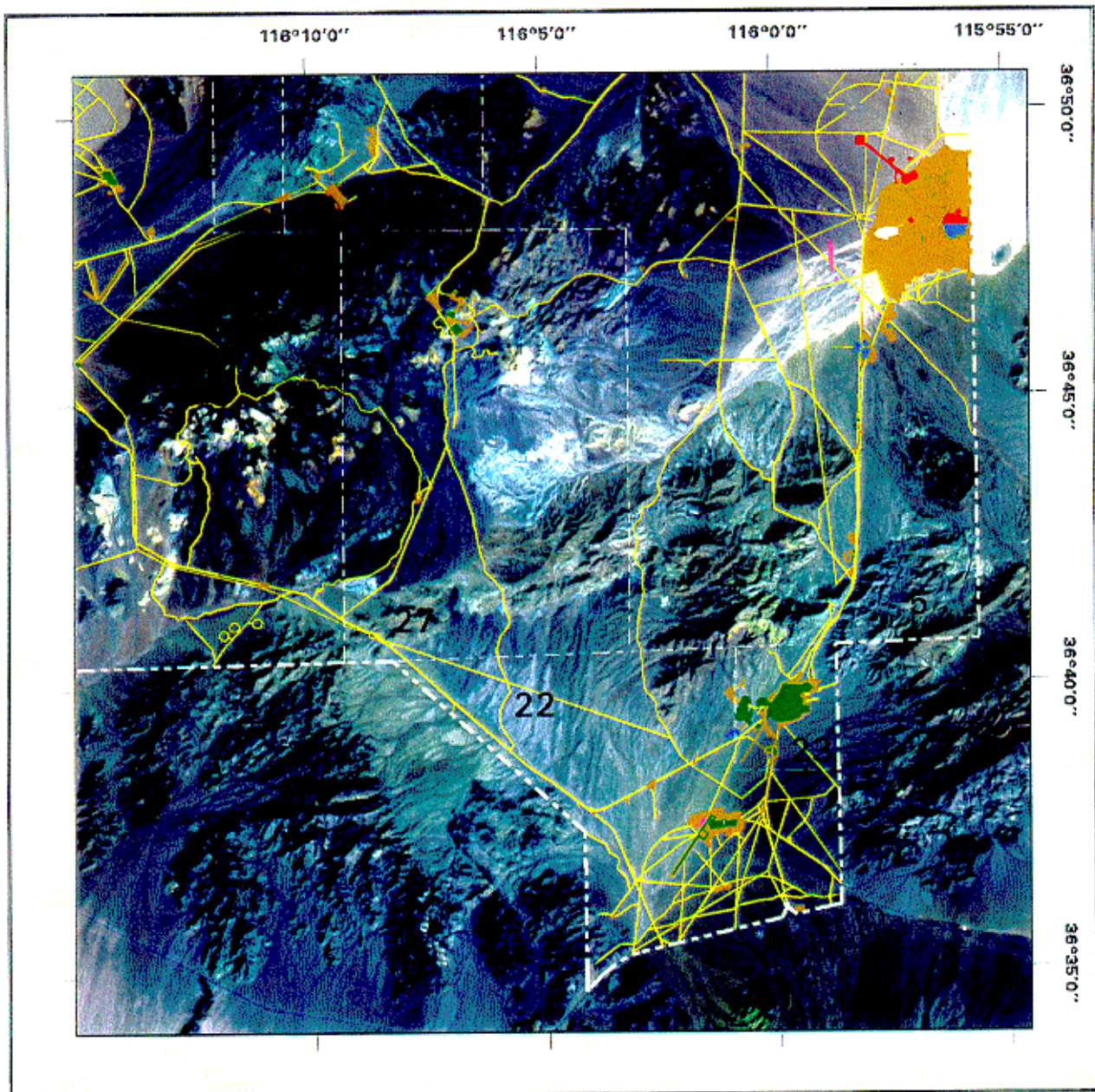
2 0 2 4 6 8 KM

- | | |
|---|--|
|  Facility Related |  Earthen Structure |
|  Suspected Event Related |  Road or Linear Feature |
|  Scrape or Clearing |  Unknown Type |

Note: Disturbance information shown is preliminary.

