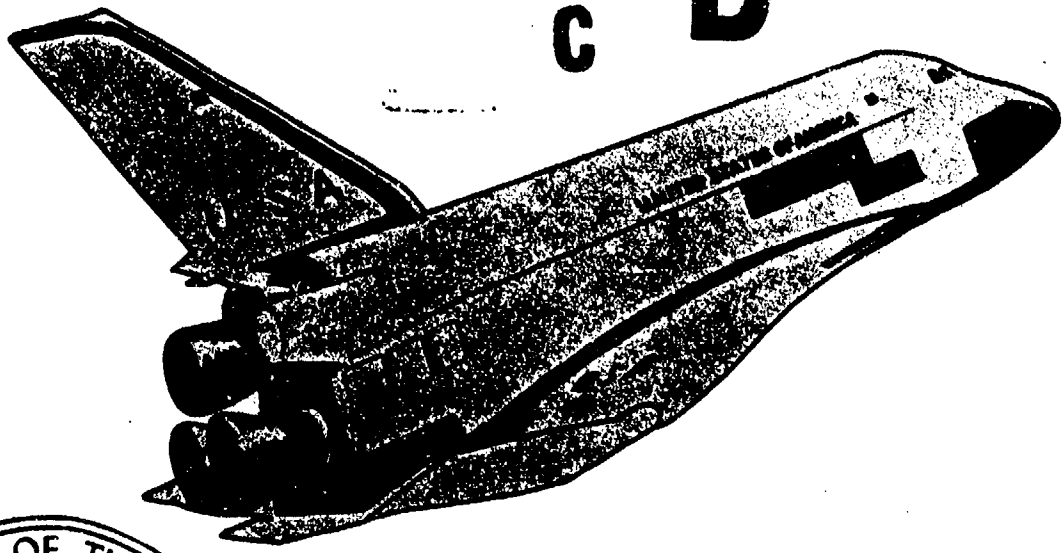
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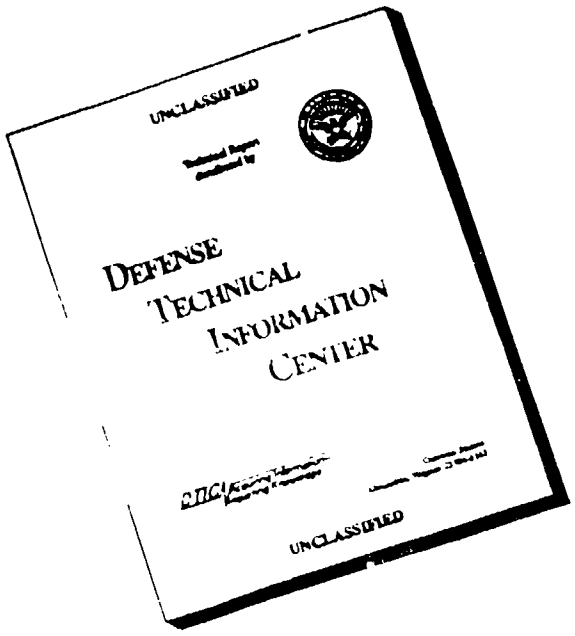
SUPPLEMENT
TO
FINAL ENVIRONMENTAL IMPACT STATEMENT
SPACE SHUTTLE PROGRAM
VANDENBERG AFB, CALIFORNIA
JULY 1983

DEPARTMENT OF THE AIR FORCE

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SUPPLEMENT
to the
FINAL ENVIRONMENTAL IMPACT STATEMENT
SPACE SHUTTLE PROGRAM, VANDENBERG AFB,
CALIFORNIA

RESPONSIBLE AGENCY: Air Force Systems Command
Directorate of Civil Engineering
Headquarters Space Division

ABSTRACT:

The Supplement to the Final Environmental Impact Statement for the Space Shuttle Program at Vandenberg AFB updates environmental information arising from additional environmental analyses and proposed program changes subsequent to January 1978. New or revised action aspects are examined for significant effects on the environment of Vandenberg and surrounding areas. Major impacts include cutting through a portion of one archaeological site at Vandenberg AFB; removing one of three structures from a historically significant Coast Guard Station; and causing extensive, although temporary, disruption of two acres of subtidal habitat and one-third acre of intertidal habitat during construction of a barge landing facility. The impacts on archaeological and historical resources will be satisfactorily mitigated by data recovery on archaeological sites and by archival documentation and preservation of historical facilities. Impacts to the marine environment will be minimized through appropriate construction and operation procedures as well as planned mitigation measures. Insignificant impacts are expected from air emissions during Space Program construction and operations, clearing and grading for facility siting, strengthening an existing bridge, sonic boom events in the vicinity of the Northern Channel Islands, the release of rocket exhaust products during launches, and the generation and handling of hazardous wastes. Revisions in construction and operation schedules are discussed in terms of changes in socioeconomic impacts. The Shuttle program, along with other major federal projects in the area, will induce significant population growth and aggravate current housing and water availability problems. Six appendices offer more detailed environmental assessments for the key issues of air quality impacts, inadvertent weather modification, archaeological impacts, historical resource impacts, sonic boom effects, and consistency with the California Coastal Act. Other appendices contain descriptive details of Shuttle facilities, and environmental permits issued for various aspects of the program. Responses to comments on the Draft SFEIS are contained in a final section.

FURTHER INFORMATION:

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SUMMARY

FINAL SUPPLEMENT
to the
FINAL ENVIRONMENTAL IMPACT STATEMENT
SPACE SHUTTLE PROGRAM, VANDENBERG AFB

1. TYPE OF ACTION:

☐ Legislative ☒ Administrative

2. DOCUMENT STATUS:

☐ Draft ☐ Final

☐ EIS ☒ Supplement

3. RESPONSIBIE FEDERAL AGENCY:

Air Force Systems Command
Headquarters Space Division
Directorate of Civil Engineering

4. PROPOSED ACTION:

The Supplement to the Final Environmental Impact Statement for the Space Shuttle Program at Vandenberg AFB updates environmental information arising from additional environmental analyses and proposed program changes subsequent to January 1978. A major reason for issuing the Supplement is to respond to issues raised during the review of the Draft EIS that required additional studies and could not be addressed in the Final EIS. In addition, the Supplement addresses environmental concerns induced by new government regulations, such as the Clean Air Act Amendments, and the Resource Conservation and Recovery Act. This Supplement also reviews new project changes.

Few major changes have occurred in program planning since that time. Plans now call for a six-year period of ground support facility construction, with an Initial Operational Capability (IOC) in late 1985.

Seven new facilities have been added, plans for eleven proposed or existing structures have been revised, and two new ground operations have been proposed. Briefly, such plans include:

(1) Modifying the Mate/Demate Facility located near the Vandenberg airfield;

(2) Providing two modified facilities and two new structures for equipment storage;

(3) Strengthening the 13th Street Bridge;

(4) Remodeling two existing buildings to provide flight crew accommodations and equipment storage;

(5) Modifying an existing building to house a facility for repair of the Orbiter's thermal protection tiles;

(6) Constructing a nitrogen storage plant north of the launch pad;

(7) Building the new Shuttle Assembly Building (SAB) to provide protection from the weather during vehicle build-up on the launch pad;

(8) Installation of a heating system at the launch mount to prevent ice build-up on the fueled External Tanks;

(9) Extending Vandenberg's military security system;

(10) Modifying an existing embayment to accept shallow-draft barges;

(11) Realigning the External Tank Tow Route to avoid impacts to archaeological sites;

(12) Modifying the Port Hueneme facility for receiving rocket boosters;

(13) Construction of a new power plant to replace an existing plant on South Vandenberg;

(14) Modifying utilities;

(15) Transporting hazardous propellants and materials to Vandenberg; and

(16) Management of hazardous wastes.

5. EXISTING ENVIRONMENT:

New information on the environmental setting at Vandenberg AFB and surrounding areas has been incorporated. Studies conducted by research teams and governmental agencies have expanded the available information on air quality, terrestrial and marine biology, archaeology, socioeconomics, and other aspects that will be affected by the Shuttle Program.

New air quality information suggests that both Vandenberg AFB in Santa Barbara County and the Naval Construction Battalion Center in Ventura County contribute small amounts of air pollutants to their respective air environments. Santa Barbara County currently exceeds National Ambient Air Quality Standards (NAAQS) for photochemical oxidants, carbon monoxide, and total suspended particulates; motor vehicles account for the majority of emission totals. Ventura County exceeds the national standards for photochemical oxidants and total suspended particulates.

A diverse assemblage of marine mammal and seabird species is found on the Northern Channel Islands, particularly at San Miguel Island, which sustains large pinniped populations and is the main seabird rookery of the islands. Anacapa Island , Santa Barbara Island, and Scorpion Rock (Santa Cruz Island) support the only western U.S. nesting populations of the brown pelican, which has shown strong recovery after many years of ill effects from the pesticide DDT. Peregrine falcons do not nest in the Northern Channel Islands.

Biological surveys at the Point Arguello Boathouse identified more than 70 species of marine plants, 270 species of soft- and hard-substrate invertebrates, and 80 species of larval and adult fish. In general, the marine biota of the Boathouse area is not as diverse as that of nearby areas. About six harbor seals are resident in the boathouse area, and 66 species of marine and land birds have been observed there.

Endangered species on Vandenberg have benefitted from protective measures implemented on the base. The nesting success of the least

tern has been good in recent years (almost 100% in 1980), and the amount of habitat protection afforded the least tern has been increased substantially at Vandenberg. Single peregrine falcons have been sighted on Vandenberg, but no nests have been found. No listed endangered or threatened plant species have been found on Vandenberg; special interest plants have been protected during construction.

Recent archaeological studies at Vandenberg have revealed 11 new sites in the vicinity of Point Arguello, all of which appear to be eligible for inclusion in the National Register of Historic Places, according to the established criteria. Investigations of submerged lands in the vicinity of the Point Arguello Boathouse revealed no underwater resources of archaeological or historical interest.

The deactivated Coast Guard Station at Point Arguello, constructed in 1936, consists of three major structures: an administration/barracks building, a garage, and a boathouse/pier complex. The boathouse and pier complex has been proposed for removal. The significance of these buildings is not due to their architecture itself, but to the fact that they are a representation on the West Coast of the Eastern U.S. Colonial Revival style.

Socioeconomic effects will be felt principally in the communities in north Santa Barbara County area - Santa Maria/Orcutt, the Lompoc Valley, and the Santa Ynez Valley. North County population amounted to about 127,800 in 1980 with almost one-half accounted for by residents in the Santa Maria/Orcutt area. The North County's economy is heavily influenced by Vandenberg AFB activities, although the ranching and agricultural sectors also play an important role. Commercial and industrial development is mostly in the Santa Maria/Orcutt area, with the Lompoc area and Santa Ynez Valley serving generally as bedroom communities for the employment activities concentrated by Vandenberg AFB, Santa Maria, and along the South Coast.

Land use in the county is dominated by the Los Padres National Forest covering about 44 percent of the land area. Of the remaining land, almost three-quarters is used for agriculture and grazing activities.

Land use plans for the North County and communities provide for ample expansion of residential, commercial, and industrial activities. The limited availability of water presents the major potential resource constraint for future development.

6. ENVIRONMENTAL EFFECTS

Shuttle Program impacts have been reevaluated in light of recent changes in the program, research studies in problem areas, and newly-acquired knowledge of the affected environment. The physical, chemical, biological, and archaeological impacts that result from changes in the Shuttle Program include effects on air quality, shoreline stability, topography, soils, hydrology, water quality, floodplains, wetlands, noise, biology, archaeology, historical resources, and weather.

Topography and soils of Vandenberg will be affected by facility construction where clearing, grading, and recontouring of the earth is required. A total of 56 acres would be added to the 400 acres already scheduled for clearing and grading in preparation for facility construction at Vandenberg. The combined acreage required for all Shuttle construction would be less than one-tenth of one percent of Vandenberg's 98,400 acres.

Biological effects of new construction will be limited to the removal of vegetation by site clearing as noted under topographic effects. No endangered or threatened plants will be removed or affected by construction. Temporary water quality degradation at the 13th Street Bridge will have insignificant effects on Santa Ynez River biology.

Dredging and blasting at the Boathouse will result in disruption of approximately 1.8 acres of hard- and soft-bottom habitat and associated benthic organisms. Recolonization by benthic organisms is expected within two years. Less than 1 percent of the 35 miles of protected Vandenberg coastline will be affected by the proposed project. No listed endangered or threatened plant or animal species on Vandenberg will be impacted by construction.

One recently identified archaeological site will be affected by newly proposed construction at Vandenberg. Excavation of a marginal area of SBa 1542 will probably result in the irretrievable loss of some site information. Data recovery operations are planned by qualified archaeologists in coordination with the National Park Service, local Native American groups, the State Historical Preservation Office (SHPO), and the Advisory Council on Historic Preservation. Data recovery on the impacted area of site SBa 1542 will satisfactorily mitigate any adverse impacts on archaeological resources. Archaeological site SBa 1686 was discovered during construction of the External Tank Storage and Checkout Facility (TCF) on South Vandenberg. Impacts to this site were mitigated through emergency data recovery conducted by qualified archaeologists. In addition, impacts to two paleontological sites and several isolated find (IF) archaeological sites discovered during extension of the Vandenberg runway were satisfactorily mitigated through data recovery and fossil collection.

Construction of the External Tank Landing Facility will result in the loss of the existing boathouse and pier at the Point Arguello Coast Guard Station. The historical integrity of the station would be jeopardized and the overall character of the site would be changed. Mitigation measures approved by the State Historic Preservation Office and the Advisory Council on Historic Preservation include archival documentation and restoration of the remaining buildings.

Construction of Shuttle ground support facilities was expected to affect local air quality through three major types of air pollution: 1) dust generated by construction activities such as land clearing and grading, 2) exhaust of construction equipment, and 3) offbase pollutants associated with Shuttle-induced community growth. The new schedule has spread the amount of construction activity (and emissions) over a longer time period, resulting in a corresponding reduction in impacts to air quality. Since construction of Shuttle facilities is approximately 80% complete, most impacts from construction have already taken place. Shuttle operation air emission sources have been identified at Vandenberg: 1) fuel combustion for heating facilities

and water, 2) motor vehicle operation, 3) Shuttle vehicle launch, and 4) sources related to population growth in offbase areas. Peak year operation emissions will account for less than three percent of the total emissions in Santa Barbara County.

Construction activities associated with the Shuttle program at Vandenberg AFB resulted in increased direct and indirect employment in the county of approximately 3,400 jobs in the peak year FY 1981, and will drop to 1,690 jobs in 1984 and 410 jobs by FY 1986. Other construction activities at Vandenberg (MX flight testing, and general base improvements) added an estimated 1,030 additional direct and indirect jobs in the County in FY 1981 and will extend the employment effects through FY 1988. Construction of liquified natural gas (LNG) facilities in the Point Conception area and outer continental shelf petroleum exploration activities will provide additional employment opportunities after the construction activities at Vandenberg AFB phase down. However, the LNG project is currently under review as to its feasibility and is not anticipated to concurrently affect the local economy during Vandenberg's build-up.

Operation impacts will accompany launches of the Shuttle vehicle. Preliminary results from computer models on the behavior of the Shuttle exhaust ground cloud suggest that a strong onshore wind and a low inversion layer would have to be present at the time of launch for movement of the cloud and ground level concentrations of gaseous HCl to be affected by terrain. The conditions occur together infrequently at Vandenberg. Terrain effects, should they occur, would serve to impede lateral movement of the cloud and to retain it in the South Vandenberg vicinity.

Other modeling results indicate that nearly all incidences of high HCl concentrations would occur on South Vandenberg or over the open ocean. Of 48 randomly selected meteorological cases, only one suggested that HCl concentrations could exceed 1.0 ppmv on property adjacent to Vandenberg, or on North Vandenberg and the cantonment area. Six other cases demonstrated a potential for HCl concentrations to exceed 1.0 ppmv on South Vandenberg. The remaining 41 meteorological cases pre-

dicted that the stabilized ground cloud would be transported over the ocean adjacent to South Vandenberg.

Studies indicate that aluminum oxide dust does not cause visible plant injury, nor do mixtures of dust and HCl gas produce significant increases in plant damage compared to HCl alone. Research indicates that no visible effects on plants will occur from HCl gas released with Shuttle rocket exhaust. Ground level concentrations below those necessary for visible plant damage are predicted. Investigators are working to improve predictions of the effects of Vandenberg's terrain on the Shuttle ground cloud.

Recent NASA studies indicate that the potential for long-term weather modification by Space Shuttle launches is not high. The trajectory of the Shuttle vehicle may focus sonic boom energy on the earth's surface; overpressures could reach 30 psf. A maximum of 7 launches are forecast over a 10-year period for launch azimuths between 147.5° and 180°, which would result in sonic booms of varying intensity over the Northern Channel Islands (up to 30 psf at San Miguel Island). Santa Rosa Island and Anacapa Island will not experience focused booms. The Orbiter is expected to produce moderate booms (0-1.5 psf) over San Miguel Island and Santa Rosa Island on each end-of-mission return--approximately every four to five weeks for most years of operation.

Sonic booms generated by the Space Shuttle are expected to have little impact on the biota of the Northern Channel Islands. Disturbances to pinnipeds resulting in mass movement from the shores of the islands to the water would be increased by less than 15 percent for sea lions and seals other than harbor seals, and by about 20 percent for harbor seals. Currently, 48-60 such events occur per year for harbor seals, with about 50% of the presently occuring sonic booms causing major disturbances. Approximately 24-36 events per year occur for the other pinnipeds, with about 25% of the incident sonic booms causing major disturbances. There is little chance of pup-death (due to stampeding) or of significant effects on marine mammal hearing. Shuttle sonic booms are not expected to seriously startle nesting seabirds or cause

egg or chick mortality. Consequences for seabird populations should be negligible.

The brown pelican (Pelecanus occidentalis) colonies on Anacapa Island, Santa Barbara Island, and Scorpion Rock are predicted to experience no high magnitude (focused) sonic booms and only seven of low magnitude (less than 2 psf) during the ten years of Shuttle operation. These are unlikely to occur during nesting periods. In addition, the evidence indicates that the pelicans will not be seriously disturbed by any booms that do occur. Therefore, no impact of Shuttle booms on the continued existence of brown pelicans is expected.

Vandenberg AFB employment is projected to increase from approximately 10,630 employees (military, civil service, contractors, and other government and non-government personnel) in FY 1980 to approximately 16,225 in the peak year 1985 (excludes the Port Hueneme labor projections--80 contractors and 4 military personnel beginning in fiscal 1985), and level off to approximately 15,290 by FY 1988. This represents a 53 percent increase in direct employment over baseline levels (1980) in the peak year 1985 and a 44 percent increase by FY 1988. The bulk of the increase is due principally from contractor employment associated with the Shuttle program. MX flight testing activities will account for 930 of these new direct jobs in the long-term.

Total direct and indirect employment increases, due to activation and operation activities at Vandenberg AFB, amounts to approximately 9,080 jobs in the peak year fiscal 1985 for the Santa Barbara County region. This represents approximately 6.9 percent of the estimated 1981 level of employment in the County.

North County population in-migration associated with both construction and operation phase activities of all projects at Vandenberg AFB will be approximately 14,285 persons in the peak year fiscal 1985 and 11,065 persons in the long-term (FY 1988). Approximately 80 percent of this population increase can be attributed to Shuttle program requirements. The effects of LNG construction

activities are not anticipated to concurrently affect the local economy.

Two impacts are considered to be "discernable" to "moderate" in importance:

(1) Construction of the External Tank Landing Facility at the Point Arguello Boathouse will result in the disruption of about 2.2 acres (0.9 ha) of subtidal marine habitat, 0.4 acre (0.16 ha) of intertidal habitat, and the excavation of a 50 to 200-foot (15-60 m) portion of the existing sea cliff for the ET Tow Route. These impacts will permanently alter the existing topography and habitat within the construction zone and temporarily disrupt the marine and shoreline habitat.

(2) Removing the boathouse and pier to make way for the ET Landing Facility at Point Arguello will adversely impact the historical and architectural integrity of the Coast Guard Station.

(3) Construction of the External Tank Tow Route will adversely impact archaeological site SBa 1542. Some site data will be unavoidable lost, although data recovery efforts will be conducted by qualified archaeologists.

The following impact is considered "significant" in importance.

(1) Population growth associated with the Shuttle program, in conjunction with other projects within the county, will aggravate short-term problems concerning housing, and the quality and quantity of available water.

7. PERMITS AND OTHER ENTITLEMENTS

Air quality permits will be required for all new and modified equipment and facilities associated with the Shuttle Program which will release air pollutants. The Santa Barbara Air Pollution Control District (APCD) is considering the Shuttle Program as a single new source and is undergoing a New Source Review. To date, 20 air quality permits have been obtained, four additional applications have been submitted, 42 applications will be submitted, and 24 exemptions either have been obtained or are expected.

The Army Corps of Engineers has issued a permit for dredging, ocean disposal, and other activities related to construction of the External Tank Landing Facility at the previous site of the Point Arguello Boathouse. This permit was issued under Section 10 of the Rivers and Harbors Act of 1899, Section 404 of the Clean Water Act, as amended, and Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972. This permit was reviewed by EPA, which also approved one-time use of an ocean site approximately 14 miles offshore for disposal of dredged material. In addition, the State Lands Commission has issued a permit for the dredging, and the California Department of Fish and Game has issued a permit and conditions for use of explosives on this project.

Consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service under Section 7 of the Endangered Species Act has been completed.

The California Coastal Commission has concurred with the Air Force's determination that all aspects of the Space Shuttle Program at Vandenberg AFB are as consistent as practicable with the California Coastal Act of 1976, as amended.

Permits will be required from federal, state, and local agencies for the handling of hazardous waste products associated with Shuttle operations. If Shuttle hazardous wastes are stored on Vandenberg AFB or at Port Hueneme for more than 90 days, a Hazardous Waste Storage Facility Permit will be required by California law. Handling and

disposal of extremely hazardous wastes will require a special permit issued by the California Department of Health Services. Discharges of SRB wastewater into the Port Hueneme sewer system will require a permit from the Ventura County Regional Sanitation District.

A Memorandum of Agreement was signed in November of 1978 by the State Historic Preservation Officer and the Advisory Council on Historic Preservation establishing data recovery programs for archaeological sites SBa 539, 670, 931. A similar agreement, a determination of No Adverse Effect, was made for SBa 1542, based on planned data recovery and sampling.

Plans for the removal of the boathouse and pier at the new site of the External Tank Landing Facility were reviewed with the State Historic Preservation Office. A Memorandum of Agreement concerning Air Force plans for boathouse removal mitigation was signed in October 1980 by the Air Force, the Advisory Council on Historic Preservation, and the State Historic Preservation Officer.

A formal request for the incidental taking (harrassment) of marine mammals due to sonic booms from Shuttle overflights has been filed with the National Marine Fisheries Service as required by the Marine Mammal Protection Act of 1972, as amended.

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1.0 INTRODUCTION

1.1 SPACE SHUTTLE FINAL ENVIRONMENTAL IMPACT STATEMENT

The Environmental Impact Analysis Process (EIAP) for the Space Shuttle Program began in 1973 with baseline studies on terrestrial and marine biology, archaeology, and paleontology at Vandenberg Air Force Base, California. Studies to describe the socioeconomic environment of the Shuttle's region of influence were also initiated. As the program became better defined, the Air Force added scientific studies and surveys in other fields to provide information for feasibility evaluations and design of program facilities. A Draft Environmental Impact Statement (EIS) was released to the public in August 1977, followed by a Public Hearing in Lompoc, California in September of that year. The Final EIS was published in January 1978.(162)

The Air Force received valuable comments during the review period for the Draft EIS. Written responses from federal, state, and local agencies offered suggestions for improving the document and requested clarification of a number of issues. The Public Hearing in 1977 brought forth additional concerns. The Air Force responded to all comments and incorporated the pertinent changes in the document to produce the Final EIS. There were environmental issues raised during the review period that required information not available at the time. The Air Force deferred comprehensive analysis of these items until the results of on-going studies were completed. These results are presented in this document.

1.2 PURPOSES OF THE EIS SUPPLEMENT

This EIS Supplement is presented to fulfill Air Force responsibilities under the National Environmental Policy Act of 1969 (NEPA), Council on Environmental Quality Regulations (40 CFR 1500-1508, 1979), and Air Force Regulation 19-2 (32 CFR 989,). These environmental protection directives call for the lead federal agency to produce a supplement to

a Final EIS if significant program changes arise, or when a new evaluation of impacts is warranted.(171, 190, 195) The Air Force has determined that additional environmental concerns related to the Space Shuttle Program at Vandenberg, as well as program changes that have occurred, can now be addressed. The lead agency for preparing the Final EIS was the Space and Missile Systems Organization (SAMSO), now named the Space Division (SD), Los Angeles Air Force Station, California.

The EIS Supplement accomplishes the following purposes relative to the EIAP of the Space Shuttle Program: 1) Addresses environmental issues raised during the EIS review period that have required additional research and could not be addressed in the Final EIS, as well as other environmental review requirements by state and federal agencies having jurisdiction over programs related to the proposed project; 2) Addresses environmental concerns raised by new regulations; 3) Presents the results of several studies, completed since 1978, which offer new insights into the impacts of constructing and operating the Shuttle Program at Vandenberg AFB and Port Hueneme; 4) Describes major changes that have occurred in the Shuttle Program, the existing environment at Vandenberg and other impacted areas, and any changes expected in environmental impacts; and 5) Documents the environmental process used to assist program officials in early planning and decision-making.

During the course of planning and development of the Space Shuttle Program at Vandenberg AFB, assumed maximum launch rates have varied between 10 and 20 launches per year. More recent program direction, however, indicates that Shuttle launches are not expected to exceed 10 per year. The actual number of launches per year will fluctuate depending on program and mission requirements.

In addition, most of the impact analyses in this document are based on an Initial Operational Capability (IOC), or first launch capability, of 1984 at Vandenberg. More recent schedules, however, call for an IOC of late 1985. Therefore, impacts dependent on the date of the first launch, such as air quality, and biological impacts related to activation and operation of the Shuttle program, will be deferred for approximately one year from the dates discussed in this document. This discrepancy is noted where appropriate. Impacts not dependent on date of first launch, such as socioeconomic, archaeological and biological impacts related to construction, will not be affected.

1.3 STATUS OF ENVIRONMENTAL INVESTIGATIONS

This Supplement is the culmination of many research and evaluation studies recently conducted for the Shuttle Program. Figure 1.3-A presents a milestone chart of major Air Force environmental activities over a 13-year period, beginning in 1973 and ending with monitoring of the first Shuttle launches.

1.4 MAJOR ISSUES

In the course of the Shuttle Environmental Impact Analysis Process (EIAP), a number of major issues have been identified that require special attention in this document. These issues represent the major concerns of agencies, organizations, and individuals who commented on the Draft EIS, and which required substantial research. The National Environmental Policy Act encourages any EIS or Supplement to satisfy all agency concerns with a single document so that review by several agencies may proceed concurrently.(131) To satisfy this directive, six issues addressing major agency concerns have been selected for in-depth analysis. They are:

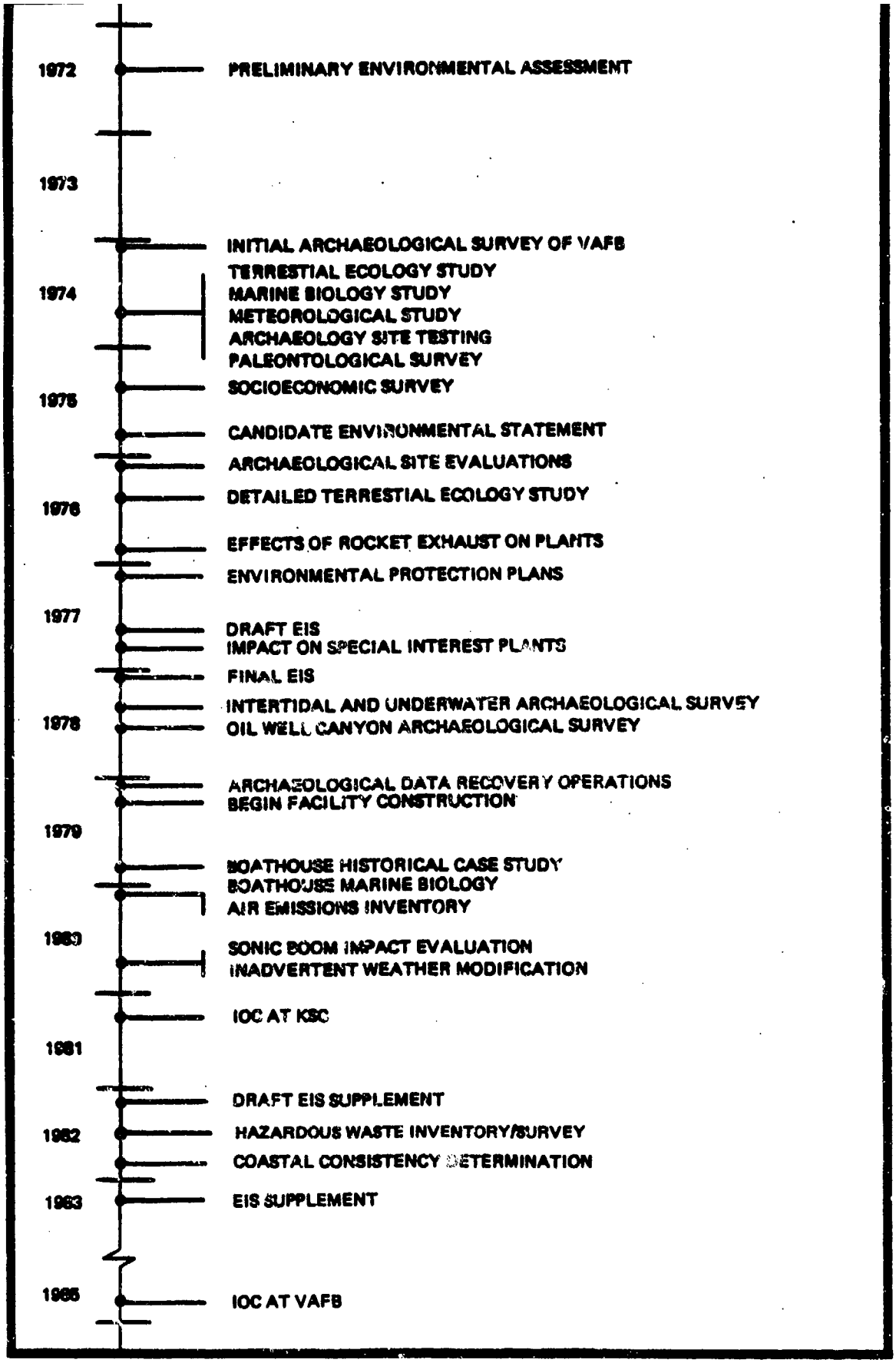


FIGURE 1.3–A MILESTONE CHART FOR MAJOR ENVIRONMENTAL STUDIES CONDUCTED FOR THE SPACE SHUTTLE PROGRAM AT VANDENBERG AFB

(1) Air quality impacts from Shuttle Program development;

(2) Inadvertent weather modification from Shuttle exhaust;

(3) Archaeology impact on Vandenberg;

(4) Historical significance of the Port Arguello Boathouse;

(5) Sonic boom impact on the Northern Channel Islands; and

(6) Determination of federal consistency with the California Coastal Zone Management Program for the Shuttle Program.

