APPENDIX A
BLM/NAWS Memorandum of Understanding

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PROGRAMMATIC MEMORANDUM OF AGREEMENT
BETWEEN
THE COMMANDER, NAVAL WEAPONS CENTER,
CALIFORNIA STATE HISTORIC PRESERVATION OFFICER
ADVISORY COUNCIL ON HISTORIC PRESERVATION

PURPOSE

This proposal establishes a process for mutual agreement between the Commander, Naval Weapons Center, China Lake, California; the California State Historic Preservation Officer; and the Advisory Council on Historic Preservation in the preservation and protection of historic and cultural property that may be affected by the Navy Geothermal Development Program in the vicinity of Coso Hot Springs, Inyo County, California, which is located on the Naval Weapons Center.

Each of these entities is concerned with the protection of historic and cultural property located on the Naval Weapons Center in compliance with requirements set forth in statutes for the protection of cultural resources. Since the proposed undertaking could have an adverse effect on historic and cultural property, the parties to this Agreement concur that it would be in the best interest of such property and of expeditious geothermal development to coordinate the process for locating, identifying, evaluating, protecting and preserving historic and cultural property in advance of and from activities relating to the development of the Navy Coso Geothermal Development Program.

The proposed action is the award of a contract to develop geothermal power as an alternative to conventional power sources at the Naval Weapons Center (NWC), China Lake, California. The contractor will be responsible for implementing a Coso Geothermal Development Program on approximately 3 1/2 square miles of 4 1/2 square miles of Navy fee-acquired land within the Coso Known Geothermal Resource Area (Coso KGRA). Execution of the contract will be subject to constraints that will facilitate development of the geothermal resource and without interference with the Naval Weapons Center's national defense mission. Successful completion of this project will provide the Navy energy self-sufficiency at its NWC facility. Energy in excess of the NWC needs will be made available to other west coast Department of Defense activities thereby releasing to the civilian sector electrical power generating capacity now devoted to defense requirements.

The proposed program is to develop geothermal resources only on Navy fee-acquired land within the Coso KGRA. The Navy geothermal development program is distinct and totally separate from the leasing program for withdrawn and public land within the Coso KGRA being considered by the Bureau of Land Management (BLM). NWC and BLM executed a Memorandum of Understanding in 1977 permitting BLM to lease land in the Coso KGRA, withdrawn under Public Land Order 431, for geothermal development by private industry. BLM has initiated a separate environmental assessment to evaluate the impact of leasing both public and withdrawn land in the Coso KGRA for geothermal development.

Because the Navy geothermal development program is not based on a lease of the geothermal resource, the Navy conducted its environmental review in a manner that differs from the BLM. The Navy will prepare a tiered or phased series of environmental reviews as described in Paragraph 1502.20 of the recently proposed National Environmental Policy Act Regulations and as proposed in "Program Objectives of the Interagency Geothermal Streamlining Task Force." By doing so, Navy expects to avoid the problems inherent in making detailed speculative projections of potential effects on historic and cultural resources without specific knowledge of the geothermal resource and the geothermal reservoir.

The Navy Coso geothermal development program is based on processing of the Navy-owned geothermal resource by a contractor. The rights to the geothermal resource will not be conveyed to the contractor. The Navy will not commit the resource to full development at the time of contract award. This distinction will be made explicit in the contract by defining decision points between the various stages of development, for example, between field exploration and field development. Using the tiered concept, these decision points will allow detailed evaluation of specific effects of each operational stage on historic and cultural resources without duplicating previous reviews and without lengthy reviews of hypothetical effects.

The Navy obtained fee-simple title to approximately 4 1/2 square miles of land in the project area in 1947 as a result of civil condemnation (311-ND). In January 1978, approximately 1 square mile of the Navy's land was listed on the National Register of Historic Places. Due to the combination of an apparent lack of significant geothermal resource within the National Register site and the complexity inherent in conducting new activities within a registered site, only the 3 1/2 square miles of surface outside of this site will initially be made available for geothermal development under the proposed contract. The location of the 3 1/2 square miles selected for development is shown in Figure 1, a foldout on the last page of this Agreement. The project area consists of four separate parcels extending from the eastern edge of Rose Valley on the west to Coso Basin on the east.