Location Map





- | | |
|---|--|
|  Facility Related |  Earthen Structure |
|  Suspected Event Related |  Road or Linear Feature |
|  Scrape or Clearing |  Unknown Type |

Note: Disturbance information shown is preliminary.

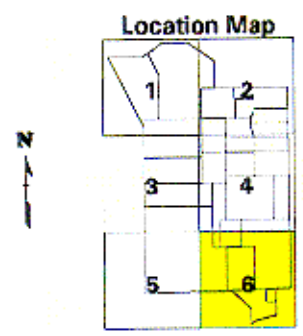
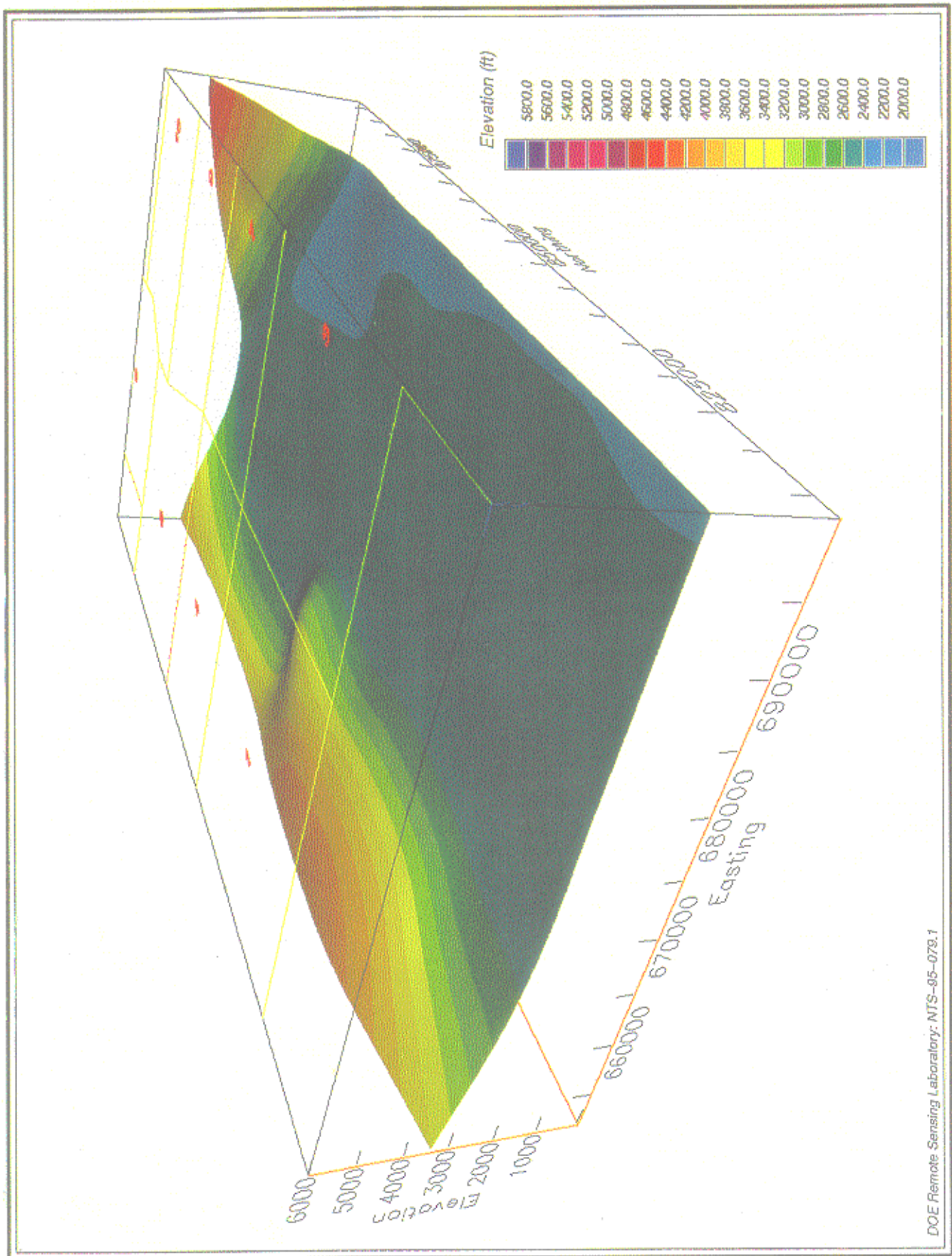


Plate 16: Surface Disturbances - Sheet 6 of 6.