Each of these issues is given individual attention in a separate appendix following the Supplement text.

1.5 ORGANIZATION OF THE SUPPLEMENT

This Supplement is organized and written in a manner to aid reviewers in interpreting key concerns and to satisfy 1979 CEQ regulations for EIS documentation. Because this document supplements a 1978 Final EIS prepared under former CEQ guidelines, the core of the Supplement follows the organization of the EIS. However, the 1979 CEQ regulations require additional information, such as a list of preparers and discussions of permits and other entitlements which must be obtained in implementing this proposal. These have been included to satisfy the intent of these regulations. The selected format presents a balance of old and new styles to provide as clear and concise an organization of material as possible.

The sections of this Supplement are:

Section 1.0. The opening chapter presents the background of this Supplement, the purposes in documenting the EIAP, and the approach of the Supplement.

Section 2.0. This chapter examines the major changes in environmental impact information gathered since the Final EIS was published. Section 2.0 assumes that the reader is acquainted with the Final EIS and does not repeat material presented there.

The discussion follows the EIS outline section by section in identifying major program changes, new environmental background information, changes in expected impacts, new alternatives, and mitigation measures for reducing adverse effects.

Section 3.0. This chapter briefly relates details of unresolved issues.

Section 4.0. A list of the persons primarily responsible for preparing the EIS Supplement is presented in this section. The professional discipline, experience, and responsibilities of each are noted.

Section 5.0. This section lists the agencies, organizations, and persons who will receive copies of the Supplement.

Section 6.0. A subject index is included to aid reviewers in locating topics of interest. The index cross-references Supplement topics with those found in the Final EIS and in relevant studies.

Section 7.0. The final section lists bibliographic references and data sources used in the preparation of this document.

Appendices. Eight appendices follow the Supplement text. Appendix A presents technical information for Shuttle ground support facilities and socioeconomic discussions. Appendices B through G present detailed environmental assessments for each of the six major issues identified in Section 1.4. These appendices employ the major topic headings recommended by CEQ for impact assessments. Appendix H contains environmental permits and other entitlement issued for various aspects of the program.

Responses to Comments on the Draft SFEIS

2.0 MAJOR CHANGES IN THE ENVIRONMENTAL IMPACT STATEMENT

2.1 INTRODUCTION TO THE PROPOSED ACTION

Few major changes in the Space Shuttle Program have been proposed since the publication of the Final Environmental Impact Statement in 1978. The primary purpose and objective of the Space Shuttle Program at Vandenberg Air Force Base remains the same--to provide the capability to launch satellites into polar orbits for defense, communication, navigation, and scientific uses. Ground support facilities at Vandenberg and Port Hueneme, and the general operation phases leading to each launch, have changed little. The basic Space Shuttle vehicle remains as described in Section 1.0 of the Final EIS.

The major changes that have occurred involve both construction and launch schedules. Changes in the construction schedule reflect a redistribution of project expenditures among the years of construction. Program planning now calls for a 6-year period of ground support facility construction, which began in 1979 and will extend through 1984. (The Final EIS development schedule anticipated the end of construction in 1982).

Due to schedule changes, Initial Operational Capability (IOC) for the Space Shuttle Program at Vandenberg has been moved from 1983 to 1985. The number of launches per year will increase at a moderate rate to an expected maximum of ten per year. The actual number of launches occurring in any year will depend on program and mission requirements.

There have been few major changes in the Shuttle ground support facilities described in the Final EIS. The location, size, number, and type of structures needed to process and store Shuttle vehicle components have changed little. Six new facilities have been added, plans for nine proposed or existing structures have been revised, and three new ground operation activities have been proposed. These changes are discussed in the following subsections.

2.2 DESCRIPTION OF THE PROPOSED PROJECT

The proposed project calls for the development and operation of Space Transportation System (STS) facilities at Vandenberg AFB and Port Hueneme, California. Section 2.0 of the Final EIS for the Space Shuttle Program presents a summary of the activity sequences required for Orbiter, Solid Rocket Booster, External Tank preparation, and Launch Pad operations. An overview of the sequences is provided in the following paragraphs to acquaint the reader with the operational phase of the proposed action.

Figures 2.2-A and 2.2-B show perspective views of North and South Vandenberg and the existing or planned Shuttle-related facilities that will support ground operations. Facility acronyms are noted on each figure.

Orbiter processing will begin at North Vandenberg with the landing of the vehicle at the airfield following a space mission. The Orbiter will be serviced on the runway, then towed to the Orbiter Maintenance and Checkout Facility (OMCF), where residual cryogenic and hypergolic propellants will be removed. The Orbiter will receive an extensive checkout and any necessary maintenance will be performed. If the Orbiter has returned with a payload, it will be removed. The exception to this sequence is when the Orbiter is delivered to Vandenberg by the special Boeing 747 carrier aircraft. The only facility required for this infrequent activity is the Mate/Demate Facility (M/DF), where the Orbiter will be detached from the carrier aircraft and reattached when the Orbiter is returned to the manufacturer for periodic maintenance. When needed for another launch, the Orbiter will be towed from storage at the OMCF along existing roads through the cantonment area, across the Santa Ynez River at the 13th Street Bridge, and to the Launch Pad in South Vandenberg.

The Solid Rocket Booster (SRB) sequence of Shuttle operations will begin with the recovery of the SRB casings from the Pacific Ocean following a launch. The SRBs will be towed to Port Hueneme (not shown in the accompanying figures) where they will be lifted from the water

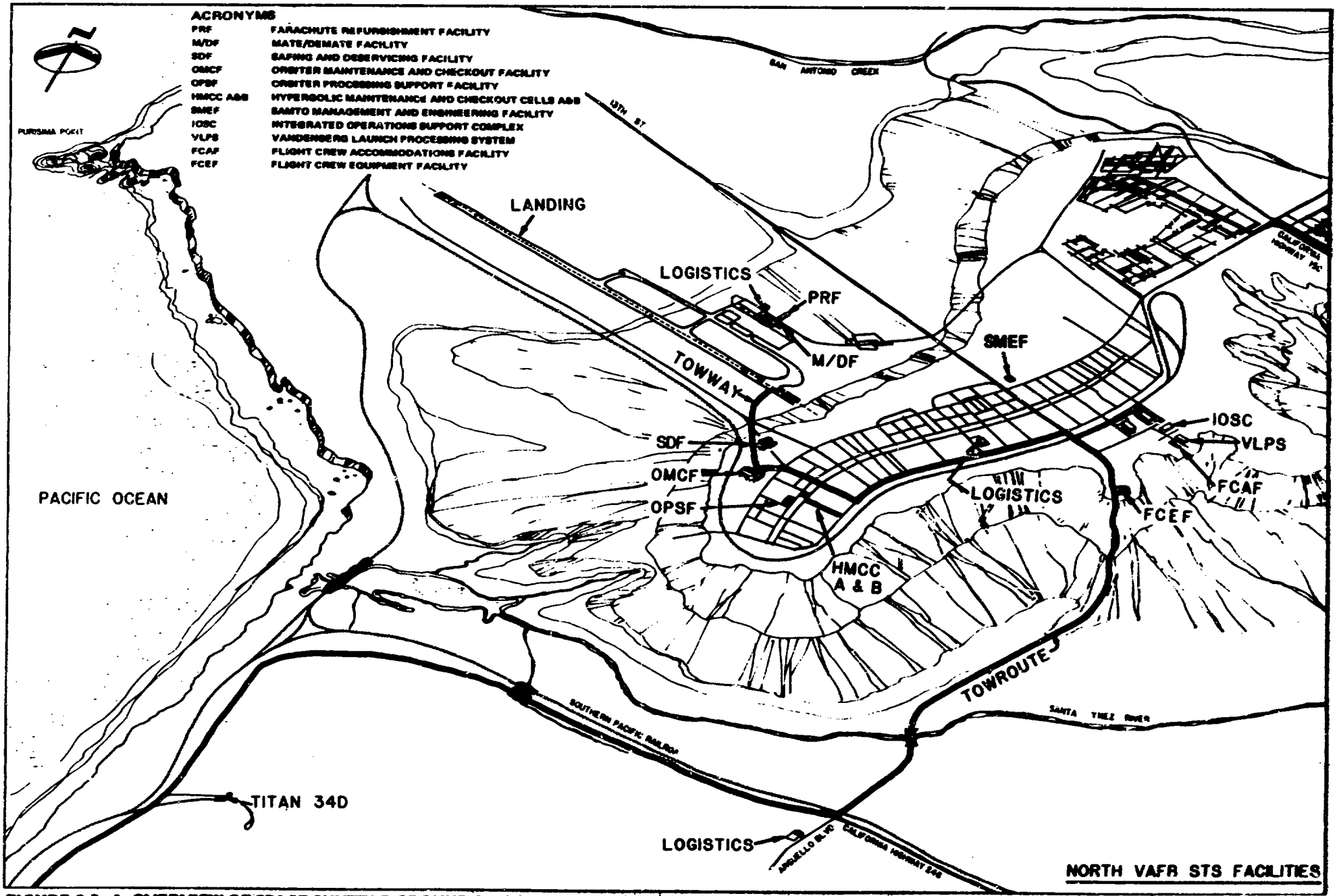


FIGURE 2.2–A OVERVIEW OF SPACE SHUTTLE GROUND SUPPORT FACILITIES ON NORTH VANDENBERG AFB

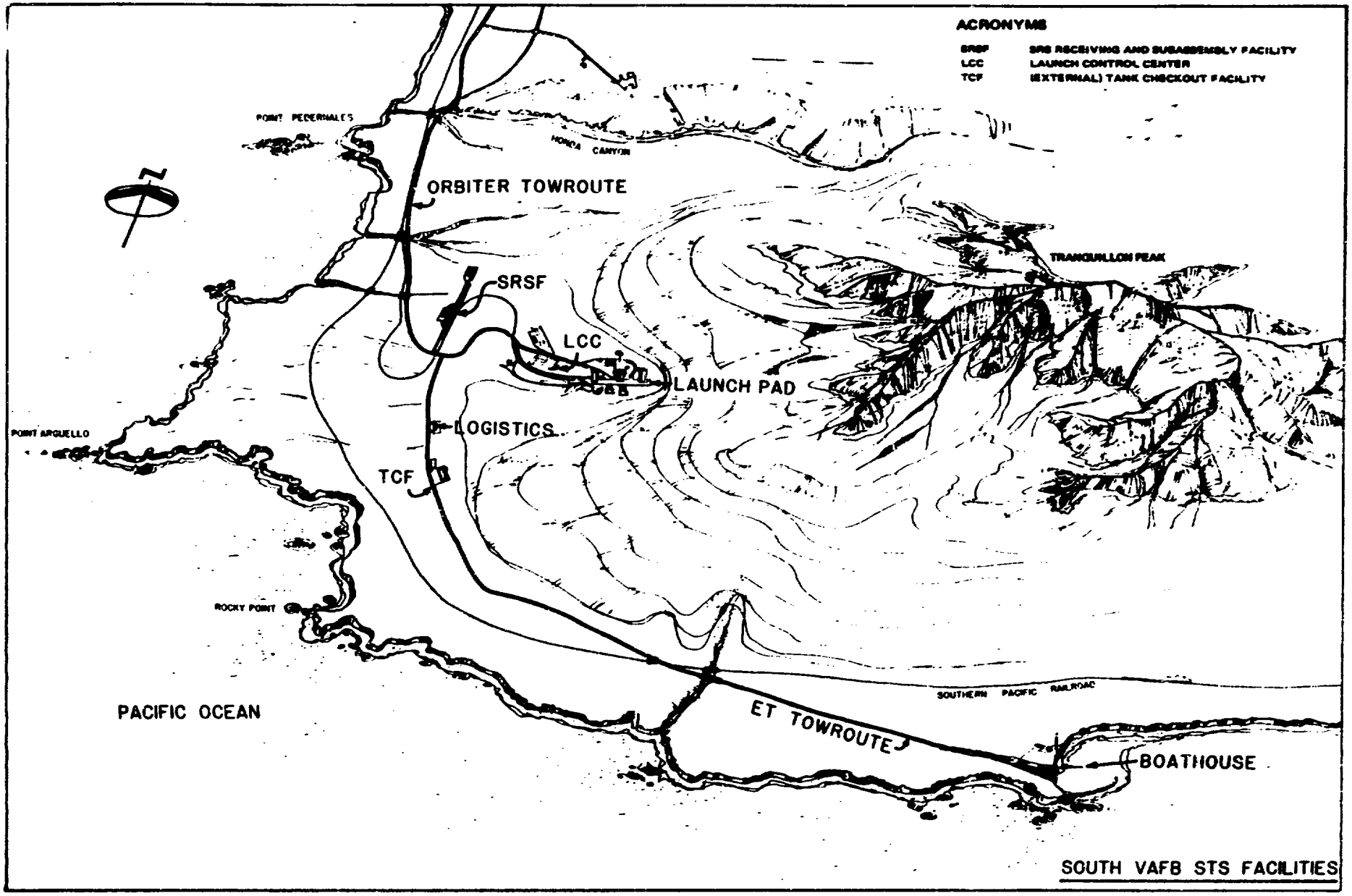


FIGURE 2.2–8 OVERVIEW OF SPACE SHUTTLE GROUND SUPPORT FACILITIES ON SOUTH VANDENBERG AFB

at a specially designed wharf and placed on rail transporters. The SRBs will then pass through an Initial Wash Facility, where residual hypergolic propellants will be drained, the ordnance system disconnected, and the outer casings rinsed with water before being moved to the disassembly area. In the SRB Disassembly Facility, the boosters will receive a high-pressure washdown with detergent (Neodol) and water, and will be disassembled, dried, and prepared for shipment. Each of the booster segments--essentially 12-foot (4-m) diameter tubes--will be shipped by rail to the manufacturer for checkout and reloading with propellant. When the loaded booster segments have been returned to South Vandenberg, they will be stored at the SRB Refurbishment and Subassembly Facility (SRSF) until needed for the next launch.

The large External Tanks (ETs) will be manufactured in Louisiana and transported through the Panama Canal to the West Coast on a ballasted barge. Four ETs will be delivered with each shipment to the External Tank Landing Facility at the present site of the Point Arguello Boathouse on South Vandenberg. The transport barge will be maneuvered into a shallow harbor where the barge will take on ballast water and rest on an above-water protrusion of the dock. The ETs will be transported from the barge to the ET Storage and Checkout Facility (TCF) along a newly constructed ET Tow Route. The barge will then be returned to the ET manufacturing site. At the TCF, the ETs will be inspected, tested, cleaned, and stored until needed for a launch.

The Space Shuttle will consist of four elements that will be mated on the launch pad to form the vehicle: the Orbiter, two Solid Rocket Boosters, and the External Tank. The SRB segments will be taken from storage and transported to the launch mount at Space Launch Complex No. 6 (SLC-6), where the two SRBs will be assembled. Next, the External Tank will be taken from storage, hoisted to a vertical position, and aligned between the SRBs. The Orbiter will then be moved from the OMCF to the Launch Pad, where it will be lifted in a vertical position and joined to the External Tank. Following preparation, the payload will be transferred to the Orbiter by the mobile Payload

Changeout Room (PCR). Propellant loading will begin and the crew and passengers will assume their launch positions. The Shuttle main engines will start four seconds before the SRBs ignite. Water under pressure will be sprayed on the exhaust plume at a rate of 650,000 gallons (2.4 million l) per minute for less than a minute to reduce launch noise, damage to launch pad structures, and fire risk. Following each launch, the pad will be refurbished in preparation for the next launch. All four sequences involving the Orbiter, SRBs, ETs, and the Launch Pad can be completed in as few as 336 hours (14 days).

While there have been no major changes in the sequence of Shuttle operations, some new facilities have been planned and others have been modified. New project information is summarized in Appendix A, which contains revised data briefs and artist renditions for each altered facility. The following subsections briefly describe the changes in the Shuttle Program as they relate to environmental impacts.

2.2.1 ORBITER SEQUENCE

No new facilities are proposed for the Orbiter sequence of operations. The Mate/Demate Facility has been redesigned to include a new lifting device, an Orbiter Lifting Frame (OLF), that will be less expensive to construct than the original plan. The mate/demate activity will occur at the same site and will require the same acreage as before. Consequently, there will be no significant changes in environmental impact. Data Brief 2.1-3 in the Final EIS describes construction and operation details.

An existing building near the Mate/Demate facility will be modified to house the Thermal Protection Facility (TPF), where the thermal protection tiles on the Orbiter will be inspected and repaired as needed.

When the Orbiter is transported to the launch pad, it will cross the Santa Ynez River at the 13th Street Bridge. There is concern that river flooding might wash out this bridge and delay essential Shuttle mission. The 13th Street Bridge has washed-out twice before--once in

February 1969, while the bridge was being constructed, and again in March 1978.(120) In 1979, sheet piling was installed around each of eight supporting piers to prevent erosion and scour. However, further strengthening is needed. Plans have recently been formulated that call for additional scour protection, consisting of an inverted pyramid of boulders sunk to a depth of 40 feet (12 m) around each pier. Debris nosing will be added to protect the piers from floating debris during floods. Bridge strengthening designs will be reviewed and finalized by the U.S. Army Corps of Engineers.(120)

The remaining Orbiter facilities have not been significantly changed in location, size, or intended use. The new construction schedule has altered the time of development of these facilities, but no major changes in impacts are expected. Revised data briefs in Appendix A provide additional information.

2.2.2 SOLID ROCKET BOOSTER SEQUENCE

Minor changes have been proposed for the SRB Retrieval and Disassembly Facility at Port Hueneme. SRBs will be recovered by a retrieval vessel and tug, which will tow the floating boosters to Port Hueneme. Two large straddle cranes are proposed to replace the single Navy barge crane for hoisting the SRBs from the water at Port Hueneme Harbor. The initial wash facility has been enlarged to accommodate the processing of two SRBs simultaneously. No significant changes in impacts are expected from these alterations.(210) Revised construction schedules have been adopted for all SRB sequence facilities; these are noted in data briefs contained in Appendix A.

2.2.3 EXTERNAL TANK SEQUENCE

A major change in the ET sequence of operations took place between the writing of the draft and final editions of the Shuttle EIS. The Draft EIS proposed the development and use of a hovercraft facility for receiving the External Tanks from the manufacturer. The Final EIS reported a change in program planning that replaced the hovercraft option with the construction of a shallow marine harbor at the deac-

tivated Coast Guard Station at Point Arguello.(121) Because this change has not been presented for public review and comment, the Air Force restates the proposal in this document to facilitate public review.

Under the current plan, the External Tanks (ETs) will be delivered to Vandenberg via ocean-going barges which will be landed at the present site of the Point Arguello Boathouse. The existing boathouse and pier will be removed, and a channel approximately 200 ft wide (61 m) and 500 ft long (153 m) will be dredged to a depth of minus 9 ft (3 m) Mean Lower Low Water. At present, it is estimated that 55,000 cubic yards (42,075 cubic meters) of material (mostly fractured shale) will be removed. This material will be disposed at sea. Alternative types of disposal that were considered are discussed in Section 2.6.1.2.

A substantial cut will be made in the sea cliff above the dock to provide access from the Landing Facility to the ET Tow Route that leads to the Coast Road. Transport operations, which were discussed earlier, call for as many as four ET transport barge deliveries annually.(162) Figure 2.2.3-A shows an artist's conception of a covered barge at the External Tank Landing Facility.

Another recent modification involves the selection of an alternate ET Tow Route path from the Landing Facility to the Coast Road. In response to newly-acquired archaeological information, the tow route has been realigned to avoid impacting several potentially significant archaeological sites.(42) This change in the program constitutes a mitigation measure and, as such, is discussed in more detail in Section 2.7.

2.2.4 LAUNCH PAD OPERATIONS SEQUENCE

Minor changes in Launch Pad facility designs have been proposed. Several structures have been modified slightly to accommodate design requirements, but only one change in impacts will result. A system will be installed at the launch mount to prevent build-up of ice on the External Tank after it has been filled with cyrogenic fuel

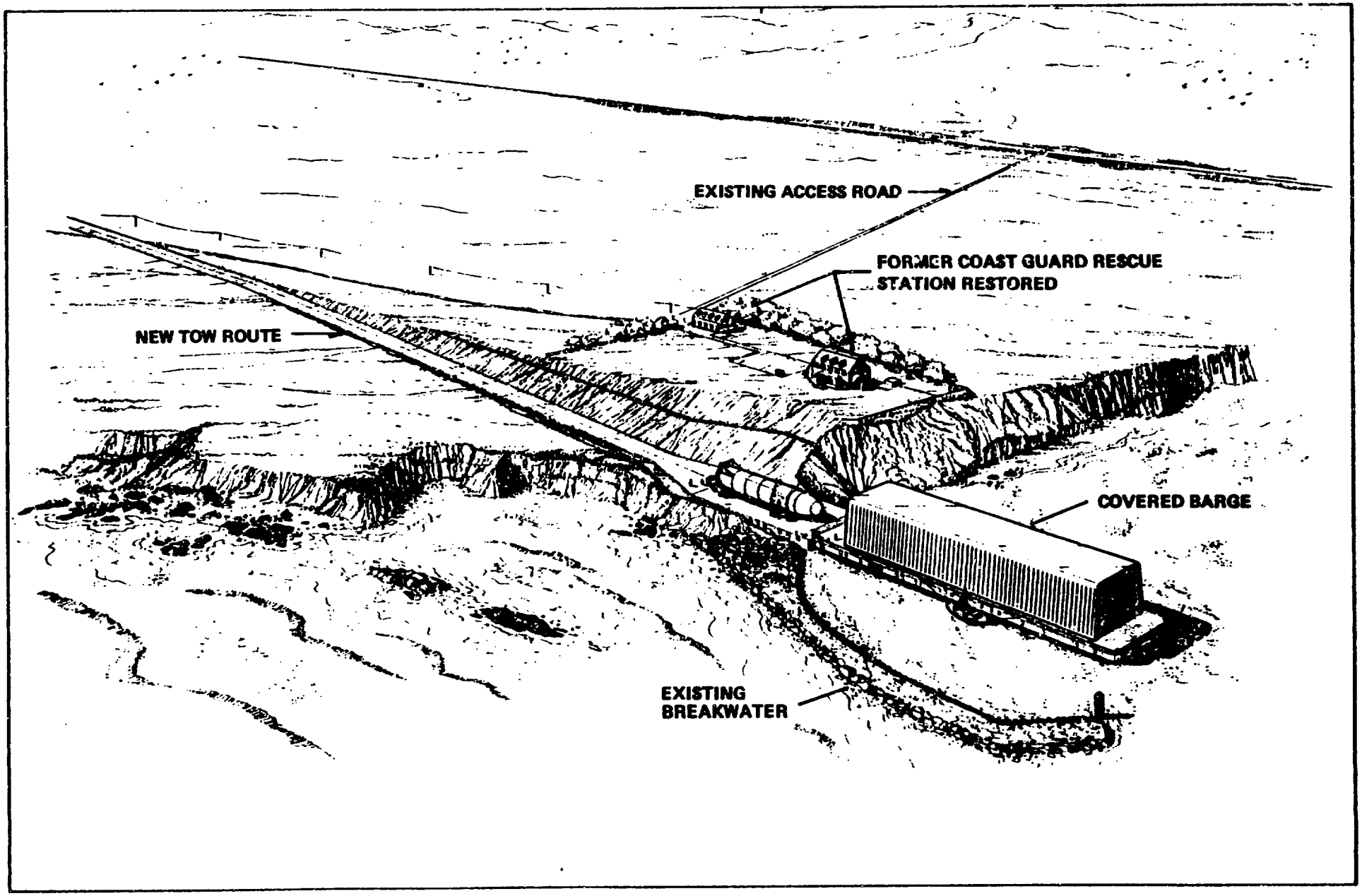


FIGURE 2.2.3 – A. ARTIST'S CONCEPTION OF EXTERNAL TANK LANDING FACILITY AT THE POINT ARGUELLO COAST GUARD STATION

just prior to launch. This system will use a two-jet engine heating system to flow heated air over the surface of the ET. The new schedule calls for Launch Pad construction from February 1979 through June 1984. Figure 2.2.4-A shows an artist's conception of the completed Launch Pad facilities at SLC-6.

2.2.5 HAZARDOUS WASTE MANAGEMENT

Space Shuttle facilities at Vandenberg AFB and the Port Hueneme Naval Construction Batallion Center will produce a variety of hazardous wastes. Facilities expected to generate hazardous wastes under normal operations are the Orbiter Maintenance and Checkout Facility (V19), the Hypergolic Maintenance and Checkout Facility (V21), the Launch Pad (V23), the SRB Refurbishment and Subassembly Facility (V31), the SRB Recovery and Disassembly Facility (V32), and the External Tank Processing and Storage Facility (V33).

A Hazardous Waste Handling Plan has been developed for the Shuttle Program to assure compliance with federal, state, and local regulations regulating the handling, storage, treatment, and disposal of hazardous wastes. Following Sections 2.2.5.1, 2.2.5.2, and 2.2.5.3 describe the quantities and types of wastes generated, planned means for treatment/disposal of wastes, and planned Shuttle hazardous waste facilities, respectively. Impacts of the handling, storage, treatment, and disposal of Shuttle hazardous wastes are addressed in Sections 2.5.1.1 and 2.5.1.2. Alternatives currently under consideration for on-base treatment of wastes are described in Section 2.6.1.3. Section 2.7.4.3 addresses the hazardous waste permits, and relevant regulations, required for the Shuttle Program.

2.2.5.1 Quantities and Types of Wastes

Shuttle Program operations at Vandenberg AFB and Port Hueneme will produce large quantities of hazardous wastes. Under normal operations, approximately 1,609,000 gallons of liquid wastes and 7,400 lbs. of solid wastes will be produced per launch. Under full operational

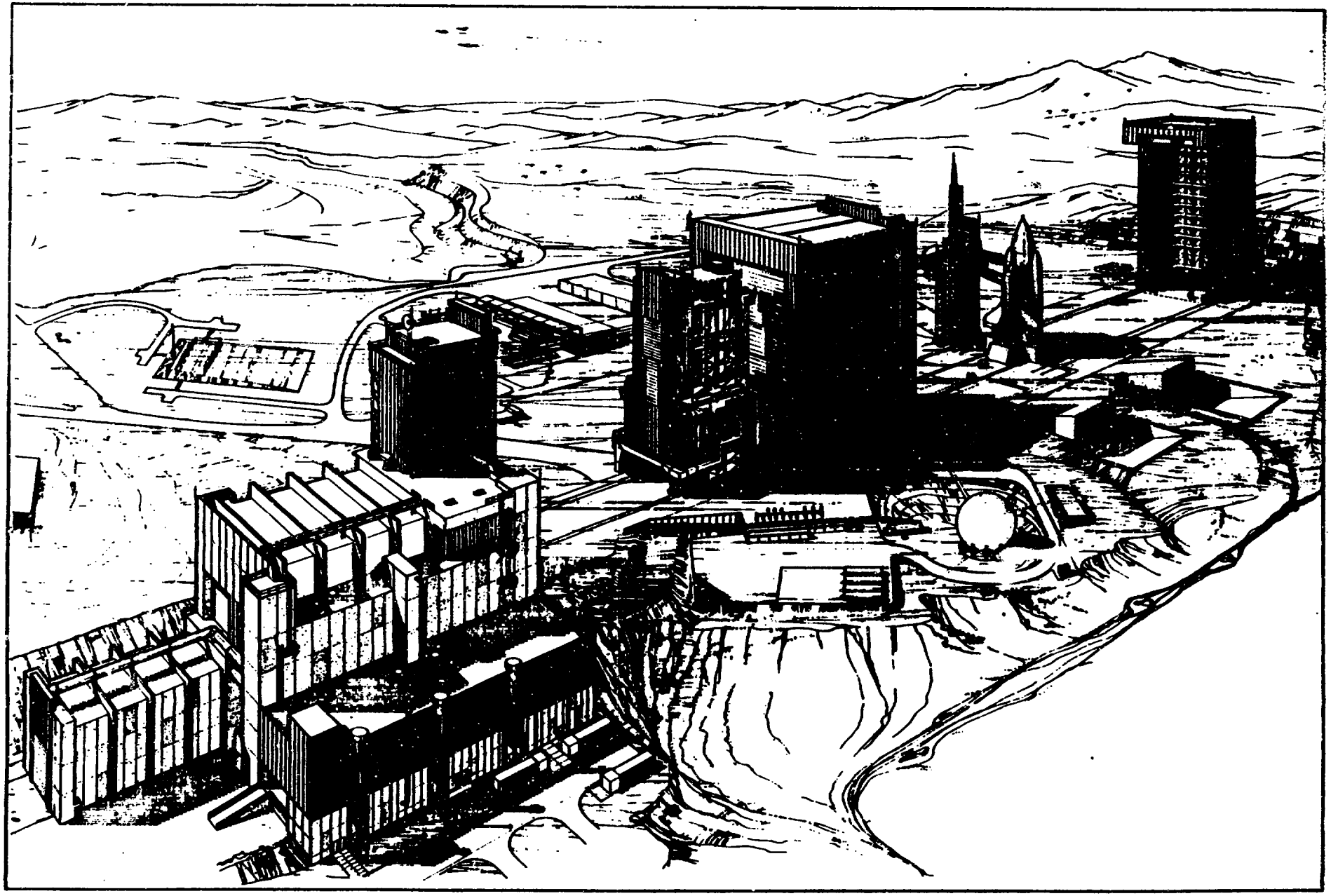


FIGURE 2.2.4–A ARTIST'S RENDERING OF SPACE SHUTTLE FACILITIES AT SLC–6

capacity (10 launches per year), approximately 16.1 million gallons of liquid waste and 74,000 lbs. of solid waste will be produced per year by the Shuttle Program. During the years of full Shuttle operations, all Vandenberg AFB programs will produce approximately 19.2 million gallons of liquid hazardous waste and 142,000 lbs. of solid hazardous waste per year. The Shuttle Program therefore will account for approximately 84% of the liquid hazardous waste and 49% of the solid hazardous waste produced at Vandenberg annually. Of the liquid wastes generated by the Shuttle Program, 98% will be sound suppression pad washdown water and SRB insulation wastewater (see below) that will be treated on-site. Only 2.2% of liquid wastes will be taken off-site for treatment or disposal.

Two types of wastewaters will account for the vast majority of Shuttle hazardous wastes by quantity: 1) sound suppression and pad washdown water used at the launch pad, and 2) SRB insulation wastewaters at the SRB Recovery and Disassembly Facility at Port Hueneme.