The four discrete locations of fee-acquired lands discussed herein are assigned letter designations as follows and are identified in Figure 1.

Parcel A: The westernmost parcel located in Rose Valley contains a total of 640 acres.

Parcel B: The central and largest parcel consists of approximately 1,315 acres. This parcel contains the Coso Hot Springs NATIONAL REGISTER site.

Parcel C: The northernmost parcel contains 40 acres.

Parcel D: The southernmost parcel lying on the edge of the Coso Basin consists of 320 acres.

All proposed geothermal wells must be drilled on Navy fee-acquired land. The support, conveyance, and power generation facilities may be constructed on either fee-owned or adjacent withdrawn land within NWC boundaries, subject to Navy approval. At no time will ownership of the land or the geothermal resource be conveyed to the contractor.

Any production of by-products from the produced geothermal fluids must be specifically approved by the Navy. Distribution of any income derived will be subject to the law in existence at the time by-product production is proposed.

The electric generation system provided by the contractor will be integrated with the commercial power grid to the degree required to maintain a reliable and economic power supply to the activities served.

GEOTHERMAL DEVELOPMENT PROGRAM

The proposed contract will require the contractor to prepare a Geothermal Development Program to be implemented at his expense. The program must address how the following development phases will be conducted:

(a) Field investigation and research

(b) Field exploration

(c) Field development and power plant construction

(d) Power production and field operation

(e) Field closure

Before proceeding from one phase of development to the next, mutual agreement on the economic, technical, and environmental feasibility must be reached by the contractor and the Navy. Should the resource at Coso prove unsuitable for economic power generation at the then present state of the art, the contractor can withdraw. If the geothermal resource is suitable for power-production, the contractor shall build, own, operate and maintain one or more geothermal plants and necessary power lines, power transformer substations and associated equipment and facilities to deliver initially the full electrical energy requirements of NWC and subsequently other Navy activities. The government will reserve the right to purchase all contractor-owned facilities and cancel the contract at any time for reasons of national security, national defense preparedness, or national emergency.

The above description illustrates the manner in which the project contract characteristics will provide the overall decision-making framework for future development of Navy-owned resources in the Coso KGRA. It is not a detailed development plan; it is a broad program with phases that cannot be defined in detail until each previous phase has been completed. Detailed evaluations of potential effects on historic and

cultural resources will be prepared for public review at each stage of the program and will be used to determine the feasibility of the next phase, as defined by the contractor. Evaluation of cumulative effects will be conducted at each review stage; modifications to original projections of cumulative effects will be made as new information indicates such changes are merited.

In order to project effects on historic and cultural resources resulting from geothermal development, it is necessary to characterize the most significant land uses associated with development of the geothermal resource. A Coso Geothermal Development Model describing the decision-making points has been developed for Navy fee-acquired lands at Coso. The model identifies the types of man-made actions required at each stage of development.

Field Investigation Research

A substantial body of geologic and geophysical data has already been compiled regarding the geothermal resource at Coso. The contractor will use this information plus any additional data that is available to select exploratory drill site locations. It is anticipated that this phase of the operation will be limited in terms of time and in the amount of additional field data that will be required.

The typical activities conducted during this phase include airborne exploration; surface surveys; and subsurface investigations (seismic surveys and temperature gradient holes). The deep research hole, Coso Geothermal Exploratory Hole No. 1, (CGEH-1) drilled by the Department of Energy to evaluate the hot dry rock potential at Coso represents a specialized data gathering effort that will not be duplicated by the contractor in his investigation and research phase.

These activities involve small numbers of people and vehicles. The potential for permanently affecting historic or cultural resources during this phase is minimal. Drilling of seismic test and/or temperature gradient holes represents the most intensive land use. Small truck-mounted drill rigs can drill to the required depths for seismic and temperature gradient tests. Effects on historic or cultural resources are minor at this stage and can be readily mitigated.

All vehicular traffic and/or ground disturbing activities in the Field Investigation Research phase shall be limited to existing roads, trails or disturbed areas.

Field Exploration

Given a favorable prognosis based on evaluation of research data, the contractor will design a program to drill exploratory geothermal wells at selected locations. Geothermal well drilling designed to penetrate the deep geothermal reservoir requires a portable, oil well type drilling rig, sufficient water for drilling, and an adequate power supply. Each drilling site requires sufficient area for a mud or waste fluid pit, the rig itself, and its support facilities.