DOE Remote Sensing Laboratory: NTS-95-079.1

Plate 17: Yucca Flat Water Table Elevation Contours (View to the Northwest)

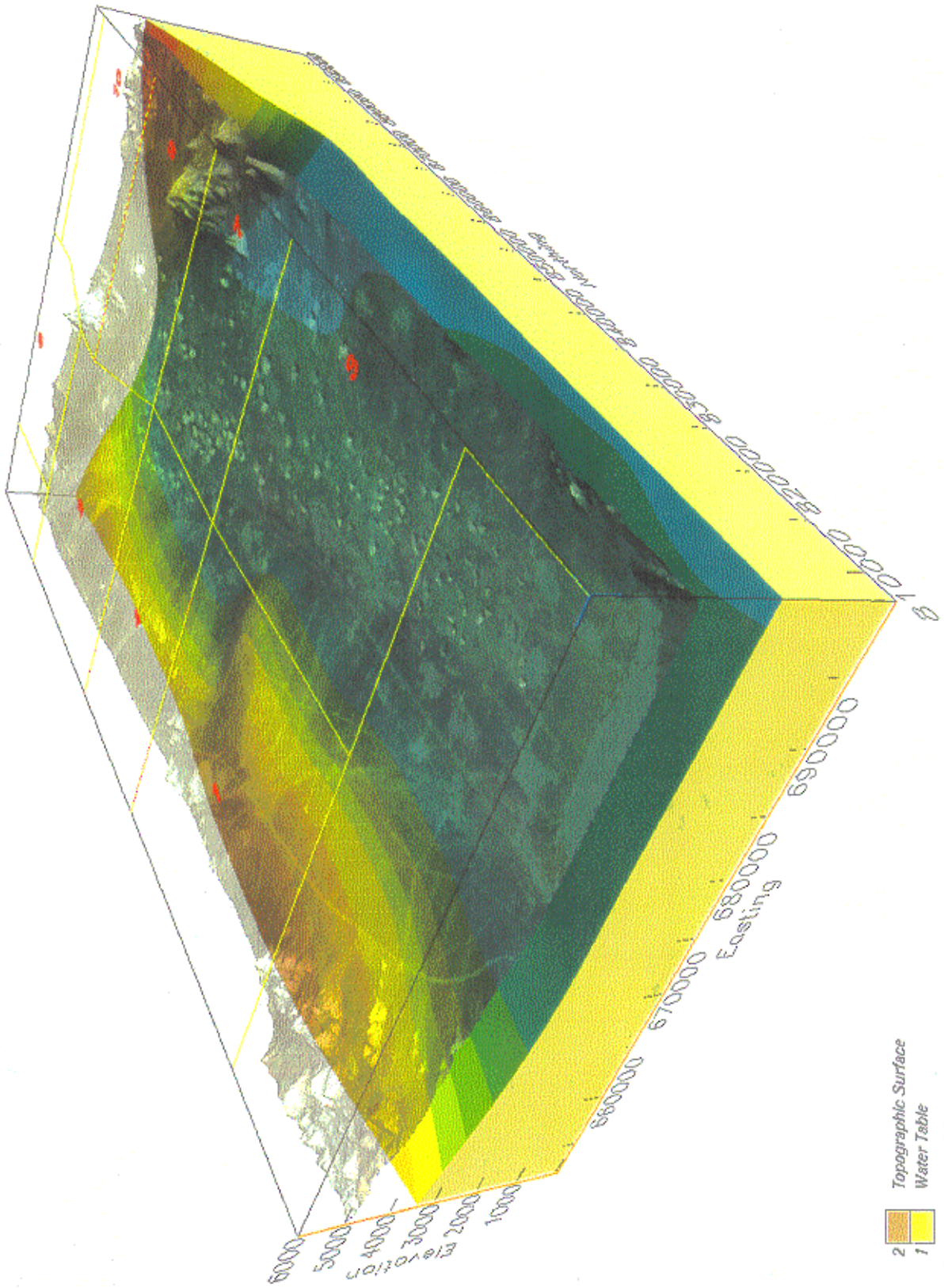


Plate 18: Yucca Flat Water Table Elevation Contours and Transparent Topographic Map Image (View to the Northwest)