Sound suppression water and pad washdown water will combine to form the largest single waste item produced by Shuttle operations. To reduce acoustic vibration, a maximum of 700,000 gallons of water will be sprayed into the flame buckets under the launch mount during launch. In the process, this sound suppression water will contact hydrogen chloride (HCl) in the SRB engine exhaust and become highly acidic (pH below 2.0), thus rendering it hazardous. After launch, exhaust residue will be washed from launch pad structures with a maximum of 800,000 additional gallons of water. This washwater will contain a variety of metals (Al, Ba, Cd, Cr, Cu, Fe, Ni, Pb, Ti, Zn) and will also collect in the flame buckets, bringing the combined quantity of the two waters to a maximum of 1.5 million gallons. This water will be piped to the treatment facility to be built nearby for treatment (see Section 2.2.5.2).

The second largest category of hazardous waste will be generated at Port Hueneme, where protective insulation on the exterior of the SRB will be removed using a high-pressure water stream (approximately 100,000 gals per launch). Insulation wastewater (IW) requiring treat-

ment will contain solid pieces of insulation and paint residues which may include organometallic compounds.

The remaining categories of wastes include large volumes of contaminated fuel, oxidizer, alcohols, ketones, substituted aromatics, hydrocarbons, alkylamines, and other nonaqueous fluids. Washwater containing low concentrations of propellants will result from the hosing down of leaks or spills, from safety showers, and from system flushing operations. Solid materials such as contaminated rags, epoxy resins, plastics, and inorganic salts are also expected.

Tables 2.2.5-1 through 2.2.5-6 show the quantities of wastes produced per launch at each of the six hazardous waste generating Shuttle facilities. Table 2.2.5-7 shows total quantities of wastes generated at these facilities and at all facilities combined, for each launch.

2.2.5.2 Waste Treatment and Disposal

Only two categories of Space Shuttle hazardous wastes, the sound suppression water/launch pad washdown water and the SRB insulation wastewater, are planned to be treated on-site; it is expected that all other hazardous wastes will be transported to off-base commercial facilities for treatment and/or disposal.

The sound suppression/launch pad washdown water will be treated at a facility to be built at the launch pad site (SLC-6), and then pumped to a new storage tank at SLC-6 to be re-used for sound suppression and pad washdown. Treatment of this water will involve neutralization and precipitation of metals, multi-media filtration to reduce suspended solids, and reverse osmosis to reduce dissolved solids. The sludge containing the precipitated metals may or may not be hazardous, depending on the concentrations of metals, and will be taken to a Class I landfill for disposal. The reject brine from the reverse osmosis will be de-watered in evaporation ponds, producing a non-hazardous salts. Alternative means considered for treating and disposing of this wastewater are discussed in Section 2.6.1.3.

Table 2.2.5-1. HAZARDOUS WASTES PRODUCED PER LAUNCH AT THE ORBITER MAINTENANCE AND CHECKOUT FACILITY (V19)

Liquid		Solid	
Waste Type	Quantity (gals/launch)	Waste Type	Quantity (lbs/launch)
Oxidizer/Scrubber Liquor	824	Thermal Protection System Maintenance Wastes	90
Eyewash & Shower Water	800		
Fuel/Scrubber Liquor	751		
Miscellaneous	25		
Total	2,568		90

Table 2.2.5-2. HAZARDOUS WASTES PRODUCED PER LAUNCH AT THE HYPERGOLIC MAINTENANCE AND CHECKOUT FACILITY (V21)

Liquid		Solid	
Waste Type	Quantity (gals/launch)	Waste Type	Quantity (lbs/launch)
Eyewash & Shower Water	720	Miscellaneous	20
Fuel Liquor	130		
Oxidizer Liquor	120		
Miscellaneous	20		
Total	992		20

Table 2.2.5-3. HAZARDOUS WASTES PRODUCED PER LAUNCH AT THE LAUNCH PAD (V23)

Liquid		Solid	
Waste Type	Quantity (gals/launch)	Waste Type	Quantity (lbs/launch)
Sound Suppression & Pad Washdown Water	1,500,000	Foam Wastes	645
Fuel Liquor	1,250	Insulation Wastes	200
Oxidizer Liquor	863	Miscellaneous	142
Eyewash & Shower Water	800		
Miscellaneous	834		
Total	1,503,747		987

Table 2.2.5-4. HAZARDOUS WASTES PRODUCED PER LAUNCH AT THE SOLID ROCKET BOOSTER REFURBISHMENT FACILITY (V31)

Liquid		Solid	
Waste Type	Quantity (gals/launch)	Waste Type	Quantity (lbs/launch)
Insulation Liquids, Solvents	760	Insulation Wastes	3,199
Eyewash & Shower Water	320	Contaminanted Filters	1,000
Miscellaneous	272		
Total	1,352		4,199

Table 2.2.5-5. HAZARDOUS WASTES PRODUCED PER LAUNCH AT THE SOLID ROCKET BOOSTER DISASSEMBLY FACILITY (V32)

Liquid		Solid	
Waste Type	Quantity (gals/launch)	Waste Type	Quantity (lbs/launch)
Insulation Waste-waters	100,000	Insulation Wastes	1,610
		Lithium Batteries	18
Miscellaneous	252		
		Silver-Zinc Batteries	180
		Ordnance	200
Total	100,252		2,008

Table 2.2.5-6. HAZARDOUS WASTES PRODUCED PER LAUNCH AT THE EXTERNAL TANK PROCESSING AND STORAGE FACILITY (V33)

Liquid		Solid	
Waste Type	Quantity (gals/launch)	Waste Type	Quantity (lbs/launch)
Eyewash & Shower	50	Miscellaneous	80
TPS Liquid Waste	30		
Total	80		80

Table 2.2.5-7. TOTAL HAZARDOUS WASTES PRODUCED PER LAUNCH BY SHUTTLE FACILITIES AND BY THE OVERALL SHUTTLE PROGRAM

Facility	Quality of Waste	
	Liquid (gals./launch)	Solid (lbs./launch)
V19 Orbiter Maintenance and Checkout Facility	2,568	90
V21 Hypergolic Maintenance and Checkout Facility	992	20
V23 Launch Pad	1,503,747	987
V31 SRB Refurbishment Facility	1,352	4,199
V32 SRB Disassembly Facility	100,252	2,008
V33 External Tank Processing and Storage Facility	80	80
Total	1,608,991	7,384

The SRB insulation wastewater will be treated to the applicable standards, through filtration to remove insulation solids, and discharged to the Port Hueneme sewer system and treatment plant.

All other categories of hazardous wastes generated by Shuttle operations are not planned to be treated on-base, but may, in accordance with relevant regulations be collected, containerized, stored, and transferred to one of two approved Class 1 landfills: 1) Casmalia Resources, Santa Barbara County; approximately 3 miles from Vandenberg and approximately 12 miles from the main gate; and 2) Kettleman Hills, Kings County, approximately 120 miles from Vandenberg. It has been determined that these two facilities can treat and/or dispose of all types and quantities of wastes produced by the Shuttle Program. The Defense Property Disposal Service will have responsibility for off-base disposal of hazardous wastes, except hypergolics and sludges.

2.2.5.3 Hazardous Waste Facilities

Three facilities will be built to handle hazardous wastes generated by the Shuttle Program: 1) a facility to treat the sound suppression/pad washdown water produced at the launch pad, 2) a facility to treat the insulation wastewaters produced at the SRB Disassembly facility at Port Hueneme, 3) and a hazardous waste storage facility for Vandenberg. In addition, accumulation points will be built as needed: one for Port Hueneme and possibly two for Vandenberg.

The sound suppression/pad washdown water treatment facility will be located in the SLC-6 complex. The evaporation ponds for de-watering the reverse osmosis reject brine will occupy approximately 8 acres and will be located south of SLC-6. See Section 2.7.4.3 for a discussion of applicable standards and permits.

The SRB wastewater treatment facility will be located within the SRB processing complex at the Port Hueneme Naval Construction Batallion Center.

The Vandenberg AFB Hazardous Waste Storage Facility will be built on North Vandenberg, east of New Mexico Avenue near the intersection with 33rd Street. The facility will be 6,000-8,000 sq. ft. and will be surrounded by 7-ft. high chain link fence.

The facility location is in a relatively remote part of the developed area of North Vandenberg, at the site of some structures built in the 1940's and since removed. Hazardous waste storage facilities are required to be at least 50 ft. from adjacent structures. The Vandenberg facility will be 1,250 ft. from the nearest structure, the Hypergolic Maintenance and Checkout Facility (V21). In addition, the site is downwind of the Vandenberg cantonement area and out of the flight approach to the Vandenberg runway.

The Hazardous Waste Storage Facility will be constructed and operated in accordance with EPA (40 CFR, Parts 122-124 and 261-265) and California DHS (Title 22, Div. 4) regulations concerning the handling and storage of hazardous wastes.

2.2.6 OTHER GROUND SUPPORT OPERATIONS

Several ancillary facilities and operations have been recently proposed at Vandenberg. Most are related to either the supply of industrial materials needed for Shuttle operations, or to security facilities. Each new or modified structure is discussed briefly below to establish a basis for impact determination.

Two existing structures will be remodeled to provide services for flight crew personnel on North Vandenberg. Building 8505 will be modified to accommodate flight crews and passengers before and after each space mission. Existing Building 6710 will be altered for technical and logistic support of flight crew equipment. New utility lines, parking lots, and paved areas will be constructed.(210)

Military security of Space Shuttle facilities will be enhanced by a system of fences, perimeter lighting, closed-circuit TV, and disturbance sensors proposed for Vandenberg AFB. The following facilities

will have security systems incorporated into the existing site plans: External Tank Processing and Storage Facility (V33); Launch Pad and Launch Control Center (V23/V28); Central Security Control; Solid Rocket Booster Refurbishment and Subassembly Facility; Central Supply Facility (V88); Building 1731; Building 6710; Orbiter Maintenance/Checkout Facility (V19); Hypergolic Maintenance/Checkout Facility (V21); Operations Support Complex (Buildings 8500/8505/8510); and the Mate/Demate Facility (V18).

Current plans include the extension of base utilities and services to several ground operation facilities. Utilities will include electrical power, fire suppression water, and sanitary sewers. Dual power supply lines are needed to the North Vandenberg Orbiter processing area and to South Vandenberg. Sewage pumping stations will be constructed at the major facilities on North Vandenberg, and a new pump station to supply water for fire fighting will be built on the north base.(210) Installation of communication cables is governed by base environmental procedures.

A new power plant will be built within the facilities area of the existing power plant and fire station on South Vandenberg. This facility will replace the existing plant and will have a capacity of 17,500 KVA. It will provide backup power for Space Shuttle launches at SLC-6 and for launches for other Vandenberg programs at SLC-3 and SLC-4.

Two existing buildings will be modified and two new structures will be used for equipment storage, support facilities, and services required for ground operations. Existing Buildings 871 and 1731 will receive interior modifications. A new Central Supply Facility and a new Material Service Center will be constructed, along with access roads and paved parking areas.(210)

Ground operations for each Space Shuttle mission will use large quantities of propellants and other hazardous materials. In preparation for each launch, seven essential hazardous materials will be transported to Vandenberg from sources around the nation. All

materials will be delivered over public highways by truck--with the exception of helium, which will be shipped by rail.[148] Table 2.2.6-1 lists these hazardous materials, the approximate quantities needed for each launch, and the number of truck or railcar loads expected for each launch cycle.

Some of these materials will come from as far as Mississippi and Louisiana, and others from the Los Angeles area. The transport of hazardous materials must comply with regulations of the U.S. Department of Transportation, the California Highway Patrol, and Vandenberg safety provisions. Public routes have been identified and evaluated for all Shuttle Program deliveries.[148] In addition, movements of hazardous materials will be coordinated with the Santa Barbara County Office of Emergency Services.

2.2.7 SUMMARY OF MAJOR PROGRAM CHANGES

Figures 2.2.7-A and 2.2.7-B indicate locations of changes in Shuttle ground support facilities on Vandenberg AFB addressed by this Supplement. On North Vandenberg, plans for the Mate/Demate Facility near the airfield have been revised; two existing facilities and one new structure will provide logistic support; the 13th Street Bridge will be strengthened; and two existing buildings will be remodeled to provide flight crew accommodations and equipment storage. Two additional activities are noted on Figure 2.2.7-A--the transport of hazardous materials to storage sites on the base and the disposal of hazardous waste products to off-base sites.

On South Vandenberg, a liquid nitrogen storage and conversion plant and a gaseous nitrogen production plant have been sited north of the launch pad; a new storage facility will provide logistics support. An extensive security system will be constructed around SLC-6. A new External Tank Landing Facility will be built in the Point Arguello Boathouse vicinity, and the new ET Tow Route will be redesigned to avoid archaeological sites. Not shown on Figure 2.2.7-B are numerous minor modifications associated with utilities and revisions in the SRB Disassembly Facility at Port Hueneme.

Table 2.2.6-1. INVENTORY OF HAZARDOUS MATERIALS TRANSPORTED TO VANDENBERG AFB IN SUPPORT OF THE SHUTTLE PROGRAM

COMMODITY	SYMBOL	HAZARD CLASSIFICATION	NORMAL QUANTITY SHIPPED PER LAUNCH	APPROXIMATE DELIVERIES PER LAUNCH
o Liquid Oxygen	LO_2	Non-flammable Gas	1,714,942 lbs	40 truckloads
o Liquid Hydrogen	LH_2	Flammable Gas	279,697 lbs	41 truckloads
o Nitrogen Tetroxide	N_2O_4	Poison A	44,730 lbs	1 truckload
o Monomethyl Hydrazine	MMH	Flammable Liquid	26,900 lbs	1 truckload
o Hydrazine (anhydrous)	N_2H_4	Flammable Liquid	964 lbs	1 truckload
o Helium	He	Non-flammable Gas	21,700 lbs	7 rail-cars

SCF = Standard cubic feet

Source: Spectra Research Systems and Science Applications, Inc. 1979.(148)

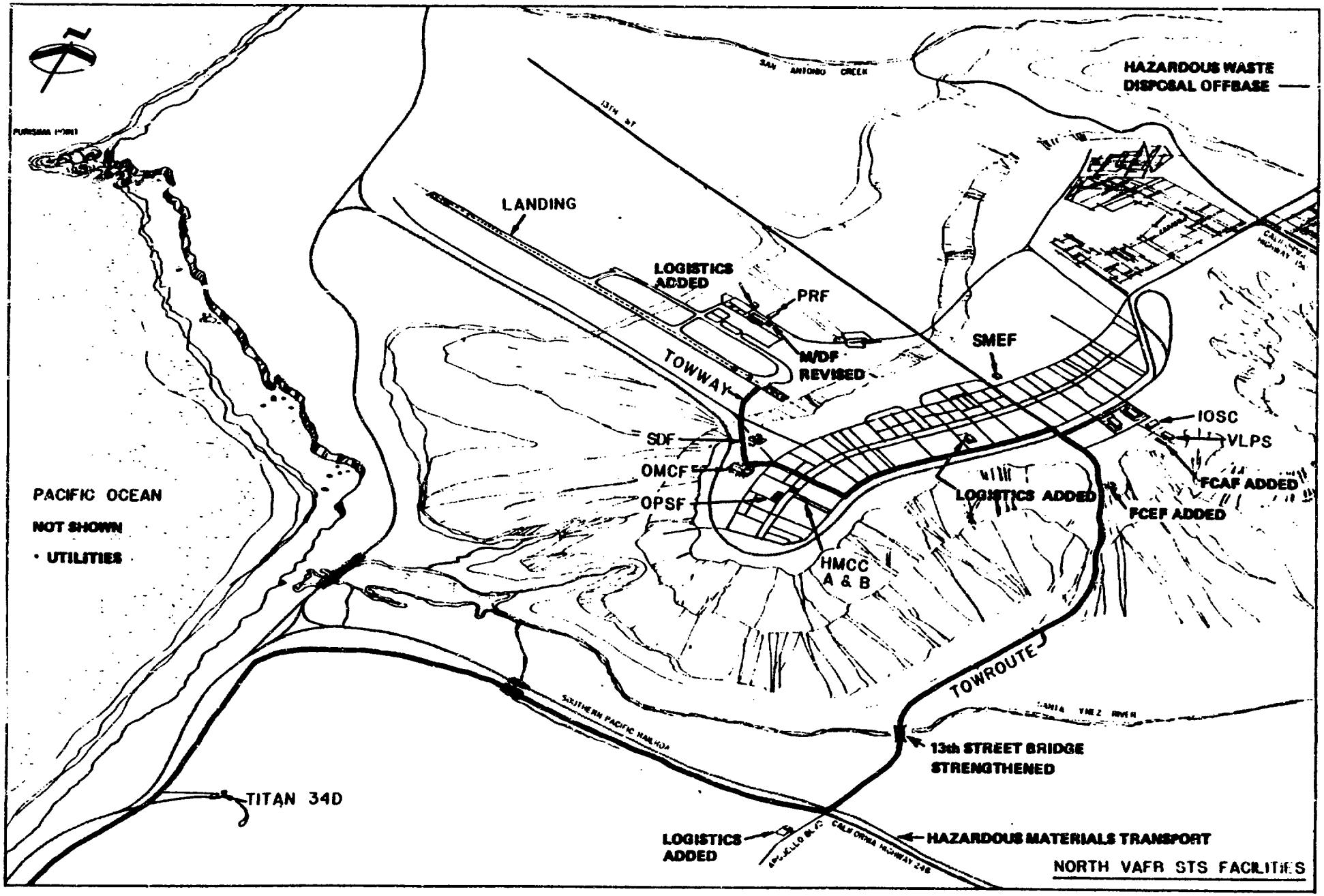


FIGURE 2.2.7–A ARTIST'S PERSPECTIVE OF NORTH VANDENBERG SHUTTLE FACILITIES SHOWING PRIMARY PROGRAM CHANGES

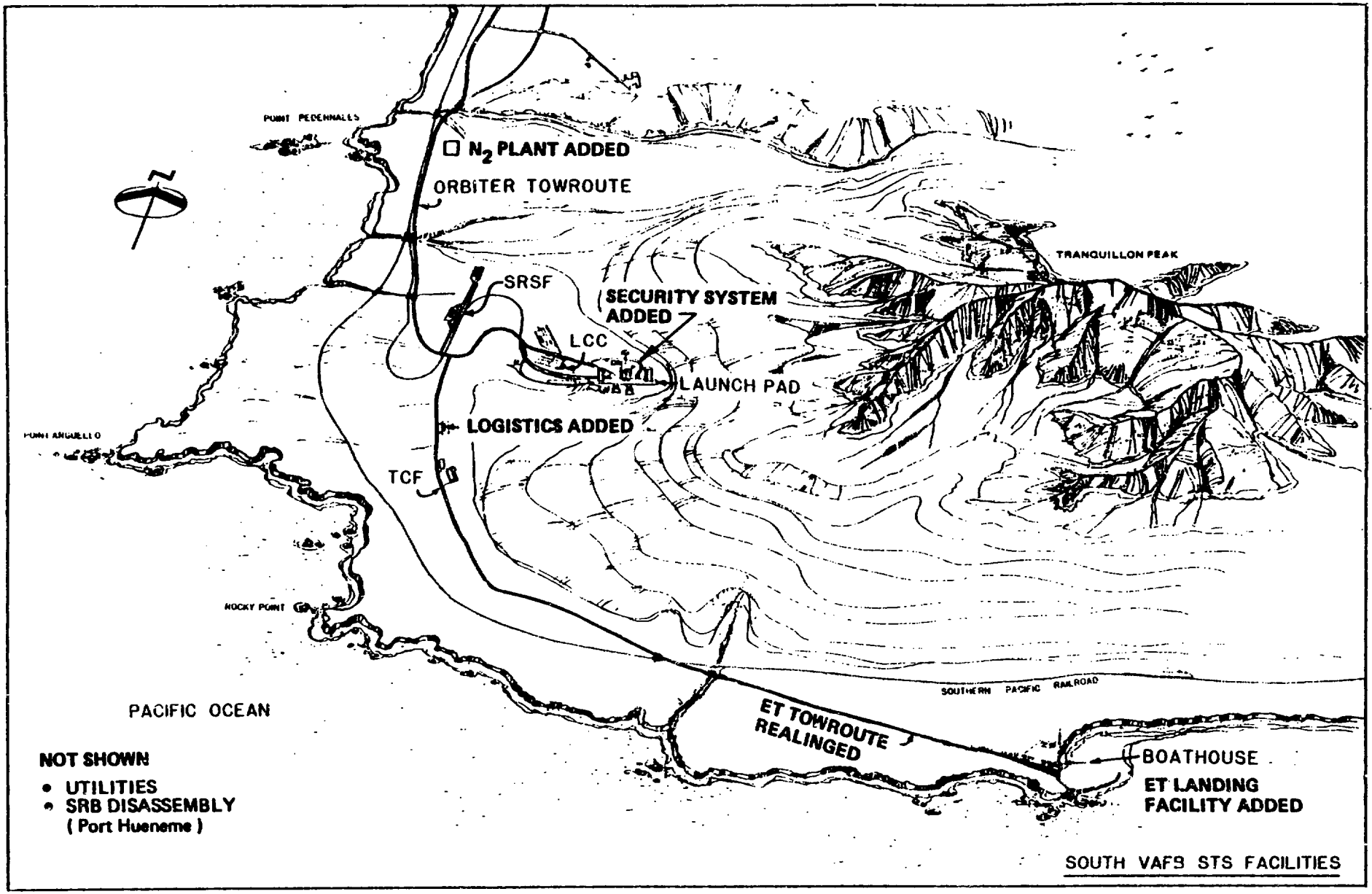


FIGURE 2.2.7–B ARTIST'S PERSPECTIVE OF SOUTH VANDENBERG SHUTTLE FACILITIES SHOWING PRIMARY PROGRAM CHANGES

2.2.8 IMPLEMENTATION OF THE PROPOSED PROJECT

This section presents the construction cost schedules and labor requirements for both construction and activation/operations phases for the Shuttle program at Vandenberg AFB. This information reflects the construction phase status of March 1982 and activation/operations phase status as of September 1982.

2.2.8.1 Construction Cost Summary

Total construction investment costs for the required facilities at Vandenberg AFB and Port Hueneme will be 559.0 million (program year dollars). This figure, however, simply represents estimated appropriation requirements for facility construction in a particular year and does not reflect estimates of actual expenditures. Table 2.2.8-1 summarizes the estimated expenditure profile (1980 dollars) associated with the estimated Military Construction Program (MCP) requirements. Construction is anticipated through FY 1986 due to the particular time-phasing of the construction projects proposed in the later years of the Shuttle MCP. The peak construction activities for Vandenberg AFB facilities was during FY 1981. Construction of the Solid Rocket Booster (SRB) and External Tank (ET) processing facilities, and continued launch complex facility construction occurred during this time period. Construction of these facilities as well as other facilities throughout the 1979-1986 period (logistics, airfield landing flight crew, SRB disassembly, ET landing, and deservicing facilities) will result in increased economic activity thoughout the regions of influence and is analyzed in Section 2.5.2.

2.2.8.2 Construction Manpower Summary

Table 2.2.8-2 summarizes the total annual average requirements for craft labor and supervision, inspection, and overhead personnel (SIOH) at Vandenberg and Port Hueneme through the construction phase of the STS program. These estimates reflect labor requirements based upon the estimated expenditure profile presented in Table 2.2.8-1 and sur-

Table 2.2.8-1. SHUTTLE EXPENDITURE PROFILE, VANDENBERG AFB (V) AND PORT HUENEME (PH), (MILLIONS OF 1980 DOLLARS).

Fiscal Year	(V)	(PH)
1979	9.36	--
1980	45.45	--
1981	87.59	--
1982	84.85	--
1983	50.39	11.00
1984	43.23	2.50
1985	25.18	--
1986	10.50	--
Total	356.55	13.50

Source: USAF, 1982.(165)

Table 2.2.8-2. CONSTRUCTION PHASE LABOR REQUIREMENTS FOR SHUTTLE CONSTRUCTION ACTIVITIES, VAFB AND PORT HUENEME, 1981-1985.

Fiscal Year	Vandenberg AFB			Port Hueneme		
	Craft	SIOH	Total	Craft	SIOH	Total
1979	52	13	65	--	--	--
1980	230	50	280	--	--	--
1981	654	135	789	--	--	--
1982	524	110	634	--	--	--
1983	325	68	393	63	13	76
1984	222	46	268	16	3	18
1985	149	31	180	--	--	--
1986	85	18	103	--	--	--

Source: USAF, 1982[165]

vey data which reflects historic labor levels on a monthly basis. Total craft and SIOH labor at VAFB on an annual average basis stood at approximately 789 in 1981.(165) During the peak construction period in 1981, a monthly peak of 914 construction and SIOH workers occurred in September.

Craft labor requirements for construction of Port Hueneme facilities are approximately 63 in fiscal 1983 and 16 in fiscal 1984.

2.2.8.3 Activation and Operation

Table 2.2.8-3 summarizes the estimated direct employment increases at Vandenberg and Port Hueneme on a fiscal year basis. An increase of 84 jobs is projected for Port Hueneme beginning in FY 1985. At Vandenberg, however, increased employment is expected to reach 5,139 in FY 1986 and level off at approximately 4,838 by FY 1988. Support equipment procurement expenditures are slated for Vandenberg AFB during activation phase activities, with approximately $4.9 million per year slated for operations phase activities in the long-term.

2.2.9 Activation Optimization

In order to begin launching the Space Shuttle from Vandenberg AFB by 1985, a method has been proposed to optimize existing facilities and capabilities at the Kennedy Space Center (KSC) at Cape Canaveral, Florida while construction is being completed on VAFB. Under this program, at least one facility would be totally deleted from the VAFB construction plan, and the building of others would simply be deferred (while maintaining a 1987 completion schedule). It may also be advantageous to divide some of the functions between KSC and VAFB, with each retaining certain responsibilities.

The program calls for the first two or three Space Shuttle flights launched from Vandenberg to land at KSC, where several processing activities would be conducted. This plan would enable the first flights from VAFB to proceed two years earlier than originally

Table 2.2.8-3. ACTIVATION/OPERATIONS PERSONNEL ASSOCIATED WITH THE SHUTTLE PROGRAM AT VANDENBERG AFB (V) AND PORT HUENEME (PH), FY 1980-1988[1,2].

Fiscal Year	Military (V)	Military (PH)	Civilians (V)	Contractors (V)	Contractors (PH)	Total
1980	89	--	43	981	--	1,113
1981	128	--	64	1,298	--	1,490
1982	228	--	120	1,979	--	2,327
1983	494	--	179	2,411	--	3,084
1984	644	--	227	3,424	--	4,295
1985	116	4	246	4,269	80	4,715
1986	586	4	284	4,269	80	5,223
1987	595	4	284	3,959	80	4,922
1988	595	4	284	3,959	80	4,922

1. Does not include estimates of testing surge increases--FY 1985: 415; FY 1986: 805; FY 1987: 415.

2. Based on activation optimization and Initial Operational Capability (IOC) of October 1985.

Source: Fiederer, 1982.(57)

planned. In addition, duplication of facilities would be eliminated or reduced, creating a cost advantage and lessening potential environmental impacts.

The facilities and changes being considered in this scenario include the following:

- Orbiter Maintenance/Checkout Facility
  - -Deferred; first three launches processed at KSC.
- Hypergolic Maintenance/Checkout Facility
  - -Deleted as separate facility
  - -Some functions transferred to KSC: remainder performed at VAFB
  - -VAFB functions moved to other facilities
- Solid Rocket Booster Refurbishment and Subassembly
  - -Some functions transferred to KSC and manufacturer; remainder retained at VAFB
- Solid Rocket Booster Retrieval and Disassembly
  - -First three launches retrieved using KSC ship; remainder retained
- Parachute Refurbishment
  - -Deleted from VAFB; all done at KSC
- External Tank Processing and Storage
  - -Some functions transferred to manufacturer

2.3 DESCRIPTION OF THE EXISTING ENVIRONMENT

New information concerning the existing environment at Vandenberg and the surrounding region has been collected and reviewed since the Shuttle Final EIS was published. This information, in the form of studies conducted by research teams and governmental agencies, has expanded the scientific knowledge of the environmental setting at the

base and includes: air quality, terrestrial and marine biology, archaeology, socioeconomics, and other environmental aspects that will be affected by the Shuttle Program. The following discussion summarizes the findings of recent studies. Background data and analyses are commensurate with the importance of the issues involved. Less important material is summarized and referenced. References are cited for the reader interested in more complete discussion of environmental baseline information.

2.3.1 PHYSICAL, CHEMICAL, BIOLOGICAL AND ARCHAEOLOGICAL ENVIRONMENT

2.3.1.1 Air Quality

A comprehensive study has been completed for air emissions and air quality impacts expected from construction and operation of the Space Shuttle system. Appendix B summarizes the major findings of this study. Part of this special assessment addresses a profile of current emissions in the region surrounding Vandenberg and Port Hueneme; it is briefly recounted here.

Santa Barbara County currently exceeds the National Ambient Air Quality Standards (NAAQS) for photochemial oxidants--one of the precursors of smog. The county's western portion (which includes Vandenberg) exceeds the NAAQS for total suspended particulates, and the southern coastal area from Point Conception to Ventura County exceeds the national standards for carbon monoxide and oxidants. An inventory of estimated pollutant emissions for Santa Barbara County in 1979 shows that mobile sources (primarily motor vehicles) account for the majority of emission totals. Mobile sources contributed 97 percent of the total carbon monoxide, 47 percent of the hydrocarbon compounds, and 72 percent of the nitrogen oxides produced in the county in 1979. Stationary sources (primarily the combustion of fuels for heat and power generation) accounted for 74 percent of the sulfur dioxide emissions. Pesticide application, farming operations, and construction/demolition to were responsible for most of the particulate emissions in 1979. The occurrence of acid rain, usually

associated with high and persistent sulfur dioxide levels, is not a significant problem in the county at this time.[44]

A 1981 emissions inventory for Vandenberg AFB indicated that Vandenberg accounts for less than two percent of Santa Barbara County's total emissions.[53] Three sources account for the majority of Vandenberg's air emissions: fuel combustion for heating, motor vehicles, and missile launches. Pollutants from missile launches at Vandenberg have decreased significantly in recent years as various test programs have ended. The number of launches dropped to 32 in 1978, less than one-half of the 70 launches the base averaged each year since 1958. Table 2.3.1.1-1 summarizes the emissions inventory for Vandenberg AFB in 1981.