The total size of the well pad can vary from 3 to 5 acres, depending on a variety of factors such as pit size, topography, and power supply. Air compressors are normally provided for this stage of drilling. Existing roads may require improvement and new access roads may have to be constructed.

Up to 1,000 barrels of water (42,000 gallons) are consumed per day in drilling a well depending on subsurface condition and drilling technique used.

Once completed, an exploratory well is tested (allowed to flow freely) to evaluate its productive capacity. During this period, which includes well clean-out and flow testing, the geothermal fluid (hot water) or vapor (steam) is allowed to flow into the waste discharge pit where it largely evaporates. The geothermal fluid can contain a variety of dissolved and suspended solids. The flow produces substantial noise levels requiring muffling, and is commonly accompanied by noncondensable gases. Flow testing will remove only small volumes of fluid from the reservoir, depending on the length of the flow test and the rate of flow: The total volume of fluid brought to the surface during a flow test will seldom exceed several acre feet.

Once the flow testing is completed, and depending on whether the resource is hot water or steam, an exploratory well can be permanently shut-in if it is not commercially productive, or it can be converted to a production well at a later date if the flow is adequate.

Field Development and Power Plant Construction

At the conclusion of the field exploration phase, the contractor will have collected enough information to decide whether the field will support commercial energy production. The field development phase consists of drilling wells and laying the steam gathering and related pipelines, power plant construction, and installation of transmission lines and disposal systems and constructing roads and pads.

Actual field development will take place over an extended period of time as new wells are drilled until the field is developed to its maximum sustainable capacity. During the development phase, construction activity and the size of the work force will be at its maximum.

Because the nature of the geothermal resource has not yet been defined, a description of the specific development activities and the amount of land and other resources required at Coso by these activities cannot be estimated with precision. Estimates for the amount of land by type of land use include the following:

Land use	Approximate area affected
Well pads	3-5 acres per pad
Roads:	
temporary graded (12-feet wide)	1.5 acres per mile of road
permanent (24-feet wide). . . .	2.9 acres per mile or road
Pipeline corridors. . . . . (10-feet wide).	1.2 acres per mile of corridor
Transmission line corridor. . . . (100-feet wide, but 25 feet of disturbed area)	3 acres per mile of corridor
Power generation. . . . . plant	5 acres for a 50-megawatt plant
Geothermal and power plant. . . . support facilities	2.5 square feet per square foot of structure

As the geothermal field is defined, the nature and character of the reservoir in combination with protection of the NWC mission capability will be the primary determining factor in the general location of well sites, pipelines, power plant, roads and transmission lines. Environmental factors such as topography, geologic hazards, and historic or cultural resources will determine the specific location of geothermal facilities.

Power Production and Field Operation

During this phase, the principal activity will consist of operation and maintenance of the existing facilities and the continuation of field development, including siting of additional power plants. Development and production and operation phases will continue to overlap until the geothermal resource is fully developed. As field development is completed, the work force will be reduced to plant and field operation and maintenance personnel. Power generation can be expected to continue for an indefinite period.

The most significant waste products are noncondensible gases, fluid remaining after flashing to provide steam and the condensate. At this

time, the volume and character of these wastes is undefined and the potential effects of their generation and disposal cannot be specifically projected.

A variety of disposal and pollution control techniques have been developed at other geothermal fields, which can be adapted to control or reduce waste discharge effects on the environment at Coso. Accumulated wastes must either be processed into valuable by-products or disposed of in appropriate disposal sites.

Field Closure

The productive life of a geothermal field has not been determined because all the existing operating fields continue to produce energy. It is possible that geothermal reservoirs can be considered a resource which, if managed properly, can continue to produce energy indefinitely; however, if the resource at Coso should gradually become depleted, the field would have to be abandoned or converted to a lower grade energy use.

Land use activities associated with field closure would include removal of some or all facilities, abandonment and capping of wells as appropriate, and remedial actions to reclaim all disturbed areas. However, these facilities may prove to be of value to the Naval Weapons Center test range programs active at that time. Materials and facilities that can be recycled should be recovered and the remaining materials will have to be disposed of in appropriate disposal sites. Wells should be left in a safe condition for future use. Remedial surface rehabilitation activities will vary, according to NWC range use requirements.