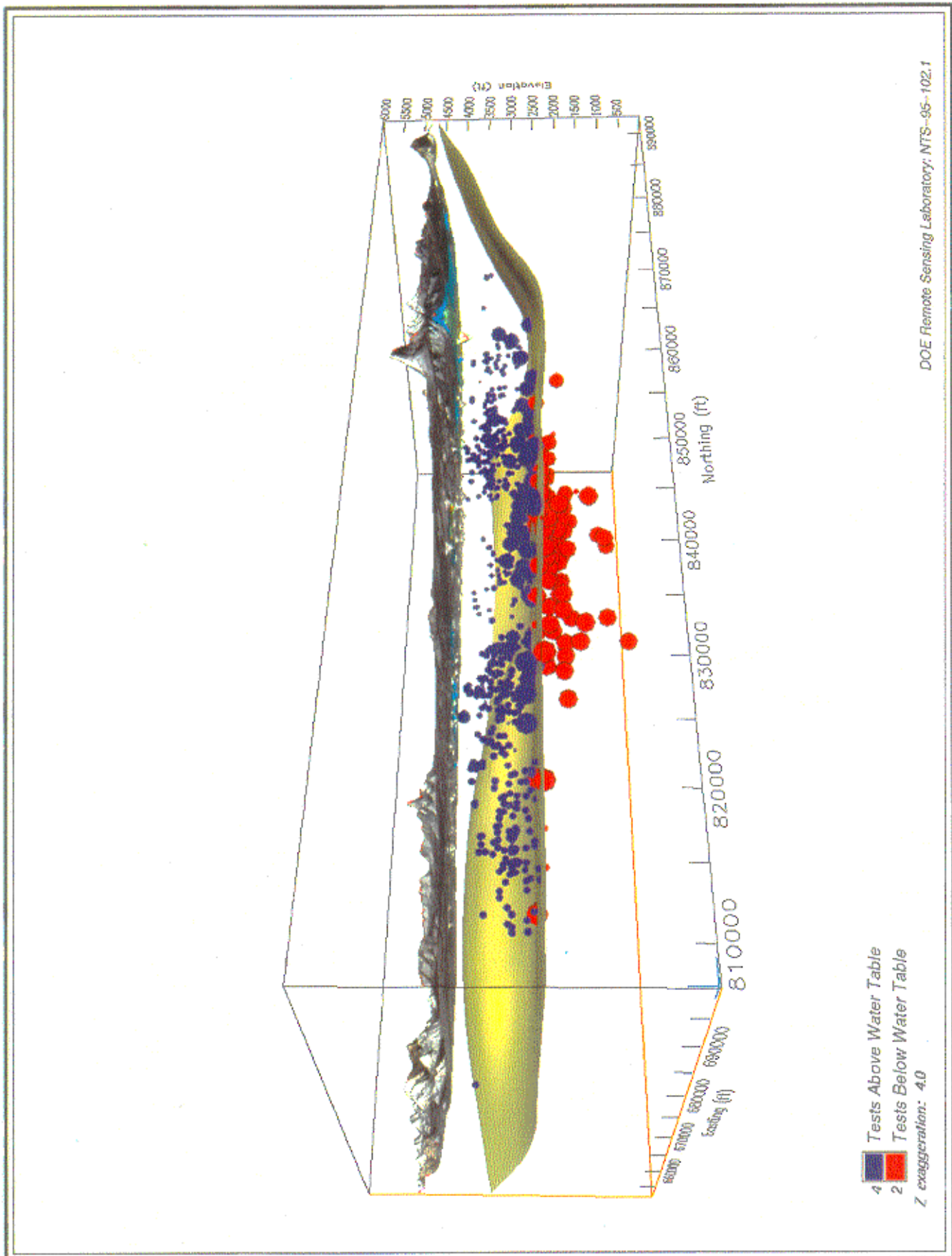


Plate 19: Yucca Flat Showing Location of Tests Both Above and Below the Water Table (View to the Northwest)