Ventura County shares its western boundary with Santa Barbara County, and includes Port Hueneme--the selected site for SRB recovery and disassembly operations. The northern half of Ventura County is sparsely populated and includes the Los Padres National Forest. The southern section includes the cities of Ventura, Oxnard, and Camarillo. All of Ventura County exceeds the NAAQS for photochemical oxidants; the portion of the county south of the Los Padres Forest also exceeds the national standards for suspended particulates. Like Santa Barbara County, Ventura County's major pollution sources are fuel combustion for heating, motor vehicles, and activities of the petroleum industry.[96]

Port Hueneme is located near the city of Oxnard and serves primarily as a cargo port for industrial and military uses. The U.S. Navy Construction Battalion Center manages several deep draft wharves at the harbor. Air emissions from the center contribute a negligible amount of pollution to Ventura County's air environment--less than one percent of all pollutants. Petroleum storage and handling, fuel combustion, and asphalt and concrete batching operations were the major emission sources at the Naval Center in 1977.[29]

Table 2.3.1.1-1. EMISSIONS INVENTORY FOR VANDENBERG AFB--CALENDAR YEAR 1981

SOURCE CATEGORY	EMISSIONS (tons/yr)				
	Carbon Monoxide (CO)	Hydro-Carbons (HC)	Oxides of Nitrogen (NO_x)	Surfur Dioxide (SO_2)	Particulates (TSP)
STATIONARY SOURCES					
Petroleum Storage and Handling	0	35.0	0	0	0
Organic Solvent Evaporation	0	159.4	0	0	0
Combustion of Fuels	52.8	19.0	251.4	93.1	23.3
Incineration	n	n	n	n	n
Miscellaneous	5.2	66.0	1.9	1.8	26.6
SUBTOTAL	58.0	279.4	253.3	94.9	49.9
MOBILE SOURCES					
Motor Vehicles[a] (on road)	802.5	89.3	44.1	1.7	5.5
Aircraft	137.9	70.5	59.3	8.6	24.9
Ships	nd	nd	nd	nd	nd
Railroads	nd	nd	nd	nd	nd
Other Off-Road Vehicles	nd	nd	nd	nd	nd
SUBTOTAL	940.4	159.8	103.4	10.3	30.4
TOTAL	998.4	439.2	356.7	105.2	80.3

a = Data Based on FY 1975 inventory; n=negligible; and nd=no data available.

2.3.1.2 Noise

New information has been gathered by San Diego State University and the Hubbs/Seaworld Research Institute on the historic and current noise environment of the Northern Channel Islands--particularly San Miguel Island, and how it affects bird and pinniped populations. San Miguel was controlled by the U.S. Navy from 1942 to 1963, and was used as a bombing range during part of that time. This use of the island caused considerable adverse environmental impacts including faunal mortality, accelerated erosion, and the destruction of vegetation, archaeological sites, geological features, and other aspects of the natural environment.(83) Since the island came under the management of the National Park Service in 1963, disturbances by humans have been limited.

Currently, the shores of San Miguel Island are subjected to the following noise sources: surf, wind, animal vocalizations, boats, and aircraft. Sonic booms at San Miguel average eight per month. Local sound levels range from 56 to 69 decibels (A-weighted, 24-hr cumulative); maximum sound levels are frequently between 80 and 90 decibels.(5) Major disturbances to pinnipeds (causing at least half of the population to vacate the beach), occur about 24-36 times per year for sea lions and seals other than harbor seals, and about 48-60 times annually for harbor seals. These disturbances appear to be primarily from combined visual and acoustic stimuli, such as the presence of humans or low-flying aircraft. Sonic booms and boat noises sometimes cause such disturbances; approximately 50% of incident sonic booms cause major disturbances to harbor seals, while about 25% cause such disturbance to the other pinnipeds.

2.3.1.3 Biology

Northern Channel Islands Biology

Ths Northern Channel Islands support a diverse assemblage of marine mammals and seabirds. Figure 2.3.1.3-A shows the marine mammal and seabird species which breed on the Northern Channel Islands. Six pin-

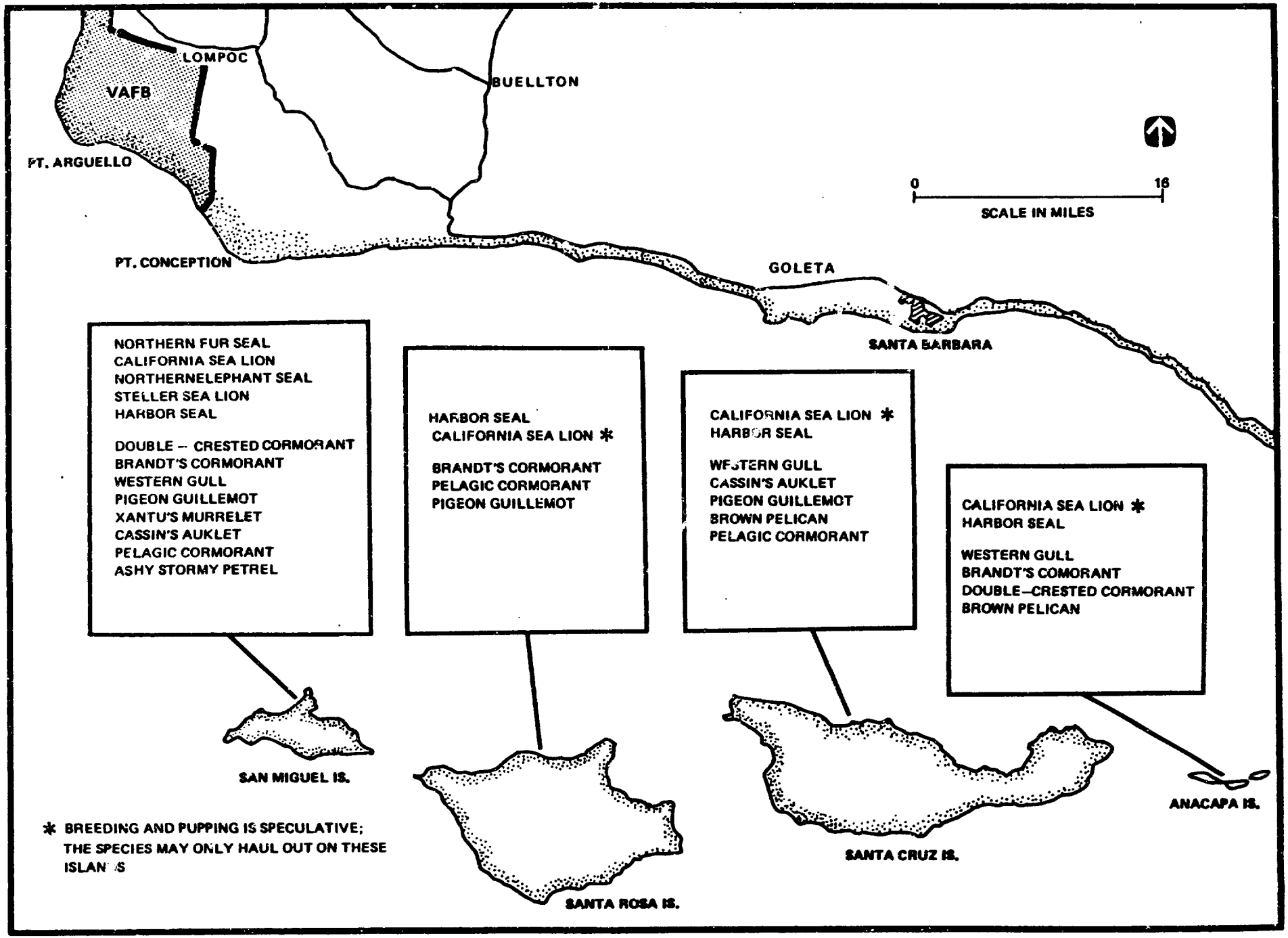


FIGURE 2.3.1.3 – A. OCCURRENCE OF BREEDING POPULATIONS OF MARINE MAMMALS AND SEA BIRDS ON THE NORTHERN CHANNEL ISLANDS

niped species occur in the Northern Channel Islands; the islands are the northern limit of the Guadalupe fur seal and the southern limit of the Northern fur seal and the Steller sea lion. About three-fourths of the estimated 74,000 seals and sea lions which occur in the Southern California Bight spend at least part of the year in the Northern Channel Islands, primarily at San Miguel Island.(151)

San Miguel Island, in addition to sustaining large pinniped populations, is the principal seabird rookery of the Northern Channel Islands. The second largest world colony of the ashy storm petrel is found on San Miguel Island, along with nesting populations of the double-crested cormorant, Brandt's cormorant, pelagic cormorant, pigeon guillemot, and Cassin's auklet.(201)

Point Arguello Boathouse Biology

The marine biota of the vicinity of the Point Arguello Boathouse is representative of this portion of the California coastline, where the overlap of two biological provinces result in high diversity.(31) The nearshore environment is characterized by high surf and a good deal of water and sand movement. Most of the species present are tolerant of sand movement and/or burial, or are good colonizers. Both hard (rock) and soft (sand) bottom substrates are present, with hard bottom predominating in the shallower water. In a recent survey, more than 180 species of soft-bottom invertebrates were identified in the area; 91 species of invertebrates and 71 species of marine plants were identified from the rocky areas.(31) None of the species is unusual for the region. Eighty-one species of larval and adult fish were collected in the area; the most common were walleye surfperch, pile perch, topsmelt, and striped seaperch. Kelp occurs in water over 25 feet (7.6 m) deep and shallower water in the lee of the breakwater. In general, the marine biota of the boathouse area is not as diverse as that of nearby areas, for example at Honda Point 5 miles (8 km) to the northwest.(31)

About 6 harbor seals are resident in the boathouse area, and transient harbor seals are known to haul out on an intertidal rock approximately 165 feet (50 m) west of the breakwater. A few California sea lions and California sea otters have been seen in the boathouse area, and migrating California gray whales have been observed offshore.(31)

Sixty-six species of marine and land birds, none of which is unusual for this part of the coast, have been observed around the boathouse. All of the species known to nest in the area are land birds: blackbird, starling, white crowned sparrow, song sparrow, rock dove, great horned owl, and meadowlark. The brown pelican, an endangered species, is common in the area in the summer, fall and winter, but does not nest there.(31)

Water quality in the area is generally good, although oil and grease values were found to be high and variable in water samples (2.4 to 6.0 mg/l) and in sediment samples (85 to 410 mg/kg wet weight). A natural oil seep is the most likely explanation for this.(127) Lindane concentrations (0.10 to 0.19 ppm) in sediments were higher than those of other pesticides, but not alarmingly so.(31)

Vandenberg Endangered and Threatened Species

The Endangered Species Act of 1973, as amended, is administered jointly by the Department of Commerce, National Marine Fisheries Service (NMFS) and the Department of the Interior, Fish and Wildlife Service (FWS). Marine mammals (except for sea otters) are the responsibility of NMFS, while the FWS is responsible for plants, birds, reptiles, amphibians, freshwater fish, terrestrial mammals, and sea otters. Marine turtles and fish are the joint concern of both agencies.

Resident animal species at Vandenberg that are listed as endangered by the U.S. Fish and Wildlife Service are the California least tern (Sterna albifrons browni), the peregrine falcon (Falco peregrinus anatum), and the unarmored three-spine stickleback (Gasterosterus aculeatus williamsoni). The stickleback occurs in San Antonio Creek, and

least terns are found in several locations at Vandenberg.(112) Individual peregrine falcons have been sighted on and near the base, but no nests have been identified.(180) These same species appear on the State of California list of endangered animals.(21)

In the spring, California least terns nest in shoreline areas of Vandenberg AFB, which is near their northern breeding limit. In the last few years, the amount of habitat protection afforded the least tern at Vandenberg has increased substantially, due to fencing around their nesting areas, which restricts human access during the breeding season. This has not affected the number of breeding pairs (25 in 1977, over 30 in 1979, 23 in 1980) as much as the extent of the shore used for nesting. The nesting area has expanded southward from the mouth of San Antonio Creek, including the shore just south of Purisima Point, where most terns now nest. In addition, nesting success has been good in recent years, almost 100 percent in 1980. The least terns at Vandenberg have been observed to feed at sea, an unusual occurrence because this species normally feeds in coastal streams.(117, 118)

Bells vireo (Vireo bellii pusillus), a bird which has been seen at San Antonio Creek on Vandenberg, is expected to be listed in the future, as either threatened or endangered, by the U.S. Fish and Wildlife Service. This species is listed as endangered by the State of California.(21)

There are no federally listed endangered or threatened plant species on Vandenberg. One plant species listed by the State of California as rare, Lompoc yerba santa (Eriodictyon capitatum), occurs in several places on North Vandenberg.(22) The largest known population on the base occurs in a burned area approximately 0.5 miles northwest of the Orbiter Maintenance and Checkout Facility.

A number of additional plant species occuring on the base are considered of special interest because they are listed as rare or endangered by the California Native Plant Society, and because they appear on earlier lists of species proposed for threatened or

endangered status.[25, 218] The locations of populations of these species have been documented in a report to the U.S. Fish and Wildlife Service on the expected impact of the Space Shuttle Program on special interest plants, as part of the consultation and assistance required by Section 7 of the Endangered Species Act of 1973.[218] VAFB environmental resource maps, showing the location of special interest plant species, are used in planning construction and other activities on the base (See Appendix A).

The risk of fire is sometimes very high on the base. A major fire on South Vandenberg in December 1977 consumed 9,040 acres (3,600 ha) of vegetation.[90] In coordination with Vandenberg resource managers, the U.S. Forest Service and the University of California have entered into a cooperative agreement to develop a plan for controlling fire risks on the base.[60]

Northern Channel Islands Endangered and Threatened Species

At present, the only western U.S. nesting places of the brown pelican (Pelecanus occidentalis) are Anacapa Island (1,300-1,400 pairs) and Scorpion Rock (40 pairs) at the eastern end of Santa Cruz Island.[91] Santa Barbara Island also occassionally hosts nesting pelicans, although Anacapa is the only consistent nesting site on the west coast (See Letter A). This species has shown strong population recovery on the West Coast in the past few years due, in part, to the return of normal egg shell thickness after several years of thin shells attributable to DDT effects.[48]

Peregrine falcons do not nest in the Northern Channel Islands. A few migrate through the islands from time to time, and one or two overwintered at San Miguel Island in 1978-1979 and in 1979-1980. The likelihood of re-colonization of the island by the peregrine is not known.[88]

Marine species listed by the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) as endangered or threatened which may occur in the Southern California Bight include the following:

Gray whale	(Eschrictius robustus)
Blue whale	(Balaenoptera musculus)
Humpback whale	(Megaptera novaeangliae)
Right whale	(Eubalaena spp.)
Fin whale	(Balaenoptera physalus)
Sei whale	(B. borealis)
Sperm whale	(Physeter catodon)
Leatherback sea turtle	(Dermochelys coriacea)
Pacific hawksbill sea turtle	(Eretmochelys imbricata brissa)
Green sea turtle	(Chelonia mydas)
Loggerhead sea turtle	(Caretta caretta)
Pacific Ridley sea turtle	(Lepidochelys olivacea)
Southern sea otter	(Enhydra lutris neresis)
Guadalupe fur seal	(Arctocephalus towsendi)

With the exception of the gray whale, most of these species are fairly uncommon in the project area, although individual animals may be seen.

The majority of the eastern Pacific population (11,000-18,000 animals) of the gray whale migrates through the Southern California Bight twice a year, between December and March. The major migratory routes apparently lie between several hundred meters offshore and the Channel Islands; few whales have been sighted seaward of the Channel Islands.(204)

2.3.1.4 Floodplains and Wetlands

In 1977, two executive orders were issued that called for specific planning by federal agencies engaging in construction within floodplains or wetlands. Executive Order 11988 requires each agency

to consider flood hazards and floodplain management before taking action within an area designated as a floodplain by the Department of Housing and Urban Development (HUD) or the U.S. Army Corps of Engineers.(191) Executive Order 11990 calls for federal action to minimize any degradation of wetlands and to enhance beneficial values, where possible.(192) The importance of floodplains and wetlands has been considered in planning the Shuttle ground facilities at Vandenberg, and Shuttle activities are considered to be consistent with EO 11988 and EO 11990.

The only anticipated action occurring within a floodplain involves the upgrading of the 13th Street Bridge, over which the Orbiter tow route will cross the Santa Ynez River. Descriptions of the Santa Ynez floodplain are included in the Shuttle Final EIS (refer to Figure 3.1.3-B, page 3-23 of that document). Program planners are concerned for the structural integrity of the bridge during flood seasons. The average flow rate of the Santa Ynez River is about 52 cubic feet per second (1.5 cms). The 1969 flood reached a peak discharge rate of about 100,000 cfs (2,800 cms).(162) Loss of this bridge during Shuttle operations could seriously endanger Air Force missions. This is because the bridge is the only passage over the Santa Ynez River between the airfield at North Vandenberg and the launch pad at SLC-6 that is suitable for transporting the Orbiter.

The U.S. Fish and Wildlife Service (FWS) recently mapped, classified and described the wetland areas of Vandenberg AFB.(181) Approximately 5,125 areas (2075 ha) on the base were designated as wetland, in low-lying areas and along the 123 miles (198 km) of streambed on the base. Shuttle-related construction has a potential for impacting a very small fraction of the total wetland area on Vandenberg. Potentially impacted wetlands are described below, in north to south order. Refer to Figures 2.2.7-A and 2.2.7-B.

The northern end of the proposed runway extension will lie just south of a small canyon. Runway construction will impact this canyon (Section 2.5.1.1). Approximately 5,300 linear ft (1,600m) of the bottom of this canyon has been identified as a wetland by the FWS. The

upstream portion of the wetland contains water only part of the year, and the FWS has designated this portion PEMY (palustrine, emergent vegetation, saturated/semipermanent/seasonal). Part of this upper portion of the canyon has been disturbed by use as a borrow area. Due to partial damming by a Southern Pacific Railroad bridge, the downstream portion of the wetland supports a pond most of the year. The FWS has designated this area POWZ (palustrine, open water, intermittently exposed/permanent). This pond covers approximately 6.2 acres (2.5 ha) and supports a good deal of emergent aquatic vegetation.

Between Honda Creek and SLC-6, the Orbiter tow route will cross two seasonal streambeds via existing bridges. Both of these streambeds have been identified as wetlands by the FWS and designated R4SBY (riverine, intermittent streambed, saturated/semipermanent/seasonal).

The small canyon south of SLC-6, which serves as a streambed during rainy periods, has been channelized (graded and lined) to protect the launch area from flooding. In addition, an earthen bridge, with a culvert for water flow, has been built across the canyon. Based on information collected before construction, the FWS designated the bottom of this canyon as a wetland (R4SBW). The best-developed portion of this wetland is west of the new bridge and has not been disturbed.

Approximately 0.8 miles (1.4 km) from the ET landing facility, the ET tow route will cross a small canyon, Oil Well Canyon, that serves as a drainage during rainy periods. Although the FWS has designated this canyon as a wetland (R4SBY), it has been degraded by long-term cattle grazing and supports essentially no aquatic vegetation or wetland function.

2.3.1.5 Archaeological and Historical Resources

Archaeological Resources

Knowledge of Vandenberg's archaeological resources has been recently expanded by four specific studies conducted since the Final EIS. Archaeologists have examined four proposed construction areas: the

Orbiter tow route, the External Tank tow route, and the External Tank landing facility at the Point Arguello Boathouse, and a transmission line corridor on South Vandenberg. Appendix D describes the major findings of these studies.

Three archaeological sites along the proposed Orbiter tow route were resurveyed and partially excavated in an archaeological data recovery program. The three sites are SBa 539, 670, and 931 (SBa is the official California designation for archaeological sites in Santa Barbara County).(162)

Archaeological site SBa 539, as noted in Appendix D, is a heavily disturbed site which perhaps served as a seasonal base camp for various indigenous populations. The fact of considerable population movements occurring prior to late prehistoric times suggests the possibility of recurrent site occupation by various prehistoric people including the Chumash and their direct ancestors. Positive evidence of Chumash occupation must rest on additional site investigation including further excavation work and artifact material dating analysis. Midden deposits at this site are similar to many of the other coastal deposits in the Vandenberg region, with a high density of shellfish remains and evidence of chipped stone tools. SBa 539 investigations also revealed a badly disturbed human burial--the only burial discovered in the course of tow route investigations. An in-field analysis of the remains was followed by reburial near the site at the request of Chumash descendants and under the authorization of the Interagency Archaeological Services.(65)

Archaeological site SBa 670 is similar to site SBa 539 in that it contains several layers of cultural materials associated with different cultural periods including Middle and Late Period components. Preliminary investigations uncovered numerous shellfish remains and various chert flates, although no specific distinctive features such as burial remains or evidence of sedentary occupation were revealed. The relative importance of site SBa 670 is due to its position relative to other sites of importance with the archaeological setting including SBa 539 and SBa 931.

Resurvey and excavations at SBa 931 uncovered additional shellfish remains, chert flakes, and what appears to be a roasting pit of earth and stone construction, adjacent to a graded living area. Previous excavation and resurvey work at this site indicates successive occupation. The lower component of nearby SBa 712 was radiocarbon dated to 5,000-5,700 B.C. This suggests that lower components of SBa 931 may also be of similar age.(65)

Recent surveys of the External Tank tow route near Point Arguello identified 11 previously unrecorded archaeological sites. Nine of the sites, ranging from small surface evidence of shells and flakes to large middens, are located near Oil Well Canyon, northwest of the Boathouse. The other two are coastal sites.(42) Some of these sites have a high density and diversity of stone tools, animal remains, and other evidence of tool making. The deposits probably represent seasonal settlements. Site SBa 1542 (the only site that will be impacted) is located in a chert outcrop near the abandoned Coast Guard Station, and contains an extremely high density of stone tools and flakes. The number of chert outcrops and various tool artifacts found in association with site SBa 1542 indicates a specialized occupational character. The site is not considered unique, however, in consideration of all the archaeological sites and resources of this type at Vandenberg. All sites have been found eligible for inclusion in the National Register of Historic Places in terms of the established eligibility criteria (see Appendix D).

Investigations of submerged lands in the vicinity of the Point Arguello Boathouse revealed no underwater resources of archaeological or historical interest.(30)

The construction of a proposed electrical transmission line on South Vandenberg will impact two archaeological sites: SBa 534 and 680. The cultural artifacts collected from these sites consist almost entirely of chipped stone, suggesting the primary activities were the procurement of raw materials and the production of flake stone tools. No other distinguishing features were noted in the course of data recovery.(76)

During construction of the External Tank Storage and Checkout Facility (TCF) on South Vandenberg resource monitoring activities identified a new archaeological site, SBa-1686. SBa-1686 is an extensive aboriginal site composed of one or more occupational components. The paricity of lithic remains more closely resemble lithic assemblages of local hunting stations common throughout the south coast of Vandenberg AFB, as opposed to more specialized quarry or chert processing. The exact nature of SBa-1686 activities are difficult to determine due to the lack of tools, hearths and faunal remains, distinct occupational zones, and adequate chronological makers including resolvable stratigraphy found at the site.(143)

During extension of the Runday, resource monitoring activities identified two new paleontological sites.(122) The two paleontological localities included shale bedding planes yeilding a variety of fossil imprints. The fossil imprints of paleobatanical, invertebrate, and vertebrate types include fossils of fish, crabs, algae (kelp), and coprolite (fecal) materials. These finds are not unique, as similar fossil material from the Monterey Formation in this locality is present at numerous, visible sites throughout this region.(72)

Historical Resources

The now deactivated Coast Guard Station at Point Arguello was constructed in 1936 and consists of three major structures: an administration/ barracks building, a garage, and a boathouse/pier complex that has been proposed for removal. This station is architecturally interesting because it is one of the few West Coast representations of the Eastern U.S. Colonial Revival style. Three other similar Coast Guard stations exist on the California coast: one at Fort Point, near San Francisco; another at Point Reyes; and a third at Humboldt Bay. The Point Arguello Boathouse, along with the Coast Guard Stations at Point Reyes and Humboldt Bay, has been declared eligible for inclusion in the National Register of Historic Places.(97) Appendix E presents a more complete discussion of the historical value of this facility.

Additionally, during extension of the Runway, resource monitoring activities identified a new historic site.[122] This site was a U.S. Army occupation from the late World War II or Korean War Period. A concrete foundation and other small wooden structures built during the 1940's and 1950's were observed, as well as glass and ceramic fragments, and tin cans of this vintage.

2.3.2 SOCIOECONOMIC ENVIRONMENT

This section updates the demographic, economic, housing, and land use information presented in the 1978 Final EIS. Data presented in that report relied heavily on 1970 Census information. More current estimates from the 1980 Census and other sources are now available. Current population and employment projections also are available and will be valuable in measuring the degree of the anticipated growth attributable to Vandenberg AFB and other local activites. Much of the effect will occur in the communities in the North County. Figure 2.3.2-A shows the location of the principal subareas of interest in the North County.

2.3.2.1 Population

Population estimates for Santa Barbara County and its subareas are presented in Table 2.3.2-1. Total population in Santa Barbara County grew at the average annual rate of 1.2 percent between 1975 and 1980, and is projected to grow at a reduced rate of 1.0 percent between 1980 and 1985 (assuming no effect from the Shuttle program). This projected increase, however, is not distributed evenly throughout the County. Whereas the South Coast area population is projected to increase by approximately 3,700 persons by 1985, North County population is estimated to increase by approximately 10,800 persons by 1985. Principal to these projections are assumptions regarding water availability and land use policies. Water moratoria in the Goleta Valley, Montecito, and Summerland Water Districts are assumed to continue through the 1985 time frame, and result in reduced levels of growth in these areas. North County projections, however, assume water availa-

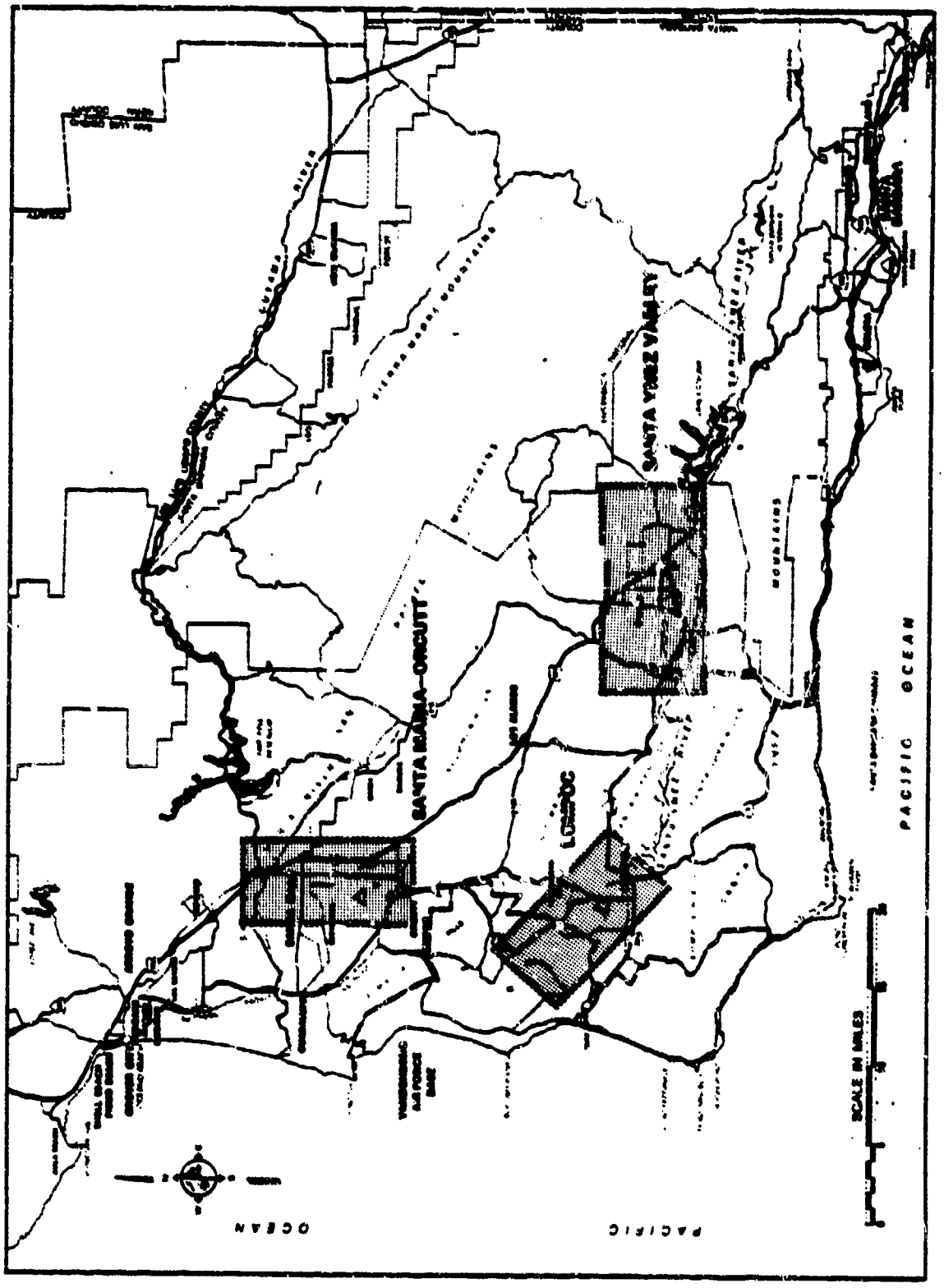


FIGURE 2.3.2–A LOCATION OF PRINCIPAL SUBAREAS OF INTEREST, SANTA BARBARA COUNTY

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Table 2.3.2-1. CURRENT POPULATION AND PROJECTIONS FOR SANTA BARBARA COUNTY AND SUBAREAS, 1980 AND 1985.[1,2]

Area	April 1975	April 1980	April 1985
Santa Maria/Orcutt Area	53,680	63,460	70,000
Lompoc	33,828	36,643	38,750
Balance of North County	26,422	27,735	29,906
Subtotal North County	113,930	127,838	138,656
South Coast	167,125	170,856	174,625
Total	281,055	298,694	313,281
North County Percentage of Total	40.5	42.8	44.3
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[1] North County projections assume there will be available water, land use policies will be responsive to market needs, and no increased activity at Vandenberg AFB.

[2] South Coast projections assume continuance of water hook-up monatoria in Goleta Valley, Montecito, and Summerland Water Districts.

Source: Pauley, 1982.(123)

bility will not be a limiting factor,[123] and that land use policies will be responsive to market needs.

The Santa Maria/Orcutt area's population is projected to increase by the largest amount of all the subareas in the County, approximately 6,500 persons by 1985. Most interesting to note is the North County's increasing percentage share of the County's total population. By 1985, North County population will account for approximately 44.3 percent of the total county population. This is up from 40.5 percent in 1975 and 42.8 percent in 1980. With the anticipated increase in Vandenberg AFB activities and other non-VAFB related projects, this figure can be expected to increase further. Subsequent increases in demand for residential and commercial land are also anticipated and will result in increased pressure for conversion of land currently in agricultural use to more urban uses.