As described above the proposed contract requires the contractor to complete detailed evaluations of potential effects on historic and cultural resources as well as all other environmental impacts for public review at each phase of the geothermal development program as well as an evaluation of cumulative effects. In this way last minute discoveries of any sites not previously identified can be protected, preserved, or data recovery operations can be performed as appropriate.

HISTORIC AND CULTURAL RESOURCES MANAGEMENT PROGRAM

The objectives of the historic and cultural resources management program outlined herein are as follows:

A. To provide appropriate and expeditious execution of all identification, evaluation, preservation and where necessary data recovery operations at each phase of the geothermal development program.

B. To ensure the collection and dissemination of reliable and scientifically valid information about affected cultural properties within the Navy fee-acquired lands in the Coso KGRA.

Authority

1. An Act for the Preservation of American Antiquities, 1906 (34 Stat L. 225)

2. National Historic Preservation Act of 1966 (80 Stat 925), as amended (90 Stat 1313)

3. Executive Order 11593 of 1971

4. Reservoir Salvage Act of 1960 (74 Stat 220, 221) as amended by the Archeological and Historic Preservation Act of 1974 (88 Stat 174)

5. Procedures for the Protection of Historic and Cultural Properties (36 CFR Part 800), and the Proposed amendments thereto published in the Federal Register Vol. 43, No. 210 of October 30, 1978.

6. Public Land Order 431 of 1947

7. 311-ND of 1947

Definitions

1. Historic and Cultural property: remains of past human activity, occupation or endeavor as reflected in districts, sites, structures, buildings, objects, artifacts, ruins; works of art, architecture, and natural features that were important in human events. These properties consist of (1) physical remains, (2) areas where significant human events occurred--even though evidence of the event no longer remains, and (3) the environment surrrounding the actual resource.

2. Mitigation: the lessening of possible adverse effects of an action upon a historic or cultural property by appropriate preservation, protection and/or data recovery measures.

Historic and Cultural Property Management

The Commander, Naval Weapons Center, agrees that he will implement the proposed undertaking in accordance with the following process to avoid or satisfactorily mitigate any adverse effects on significant historic or cultural property.

1. The Navy geothermal development contractor will be required to allocate sufficient funds and time in advance of implementation of any element of the geothermal development progress to perform adequate historic and cultural surveys, to analyze recovered materials, to prepare and disseminate resultant reports, and to implement the historic and cultural property management program.

2. The historic and cultural property management program for Navy Coso Geothermal Development Program will cover the entire project and its

related facilities including all areas that would be directly or indirectly affected by the geothermal development program.

3. The Commander, Naval Weapons Center, will administer the historical and cultural property management program for the Navy Coso Geothermal Development Program to ensure quality control of all program elements, proper phasing of investigations with decision-making points, and procedural compliance with pertinent statutes and regulations.

4. The Commander, Naval Weapons Center, will ensure that the contractor performs the phased reviews and evaluations of historic and cultural resources in a competent professional manner in compliance with 36 CFR 61.5 and other pertinent regulations, Federal or State.

5. The historic and cultural property stipulations of this proposal will be incorporated into the programmatic environmental review process.

6. The Commander, Naval Weapons Center, will ensure that the following measures will be carried out at the appropriate development phase:

a. Prior to commencement of any project-related undertaking, locate, identify, and evaluate all historic and cultural property that has been included in, determined eligible for inclusion in, or that may be eligible for inclusion in the National Register of Historic Places through a complete surface field survey following an existing data study including, but not limited to, archival and literature research, ethnographic research, museum research, and oral history. Data produced by such investigations will become a part of the statewide survey of cultural resources maintained by the California State Historic Preservation Officer. These activities are to be carried out under valid Federal and State Antiquities Permits for investigation on Federal land.

b. Determinations of a property's potential eligibility for inclusion in the National Register of Historic Places and of the effects of the project on such properties, will be made by the Commander, Naval Weapons Center, in coordination with the California State Historic Preservation Officer. Documentation on all properties found to meet the criteria for inclusion in the National Register of Historic Places will be forwarded to the Office of Archaeology and Historic Preservation pursuant to 36 CFR Part 63.3. In situations where the Commander, Naval Weapons Center, and the California State Historic Preservation Officer disagree as to eligibility, a written request for a determination of eligibility will be sent to the Keeper of the National Register, Office of Archaeology and Historic Preservation, pursuant to 36 CFR Part 63.2

c. Avoid by project redesign or project relocation, where prudent and feasible, the historic and cultural properties included in or eligible for inclusion in the National Register of Historic Places.