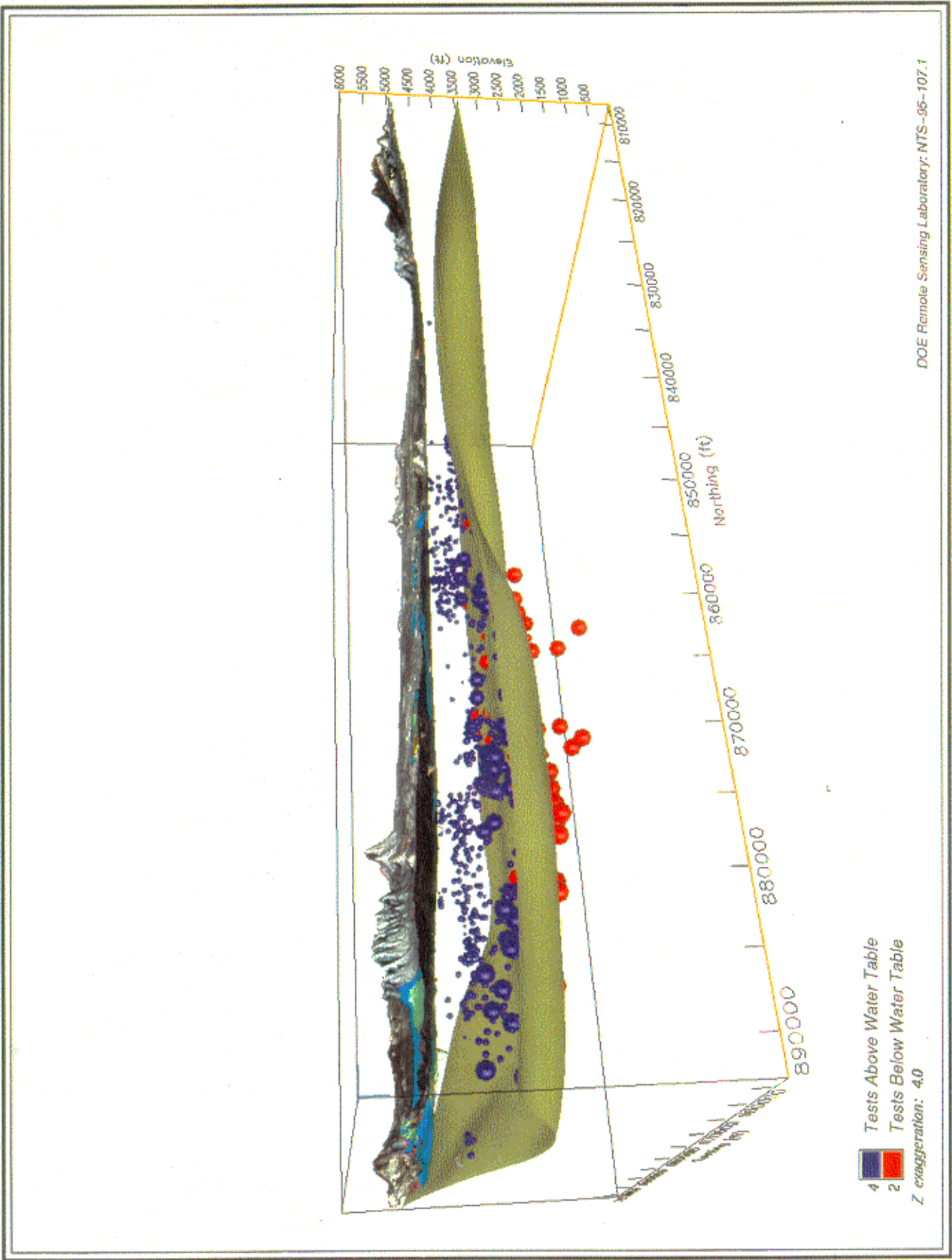


Plate 20: Yucca Flat Showing Location of Tests Both Above and Below the Water Table (view to the Southeast)