2.3.2.2 Employment

Civilian labor force, employment, and unemployment levels for the Tri-County region of influence are presented in Tables 2.3.2-2 and 2.3.2-3. Wage and salary employment by place of work in the Tri-County region amounted to approximately 357,500 in 1981, with Ventura and Santa Barbara Counties accounting for the majority of the total regional employment. Retail trade, service, and government employment accounts for the majority of the wage and salary employment in each county area. While these figures reflect a continued growth in job opportunities on a place of work basis in each county area, significant levels of inter-county commuting and self-employed proprietors raise employment levels significantly on a place of residence basis (including all civilian and government workers) in the Tri-County region, and amounted to 473,700 in 1981, with approximately one-half being residents of Ventura County. In 1981 approximately 33,400 residents in the Tri-County region were unemployed, resulting in an aggregate unemployment rate of 7.2 percent. Within the region, Santa Barbara County registered the lowest rate, 6.1 percent, with San Luis Obispo County and Ventura County following with rates of 6.7 per-

Table 2.3.2-2. WAGE AND SALARY EMPLOYMENT BY PLACE OF WORK, 1981

Industry	Santa Barbara County		San Luis Obispo County		Ventura County	
	Number	%	Number	%	Number	%
Agriculture	7,900	6.0	1,950	3.8	15,900	9.1
Mining	1,600	1.2	250	0.5	2,900	1.7
Construction	4,900	3.7	3,150	6.1	7,300	4.2
Manufacturing	17,800	13.5	3,750	7.3	25,400	14.5
Transportation and Public Utilities	5,300	4.0	3,300	6.4	6,900	4.0
Wholesale	4,100	3.1	1,300	2.5	7,300	4.2
Retail Trade	25,200	19.2	11,550	22.5	30,800	17.6
Finance, Insurance and Real Estate	5,900	4.5	1,900	3.7	8,300	4.8
Services	33,900	25.8	10,200	19.9	32,000	18.3
Government	24,800	18.9	13,950	27.2	37,900	21.7
Total	131,400	100.0	51,300	100.0	174,700	100.0

Source: California Employment Developed, 1982.[23]

Table 2.3.2-3. CIVILIAN LABOR FORCE, EMPLOYMENT AND UNEMPLOYMENT, 1980-1983[1] ANNUAL AVERAGES, SANTA BARBARA, SAN LUIS OBISPO, AND VENTURA COUNTIES.

County	1980	1981	1982	1983
Santa Barbara County				
Civilian Labor Force	148,100	153,600	158,000	162,700
Employment	139,800	144,300	147,000	152,100
Unemployment	8,300	9,300	11,000	10,600
Unemployment Rate	5.6	6.1	7.0	6.5
San Luis Obispo County				
Civilian Labor Force	64,000	67,000	69,000	71,000
Employment	60,100	62,500	63,500	66,000
Unemployment	3,900	4,500	5,500	5,000
Unemployment Rate	6.1	6.7	8.0	7.0
Ventura County				
Civilian Labor Force	234,500	246,500	256,000	265,600
Employment	217,200	266,900	235,200	245,100
Unemployment	17,300	19,600	20,800	20,500
Unemployment Rate	7.4	7.9	8.1	7.7

[1] 1982 and 1983 reflect forecasts as of May 1982.

Source: California Employment Development Department, 1982.(23)

cent and 7.9 percent, respectively. With the exception of Santa Barbara County, these rates were comparable to the national average of 7.6 percent in 1981 for all workers in the United States.(39) Projections for 1982 indicate annual average unemployment rates in the three counties will rise to 7.0 percent in Santa Barbara County, 8.0 percent in San Luis Obispo County, and 8.1 percent in Ventura County. Preliminary figures for 1982 have been posted through July 1982 and while the state-wide unemployment rate reached 10.7 percent in July 1982, up from 9.4 percent in June, Santa Barbara County registered a 8.3 percent unemployment rate and San Luis Obispo County registered 8.6 percent. While these local rates are on the rise, they still remain below state rates even in light of recent cutbacks in some North county business sectors most notably, the Piper manufacturing plant closure (loss of 800 jobs) and the CBS Records cutback (loss of 400 jobs). The relatively superior position of the region as contrasted to unemployment levels throughout the rest of the State can be attributed in part to expansion of Vandenberg AFB programs.

2.3.2.3 Status of Land Use Plans

The County of Santa Barbara completed adoption of the Land Use and Circulation Elements of the Comprehensive Plan in December 1980. Complementing the County land use element, which addressed the inland portions of the County, the Local Coastal Plan established long-range land use policies for the coastal areas in the County. The Local Coastal Plan was adopted by the County in January 1980 and received full certification from the State Coastal Commission in August 1982. The County has initiated the process of revising its zoning ordinances and land use plans since state statues require that these must be consistent. A proposed zoning ordinance is expected to be reviewed by the Santa Barbara County Board of Supervisors in November 1982.

Proceeding concurrently with work on the County land use plans has been revision of the County housing element which was adopted in July 1981.

The cities of Santa Maria and Lompoc have also been active in updating their respective planning documents. Santa Maria's City Council approved an amended land use element and revised circulation element in May 1982. The City's housing and recreation elements, as well as the circulation element, however, remain in review to insure future growth may be accommodated. The recreation element is expected to be approved in 1983. A revised housing element is anticipated to be approved in mid-1983 while a circulation amendment is likely to be approved in November 1982. Santa Maria has completed the general plan Environmental Resources Management Element and adopted it in 1981.

The City of Lompoc is currently updating its land use, circulation, and recreation elements. The housing element was released in draft form in 1981 and is currently under review by the State Office of Housing and Community Development. In concert with the preparation of the housing element, a revision of the land use element has been researched and written. Action on the land use element will utilize the public input taken during the review of the housing element. Work in 1982 is expected to focus on updating the recreation element with the use of a recently-prepared recreation plan.

2.3.2.4 Residential Land

Data for residential land are presented in Table 2.3.2-4 for the municipalities and unincorporated areas of the North County. Examination of the distribution of vacant land between the different areas shows that the Santa Maria/Orcutt area has the largest amount of land for future residential development (over 3,800 acres - 1,540 ha). The Lompoc and Santa Ynez Valley areas have similar amounts of vacant residential land with 1,577 acres (638 ha) and 1,660 acres (672 ha), respectively. Single family residences and similar low density developments are planned in the North County, since over 90 percent of the vacant land is designated for development at densities of 6.2 dwelling units/acre or lower. The areas for higher density development (12 dwelling units/acre or greater) are divided between the Santa Maria/Orcutt and Lompoc areas in the following manner, 237 acres (96 ha) and 157 acres (64 ha), respectively.

Table 2.3.2-4. DEVELOPED AND VACANT RESIDENTIAL LAND--NORTH COUNTY.

Area	Residential Land (Acres)								
	Low Density		Medium Density		High Density		Total		
	Developed	Vacant	Developed	Vacant	Developed	Vacant	Developed	Vacant	Percent Developed
City of Santa Maria[1]	NA	919	NA	125	NA	6	NA	1,050	NA
Orcutt Area*[2]	2,026	2,662	--	106	46	--	2,072	2,768	42.8
City of Guadalupe[3]	NA	103	NA	7	NA	--	NA	110	NA
Guadalupe Area[2]	4	15	--	--	--	--	4	15	21.1
City of Lompoc[4]	890	346	129	45	224	44	1,243	435	74.1
Lompoc Valley[2]	872	1,074	11	28	14	40	897	1,142	44.0
Santa Ynez Valley[2]	1,481	1,630	6	11	29	19	1,516	1,660	47.7
Total	NA	6,749	NA	322	NA	109	NA	7,180	NA

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NA = not available.

*Includes Los Alamos, Sisquoc, and Garey.

Sources: 1 City of Santa Maria, 1980. (137)
2 County of Santa Barbara, 1980. (136)
3 City of Guadalupe, 1980. (73)
4 City of Lompoc, 1981. (102)

2.3.2.5 Housing Units

The 1978 Final EIS contained data on the housing stock as of 1975. Since that time significant additions to the housing stock have taken place in the North County. These have been due in part to the increased housing prices in the South Coast, limited availability of water hook-ups in the Goleta area, and relatively lower costs for residential land in the Orcutt area. The North county had increases in the yearly housing stock ranging from approximately 1,200 to 2,000 dwelling units/year. The South Coast had substantially lower additions, ranging between 300 to 860 dwelling units/year. During the five year period ending in 1980, the additions to the housing stock in the North County were 180 percent greater than the additions to the South Coast. Since 1980 and up until mid-1982, however, the North County experienced additions to the housing stock four times greater than additions to the housing stock in the South Coast. Total dwelling units in the North County area rose from 38,054 units in 1975 to 47,521 in mid-1982. In the South Coast region, housing increased from 65,667 units in 1975 to 68,793 in mid-1982.(126)

The City of Lompoc had substantial additions to the housing stock between 1975-1980: 11.4 percent of the North County single family dwellings, 40.1 percent of the 2-4 unit dwellings, and 30.5 percent of the 5-plus units. Since 1980, however, the City's share of North County single family dwelling unit additions in the North County increased to 16 percent, the share of additional North County 2-4 unit dwellings fell to 32 percent, and 5-plus units built in Lompoc comprised nearly 50 percent of all those built in the North County. Lompoc has not had a mobile home park constructed since 1975. Santa Maria on the other hand experienced a reversal in building trends from the 1975-1980 time period. During the 1975-1980 period Santa Maria had 28.6 percent of the North County's additional single family units, 48.1 percent of the 2-4 unit group, 45.8 percent of the 5-plus apartments and town houses, and essentially no mobile home additions until 1980. Since 1980 and up to mid-1982 the City of Santa Maria's proportion of North County single-family unit additions was 56 percent, 2-4

unit additions 50 percent, and 5-plus unit additions 29 percent. Also, more than 200 mobile homes were added to the City's housing stock. These two cities dominated the North County's housing growth. Remaining growth occurred primarily in unincorporated portions of the North County, particula ly in Orcutt and the Santa Ynez Valley.

The location of future residential construction will be determined by the demand for new units and the supply of land available for housing construction. The land use elements of the County Comprehensive Plan and the Santa Maria and Lompoc General Plans act as the governmental policy statements on the supply, location, and allowable densities of future housing development. With use of these elements, the number of additional dwelling units that can be constructed has been determined for each of the subareas in the North County. Table 2.3.2-5 displays this information as well as the number of existing dwelling units. The determination of allowable dwelling units has not taken into account land requirements for streets, public easements, and open space as well as lot restrictions due to slope, drainage, and other building site constraints. These factors can mean the actual constructed densities could be 25 percent less than the maximum permitted densities.

The Orcutt area has the largest growth potential with 16,118 additional units. This additional growth would be 190 percent increase above the mid-1982 baseline level. The cities of Santa Maria and Lompoc also have potential for growth given the current municipal boundaries but to lesser extent. Presently both cities have quantities of vacant residential land that would result in between 27 and 29 percent increases in the number of dwelling units if development were to take place at the maximum densities permitted by their respective general plans. Unincorporated areas of North County, excluding Orcutt have the potential to increase the number of their residential units by more than 50 percent under maximum allowable development conditions. The largest portion of this potential growth would occur in the Lompoc and Santa Ynez Valleys.

Table 2.3.2-5. EXISTING AND ADDITIONAL DWELLING UNITS--NORTH COUNTY.

Dwelling Units	City of Santa Maria	Orcutt Area	City of Guadalupe	Guadalupe Area	City of Lompoc	Lompoc Valley[1]	Santa Ynez Valley	Total North County[2]
Number of existing dwelling units (6-30-82)	15,974	8,480	1,068	223	10,217	5,944	5,615	47,521
Maximum number of potential additional dwelling units (6-30-82)[3]	4,360	16,118	545[5]	68	3,026[6]	4,006	1,834	29,954

1 Includes VAFB and Los Alamos.

2 Does not include Cuyama.

3 As per comprehensive and general plan build out capacities; the number of dwelling units actually constructed.

4 Scheel, 1981.(139)

5 Power, 1981.(126)

6 Thompson, 1981.(103)

Source: Machacek, 1982.(103)

2.4 RELATIONSHIP OF PROPOSED ACTION TO LAND USE PLANS, POLICIES, AND CONTROLS

2.4.1 RELATIONSHIPS ONBASE

No major changes in the construction and operation of shuttle facilities at Vandenberg have been proposed, and the general land use areas that have been established in the Vandenberg AFB Master Plan will not be altered. However, since the publication of the Shuttle EIS, a major program has been initiated at Vandenberg: the development of an advanced Inter-Continental Ballistic Missile (ICBM) known as MX.

2.4.1.1 MX Program

Extensive testing of the nation's newest ICBM system, Missile X, will be conducted at Vandenberg by the Ballistic Missile Office at Norton Air Force Base, California. MX activities will include support facility construction; equipment assembly, installation, and checkout; and missile ground and flight tests. Twenty research and development flight tests will be made from Vandenberg between 1983 and 1986, to be followed by operational flight tests by the Strategic Air Command. MX test launches will be similar to the Minuteman Missile tests and other operational exercises currently performed on the base. A Final Environmental Impact Statement for Milestone II of the proposed Full-Scale Engineering Development of the MX System was filed with EPA in October 1978.(161)

Construction of MX facilities has begun at sites about 3.5 miles (5.6 km) north of the base cantonment on elevated ground known as San Antonio Terrace and at a single site within the cantonment area. Ground support facilities for MX testing will require about 30 acres (12 ha) for a Missile Assembly Building, Stage Modification Facility, Integrated Test Facility, and other structures. Development of the MX test facilities on North Vandenberg will not conflict with land uses for the Space Shuttle Program. Figure 2.4.1.1-A shows the location of the MX test and launch facilities at San Antonio Terrace.

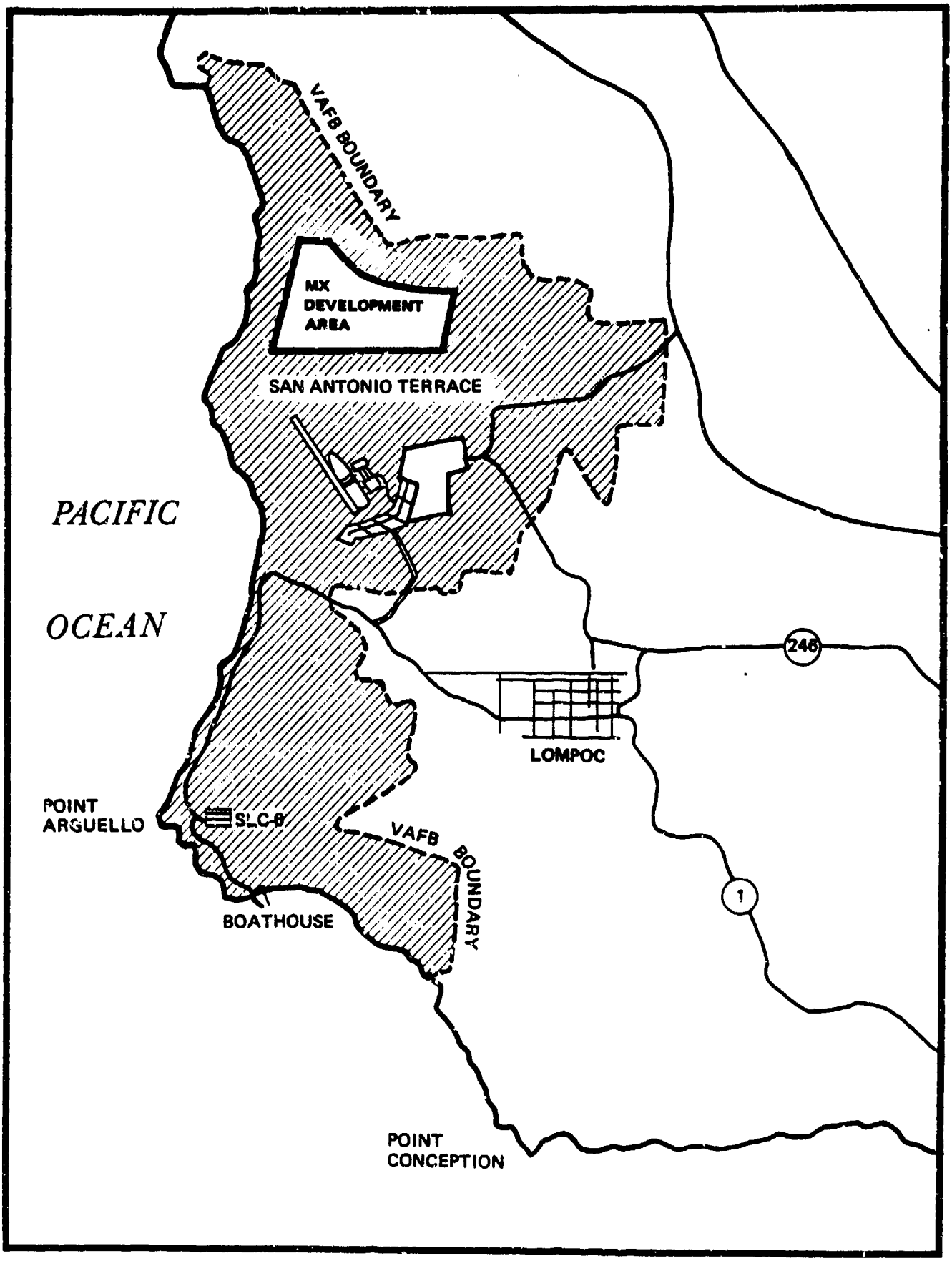


FIGURE 2.4.1.1–A MX DEVELOPMENT AREA AT SAN ANTONIO TERRACE

2.4.1.2 Other Vandenberg AFB Programs

Expendable rocket boosters will continue to deliver military and scientific payloads into earth orbit for at least the next six years until the Shuttle becomes fully operational. Launch facilities are available at Vandenberg for firing Scout, Thor, Atlas, and Titan III launch vehicles for orbiting space missions, and Minuteman and Bomarc missiles for suborbital defense testing.(161) From 1980 through 1985, several dozen launches of expendable vehicles are expected at Vandenberg.

Launching of Scout, Atlas, or Titan III vehicles from South Vandenberg could result in a temporary halt in Shuttle construction at SLC-6. For safety and military security reasons, the entire South Vandenberg area will probably be evacuated several hours before a launch. Construction delays will be short term and are unlikely to seriously impair Shuttle construction schedules.(10)

Another test program has been proposed at Vandenberg which is smaller in scope than either the Shuttle or MX Programs. The Space Defense System, if implemented, would require an existing building (as yet unidentified) for the mission operations center. Minor modifications to this structure will be required for computers and test monitoring terminals. Development of the prototype Space Defense System will require two to five launches of the Scout launch vehicle from the SLC-5 launch facilities at Vandenberg. No new construction will be required.(166) Consequently, there will be no land-use conflicts between the Space Defense System and the Shuttle Program.

A large tank system has been proposed for storing hypergolic propellants that may be used for large non-Vandenberg programs such as the F-16 aircraft, and for several Vandenberg launch operations, including the Shuttle Program. This facility will be located on South Vandenberg and will accommodate 1.1 million pounds (0.5 million kg) of hydrazine and 2.3 million pounds (1.0 million kg) of nitrogen tetroxide.(104) The proposed plans for hypergolic storage will not conflict with planned Shuttle ground support facilities.

The Air Force Logistics Command has proposed to construct and operate a liquid nitrogen storage and conversion plant at a site about 2 miles (3.2 km) north of SLC-6.(144) Both gaseous and liquid nitrogen are required for industrial processes supporting the Shuttle Program, as well as other Vandenberg AFB operations. Ten alternative sites and two optional pipeline routes to SLC-6 were evaluated in a recent assessment.(155) The proposed action calls for construction on a total of 6.2 acres (2.5 ha) for both the storage and conversion plant and pipeline.

5 The Strategic Air Command (SAC) is the host organization at Vandenberg AFB and has recently proposed a number of base improvement projects. A Military Construction Program (MCP) has been suggested for Fiscal Years 1983 to 1986 that would include: vehicle maintenance shops, petroleum operations buildings, road improvements, a security police facility, a fire station, a new control tower, enlisted personnel housing, visiting officers quarters, and a data processing facility.(147) None of these projects is essential to the Shuttle or MX Programs, but would provide indirect support by increasing efficient use of base facilities.(15)

2.4.2 RELATIONS OFFBASE

2.4.2.1 LNG Ship Terminal and Processing Facility

Point Conception has been proposed as the site for a terminal for the receipt of liquified natural gas (LNG) from Indonesia and Alaska. The LNG project, if approved, will be the largest facility of its kind in California and will significantly augment the State's natural gas supplies. The California Public Utilities Commission presented a description of the proposed project(26) in a Final Environmental Impact Report for the Point Conception LNG Terminal Project. The Western LNG Terminal Associates plans a daily handling volume of 900 million cubic feet (25 million cu m) of natural gas initially, with eventual expansion to 1.3 billion cubic feet (37 million cu m) per

day. Figure 2.4.2.1-A shows the location and configuration of LNG facilities.

The LNG terminal will consist of three 550,000-barrel (87,500-cu m) storage tanks, an administration building, natural gas vaporizer and odorizer units, power generation equipment, and diesel fuel storage tanks. A marine berthing and unloading facility for the terminal will be located about 4,600 feet (1,400 m) offshore. The liquified natural gas will be pumped from a ship through a pipeline supported on a trestle to the three storage tanks. Vaporized natural gas will be supplied to existing gas transmission lines through a newly constructed pipeline leading from the Point Conception LNG facility to Arvin (near Bakersfield, California). As of this writing, Western LNG Terminal Associates have not received the permits needed to begin construction. Western LNG terminal associates are currently evaluating the feasibility of the project. Based on this review construction is not estimated to begin until the late 1980s or early 1990s.(138) Once development permits have been obtained, construction of the LNG facilities will require from 48 to 54 months to complete.(45) Construction activities would employ a peak number of 1,485 workers; operation employment will number about 30.

Concern has been expressed for the safety of construction and operation personnel at the LNG terminal site. The proposed location is within a missile debris hazard zone for certain launch azimuths and wind conditions. Casualty risks might be high enough to prevent missile launches. On the basis of unacceptable risks to national security and defense missions, the Air Force Systems Command filed a petition with the Federal Energy Regulatory Commission on August 30, 1979 opposing the development of the terminal at the Point Conception site. Subsequently, an agreement was established between the Air Force and the Western LNG Terminal Associates that set forth procedures for reducing personnel risks by sheltering personnel under certain high risk launch conditions.(208) A hold-harmless agreement was signed by both parties to establish responsibilities for damage or injury that might result from U.S. government actions. Western LNG

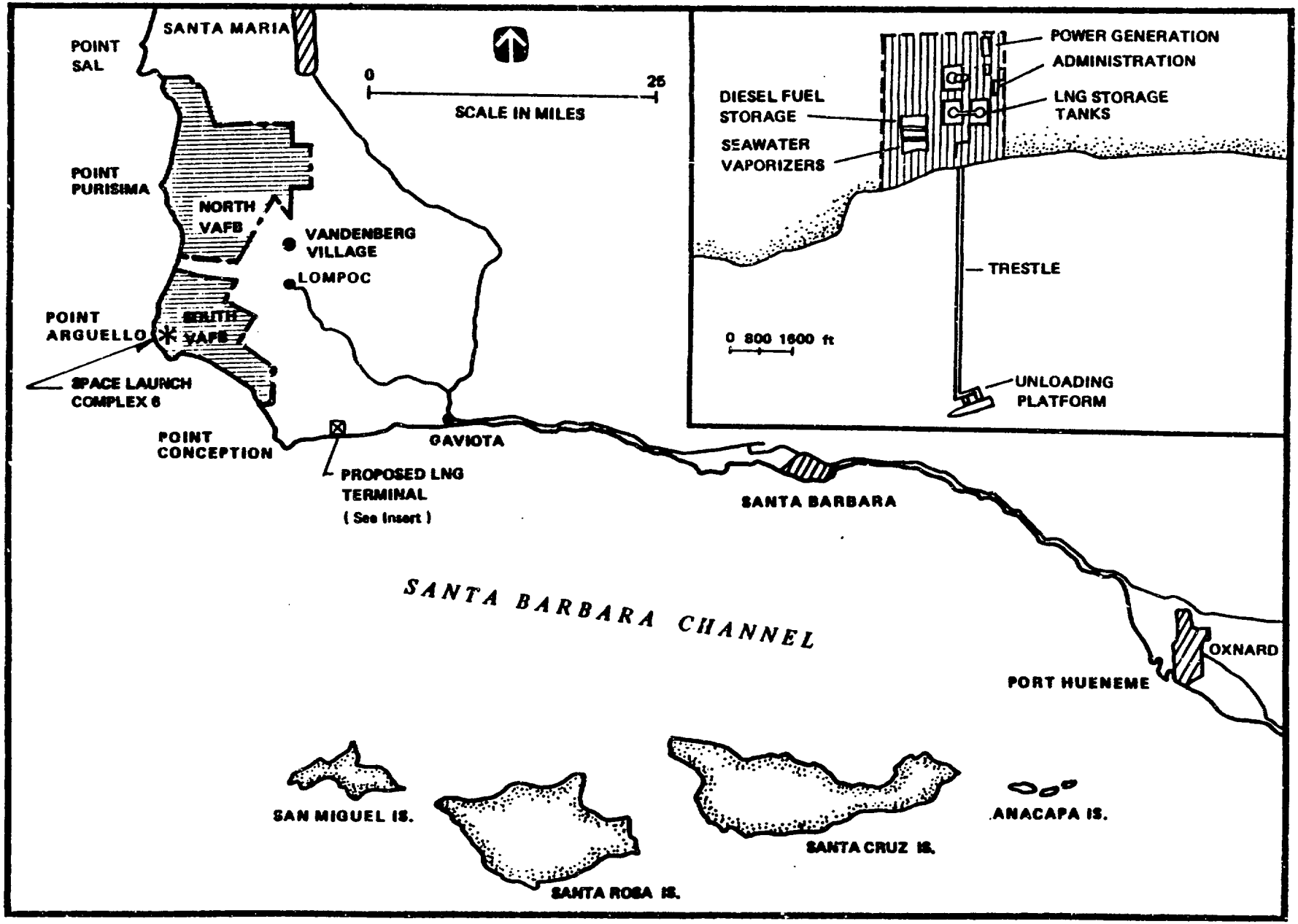


FIGURE 2.4.2.1–A LOCATION OF PROPOSED LNG TERMINAL AT POINT CONCEPTION, CALIFORNIA

Terminal Associates assumes all risks of damage or injury under the agreement, and guarantees the Air Force's right to review and approve future development of industrial facilities (other than LNG) located within a 4-mile radius of the LNG site. Figure 2.4.2.1-B shows the complete text of the hold-harmless agreement. Western LNG has further agreed to work with the Air Force in building their facility to shelter specifications for the protection of LNG personnel during missile launches. Evacuation procedures will be developed for any personnel who cannot be provided shelters.(208)

A risk analysis of Shuttle impacts on LNG facilities at Point Conception has been completed. Risks were calculated using a statistical analysis technique that included considerations of 1) the working population of the LNG facility, 2) the shelters expected to be available, 3) the trajectory of Shuttle launches, 4) the reliability of the missile, 5) the number of missile pieces expected from a possible in-flight break-up, 6) the effects of wind on missile debris, 7) the abort lines for missile safety, and 8) the potential kinetic energy of missile pieces following a break-up.(10) Calculations incorporating these factors are currently under evaluation and preliminary analysis indicates the risk is acceptably low. In addition to Shuttle launches, there are also minimal risks to the LNG facility by the Scout, Thor, Atlas, and Titan III launches from Vandenberg.

2.4.2.2 Bixby Ranch Development

A planned private housing development southeast of Vandenberg AFB would also lie within the missile debris hazard zone for certain launch azimuths and wind conditions. Planners for Bixby Ranch have proposed to construct about 400 new dwellings on coastal slopes between Jalama Beach and Point Conception (refer to Figure 2.4.2.2-A). Single-family homes would be individually sited in rural clusters rather than urban clusters such as townhouses or condominiums.(211) Vehicle access would be via Jalama Road. Precise details of the proposed development have not been established. As proposed, the development would be within the safety hazard zones associated with launches of some Titan III, Atlas, and Space Shuttle vehicles.

HOLD HARMLESS AGREEMENT

Whether or not compensation for any damage or injury might be due under a theory of fault or strict or absolute liability or otherwise, Western LNG Terminal Associates ("Western"), assumes all risks to damage or injury to persons or property which occurs at or near the Little Cojo Point Conception LNG terminal site to any person or persons or to any property of any person or persons who are agents, employees or invitees of Western doing business with the permittee in connection with any activities being performed by Western at the above-mentioned LNG terminal site, if such injury or damage to such person or property occurs by reason of the activities of any agency of the U.S. Government, its contractors or subcontractors, or any of their officers, agents or employees, being conducted as a part of or in connection with the programs and activities of the Space and Missile Test Center (SAMTEC).

Western assumes such risk whether such injury or damage is caused in whole or in part by any act or omission regardless of negligence or fault, of the United States, its contractors or subcontractors, or any of their officers, agents, or employees. Western further agrees to indemnify and save harmless the United States against all claims for loss, damage, or injury sustained by Western, and to indemnify and save harmless the United States against all claims for loss, damage, or injury sustained by the agents, employees, or invitees of Western, or any independent contractors or subcontractors doing business with Western in connection with the programs and activities of the SAMTEC, whether the same be caused in whole or in part by the negligence or fault of the United States, its contractors, or subcontractors, or any of their officers, agents, or employees and whether such claims might be sustained under theories of fault or strict or absolute liability or otherwise.