d. Develop and implement, in consultation with the California State Historic Preservation Officer, appropriate means for protecting historic and cultural properties included in or eligible for inclusion in

the National Register of Historic Places. These means may include, but need not be limited to signing, patrolling, fencing, erosion control, preservation, relocation, salvage, and other physical or administrative measures.

When it is neither prudent nor feasible to avoid a cultural property, the Commander, Naval Weapons Center will provide a report documenting that fact to the California State Historic Preservation Officer.

e. The Commander, Naval Weapons Center, will establish baseline data on the seasonal activity of some 40 steam wells and boiling mud pits at Coso Hot Springs sufficient to permit systematic monitoring for any effect that may be caused over time by the geothermal development program. Additionally, at each tiering phase of the development program re-evaluation of the monitoring techniques and the surface activity of the hot springs will be conducted.

Prior to the installation of monitoring devices at the hot springs, the Commander, Naval Weapons Center, will consult with the Owens Valley Band of Paiute-Shoshone Indians to fully inform them of plans for monitoring and the expected benefits from monitoring the surface activity. A description of the monitoring program will be forwarded to the Board of Trustees for the Owens Valley Paiute-Shoshone Band of Indians and to the California State Historic Preservation Officer for review and comment.

Present knowledge of the hydrogeology of Coso Hot Springs indicates that the fluids at the springs are not interconnected with the deep geothermal reservoir; therefore the geothermal development program is not expected to affect their surface activity. **Criteria shall be developed** by the Navy to detect perceptible change to the surface activity of Coso Hot Springs which will be offered to the Board of Trustees for the Owens Valley Paiute Shoshone Band of Indians and to the California State Historic Preservation Officer for review and comment prior to implementation of the second phase (Field Exploration) of the geothermal development program. In the event a perceptible change to the surface activity of the hot springs were to occur over a period of time as a result of the geothermal development program the Navy will cease those actions on the part of the Navy and/or its agents which can reasonably be presumed to be causing this effect and will make every reasonable effort to determine what actions could be taken to mitigate this change. The Navy will request the comments of the Owens Valley Paiute-Shoshone Band of Indians, the California State Historic Preservation Officer and the Advisory Council on Historic Preservation. The Owens Valley Paiute-Shoshone Band of Indians will be afforded 30 working days to comment and the California State Historic Preservation Officer will be afforded 30 working days to comment, these times to run concurrently. **If the California State Historic Preservation Officer,** the Advisory Council on Historic Preservation and the Navy cannot agree on actions which would adequately mitigate these effects, the Navy will request consultation with the Advisory Council in accordance with Title 36 of the Code of Federal Regulations, Chapter VIII, prior to undertaking any actions which could reasonably be presumed to result in a further detrimental change in the Springs' activities.

. Hot springs such as Coso which are located on geologically young faults and in highly seismic areas are not permanent features but are apt to be changed or eliminated by natural forces.

f. Consultation with the California State Historic Preservation Officer.

(1) If it is determined that the affected historical or cultural property is eligible for inclusion in the National Register of Historic Places primarily because it may be likely to yield information important in prehistory or history, and does ~~not~~ meet ~~[illegible]~~ the criteria as detailed in Part I of the "Guidelines for Making 'Adverse Effect' and 'No Adverse Effect' Determinations for Archeological Resources in Accordance with 36 CFT Part 800", the Commander, Naval Weapons Center, will ensure that the contractor institutes a data recovery program in consultation with the California State Historic Preservation Officer, in accordance with Part II of the Council's "Guidelines for Making 'Adverse Effect' and 'No Adverse Effect' Determinations for Archaeological Resources in Accordance with 36 CFR Part 800", without affording the Council further opportunity to review and comment.

(2) If it is determined that the affected historic or cultural property is eligible for inclusion in the National Register of Historic Places primarily for any other reason, the Commander, Naval Weapons Center after determining the effect of the action on the property will obtain the comments of the California State Historic Preservation Officer on a preliminary case report including the following information:

-A general description of the proposed undertaking with explanatory material.