FIGURE 2.4.2.1-B **D HARMLESS AGREEMENT BETWEEN THE DEPARTMENT OF THE ... FORCE AND WESTERN LNG TERMINAL ASSOCIATES, 1979**

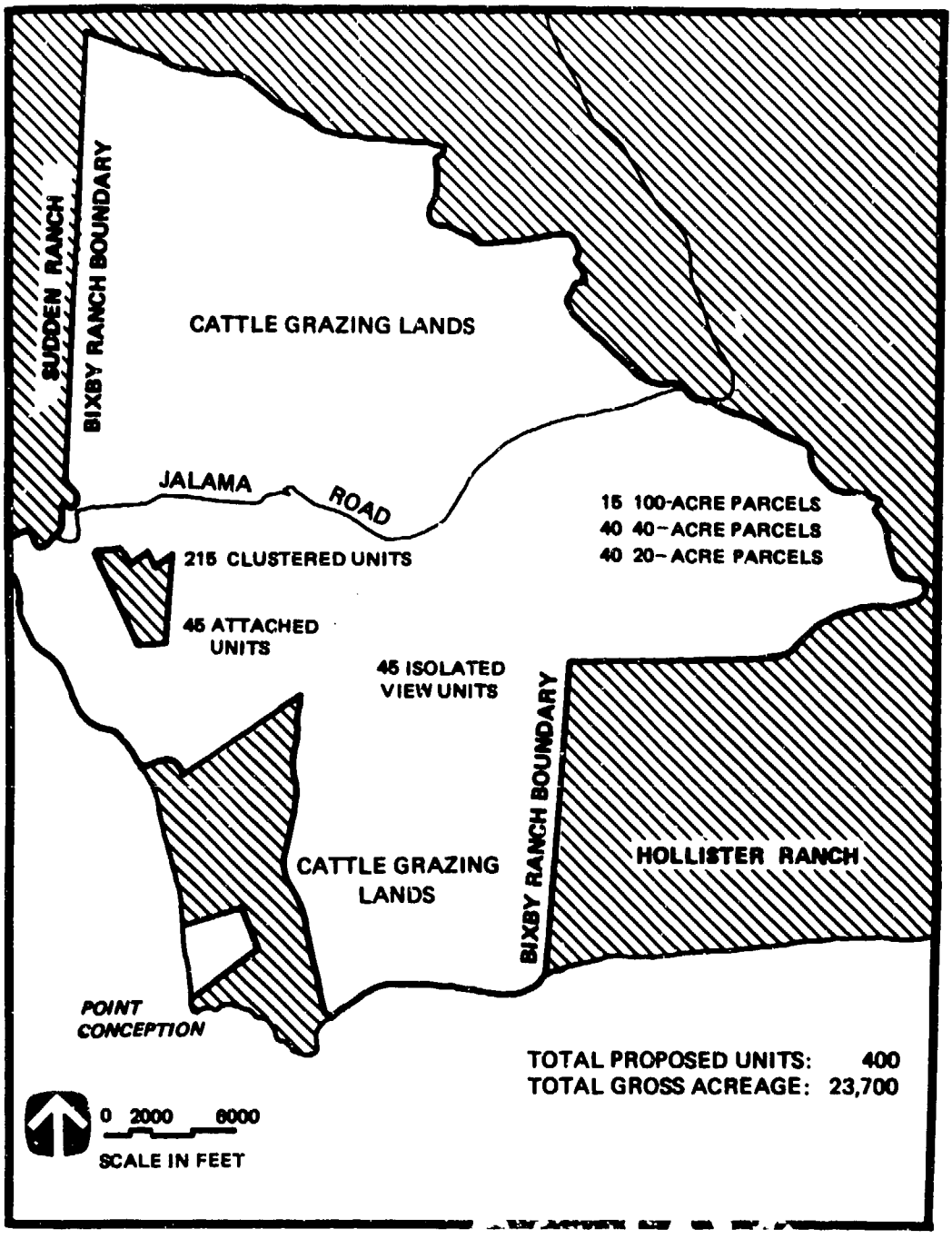


FIGURE 2.4.2.2–A PRELIMINARY PLAN FOR RESIDENTIAL DEVELOPMENT AT BIXBY RANCH

Residential development at Bixby Ranch would be permitted if a proposed coastal plan is implemented in Santa Barbara County. The Local Coastal Plan (LCP) was drafted by special staff of the County Planning Department and has been approved by the County Planning Commission, the County Board of Supervisors, and the California Coastal Commission over objections by Air Force officials at Vandenberg AFB. The coastal plan was implemented in August 1982, after county approval and state certification of the Coastal Zone Ordinance. These actions occurred after a series of public hearings in the fall of 1981 and winter of 1982.(1)

Land Use Policy 8-8 of the LCP directly affects large-scale developments on agricultural land, such as proposed with the Bixby Ranch development. The policy provides for the protection of non-prime agricultural operations of 10,000 acres (4,047 ha) or greater within certain planning areas. Provisions include density restrictions, with bonuses for developments where housing units are clustered on 2 percent or less of the gross acreage. The remaining land must be retained for agricultural operation or open space. The development must also provide acreage for public recreation and visitor services to be acceptable to the County.

Policy 8-8 lists a number of conditions for acceptability of a development project. The County must find proposed projects to be compatible with long-term efforts to protect agricultural operations. Water resources must be adequate for development, giving priority water use to existing agricultural operations. Rural character must be retained and restrictions must be enforced that would permanently maintain agricultural lands and open space. Relevant to Air Force concerns is Finding C of Policy 8-8:

> The County shall make the findings that the proposed development has been sited and designed so as to: 1) avoid and buffer all prime agricultural areas of the site; 2) minimize to the maximum extent feasible the need for construction of new roads by clustering new development close to existing roads; 3) avoid placement of roads or structures on any environmentally sensitive habitat areas; 4) minimize impacts of non-agricultural structures on public views from beaches, public trails and roads, and public

> recreational areas; and 5) minimize risks to life and property due to geologic, flood, and fire hazard.

Because portions of the Bixby Ranch property lie in missile debris hazard zones, Air Force officials are concerned for the safety of persons and property in the event that land southeast of Vandenberg AFB is developed in accordance with Policy 8-8. To maintain acceptable safety levels, some missile launches would have to be delayed under certain wind conditions if the Bixby Ranch proposal were implemented. Delays of Titan III, Atlas, and Space Shuttle launches could seriously jeopardize Air Force space activities, and might conflict with the Congressional directive to provide polar orbiting capabilities. In an August, 1981 letter to the Santa Barbara County Board of Supervisors, the Air Force formally requested an amendment to the Local Coastal Plan.(207) The Air Force proposed to add the following to finding C(5) of Policy 8-8:

> ...and those hazards associated with national defense and space activity within the County.

The proposed amendment reflects the Air Force position that County policies should require all known public hazards, including those resulting from space launches, to be considered in siting development.

Because the original 1978 plans for the development of Bixby Ranch conflict with the Local Coastal Plan (adopted in 1981), some modifications to the Bixby plans will be required.(1) The Air Force has suggested that if the development area is moved inland (northwestward) at least three miles (5 km), protection of life and property would be assured. Bixby planners have also considered providing shelters as a measure to protect residents. However, personnel shelters would do nothing to protect property and there is currently some question as to the legality of requiring residents to use safety shelters during each launch.(16) The Air Force is continuing to meet with officials of Santa Barbara County, the California Coastal Commission, and representatives of Bixby Ranch in order to find a mutually acceptable solution to the problem of public safety at Bixby Ranch.

2.4.2.3 Outer Continental Shelf (OCS)

The U.S. Geological Survey has estimated oil and gas reserves in Santa Barbara Channel at 300 million barrels (48 million kl) of oil and 300 billion cubic feet (8.5 billion cu m) of natural gas. Exploration, development, and production of these fields was authorized by the Department of the Interior, Minerals Management Service, under a lease sale plan that continued federal OCS leasing offshore of California. Offshore leasing began in this area in 1963 and was followed by 1966 and 1968 lease sales in the Santa Barbara Channel, OCS Sale No. 35 in 1975, and OCS Sale No. 48 in 1979 in the Southern California Bight.[175] The U.S. Bureau of Land Management has recently leased parcels in OCS Sale No. 53, which extends along the central and northern California coast from the Point Conception vicinity to the Oregon border. Some parcels of No. 53 are under or near missile launch trajectories off the western coast of Vandenberg AFB.

Following an OCS lease sale, exploratory wells are usually drilled on the tracts having the best prospects for discovery. These wells are drilled from temporary work platforms such as semisubmersibles, jackups, and drillships. If commercially productive reservoirs are found, development wells are normally drilled from fixed platforms. The development phase of oil operations requires offshore or onshore hydrocarbon storage and processing facilities, as well as pipelines and deepwater tanker ports.

Offshore oil production platforms may be moderately threatened by missile launches from Vandenberg at a much lower risk factor than the Bixby Ranch development, but similar to the LNG Terminal. In order to provide safety measures, the Air Force established "shared use" stipulations in the earlier OCS Lease Sale No. 35 and No. 48. The Air Force has requested that the Bureau of Land Management include similar shared use stipulations for the necessary parcels of No. 53. Further, the Air Force has requested that any permit or license issued by the U.S. Army Corps of Engineers for test drilling or production operation include these shared use stipulations.[6] The concept of shared use provides for joint use of leased areas by the oil industry and the

military commander. In effect, the oil industry will use the leased areas 99 percent of the time, but agrees to shelter or evacuate personnel when requested to do so by the military commander during the remaining 1 percent of the time used for missile launches. Under the stipulations, OCS parcel lessees agree to assume all risks of damage or injury to persons and property resulting from missile launch activities of the U.S. government. Oil operations must be suspended temporarily at the direction of military commander; personnel must be evacuated and shelters must be provided for persons not evacuated. Lessees must comply with boat and aircraft restrictions and control their electromagnetic emissions to minimize interference with missile launch operations.(6)

2.4.2.4 Inner Continental Shelf (ICS)

The California State Lands Commission has announced plans to lease Inner Continental Shelf (ICS) oil tracts between Point Arguello and Point Conception. The lands include approximately 40,000 acres (16,200 ha) of submerged and tidal properties extending from the mean high tide line seaward to the State's three nautical mile limit.(27)

Air Force comments on conflicting uses of this area were provided to the State Lands Commission for inclusion in an EIR by the Commission. Shared use stipulations, like those enacted for all OCS lease sales, have been requested for inclusion in all ICS lease sales by the state.(212)

2.4.2.5 Northern Channel Islands

In May 1980, portions of the Northern Channel Islands of San Miguel, Santa Rosa, Anacapa, and Santa Cruz were designated as a National Park. In September 1980, the area six nautical miles (11 km) surrounding San Miguel, Santa Rosa, Anacapa, Santa Cruz, and Santa Barbara Islands was designated as a National Marine Sanctuary, administered by NOAA. The Channel Islands are well known as important feeding and nesting areas for numerous animals as well as for their marine mammal (pinniped) and bird rookeries. These islands also sup-

port unique plant and animal communities and a number of endemic species. Archaeological and paleontological resources are abundant throughout the islands. Santa Rosa Island, now slated for acquisition from private owners, has long been used for cattle grazing. The Nature Conservancy owns approximately 90 percent of the Santa Cruz Island, and currently leases it for cattle ranching.(78) The remaining 10 percent will be acquired for the National Park. Anacapa Island and Santa Barbara Island made up the Channel Islands National Monument prior to being included in the National Park. The islands of Santa Barbara, Anacapa, and San Miguel are the subjects of a National Park Master Plan, published in 1981.

2.5 ENVIRONMENTAL IMPACT OF THE PPOPOSED PROJECT

Shuttle Program impacts have been reevaluated in light of recent changes in the program and newly-acquired knowledge of the affected environment. Impacts are identified and discussed in two sections, which are presented in a sequence similar to the Final EIS. The first section summarizes the significant impacts to the physical, chemical, biological, and archaeological environment; the second section addresses socioeconomic impacts.

The following paragraphs address the significant issues raised by the proposed changes in the Shuttle Program. The direct and indirect impact is noted. To give appropriate emphasis to the various issues, insignificant issues are discussed first, stating briefly why no significant effects are anticipated, and indicating where additional coverage of the issue may be found. Significant issues are collected under separate sub-headings. Table 2.5-1 summarizes the significant and insignificant issues associated with proposed program changes.

2.5.1 PHYSICAL, CHEMICAL, BIOLOGICAL, AND ARCHAEOLOGICAL IMPACTS

The physical, chemical, biological and archaeological impacts that result from changes in the Shuttle Program include effects on air

quality, shoreline stability, topography, soils, hydrology, water quality, floodplains, wetlands, noise, biology, archaeology, historical resources, and weather. In relating these effects, reference is frequently made to the impact discussion presented in the Final EIS.

2.5.1.1 Construction Impacts

Most of the environmental effects from new construction activities at Vandenberg AFB are insignificant issues, as noted in Table 2.5-1. The following paragraphs explain why these are considered insignificant. Significant issues are examined in subsequent sections.

Shoreline stability could be influenced by the development of the External Tank Landing Facility at the site of the Pt. Arguello Boathouse. No major construction is planned for the littoral zone; the proposed action takes advantage of an existing rock breakwater, and no additional protection against sea swell and waves is needed. Dredging in the harbor could interrupt normal littoral sand transport, resulting in small and temporary deprivation of sand to the beach immediately east of the harbor.

Topography and soils of Vandenberg will be affected by facility construction where clearing, grading, and recontouring of the earth is required. The new facilities and acreage involved are: 1) Nitrogen Plant and Pipeline, 6.2 acres (2.5 ha), 2) Launch Pad and Launch Control Complex Security System, 21.5 acres (8.6 ha), 3) Utilities, assumed less than 1.0 acre (0.4 ha), 4) Hazardous Waste Storage Facilities, 15.7 acres (6.3 ha); 5) Logistic Storage Facilities, 6.0 acres (2.4 ha); and 6) various Security Facilities, 15.7 (6.3 ha). Construction of these facilities would cause topographic and soil impacts to about 51.4 acres (20.5 ha). An additional 4.0 acres (1.6 ha) will be disturbed during construction of the External Tank Tow Route, running 6,000 feet (1,800 m) from the Coast Road to the ET Landing Facility. A large cut in the cliff above the Boathouse will permanently alter the topography and drainage in an area 1,000 feet (300 m) long by 50 to 200 feet (15-60 m) wide. Thus, a total of 56 acres

Table 2.5-1. SUMMARY OF SIGNIFICANT AND INSIGNIFICANT ISSUES CONCERNING PROPOSED CHANGES IN THE SPACE SHUTTLE PROGRAM

LEGEND:

● Significant Issue

○ Insignificant Issue

Blank Indicates No Impact or Adequately Discussed in FEIS

PROGRAM CHANGES	CONSTRUCTION IMPACTS									OPERATION IMPACTS										
	Air Quality	Shoreline Stability	Topography & Soils	Hydrology & Water Quality	Floodplains & Wetlands	Noise	Biology	Archaeology & Historical	Socioeconomics	Air Quality	Microclimate	Shoreline Stability	Topography, Geology, Soils	Hydrology & Water Quality	Floodplains & Wetlands	Noise	Biology	Archaeology & Historical	Weather Modification	Socioeconomics
Mate/Demate																				
13th Street Bridge				○	●		○													
SRB Retrieval Facility																				
ET Landing Facility		○		○			●	●						○						
ET Tow Route			○				●	●												
Flight Crew Facilities																				
Nitrogen Plant			○				○													
Launch Pad Security System			○				○													
Utilities			○				○													
Storage Facilities			○				○													
Hazardous Material Transport										○										
Hazardous Waste Disposal										○										
New Construction Schedule	●					○			●											
New Operation Schedule										●						●	●		●	●

(22.4 ha) would be added to the 400 acres (162 ha) already scheduled for clearing and grading in preparation for facility construction at Vandenberg. The combined acreage required for all Shuttle construction would be less than one-tenth of one percent of Vandenberg's 98,400 acres (39,820 ha). Other changes in the proposed action involved existing or previously planned facilities, which are addressed in Section 5.1.1.3 (page 5-11) of the Final EIS. No prime agricultural land will be removed by the proposed action.

Hydrology and water quality will be temporarily affected by modifying the 13th Street Bridge and constructing the External Tank Landing Facility. Bridge modification requirements will result in temporary increases in turbidity in the Santa Ynez River. Accidental oil spills or fuel leaks from construction equipment would affect local water quality slightly. Similarly, construction activities at the boathouse harbor will lead to local and temporary increases in suspended sediments and degradation of water quality. Sediments within the harbor are relatively unpolluted; some lindane may be resuspended, but the levels of this pesticide in harbor sediments are not exceptionally high (0.01 -0.19 ppm). Minor fuel and oil spills during construction would degrade water quality insignificantly since quantities would be low and because the flushing characteristics of the harbor are adequate to dissipate such spills quickly.(31) Vandenberg AFB has established a Spill Prevention and Countermeasure Plan (SPCC) in accordance with Title 40 of the Code of Federal Regulations, Part 112, to provide services and facilities to mitigate impacts from oil spills.(144)

Noise levels resulting from construction at Vandenberg will be generally those outlined in Section 5.1.1.5 of the Final EIS (page 5-17). However, the new construction schedule extends the two-year duration of development activity to six years. No significant effects are expected from this change because, as before, only construction personnel will be exposed to hazardous noise levels and workers will wear hearing protection. Access to construction areas will be controlled.

Biological effects of new construction will be limited to the removal of vegetation during site clearing as noted under topographic effects. New facilities will require the clearing of about 56 acres (22.4 ha). No threatened or endangered species will be removed or affected by construction. Temporary water quality degradation at the 13th Street Bridge will have insignificant effects on Santa Ynez River biology.

Construction of hazardous wastes facilities will have minor environmental impacts. Both the sound suppression/pad washdown water treatment facility (5,000 sq ft; 500 sq m) at SLC-6 and SRB wastewater treatment facility (10,000 sq ft; 1,000 sq m) at Port Hueneme will be located in already heavily developed construction and operations areas, and so will have no additional impact on the natural environment.

The Hazardous Waste Storage Facility will require clearing of approximately 0.8 acres (0.3 ha) of vegetation. This site is the previous site of structures that were used in the 1940s and 1950s and which have since been removed. The site has been colonized by invading native and non-native species, and the vegetation on the site is classified as disturbed/successional. A careful biological survey of the site revealed no special interest plants. Similarly, an archaeological survey of the site revealed no prehistoric or early historic archaeological resources. The site is not located near any wetlands or watercourses.

The environmental effects of implementation of the Activation Optimization Program (see Section 2.2.9) would be beneficial, since construction of some facilities would not occur. The reduction of impacts cannot be quantified until details of the program are defined. Depending on which facilities were deleted and which specific functions were performed at Vandenberg versus Kennedy Space Center, certain construction and/or operation related impacts would be lessened. For example, if the Hygergolic Maintenance/Checkout Facility functions were partially conducted at KSC, there could be a reduction in the amount of hazardous materials requiring handling and treatment at Vandenberg. If this facility were eliminated completely from the Vandenberg construction plan, there would also be a concomitant reduc-

tion in habitat disturbance, dust, noise, etc. Conversely, if the Parachute Refurbishment facility were eliminated as proposed, there would not be any reduction in construction-related impacts, since an existing building was to be remodeled (see Appendix A). There would therefore be essentially no change in construction impacts.

Impacts on Air Quality

Construction of Shuttle ground support facilities will affect local air quality through three major types of air pollution: 1) dust generated by construction activities such as land clearing and grading, 2) exhaust of construction equipment, and 3) offbase pollutants associated with Shuttle-induced community growth.

In 1981, the year of maximum construction activity at Vandenberg, fugitive dust produced during land clearing and grading were expected to account for 88 percent of the total suspended particulate (TSP) emissions expected from Shuttle development. The use of heavy construction equipment will produce 273 tons (248 m tons) of nitrogen oxides (NO_X), comprising more than 99 percent of the total NO_X emissions from the base forecast for that year. Heavy equipment will also release more than 92 percent of the sulfur dioxide (SO_2) produced during 1981. Secondary sources in offbase areas will generate large quantities of carbon monoxide (CO), hydrocarbons (HC) and NO_X resulting from the activities of new residents who move into Santa Barbara County because of Shuttle facility construction.(96)

Under the proposed six-year construction schedule, annual emissions associated with the Shuttle system at Vandenberg will be lower than they would have been under the two-year schedule. The new schedule will spread the amount of construction activity (and emissions) over a longer time period, resulting in a corresponding reduction in impacts to air quality.

The total of the five major pollutants (CO, HC, NO_X, SO_X, and TSP) generated during 1981 will contribute less than 1.0 percent of the 1977 emissions within the South Central Coast Air Basin (SCCAB), and

less than 7.0 percent of the 1977 emissions in Santa Barbara County. All other years of construction will have emission totals below the estimates used for these comparisons.(96)

No significant impact is expected to result from emissions of CO or SO_2. Maximum emissions of TSP, HC, and NO_x were examined further to determine the potential for Shuttle construction impacts on Santa Barbara's attainment efforts for particulates and ozone. The results of a formal Air Quality Impact Analysis (AQIA), using EPA-approved computer modeling techniques, indicate that development of the Shuttle Program at Vandenberg will not impede local efforts to reduce TSP and ozone concentrations. Appendix B includes further information on air quality impacts.

Impact on Floodplains and Wetlands

Modification of the 13th Street Bridge has been evaluated by the Air Force (Figure 2.5.1.1-A). Strengthening the existing bridge will not remove any floodplain or wetland area but will temporarily increase local erosion and turbidity. Because the proposed action calls for modification of an existing bridge, it is considered a development that is compatible with floodplain regulations (E.O. 11988). No other structures are planned and there is no practicable alternative to bridge modification that is consistent with Air Force objectives.

Extension of the runway will impact an area of seasonal drainage in a shallow canyon that has recently been designated as wetland (Figure 2.5.1.1-A). Channelization (grading and lining) of the upper portion of this canyon is necessary to handle the additional runoff from the extended runway. Design was finalized prior to designation of this area as a wetland.(181) No construction is planned for the lower, semi- permanently wet portion of this canyon. This pond area, therefore, is not expected to be impacted adversely; the amount of water available to it may actually increase due to the channelization upstream. Current plans also include use of the now inactive borrow area in the upper portion of this canyon for placement of soil, concrete and asphalt from reconstruction and extension of the runway.

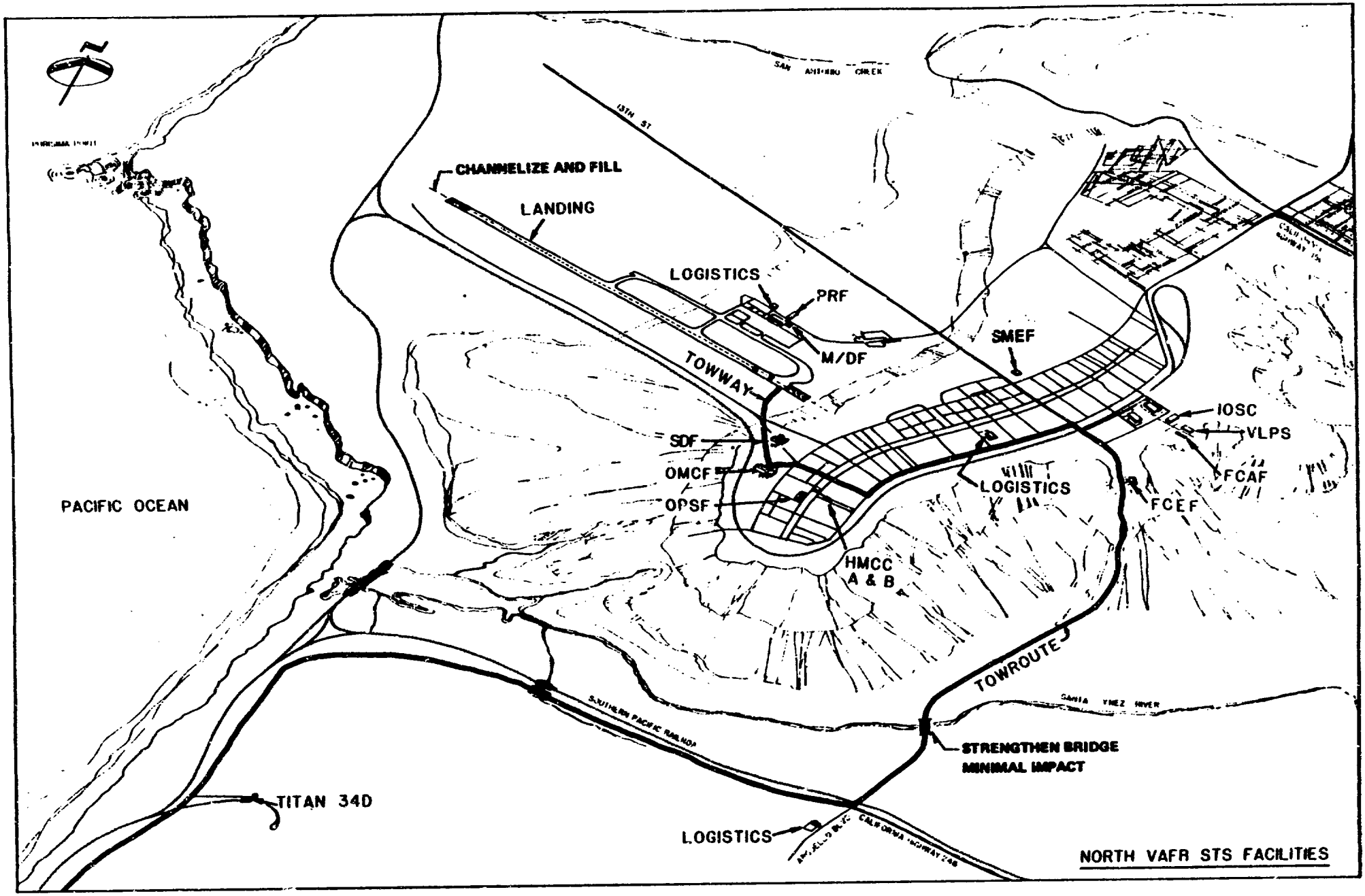


FIGURE 2.5.1.1–A. NORTH VANDENBERG WETLANDS POTENTIALLY IMPACTED BY SHUTTLE CONSTRUCTION

Honda Creek and the two streambeds between Honda Creek and SLC-6 are crossed by earthen bridges with culverts for water flow (Figure 2.5.1.1-B). The bridges have been found to be suitable for Shuttle purposes (towing the Orbiter to SLC-6), and no modifications of the bridges will be required. Therefore, no impact on these wetlands is expected from Shuttle activities.

As stated in Section 2.3.1.4, the small canyon on the south side of SLC-6 was modified before this area was designated a wetland. Drainage control in this canyon by channelization was essential to protect the launch area from flooding, and there was no practical, less environmentally damaging alternative. The best-developed portion of this wetland, downstream from SLC-6, was not disturbed.

Between the ET landing facility at the present site of the Point Arguello Boathouse and SLC-6, the ET tow route will cross Oil Well Canyon, a seasonal drainage which the FWS has designated a wetland. A small section of the canyon will have to be filled to a depth of approximately 10 ft (3 m) to accommodate the tow route (Figure 2.5.1.1-B). A box culvert will be installed to permit water flow. Because the ET tow route must cross this canyon at some point, there is no feasible alternative to this plan that is less damaging environmentally. The proposed site for this crossing supports little aquatic vegetation or wetland function. The wetland impact of this action, therefore, will be slight and much less than it would be upstream in Oil Well Canyon, where wetlands are more extensive.

Shuttle activities and construction have been planned to minimize impacts on floodplains and wetlands. Impacts will occur only where there is no practical alternative. A total of approximately 10 acres (4 ha), 0.2 percent of Vandenberg's 5,100 acres (2,075 ha) of wetlands, will be affected. Where no alternative exists, care has been taken to reduce the impact. The Space Shuttle Program at Vandenberg is therefore considered to be consistent with Executive Orders 11988 and 11990.

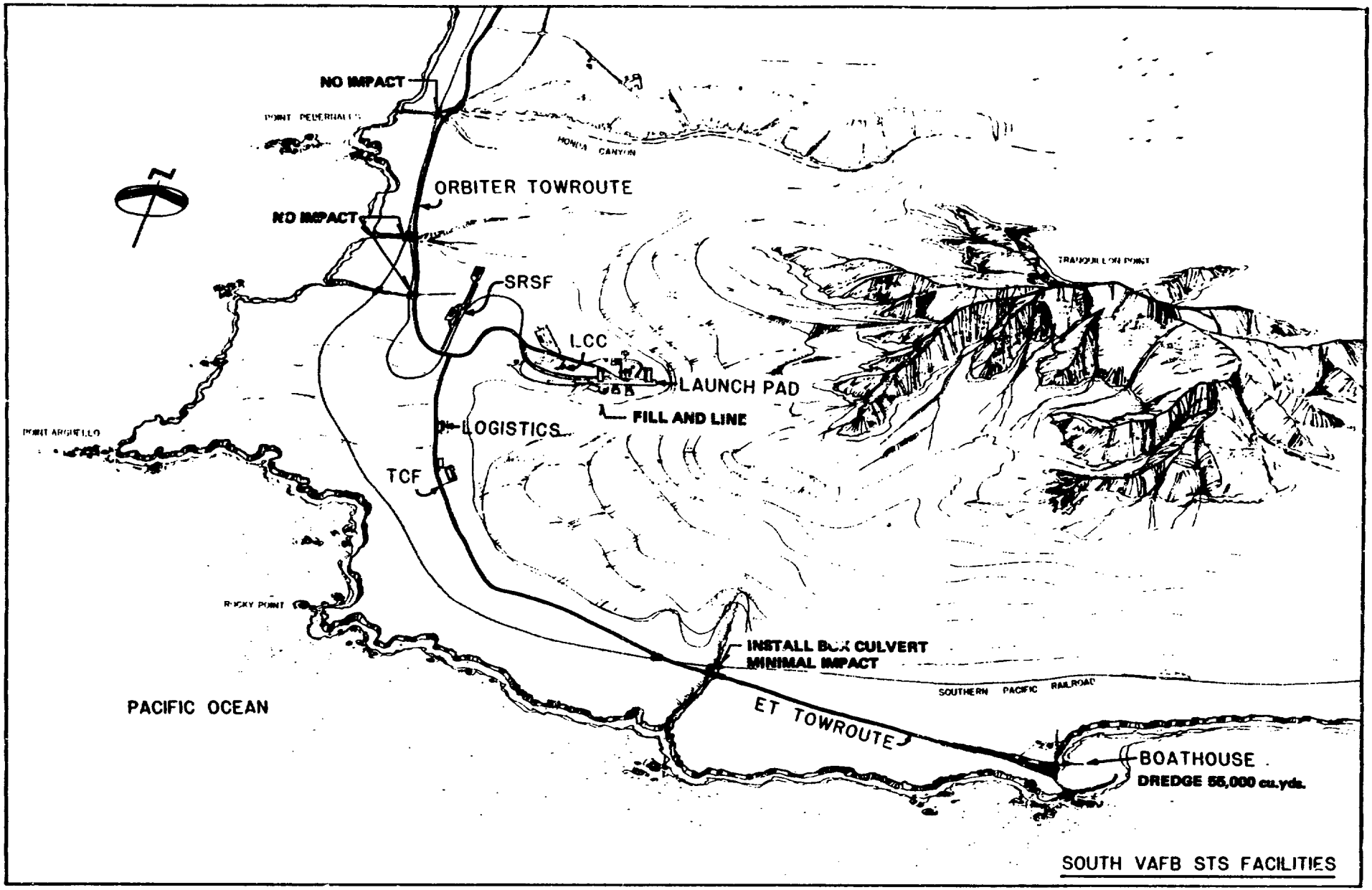


FIGURE 2.5.1.1–B SOUTH VANDENBERG WETLANDS POTENTIALLY IMPACTED BY SHUTTLE CONSTRUCTION

Impact on Biology

Construction of the Central Security Control facility will remove some special interest plants. The two species involved are Arctostaphylos viridissima (Lompoc Manzanita) and Ceanothus impressus (Santa Barbara Ceanothus), neither of which are listed by the U.S. Fish and Wildlife Service as Endangered or Threatened Species. Both of these plants are common on South Vandenberg. The estimated total acreage to be affected is only 0.4 acre (0.16 ha) within a previously disturbed area. Overall impacts are expected to be insignificant.

The environmental impacts of the proposed harbor modification will probably be less at the Point Arguello Boathouse area than they would be for most sections of the Point Conception coast.(31) Only marine life in the small embayment area will be directly impacted. It is not as rich biologically as some comparable areas nearby.(31) Less than one percent of the 35 miles (56 km) of undisturbed Vandenberg coastline will be affected by the proposed project. Moreover, the project site has already undergone some modification by the construction of the pier and breakwater in the 1930s.

Dredging (and possibly blasting) will result in disruption of approximately 2.2 acres (0.9 ha) of hard- and soft-bottom habitat and associated benthic organisms. Recolonization by benthic organisms is expected within two years in non-operation areas. Some sedentary benthic organisms in adjacent areas will be buried by redeposition of sediment suspended by dredging and blasting. A small kelp bed in the lee of the breakwater will be lost, and the construction of the dock will eliminate approximately 0.4 acres (0.2 ha) of intertidal habitat.