-A description of the properties included in or eligible for inclusion in the National Register of Historic Places affected by the undertaking, identifying the significant features of the properties.

-An evaluation of the effect of the undertaking upon the properties included in or eligible for inclusion in the National Register of Historic Places.

-A discussion of measures taken in considering the undertaking's effect on the properties included in or eligible for inclusion in the National Register of Historic Places, including an indication of the support or opposition of units of government, as well as public and private agencies and organizations and a review of alternatives that would avoid any adverse effects.

-A proposal for a course of action to be implemented that would mitigate the adverse effect.

(5) Upon completion of the preliminary case report it, with the comments of the California State Historic Preservation Officer, will be forwarded by the Commander, Naval Weapons Center to the Advisory Council on Historic Preservation, for comment as required by the "Proce-

dures for the Protection of Historic and Cultural Properties" (36 CFR 800). In the interim no action will be approved by the Navy that could result in an adverse effect on the subject cultural property.

d. In emergency situations, where the procedure outlined in "a" above does not apply, when the time to undertake adequate mitigation is short, where failure to act in a short time would result in project construction delays, and an agreement on an emergency mitigation plan has been reached by the Commander, Naval Weapons Center and the California State Historic Preservation Officer, the Commander, Naval Weapons Center will forward the preliminary case report with the proposed mitigation plan to the Advisory Council on Historic Preservation requesting an expeditious review and comment. Within 10 working days of receipt of such documentation the Executive Director will notify the Commander, Naval Weapons Center, that the proposed mitigation is sufficient and he is preparing the required Memorandum of Agreement, or that he notes an objection. If an objection is noted the Executive Director will work with the Commander, Naval Weapons Center and the California State Historic Preservation Officer in an attempt to satisfy his concerns, or request that the Chairman schedule a special meeting of the Council to consider the matter. If the Executive Director objects, until the objection is resolved, no action will be approved by the Commander Naval Weapons Center that could result in an adverse effect on the subject historic or cultural property.

7. The Commander, Naval Weapons Center, will within 5 working days bring to the attention of the California State Historic Preservation Office and the Owens Valley Paiute-Shoshone Band of Indians any cultural property discovered as a result of any action relating to the geothermal development program. The Commander, Naval Weapons Center, in coordination with the California State Historic Preservation Officer will protect and evaluate such discoveries and will determine within 5 working days what action will be taken with respect to such discoveries, including protection as provided for in Section 106 of the National Historic Preservation Act of 1966 and other relevant statutes.

8. Reports of progress at each developmental phase of the geothermal program, and a final program report on the results of all cultural property operations will be distributed by the Commander, Naval Weapons Center, to the California State Historic Preservation Officer, and to the Owens Valley Band of Paiute-Shoshone Indians. Report standards will be of appropriate professional quality.

9. Artifacts and other cultural materials recovered from Naval Weapons Center lands will, after analysis, be curated in accordance with professional practices and stored at a repository designated by the Smithsonian Institution.

10. One year from the date of ratification of this Agreement by the Chairman of the Council, and annually thereafter until the geothermal development program is completed, the Commander, Naval Weapons Center and the California State Historic Preservation Officer will review the program established by the Agreement and submit to the Council an assessment of

the progam operation, with copies of the tiered review reports prepared by the contractor. Unless modified, this Agreement will continue in effect.

11. Should any party to this Agreement desire to amend or alter the provisions herein, all parties agree to make an effort to negotiate an acceptable amendment or alteration within thirty (30) days after written notification. In the event a mutually acceptable resolution cannot be reached by the signatories within thirty (30) days, the consultation process provided by Title 36 of the Code of Federal Regulations, Chapter VIII, Part 800, shall be initiated by the Naval Weapons Center.

12. This Memorandum of Agreement is executed in three (3) original copies, each of which contains the official text.

Knox McEllon
STATE HISTORIC PRESERVATION OFFICER

William B. Haff
COMMANDER, NAVAL WEAPONS CENTER

NOV 5 1979
DATE

OCT 18 1979
DATE

CHAIRMAN, ADVISORY COUNCIL ON HISTORIC PRESERVATION

DATE