Some fish will be killed by underwater blasting, and there is a remote possibility that injury or mortality of seabirds or marine mammals in the area during the blasting could also occur. However, these effects are considered unlikely because increased human activity and equipment noise in the area during construction will discourage marine mammals

and birds from using the area. Harbor seals will probably cease to use the intertidal rocks just west of the breakwater as a haulout area.(31)

Removal of the boathouse, excavation of the cliff, and the general disturbance of construction will destroy some nesting habitat of some of the breeding land birds mentioned in Section 2.3.1.3, Biology.

It is proposed to transport the dredged material for disposal to a one time only ocean disposal site subject to approval by the Environmental Protection Agency (EPA). Two other alternatives for disposal are available: (1) approved EPA ocean disposal site LA-1, near Port Hueneme, approximately 100 miles from the project site; and (2) an upland disposal site. Both these methods would considerably raise the cost of the disposal of the dredged material. A maximum of 55,000 cubic yards (42,075 cubic meters) of Monterey shale and sand (fractured shale generally one foot dia. in size) will be disposed of at this site. The shale is clean, uncontaminated bedrock, with less than 10 percent sand. The proposed disposal site is located 14.4 miles (23.2 km) west of the dredge site and 12.7 miles (20.5 km) west southwest of Point Arguello in the upper reaches of the submarine Arguello Canyon system, at a depth of 2,100 feet (630 m) below mean sea level. Disposal is planned for the fall 1982. This site is located seaward of areas utilized for commercial fishing and is not within any current OCS lease tract or near any oil or gas-related development activities. Impacts to the benthic biology and water quality of the disposal site are expected to be insignificant.

Impacts of the proposed disposal activity will involve minor short-term and localized effects. The short-term increase in local turbidity through the water column above the disposal site will temporarily disturb fish and marine mammal feeding and passage and briefly interfere with phyto- and zooplankton productivity. The deposition of the shale spoil material will temporarily disrupt by smothering the benthic community in a localized area. Feeding and spawning activities of benthic organisms will be interrupted for a short period of time. The characteristics of the sea floor substrate

will be changed slightly, dependent on the amount of spoil material which will disperse versus that which will remain.

The only construction-related fuel spills likely to occur would be small and probably have a minor impact on biota.(31) Mitigation measures designed specifically to reduce the severity of impacts on marine biology are noted in Section 2.7.2.

No listed endangered or threatened plant or animal species on Vandenberg will be impacted by construction. The use of resource maps during construction precludes any impact on endangered or threatened species, and minimizes impacts on other special interest plant species.

Impact on Archaeological Resources

Two recently identified archaeological sites will be affected by newly proposed construction at Vandenberg. The External Tank Tow Route will cross the southern margin of SBa 1542 where the access road rises from the harbor to the coastal terrace above. No unique features have been observed at the archaeological site, although collected data indicate specialized use.(42) Excavation of even a marginal area of SBa 1542 will probably result in the irretrievable loss of some site information.

Data recovery on the impacted area of site SBa 1542 satisfactorily mitigated adverse impacts on archaeological resources. This recovery was conducted under the direction of the Interagency Archaeological Services, in accordance with a "No Adverse Effect" determination made by the Air Force and concurred with by the State Historic Preservation Office and the Advisory Council on Historic Preservation. All plans were approved and field work was observed by representatives of local Native American groups to ensure that religious or sacred artifacts and ancestral resources are protected. All other sites in the Oil Well Canyon area were found to be unaffected in the "No Adverse Effect" determination.

Archaeological investigations at the location of External Tank Processing and Storage Facility were carried out on a portion of site SBa 1686 as part of a program to mitigate impacts to cultural resources from construction of the STS facilities. In contrast to other investigation tasks, the investigations at this site were of an emergency nature since previous archaeological surveys failed to identify potential archaeological resources in the project area, thus preventing anticipation of impacts to archaeological rescurces prior to the initiation of construction. The impacted area of Site SBa 1686 represents relatively small portion of an extensive aboriginal site composed of one or more occupations. The paucity of lithic remains found more closely res mble lithic assemblages of local hunting stations as opposed to a more specialized quarry or chert processing site. The exact nature of SBa 1686 activities are difficult to determine from the investigation due to lack of tools, hearths and faunal remains, distinct occupational zones, adequate chronological markers including resolvable stratigraphy found at the site. The final definition of SBa-1686 function and its role in a regional subsistent/ settlement system will require further analysis.(143)

The effects of realigning and widening Coast Road for use as the Orbiter tow route have been discussed in Section 5.1.1.7 of the Final EIS (Page 5-20 of the EIS). Data recovery efforts at sites SBa 539, 670, and 931 have already reduced the severity of impacts to those sites.(65) Orbiter tow route mitigation measures are discussed further in Section 2.7.2 and in Appendix D. Three archaeological sites (SBa 534, 680 and 923) were potentially impacted by pole placement for a 69kv electrical transmission line. Re-routing the line reduced impacts, including avoiding site SBa 923 altogether.(76) A survey was specifically designed and carried out to provide data which aided realignment efforts. In sites SBa 534 and 680, data was recovered from tests pits near the pole holes as well as from the holes themselves. Data from both sources supported a determination of no adverse impact.(76)

Construction of the External Tank Processing and Storage Facility perimeter fencing may involve part of the archaeological site previously surveyed and recovered prior to building construction. Data recovery is planned for this area prior to fence installation.

Investigations of two paleontogical sites at the location of the Runway extension were conducted as a part of the program to mitigate impacts to cultural resources from construction of the STS facilities. In contrast to other investigation tasks, the paleontogical investigations at the runway were of an emergency nature since previous resource surveys failed to identify potential paleontological resources in the project area, thus preventing anticipation of impacts to paleontological resources prior to the initiation of construction. Although there is no established environmental procedure for paleontological resources, the relative rarity of these bones, their possible completeness, their excellent preservation and easily curated material make these fossils extremely significant, and should be collected if time permits. Accordingly, a number of fossil samples were collected, and will be curated and housed in the paleontological collection in the Department of Earth and Planetary Sciences at Santa Barbara City College. They will be used for educational purposes in the college and local high schools.

Impact on Historical Resources

Construction of the External Tank Landing Facility will result in the loss of the existing boathouse and pier at the Point Arguello Coast Guard Station. The historical integrity of the station would be jeopardized and the overall character of the site would be changed.(97) Mitigation measures established in a Memorandum of Agreement have been approved by the State Historic Preservation Office and the Advisory Council on Historic Preservation. These include archival documentation and restoration of the remaining buildings, and a public historical report on the Boathouse. These measures are noted in Section 2.7.2 and in Appendix E.

Historic site investigations at the location of the Runway extension were conducted on the U.S. Army Occupation site as a part of the

program to mitigate impacts to cultural resources from construction of the STS facilities. In contrast to other investigation tasks, the investigations at the runway were of an emergency nature since previous resource surveys failed to identify potential historic resources in the project area, thus preventing anticipation of impacts to historic resources prior to the initiation of construction. The runway grading plan would significantly affect the remains of the historic site. However, it was concluded that the site was not of National Register quality because the site had been previously disturbed and because of the late date of occupation as evidenced by the observed artifacts.(122)

2.5.1.2 Operation Impacts

Reference is made to Table 2.5-1 that identifies insignificant and significant issues concerning Shuttle operation impacts. As in Section 2.5.1.1, initial paragraphs briefly show why certain issues are considered insignificant. Significant issues are treated under specific sub-headings.

Two new operations have the potential for impacting air quality: 1) transporting of hypergolic propellants; and 2) treating and disposing of hazardous waste materials. In addition, negligible amounts of CO, HC, NO_x, SO_2, and TSP will be released by equipment used to heat new Shuttle facilities.

Transportation of hazardous chemicals for the Shuttle Program could impact air quality and public safety if spills occur. Hypergolic propellants will be shipped to California from manufacturing plants located in Louisiana and Mississippi by trucks utilizing specially designed, propellant-specific tank trailers. Transport of the propellant chemicals must be along highways designated as explosive routes by the California Highway Patrol (CHP). There are two alternative routes for delivery of such materials to Vandenberg listed below from east to west, beginning with entry into California.(148)

- South Route using Interstate 10 (west) to either

  a. Interstate 405 (north) to U.S. Highway 101 (West to Ventura), or

  b. Interstate 210 (north) to State Route 134 (west) to U.S. Highway 101 (west to Ventura).

  Then U.S. Highway 101 (north) from Ventura to State Route 246 (west) to EITHER 13th Street Gate, Coast (Surf) Gate at Vandenberg AFB via either a) State Route 1/Central Avenue/ Floradale Avenue / State Route 246, OR b) State Route 246.

- Northern Route using Interstate 40 (west) to State Route 14 (south by Edwards AFB) to State Route 138 (west) to Interstate 5 (north to Gorman) to State Route 166 (west) to U.S. Highway 101 (south at Santa Maria) to EITHER

  a. State Route 135 (west) to County Road S-20 (south) past Vandenberg AFB Main Gate to Santa Lucia Caynon Road/ Floradale Avenue/ State Route 246, or

  b. State Route 246 (west) to Vandenberg AFB via EITHER a) State Route 1/ Central Avenue/ Floradale Avenue/ State Route 246, OR b) State Route 246 (straight through).

All of these designated alternative hypergolic propellant delivery routes from the California border to Vandenberg AFB are improved two-lane roads or better and are all approximately 350 to 400 miles long. Emergency response procedures have been developed by the State of California for the prompt evacuation of people immediately adjacent to the highway should such a procedure become necessary. Vandenberg AFB implements an Oil and Hazardous Substance Pollution Contingency Plan (OHSPC) to provide a safeguard in the event of a spill of cryogenic and hypergolic propellants on the base.(144) In addition, Vandenberg AFB has provided Santa Barbara County authorities with information on the types of hazardous materials that are transported to the base, and on specific emergency handling procedures for each type of material.

On a routine basis, the base notifies appropriate local agencies whenever a shipment of hazardous material is expected.

The risk of major truck accidents during transport operations have been calculated using established accident rates. About 92 trucks will be needed to deliver cryogenic propellants for each launch, with an average round trip distance of 400 miles. The major accident rate for cryogenic carriers is about 1.0 accidents per million vehicle miles. Assuming 80 launches between 1985 and 1994, about 2.9 major cryogenic accidents are expected.(148)

A similar approach for the transport of hypergolic propellants predicts about 1.8 major hypergolic accidents over the 10 years of the program. This assumes 2 trucks travel a total of 4,536 miles per launch, and a hypergolic accident rate of 1.56 accidents per million vehicle miles.(148) Recent program information indicates that the launch rate for the first few years of the Shuttle Program at VAFB will be lower than previously expected, so that the probability of cyrogenic and hypergolic accidents will likely be significantly lower than discussed here.

On Vandenberg, impacts of hazardous waste generation, collection, transfer, storage, treatment, and disposal will be minimized through implementation of the Space Shuttle Hazardous Waste Handling Plan, the Vandenberg AFB Toxic and Hazardous Waste Management Plan, and the Vandenberg AFB Spill Prevention Control and Countermeasure Plan, which have been developed to assure compliance with federal, state, and local regulations (see Section 2.7.4.3). These plans will minimize the risk of waste spills, maximize the speed and effectiveness of spill cleanup and prevent the discharge of unauthorized wastes.

The impact of accidents at the Hazardous Waste Storage Facility itself will be further reduced by the facility's remote location (the closest structure is 1,250 ft away) in an area with low potential for groundwater contamination. The shale bedrock at the planned site for this facility has very low permeability and overlies minimal groundwater supplies. In addition, the sand overburden at the site is shallow, thus reducing the potential for absorption and transport of liquids.

Impact on Air Quality

Four major air pollutant emission sources have been identified for Shuttle Program operations at Vandenberg: 1) fuel combustion for space and water heating, 2) motor vehicle operation, 3) Shuttle vehicle launch, and 4) sources related to population growth in off-base areas. The combustion of sulfur-containing fuels for heating will generate about 3 percent of the SO_2 emissions expected in 1988--the peak operation year. Emissions from motor vehicles operated on Vandenberg Air Force Base in that year will account for 9 percent of Shuttle-related CO pollutant totals, 4 percent of the HC emissions, and 6 percent of the NO_X total. Ten launches of the Space Shuttle (in 1988) will generate 73 percent of the total mass of TSP emissions associated directly or indirectly with Shuttle Program operations in that year. Offbase sources associated with population growth will be responsible for the majority of emissions--more than 88 percent of the totals predicted for CO, HC, NO_X, and SO_2.[96]

Air pollutant emissions from Shuttle ground support facilities and operations will total less than 0.9 percent of the 1979 emissions of the SCCAB, and less than 3.4 percent of all emissions in Santa Barbara County in the same year. These values reflect 1988 emissions--the year of peak operation activity at Vandenberg. Pollution estimates from the AQIA process suggest that ground support emissions (excluding missile exhausts) will have negligible effect on TSP and ozone concentrations in Santa Barbara County.[96] A summary assessment of air quality impacts is presented in Appendix B.

Several unique industrial processes are required to prepare the Shuttle vehicle for launch; some involve the use of toxic and hazardous substances and chemicals. A preliminary inventory of toxic air emissions has been compiled to identify major sources, potential mitigation measures, and control equipment.[94] Overall toxic air emissions are expected to be low, so that concentrations would pose no hazard to unprotected persons.

Section 5.1.2.1 of the Final EIS (beginning on page 5-22) gives a comprehensive overview of the expected impacts resulting from rocket engine exhausts and the formation of a buoyant ground cloud. No major changes in this discussion are required, beyond the effect of reducing the maximum number of launches from 18 to 10 per year. Adverse impacts to air quality will be correspondingly reduced.

The release of gaseous hydrogen chloride (HCl) in the Shuttle exhaust was addressed by recent air quality studies, which refined predictions of ground level concentrations of HCl gas resulting from a Shuttle launch. Previous predictions were based on 1972 Shuttle exhaust chemistry and developed with the use of the NASA/Marshall Space Flight Center multi-layer diffusion model. The results of these early studies were presented on page 5-28 of the Final EIS. The model predicted that in every case the maximum ground level concentration and exposure to HCl would occur within 6 miles (10 km) of the launch pad, either on Vandenberg or over the ocean. The total mass of HCR generated per launch is estimated to be approximately 21.4% of the total exhaust mass of 250 tons (227,000 kg).

An updated version of gaseous HCl predictions is presented in Table 2.5.1-1. These results consider new information concerning the expected vehicle exhaust chemistry. The primary difference is the new lower heat values for the Shuttle exhaust -- information that is used to calculate cloud rise behavior.[68] The effect of the new data is to lower the expected height of the ground cloud stabilization, which results in greater predicted surface concentrations of HCl. Comparing the two tables, the instantaneous and ten minute average concentration value predicted by the latest studies are greater than the values presented in the Final EIS. Maximum instantaneous HCl concentrations may reach 8.4 ppmv at ground level according to the new model results, whereas the previously reported maximum value was 2.8 ppmv. Predictions of ten minute average values also increased from a maximum of 1.97 ppmv reported in the FEIS to the latest prediction of 3.31 ppmv.[68] It is important to note that these results do not consider the effects of Vandenberg terrain on HCl concentrations at ground level.

Table 2.5.1-1. SHUTTLE GROUND CLOUD AND GASEOUS HCl DATA PREDICTED FOR FORTY-EIGHT SELECTED METEOROLOGICAL CASES AT VANDENBERG DURING 1974.[a]

DATE 1974	CLOUD STABILIZATION HEIGHT meters	CLOUD STABILIZATION APPROXIMATE RANGE meters	CLOUD STABILIZATION APPROXIMATE DIRECTION degrees	HCl PREDICTION OF MAXIMUM CONCENTRATIONS INSTANTANEOUS CON ppmv	INSTANTANEOUS RNG km	INSTANTANEOUS DIR deg	10 MINUTE AVERAGE CON ppmv	10 MINUTE AVERAGE RNG km	10 MINUTE AVERAGE DIR deg
9 JAN	964	278	126	1.5	2	198	0.93	2	198
15 JAN	802	432	339	5.5	2	329	2.07	3	330
21 JAN	1077	1914	187	2.5	8	180	0.36	8	180
28 JAN	991	1597	171	3.7	5	173	0.82	6	173
4 FEB	758	227	198	5.0	2	221	1.31	2	221
10 FEB	982	190	359	4.0	2	274	1.79	2	274
16 FEB	779	259	179	2.9	2	206	1.43	2	206
23 FEB	810	1308	216	2.3	5	199	0.21	5	199
2 MAR	1157	2208	85	1.3	4	108	0.26	4	108
9 MAR	1128	1355	181	2.9	5	181	0.27	6	181
15 MAR	926	482	211	3.1	4	213	1.04	4	213
26 MAR	1056	872	36	2.7	3	2	0.73	4	3
1 APR	941	1019	149	2.5	4	152	0.51	5	150
7 APR	931	2034	200	2.2	10	198	0.32	13	195
13 APR	1013	1033	200	3.8	4	199	0.99	5	198
19 APR	1273	3077	165	1.7	10	164	0.40	12	164
26 APR	1080	2171	178	2.8	8	144	0.37	8	149
2 MAY	901	717	186	4.0	3	181	1.17	4	182
8 MAY	844	338	159	4.2	3	158	3.31	3	158
14 MAY	837	962	158	6.8	4	158	1.23	5	158
22 MAY	801	431	208	4.2	3	221	1.82	3	222
29 MAY	953	924	165	3.6	3	161	0.79	3	161
4 JUN	970	279	127	1.5	2	196	0.92	2	196
11 JUN	829	652	164	2.5	2	172	1.21	3	172
17 JUN	1178	843	148	2.9	3	156	1.28	4	155
26 JUN	688	807	206	3.2	2	237	0.65	3	241
3 JUL	903	673	308	0.6	3	218	0.30	4	214
10 JUL	1168	870	132	3.9	4	130	1.88	5	129
17 JUL	687	216	81	5.3	2	199	1.72	2	199
24 JUL	708	138	238	5.1	2	206	2.38	2	206
31 JUL	805	84	304	4.0	2	45	3.17	2	45
6 AUG	779	955	186	5.5	4	180	1.06	4	180
13 AUG	1066	319	147	3.9	5	125	2.31	5	125
19 AUG	765	914	165	0.3	3	163	1.30	4	163
25 AUG	949	311	285	4.3	4	299	1.89	4	299
31 AUG	834	445	148	6.3	4	146	1.45	5	146
8 SEP	759	573	191	5.5	5	189	1.94	6	189
10 SEP	859	622	171	5.7	4	148	0.84	4	148
24 SEP	982	377	116	3.3	3	134	1.35	4	134
4 OCT	1049	690	180	3.8	2	180	0.99	3	180
13 OCT	749	275	241	8.4	2	248	2.08	3	248
21 OCT	908	379	173	1.8	2	209	1.06	2	209
1 NOV	1484	1836	143	1.5	8	129	0.33	7	130
9 NOV	992	2292	199	2.4	5	190	0.20	6	190
16 NOV	884	565	178	4.0	2	182	1.58	3	183
23 NOV	887	1290	215	5.0	5	208	0.38	6	208
30 NOV	947	1284	318	2.8	3	304	1.07	3	304
8 DEC	799	655	76	1.9	2	142	0.80	2	102

a. Cases pertain to meteorological conditions at 0400 Pacific Standard Time on the tabulate date. All data is Rawinsonde data collected at the National Weather Service Station on North Vandenberg AFB.

Source: Stephens, 1981.(150)

The potential for the mountainous terrain on South Vandenberg to affect ground cloud movement and ground level concentrations of HCl gas has also been investigated. Preliminary results from the White Sands model suggests that such an effect is unlikely. Strong onshore winds and a low temperature inversion layer would have to be present at the time of launch for ground level concentrations of HCl to be affected by terrain. These two conditions rarely exist simultaneously at Vandenberg. When strong onshore winds are accompanied by an inversion, the inversion is usually at high elevation. These preliminary studies also indicate that terrain effects, should they occur, would serve to impede lateral movement of the ground cloud and to retain it in the South Vandenberg vicinity.

Results from the NASA/MSFC model indicate that nearly all incidence of ground cloud stabilization and high concentrations of gaseous HCl would occur on South Vandenberg or over the ocean adjacent to South Vandenberg. Of fourty-eight randomly selected meteorological cases, only one suggested that HCl concentrations could exceed 1.0 ppmv on property adjacent to Vandenberg, or on North Vandenberg and the cantonment area. Six other cases demonstrated a potential for concentration greater than 1.0 ppmv on South Vandenberg. The remaining forty-one meteorological cases predicted that the stabilized ground cloud will be transported over the ocean adjacent to South Vandenberg. The likelihood of concentrations of gaseous HCl greater than 1.0 ppmv occuring over populated areas is therefore very slight.

With gaseous HCl present in the atmosphere, there is the additional potential for the formation of acid rain if rainfall should occur at South Vandenberg shortly after launch. HCl gas has a strong affinity for water, and is dissolved readily upon contact. Falling rainwater could "scavenge" HCl gas out of the air to form hydrochloric acid, much as rainwater often combines with sulfates in the air to form the widely known sulphuric acid rain in some industrialized areas of the Northeastern U.S. The possible effects of the Space Shuttle on acid rain formation have been investigated by NASA for the space program at Kennedy Space Center (KSC) in Florida.(150) Modeling of acid rain

potential at KSC indicates that rain acidities of pH less than 1.0 are possible at distances of up to 12 miles (20 km) from the launch site under worst-case meteorological conditions. Some impacts to vegetation and soil chemistry from low pH rainfall are possible. Acidic water might leach certain elements and nutrients from the soil and render it incapable of supporting plant growth. However, the pH of rainfall would have to be less than 1.0 on a repeated basis for noticeable impacts of occur.(150)

Rain occurs infrequently at Vandenberg, and annual rainfall is low (approximately 13 inches). The chances of rain occuring during a launch is therefore very low, and any cumulative impact from the very few incidences of acid rain that might occur in the South Vandenberg area is negligable.

Impact on Noise

Following launch, and on return from space to Vandenberg AFB, the Space Shuttle vehicle, like all aircraft moving at supersonic speeds, will produce shock waves called sonic booms. Because of its weight, high speed, and large exhaust plume, the Shuttle on launch will produce more powerful booms than conventional aircraft; overpressures of up to 4-6 pounds per square foot (200-300 N/sq m) are expected. In addition, the trajectory of the vehicle will cause "focusing" of sonic boom energy in a zone approximately 1,000 feet (300 m) long (uprange-downrange) and 80 miles (130 km) wide at the uprange end of the sonic boom "footprint" on the earth's surface.(162) In this "focal region" overpressures could reach 30 psf (1,500 N/sq m). Just downrange of the focal region, the overpressures will drop abruptly to the 4-6 psf (200-300 N/sq m) range and then diminish steadily downrange as the increasing altitude of the vehicle allows greater attenuation of the shock waves by the atmosphere. Near the end of its return from space, the Orbiter is expected to produce moderate sonic booms on the surface until it reaches subsonic speeds just before landing.

Almost all of the currently scheduled Space Shuttle launches will use launch azimuths greater than 180° (a 180° launch azimuth is due south; larger azimuths are west of south). The sonic boom footprints resulting from launches at azimuths greater than 180° will occur over the open water of the Pacific Ocean. A maximum of seven launches over the 10-year period from 1985 to 1994, however, are scheduled at azimuths between 180° and 147.5°. Footprints from launches near the 150° azimuth are expected to impinge on the Northern Channel islands with the following probabilities:(75)

Location	Probability	Location	Probability
San Miguel	0.86	Anacapa	0.98
Santa Rosa	1.00	All Islands Together	1.00
Santa Cruz	1.00		

The islands are expected to be within the focal region of these footprints (near 150°) with these probabilities:

Location	Probability	Location	Probability
San Miguel	0.81	Anacapa	0.00
Santa Rosa	0.15	All Islands Together	0.96
Santa Cruz	0.08		

On each end-of-mission return to Vandenberg, the Orbiter is expected to produce moderate booms over San Miguel Island (1.0 - 1.5 psf) and Santa Rosa Island (0.5 - 1.0 psf), while Santa Cruz and Anacapa Islands should be unaffected.

All the Northern Channel Islands, then, will experience a maximum of seven moderate sonic booms from Shuttle launches over an 10-year period. A maximum of seven high-magnitude, focused sonic booms will occur over San Miguel Island during this period, while only one or two are likely over Santa Rosa. Santa Cruz and especially Anacapa should not experience focused booms.(75) In addition, San Miguel and Santa Rosa will experience mild booms from Orbiter return approximately

every four to five weeks for most years of the program, and less frequently from 1985 through 1987.

It is important to remember that this is a "worst-case" analysis of Shuttle-generated sonic booms. Because some of the seven launches will probably be at azimuths closer to 180° than to 150°, there may well be fewer focused sonic booms produced over the Northern Channel Islands than discussed above.

Sonic boom infringement on the California coast will be assessed and mitigated if future flight analyses indicate a potential problem at lower launch azimuths.

Impact on Biology

HCl Effects. The effects of hydrogen chloride (HCl) gas on biota in the vicinity of the Shuttle launch pad has been the subject of continuing study by the Aerospace Medical Research Laboratory at Wright-Patterson AFB, Ohio, and the Air Pollution Research Center at the University of California at Riverside. The research has focused on recognizing and predicting phytotoxic responses of terrestrial plants to HCl gas and aluminum oxide particles emitted from the Solid Rocket Boosters. Experimentation involved laboratory, greenhouse, and field investigations on a number of plant species native to Vandenberg or grown commercially in the vicinity of Lompoc. These studies indicate that aluminum oxide dust does not cause visible plant injury, nor do mixtures of dust and HCl gas produce significant increases in plant damage compared to HCl alone.(71)

The results of these and other pertinent studies indicate that HCl concentrations which produce no visible effects on plants after a 20-minute exposure vary according to the level of relative humidity at the exposure time. "No-effect" concentrations for the most sensitive plants are 5 parts per million (ppm) for relative humidity at 50 percent or less, and 2 ppm for humidity greater than 50 percent.(48) Plant injury from HCl is increased by higher levels of relative humidity. Modeling studies indicate that instantaneous HCl

concentrations of 2 ppm or greater are predicted to occur within about 6 miles (10 km) of the launch pad, either onbase or over the ocean.(150) Modeling to date has not considered the effects of humidity on HCl concentrations at ground level. Table 2.5.1-1 indicates that 40 out of 48 cases (84%) will have instantaneous HCl concentrations of 2 ppm or greater, and 6 of the 48 cases (13%) will have a 10-minute average HCl concentration of 2 ppm or greater.

Sonic Boom Effects. Sonic booms generated by the Space Shuttle are expected to have little impact on the biota of the Northern Channel Islands. In air, marine mammals are generally much less sensitive than humans to the low-frequency sound of sonic booms. Humans have been exposed to impulse noise similar in magnitude to the sonic booms expected from the Shuttle with no permanent hearing effects and only temporarily reduced hearing sensitivity. Outside a zone approximately 4.4 miles (7.0 km) wide directly under the flight path, almost all sonic boom sound will be reflected at the water's surface. Therefore, only those individuals that happen to be within the 4 miles by 1,000 foot (7 km by 300 m) zone will experience significant focused boom energy. Even animals exposed to focused boom energy in the water have only a small chance of experiencing minor temporary threshold shift (TTS). There is, therefore, little chance of significant impact of Shuttle-gernerated booms on marine mammal hearing.(33)

Although marine mammals have not been studied directly in this regard, studies have shown little effect on the physiology and reproduction of other species by impulse noise similar to Shuttle booms. This, in conjunction with the fact that Shuttle booms will add little to the atural stress environment of Channel Islands pinnipeds, indicates that such booms are very unlikely to affect non-auditory (including reproductive) aspects of marine mammal physiology.(33)

Time-lapse photographic monitoring has shown that large numbers of pinnipeds move suddenly from the shoreline of San Miguel Island to the water. These events have been noted to occur at a frequency of about 48-60 per year for harbor seals and approximately 24-36 per year for

other pinnipeds. Visual stimuli, such as humans and low-flying aircraft are much more likely to elicit this reponse than are strictly auditory stimuli such as boat noise or sonic booms which currently occur about eight times per month. It is rare for mass movement to take place in a "panic", and no resulting pup or adult mortality has been observed. Space Shuttle sonic booms are, therefore, expected to increase the frequency of such movements by no more than 15 percent; significant impact to pinniped populations is unlikely.(14)

The available evidence shows that pressures much greater than those expected from Space Shuttle booms would be required to crack the eggs of seabirds nesting in the Northern Channel Islands.(54) Studies on effects of simulated Shuttle booms on laying chickens and their eggs showed no effect on ovulation, ovipositon, egg hatchability or chick viability.(34) Although such results are not necessarily transferable among species, they strongly suggest that the infrequent Shuttle booms will have little effect on seabird reproduction.

Studies on two representative seabird species, Brandt's cormorant and the western gull, revealed little response to simulated Shuttle sonic booms.(140) Nesting birds did not leave the nest and no eggs were crushed or kicked from the nest. As with pinnipeds, visual stimuli elicited more response than did noise alone. Shuttle sonic booms are, therefore, not expected to seriously startle nesting seabirds or to cause egg or chick mortality. Consequences for seabird populations should be negligible.

Shuttle-produced booms may collapse some of the burrows of Cassin's auklets and other burrow-nesting birds of the Northern Channel Islands. Such collapses occur frequently from natural causes, including the burrowing of the birds themselves. These bird species are adapted to this condition and usually re-excavate collapsed burrows quickly.(140)

Sonic booms from the Space Shuttle may cause a few landslides that were likely to occur. Some of the more fragile caliche deposits may collapse as well. Such collapses occur frequently from natural causes; likewise more deposits are constantly being exposed by eroding dunes.(38)

Impacts on Endangered Species. None of the endangered or candidate endangered species of plants or animals that occur at Vandenberg are expected to be impacted by Shuttle operations.(118)

The brown pelican colonies on Santa Barbara Island, Anacapa Island and Scorpion Rock are not expected to experience any high magnitude (focused) sonic booms and only two or three booms of low magnitude (less than 2 psf) during the ten years of Shuttle operation. These booms are unlikely to occur during nesting periods. In addition, the evidence indicates that the pelicans will not be seriously disturbed by any booms that do occur.(38) Therefore, it is not expected that Shuttle booms will impact the continued existence of brown pelicans.

Because the peregrine falcon does not nest in the Northern Channel Islands and is only an occasional visitor there, the infrequent Shuttle-produced sonic booms expected for these islands are not likely to affect this species. Studies of the effect of sonic booms on nesting peregrine and prairie falcons indicate little likelihood of impact should colonization of the Northern Channel Islands occur. The continued existence of the peregrine falcon population would not be jeopardized.

Shuttle sonic-boom footprints will fall seaward of most of the migration routes of the gray whale. Moreover, the few gray whales that might be exposed to maximal sonic boom energy are unlikely to exprience auditory damage. Shuttle sonic booms are expected to have no significant impact on the gray whale population. The migration routes of this species are too far offshore to be affected by construction or operations at the ET Landing Facility at Point Arguello.

Maintenance Dredging Effects. It is probable that maintenance dredging of the barge channel will be required at least once during the ten year operational life of the ET landing facility. The material will be exclusively fine, unconsolidated, and recently deposited sediment; the dredge choice will probably be hydraulic, with or without a cutter head.

The impacts of dredging are essentially those expected during the initial dredging, i.e., increased noise, traffic, dust, and slightly degraded air quality. Local marine birds and mammals will be temporarily disturbed by the noise and generally higher level of activity. Also, whatever benthic community had developed in the deposits will be lost.(156)

Areas adjacent to the dredge site may experience increased turbidity and siltation because of resuspended sediments, but the impacts, if any, will be slight. An undetermined but relatively small number of fish will be drawn into the dredge and killed. Because a suction dredge will probably be used and because the material will be fine, beach nourishment at nearby sites is a likely way to dispose of the dredged material. Some benthic forms will be smothered and the water in the vicinity of the discharge will be turbid during the operation. These impacts are not anticipated to be serious.(149)

Inadvertent Weather Modification

The potential for Shuttle launches from Vandenberg to alter local weather has been a concern of continuing interest. Section 5.1.2.9 of the Final EIS (page 4-48k) discussed weather modification and noted that studies of Solid Rocket Booster exhaust were underway. In recent years, meteorologists at the Institute on Man and Science at the State University of New York at Albany have studied the potential for weather modification from atmospheric injections of aluminum oxide particles, hydrogen chloride gas, and other contaminants from each Shuttle launch. Based on their tests and observations, the potential for long-term weather modification by Space Shuttle launches is not high.(12) Although the overall impact of weather modification an Vandenberg is not directly predictable (see Appendix C), the probability of impact can be assessed on the basis of weather conditions at the time of launch. It is apparent that modification is probable if launches occur in the presence of deep convection summer storms or cold winter lows. Because there will be few launches under these conditions, it is unlikely that Shuttle exhausts could lead to climate

modification or noticeably affect regional precipitation in any way.(12)

2.5.2 SOCIOECONOMIC IMPACTS

Socioeconomic impacts are calculated for proposed projects at Vandenberg AFB including the Shuttle program, MX flight testing activities, the Global Positioning Sytem, a nitrogen storage facility, hypergolic storage facilities, and general base improvements such as transportation, health, safety, and housing facilities. Outer continental shelf petroleum exploration activities as well as the proposed LNG facility impacts are discussed in Section 2.5.2.4.

2.5.2.1 Construction Phase Economic Impacts

Space Shuttle Program

Construction of Shuttle facilities at Vandenberg AFB is proposed through fiscal year 1986. Construction of Port Hueneme facilities is anticipated in the 1982-83 fiscal year period. The Shuttle Military Construction Program (MCP) and expenditure profile for facility construction at both Vandenberg AFB and Port Hueneme as of March 1982 have been presented in Section 2.2.8. Construction of these facilities as well as other facilities throughout the 1979-1986 period (logistics, flight crew, SRB dissassembly, ET landing, and deservicing facilities) will result in increased economic activity throughout the regions of influence both directly and indirectly. Indirect effects are estimated using the appropriate Regional Industrial Multiplier System (RIMS) gross output multiplier for the industry under analysis, in this case, construction of new military facilities (see Appendix A). While the bulk of the effects will occur in the Santa Barbara and Tri-County areas, significant levels of the inter-regional trade will result in some indirect effects to be felt in the Los Angeles and Orange County areas.

Estimates of the number of indirect jobs generated in the construction phase are based on the profile presented in Section 2.2.8.1. Approximately 2,626 indirect jobs are anticipated to be created in ıe Santa Barbara County in 1981 with 2,910 jobs estimated for the Tri-County area as a whole in the same year (Table 2.5.2-1). These estimates assume that the inter-industry transactions which create the additional indirect economic activity occur within the same time frame as the initial estimated change in direct construction effects. However, lags of one to three years in the generation of these indirect jobs can be anticipated. Though the magnitude of this effect is difficult to determine, it would effectively reduce the estimates presented for fiscal 1981 with concurrent increases in subsequent years' employment.

Total direct and indirect employment estimates due to Shuttle construction activities are approximately 3,415 and 3,699 additional jobs in Santa Barbara County and the Tri-County regions, respectively, in the peak year fiscal 1981 (Table 2.5.2-2). This represents approximately 2.6 percent and 1.0 percent of estimated 1981 employment in Santa Barbara County, and the Tri-County regions, respectively. Decreasing levels of construction employment are expected as construction activities are supplanted by activation and operations activities.

MX Flight Testing

The construction phase of the MX flight testing program at Vandenberg AFB amounts to approximately $43.0 million (program year dollars) in construction investment from 1980 through fiscal year 1982.(165) Included in this construction program are an Intergrated Test Facility, Missile Assembly Building, Mechanical Maintenance Facility, Rail Transfer Facility, Stage Processing and Storage Facilities, an Installation and Check-out Facility, Payload and Assembly Building, a Test Pad, and improved roads and utilities.

Table 2.5.2-1. INDIRECT EMPLOYMENT GENERATED DUE TO SHUTTLE CONSTRUCTION ACTIVITIES IN SANTA BARBARA COUNTY, TRI-COUNTIES REGION AND THE FIVE-COUNTY REGION, 1979-1986.

Fiscal Year	Santa Barbara County	Tri-Counties Region	Five-County Region
1979	300	330	519
1980	1,487	1,635	2,551
1981	2,626	2,910	4,676
1982	2,615	2,850	4,560
1983	1,572	2,200	3,437
1984	1,418	1,663	2,585
1985	802	884	1,391
1986	307	341	552

Table 2.5.2-2. TOTAL (DIRECT AND INDIRECT) EMPLOYMENT GENERATED BY THE SHUTTLE CONSTRUCTION ACTIVITIES IN THE REGIONS OF INFLUENCE, 1979-1986.

Fiscal Year	Santa Barbara County	Tri-Counties Region	Five-County Region
1979	365	395	584
1980	1,772	1,920	2,836
1981	3,415	3,699	5,465
1982	3,309	3,584	5,294
1983	1,965	2,593	3,830
1984	1,686	1,931	2,853
1985	982	1,064	1,571
1986	410	444	655

Total direct and indirect employment generated due to MX flight testing construction activities is approximately 1,032 in Santa Barbara County in the peak year of fiscal 1981 (Table 2.5.2-3). Although no effects are anticipated in the fiscal 1983 period, lags of one to three years can be anticipated in the generation of these indirect jobs with a concurrent reduction of the peak year effects and a gradual change in the total employment growth anticipated in the region.

Vandenberg AFB Military Construction Program

In support of the anticipated increases in base population due to activation and operations activities of both the MX and Shuttle programs at Vandenberg, a Military Construction Program of approximately $31.6 million (program year dollars) is proposed for base improvements over a several year period (Table 2.5.2-4). Included in these improvements are a new dormitory and visiting officers quarters, road improvements, expansion of the fire station, a hospital addition, control tower, recreation center, security facilities and data processing facilities. Construction of the hypergolic storage facility also is covered under the proposed VAFB MCP. This project, however, is discussed separately below. These construction programs are still subject to review and appropriation constraints; thus the timing of these projects is uncertain.

Total direct and indirect employment generated by these construction activities amounts to approximately 265 jobs in Santa Barbara County and 300 in the Tri-County region in the peak year (Table 2.5.2-5).

Hypergolic Storage Facility

Construction of a hypergolic storage facility on Vandenberg AFB is estimated to cost approximately $4.2 million in program year dollars.[110] This cost is uncertain, however, as a major item, the tanks, may be reworked and acquired from Edwards AFB. Construction labor requirements, as well as indirect employment generated, are

Table 2.5.2-3. TOTAL (DIRECT AND INDIRECT) EMPLOYMENT ASSOCIATED WITH MX FLIGHT TESTING CONSTRUCTION ACTIVITIES.

Fiscal Year	Santa Barbara County	Tri-Counties Region	Five-County Region
1980	522	565	836
1981	1,032	1,118	1,652
1982	17	19	28

Table 2.5.2-4. PROPOSED VAFB MILITARY CONSTRUCTION PROGRAM, FISCAL 1983-1986, (MILLIONS OF PROGRAM YEAR DOLLARS).

Fiscal Year MCP	Facilities	Cost
1983	Security Police Operations Building	$25.8
	Fire Station Central (2 stalls)	
	Road Improvements	
	Control Tower	
	Dormitory	
	Visiting Officers' Quarters	
	Data Processing Facility	
	Hypergolic Storage Facility	
1985	Fire Station Central (8 stalls)	$ 1.2
1986	Recreation Center	$ 4.6
	Hospital Addition	
	Medical Food Facility	
Total		$ 31.6

Source: Fiederer, 1981.(56)

Table 2.5.2-5. TOTAL (DIRECT AND INDIRECT) EMPLOYMENT GENERATED DUE TO GENERAL BASE IMPROVEMENTS PROPOSED UNDER VAFB MCPS (1984, 1985, 1987).

Fiscal Year	Santa Barbara County	Tri-Counties Region	Five-County Region
1983	170	185	265
1984	265	300	425
1985	235	260	380
1986	37	42	57
1987	50	55	75
1988	30	35	50

quite small (approximately 20 direct construction phase jobs and 40 indirect jobs over a two year period). Operations phase personnel requirements are also minor (less than ten) and could be drawn from existing propellant facilities workers.

Nitrogen Storage Facility

Construction and operation of two nitrogen storage facilities and a pipeline are proposed at Vandenberg AFB at a cost of approximately $15.0 million over a five year period. Construction phase labor requirements are approximately 50 to 75 workers[155] beginning in mid-1981, which could generate up to 150 indirect jobs in the region. The pipeline is proposed to transport the product from the main storage facility approximately 8,000 ft south to Space Launch Complex No. 6 on South Vandenberg AFB. The facilities are preliminarily proposed to be operated on a contract basis through 1986, at which time the Air Force will evaluate the service.

Global Positioning System (GPS)

The Global Positioning System is an all-weather navigation system relying on ground control facilities to support its 18 satellite constellation. Construction activity at Vandenberg AFB is limited to minor modifications to existing facilities at a cost of approximately $500,000 in 1981. Labor requirements for construction and operation activities are minor (less than 10) and could be supplied from the existing labor force.

Summary--Vandenberg AFB Construction Programs

Table 2.5.2-6 summarizes total direct and indirect employment impacts associated with the Shuttle, MX, and general base improvements proposed for Vandenberg AFB. While the employment effects are projected through fiscal 1988, the greatest impacts are anticipated in the very near term. Approximately 4,447 jobs and 4,817 jobs are estimated in fiscal 1981 in Santa Barbara County and the Tri-Counties region respectively. This represents about 3.4 percent and 1.4 percent of

Table 2.5.2-6. CONSTRUCTION PHASE TOTAL (DIRECT AND INDIRECT) EMPLOYMENT EFFECTS IN THE THREE REGIONS OF INFLUENCE DUE TO VAFB ACTIVITIES, FY 1979-1988.

Fiscal Year	Santa Barbara County	Tri-Counties Region	Five-County Region
1979	365	395	584
1980	2,294	2,485	3,672
1981	4,447	4,817	7,117
1982	3,326	3,603	5,322
1983	2,135	2,778	4,095
1984	1,951	2,231	3,278
1985	1,217	1,324	1,951
1986	447	486	712
1987	50	55	75
1988	30	35	50

estimated 1981 employment in Santa Barbara County and the Tri-County regions, respectively. Again, these estimates assume generation of indirect jobs in the same year as the initial effects (direct jobs) occur. However, lags of up to three years in the generation of these secondary effects can be anticipated. Through the magnitude of this effect is difficult to determine, it would effectively reduce the estimates presented for fiscal 1981 to some degree, with increases in employment in subsequent years.

2.5.2.2 Operation Phase Economic Impacts

Vandenberg AFB

Vandenberg AFB employment is projected to increase from approximately 10,630 employees (military, civil servants, contractors, and other government and non-government personnel) in FY 1980 to approximately 16,225 in the peak year 1985 (excludes the Port Hueneme labor projections--80 contractors and 4 military personnel beginning in fiscal 1985), and level off to approximately 15,291 by FY 1988 (Table 2.5.2-7). This represents a 52.6 percent increase over 1980 levels in direct employment in the peak year 1985 and a 43.8 percent increase by FY 1988. The bulk of the increase is due principally from contractor employment associated with the Shuttle program (Table 2.5.2-8). MX flight testing activities will account for 927 of these new direct jobs in the long-term.

Increased indirect employment estimates are presented in Table 2.5.2-9 and include the indirect employment associated with civilian and contractor personal consumption expenditures, as well as the indirect employment associated with base, support equipment, and installation services procurement. Peak year effects are anticipated in fiscal 1985 where 3,485 and 3,816 indirect jobs are projected for Santa Barbara County and the Tri-County region respectively. Total direct and indirect employment increases are presented in Table 2.5.2-10. Total direct and indirect employment increases, due to activation and operation activities at Vandenberg AFB, amounts to approximately 9,079

Table 2.5.2-7. PROJECTED VAFB AND PORT HUENEME DIRECT EMPLOYMENT (ACTIVATION AND OPERATIONS) FY 1980-FY 1988.[1]

Project	1980	1981	1982	1983	1984	1985	1986	1987	1988
Shuttle Program									
VAFB	1,113	1,490	2,327	3,084	4,295	5,131	5,119	4,838	4,838
Port Hueneme	--	--	--	--	--	84	84	84	84
Subtotal	1,113	1,490	2,327	3,084	4,295	5,215	5,203	4,922	4,922
MX Flight Testing	102	509	912	1,062	1,112	1,096	1,096	927	927
SAC, AFSC, and Other Federal Employees	8,862	8,928	9,475	9,383	9,213	9,376	9,132	8,904	8,904
Non-appropriated Fund, AF/Army Exchange	554	554	622	622	622	622	622	622	622
Total	10,631	11,481	13,336	14,151	15,242	16,309	16,053	15,375	15,375

[1] Based on activation optimization and Initial Operational Capability (IOC) of October 1985.

Source: Fiederer, 1982.(57)

Table 2.5.2-8. ACTIVATION/OPERATIONS PERSONNEL ASSOCIATED WITH THE SHUTTLE PROGRAM AT VANDENBERG AFB (V) AND PORT HUENEME (PH), FY 1980-1988[1,2].

Fiscal Year	Military (V)	Military (PH)	Civilians (V)	Contractors (V)	Contractors (PH)	Total
1980	89	--	43	981	--	1,113
1981	128	--	64	1,298	--	1,490
1982	228	--	120	1,979	--	2,327
1983	494	--	179	2,411	--	3,084
1984	644	--	227	3,424	--	4,295
1985	116	4	246	4,269	80	4,715
1986	586	4	284	4,269	80	5,223
1987	595	4	284	3,959	80	4,922
1988	595	4	284	3,959	80	4,922

1. Does not include estimates of testing surge increases--FY 1985: 415; FY 1986: 805; FY 1987: 415.

2. Based on activation optimization and Initial Operational Capability (IOC) of October 1985.

Source: Fiederer, 1982.(57)

Table 2.5.2-9. INDIRECT EMPLOYMENT INCREASES ASSOCIATED WITH INCREASED VAFB AND PORT HUENEME ACTIVATION/ OPERATION PHASE ACTIVITIES, FY 1981-1988.[1]

Fiscal Year	Santa Barbara County	Tri-Counties Region	Five-County Region
1981	550	599	870
1982	1,703	1,863	2,733
1983	2,219	2,427	3,557
1984	2,893	3,166	4,648
1985	3,485	3,816	5,611
1986	3,325	3,641	5,353
1987	2,884	3,157	4,635
1988	2,884	3,157	4,635

Table 2.5.2-10. TOTAL (DIRECT AND INDIRECT) EMPLOYMENT INCREASES BY PLACE OF WORK DUE TO ACTIVATION/OPERATIONS ACTIVITIES AT VANDENBERG AFB AND PORT HUENEME, ALL PROJECTS, FY 1981-1988.[1]

Fiscal Year	Santa Barbara County	Tri-Counties Region	Five-County Region
1981	1,400	1,449	1,720
1982	4,408	4,568	5,438
1983	5,739	5,947	6,077
1984	7,504	7,777	9,259
1985	9,079	9,410	11,205
1986	8,663	8,979	10,691
1987	7,544	7,817	9,295
1988	7,544	7,817	9,295

[1] Based on activation optimization and IOC of October 1985.

jobs in the peak year fiscal 1985 for the Santa Barbara County region. This represents approximately 6.9 percent of the estimated 1981 level of employment in the County.

Other Projects

Direct operations-related employment estimates associated with other projects are minimal. LNG facility operations will require less than 50 workers.(187) The status of this project, however, is uncertain at this time. Operational capability is not anticipated until the early to mid-1990s. Operations-related employment associated with OCS activities are included in the estimates provided in the preceding section.

2.5.2.3 Social Effects

The preceding sections presented estimates of the direct and indirect jobs generated by Vandenberg AFB construction phase and operation phase activities. These requirements are summarized in Table 2.5.2-11. The increased labor demand will overwhelm the local area's available labor supply. The effect will be increased population in-migration to the region, and increased demand for various private and public services. This section will present estimates of the population and housing effects associated with the increased Vandenberg economic activity in the region. Disaggregation of the population and housing effects to the principal sub-areas in the Santa Barbara County will also be presented. The sub-areas of interest are the Lompoc Valley, Santa Maria/Orcutt area, and the balance of the North County (principally the Santa Ynez Valley). Effects for the South Coast area are not presented. Although effects are anticipated in the Ventura County area due to increased activity at Port Hueneme, the size of the economic base and available labor supply will result in negligible labor or population in-migration.

Table 2.5.2-11. CUMULATIVE TOTAL (DIRECT AND INDIRECT) EMPLOYMENT INCREASES DUE TO VAFB CONSTRUCTION, ACTIVATION, AND OPERATIONS ACTIVITIES (ALL PROJECTS), SANTA BARBARA COUNTY, FISCAL YEAR 1981-1988.[1,2]

Employment Category	1981	1982	1983	1984	1985	1986	1987	1988
Military Personnel	225	347	463	546	543	529	538	538
Civilian/SIOH	281	241	276	289	420	421	251	251
Contractors	502	2,231	2,829	3,822	4,662	4,406	3,871	3,871
Craft Labor	878	532	380	312	229	97	15	10
Indirect Labor	3,960	4,323	3,906	4,486	4,442	3,657	2,919	2,904
Manufacturing/ Business Services	360	1,500	290	70	150	35	35	35
Total	6,206	9,174	8,164	9,525	10,446	9,145	7,629	7,609

1 Outer continental shelf petroleum exploration activities could add 4,000-6,000 additional direct and indirect jobs in the 1985-1986 period.

2 Based on activation optimization and IOC of 1985.

Sources: Fiederer, 1982.(57)

Population

Project-induced population growth depends on the number of imported workers. Of the several employment classes associated with Vandenberg AFB activities (military personnel, civilian personnel, indirect workers, contractor personnel, direct construction workers, SIOH personnel, and manufacturing/business services employment), military and contractor personnel are assumed to be entirely imported. Of the remaining categories, the level of labor in-migration depends on the available labor supply in the region. Civilian labor force and unemployment estimates for Santa Barbara County for the 1980-1983 time period are presented in Section 2.3.2. Extrapolating and extending these estimates through 1988, and reducing the result by an estimate of the frictional unemployment (about 3 percent) results in estimates of the available unemployed labor pool for the county. The 1981 available unemployment labor pool is estimated at approximately 5,100. This figure is estimated to grow to approximately 6,200 by 1988. The North County share of this amount is estimated at approximately 40 percent, the current percentage that North county wage and salary employment contributes to total county employment.

Labor in-migration into North Santa Barbara County subareas associated with Vandenberg-related activities is presented in Tables 2.5.2-12, 2.5.2-13, and 2.5.2-14. Assumptions regarding the level of Vandenberg AFB-related in-migration and distribution of these workers are based upon labor availability, the historical distribution of the various employment classes associated with past VAFB activities, the projected availability of housing, and the amount of developable land within each sub-area:

- All military personnel are imported into the area with 40 percent allocated to the Santa Maria/Orcutt area, 40 percent to the Lompoc Valley, 15 percent to the balance of the North County and 5 percent to San Luis Obispo and South Coast areas.

- All contractor personnel are imported into the region, with 50 percent allocated to the Santa Maria/Orcutt area, 30 per-

Table 2.5.2-12. LABOR INMIGRATION BY PLACE OF RESIDENCE DUE TO VAFB ACTIVITIES, SANTA MARIA/ ORCUTT AREA, 1981-1988.[1]

Fiscal Year	Military	Civilian, SIOH	Contractors	Craft Labor	Manufac-turing	Indirect Labor	Total
1981	90	70	251	351	55	594	1,411
1982	139	60	1,116	213	225	648	2,401
1983	193	69	1,415	152	45	586	2,460
1984	218	72	1,911	125	10	673	3,009
1985	217	105	2,331	92	25	666	3,436
1986	212	105	2,203	39	5	599	3,113
1987	215	63	1,936	6	5	438	2,663
1988	215	63	1,936	4	5	436	2,659

[1] Based on activation optimization and IOC of 1985.

Table 2.5.2-13. LABOR INMIGRATION BY PLACE OF RESIDENCE DUE TO VAFB ACTIVITIES, LOMPOC VALLEY, 1981-1988.[1]

Fiscal Year	Military	Civilian, SIOH	Contractors	Craft Labor	Manufac-turing	Indirect Labor	Total
1981	90	56	151	211	35	475	1,018
1982	139	48	669	128	150	519	1,653
1983	193	55	849	91	30	469	1,687
1984	218	58	1,147	75	10	538	2,046
1985	217	84	1,399	55	15	533	2,303
1986	212	84	1,322	23	5	439	2,085
1987	215	50	1,161	4	5	350	1,785
1988	215	50	1,161	2	5	348	1,781

[1] Based on activation optimization and IOC of 1985.

Table 2.5.2-14. LABOR INMIGRATION BY PLACE OF RESIDENCE DUE TO VAFB ACTIVITIES, BALANCE OF NORTH COUNTY, 1981-1988.[1]

Fiscal Year	Military	Civilian, SIOH	Contractors	Craft Labor	Manufac-turing	Indirect Labor	Total
1981	34	14	75	70	--	119	208
1982	52	12	335	43	--	130	477
1983	72	14	424	30	--	117	555
1984	82	14	573	25	--	135	722
1985	81	21	699	18	--	133	853
1986	79	21	661	8	--	110	792
1987	81	13	581	1	--	88	682
1988	81	13	581	1	--	87	681

[1] Based on activation optimization and IOC of October 1985.

cent allocated to the Lompoc Valley, 15 percent allocated to the balance of the North County, and 5 percent to San Luis Obispo and South Coast areas.

- Approximately 50 percent of the civilian and SIOH workers are imported into the region with the remainder being local hires. Imported workers are distributed with 50 percent to the Santa Maria/Orcutt area, 40 percent to the Lompoc Valley, and 10 percent to the balance of the North County.

- Construction craft labor is heavily weighted in the 1981 and 1982 periods. Eighty percent of these workers are assumed imported into the region with the remainder being local hires. Fifty percent are allocated to the Santa Maria/Orcutt area, 30 percent to the Lompoc Valley, 10 percent to the balance of the North County, with the remaining 10 percent allocated to the southern San Luis Obispo and South Coast regions.

- Indirect workers generated by the activities at Vandenberg are distributed with 60 percent to the North County and 40 percent to the South Coast. Approximately one-third of the available North County labor pool is taken by civilian, SIOH, and craft labor, resulting in approximately 50 percent of the North County indirect labor requirements being imported into the region. These workers are allocated with 50 percent to the Santa Maria/Orcutt area, 40 percent to the Lompoc area, and 10 percent to the balance of the North County.

- Direct manufacturing/business services jobs in the North County are assumed to be 25 percent of the total generated by support equipment and installation services procurement. Sixty percent are allocated to the Santa Maria/Orcutt area and 40 percent to the Lompoc Valley. Fifty percent are assumed to be available locally.

These assumptions reflect the availability of labor in the North County, the historical distribution of the various employment classes associated with past Vandenberg AFB activities, and the current and projected availability of housing and developable land in the various sub-areas in the North County. They are meant to be indicative of probable settlement patterns. However, changes in the various sub-area's land use policies or other constraints, may cause different settlement patterns than those projected. No major changes are evident, however, and the current level of development in the Santa Maria/Orcutt area indicates that this area can expect much of the labor and population in-migration anticipated through the 1980s.

Tables 2.5.2-15, 2.5.2-16 and 2.5.2-17 presents the population in-migration and household formations associated with these labor demands in the principal North County sub-areas. Assumptions regarding the demographic and household characteristics of these in-migrating workers are as follows:

- Of the in-migrating military personnel, 67 percent are assumed to be married with an average household size of 2.41; single military personnel have an average household size of 1.25.(168, 173)

- Of the in-migrating construction work force, 50 percent are assumed to bring their families with an average household size of 3.6; 25 percent are single who take up permanent residence, with an average household size of 1.25; and 25 percent are single commuters with an average household size of one.(113)

- The remaining in-migrating civilian, contractor, SIOH, manufacturing/business service, and indirect work force have an average of 1.3 workers per household and an average household size of 2.79.(64)

Population in-migration associated with Vandenberg AFB activities peak in 1985 at approximately 14,285 additional residents in the North

Table 2.5.2-15. HOUSEHOLD FORMATION AND POPULATION INMIGRATION DUE TO VANDENBERG AFB ACTIVITIES, SANTA MARIA/ORCUTT, 1981-1988.[1]

Fiscal Year	Military		Craft Labor		Other Labor Inmigration		Total	
	Households	Population	Households	Population	Households	Population	Households	Population
1981	84	175	334	808	746	2,082	1,164	3,065
1982	130	270	203	489	1,576	4,397	1,909	5,156
1983	180	374	144	350	1,627	4,539	1,951	5,263
1984	203	423	119	287	2,050	5,722	2,372	6,432
1985	203	423	87	212	2,405	6,711	2,695	7,346
1986	198	411	38	90	2,202	6,142	2,438	6,643
1987	201	417	7	15	1,878	5,241	2,086	5,673
1988	201	417	4	9	1,877	5,237	2,082	5,663

[1] Based on activation optimization and IOC of 1985.

Table 2.5.2-16. HOUSEHOLD FORMATION AND POPULATION INMIGRATION DUE TO VANDENBERG AFB ACTIVITIES, LOMPOC VALLEY, 1981-1988.[1]

Fiscal Year	Military		Craft Labor		Other Labor Inmigration		Total	
	Households	Population	Households	Population	Households	Population	Households	Population
1981	84	175	201	486	552	1,539	837	2,200
1982	130	270	122	294	1,066	2,975	1,318	3,539
1983	180	374	87	210	1,079	3,011	1,346	3,595
1984	203	423	72	173	1,348	3,762	1,623	4,358
1985	203	423	53	127	1,562	4,359	1,818	4,909
1986	198	411	23	53	1,423	3,970	1,644	4,434
1987	201	417	4	9	1,205	3,361	1,410	3,787
1988	201	417	2	5	1,203	3,357	1,406	3,779

[1] Based on activation optimization and IOC of 1985.

Table 2.5.2-17. HOUSEHOLD FORMATION AND POPULATION INMIGRATION DUE TO VANDENBERG AFB ACTIVITIES, BALANCE OF NORTH COUNTY, 1981-1988.[1]

Fiscal Year	Military		Craft Labor		Other Labor Inmigration		Total	
	House-holds	Popula-tion	House-holds	Popula-tion	House-holds	Popula-tion	House-holds	Popula-tion
1981	32	69	67	162	160	446	259	677
1982	49	100	42	99	367	1,024	458	1,223
1983	67	140	29	70	427	1,191	523	1,401
1984	77	159	24	57	555	1,550	656	1,766
1985	76	157	18	42	656	1,831	750	2,030
1986	74	153	8	18	609	1,700	691	1,871
1987	76	157	1	4	525	1,464	602	1,625
1988	76	157	1	4	524	1,462	601	1,623

[1] Based on activation optimization and IOC of 1985.

County. This represents an annual average growth rate in the North County of 3.7 percent compared to the projected baseline rate of 1.6 percent, over the 1980-1985 time period. The bulk of this increase is principally due to contractor-related in-migration. The Santa Maria/Orcutt area is anticipated to experience the largest increase, approximately 7,350 additional residents in 1985, followed by the Lompoc Valley where an additional 4,900 residents are anticipated in 1985.

Housing

Housing is a critical issue in both the short-term and mid-term for the various sub-areas in the North Santa Barbara County area. Short-term problems are anticipated in the 1981 period when craft transient housing associated with Vandenberg-related activities peak. Transient housing in the form of motels, trailer parks, and camping facilities will be needed to house the temporary construction work force. Mid-term problems are anticipated when peak year population in-migration other than craft-related will require housing above the levels anticipated in the long-term.

Housing unit requirements due to Vandenberg AFB activities are presented in Table 2.5.2-18. Transient quarter demands peak in FY 1981 while other permanent housing needs peak in 1985. Long-term requirements are slightly less than peak year requirements, indicating some of the peak year demands for other permanent housing should be supplied by temporary quarters. The Santa Maria/Orcutt area is expected to receive about one-half of the long-term housing demand (2,078 units) with the Lompoc Valley projected to receive about 35 percent of the long-term demand (1,404 units).

Table 2.5.2-18. TRANSIENT AND OTHER HOUSING TYPE REQUIREMENTS DUE TO VANDENBERG AFB ACTIVITIES, NORTH COUNTY AND SUBAREAS, 1981-1988.[1]

Fiscal Year	Santa Maria/Orcutt		Lompoc Valley		Balance of North County		Total
	Transient Quarters	Other Housing	Transient Quarters	Other Housing	Transient Quarters	Other Housing	Housing
1981	334	830	201	636	67	192	2,260
1982	203	1,706	122	1,196	42	416	3,685
1983	144	1,807	87	1,259	29	494	3,820
1984	119	2,253	72	1,551	24	632	4,651
1985	87	2,608	53	1,765	18	732	5,263
1986	38	2,400	23	1,621	8	683	4,773
1987	7	2,079	4	1,406	1	601	4,098
1988	4	2,078	2	1,404	1	600	4,089

[1] Based on activation optimization and IOC of 1985.

Land Use

Under the general plans of the various cities and county areas in the North County, approximately 7,180 acres of vacant residential land are available for development. This land could accommodate an additional 23,800 dwelling units (31,800 units less approximately 25 percent due to site constraints, easements, dedicated public land, etc.). The majority of this land is found in the Santa Maria/Orcutt area where approximately 3,880 acres are available for residential development. Increased pressure for conversion of land currently in agricultural uses to residential uses is anticipated. The planning agencies in the North County have accounted for the anticipated increase in conversion of agricultural use to residential use through their respective general plans. No augmentation of this level of conversion is projected.

The potential for intensified commercial and industrial uses through redevelopment of existing commercial and industrial land uses in the North County is low. Development of the land currently planned for these uses is projected. The bulk of the land planned for industrial development in the North County is found in the Santa Maria/Orcutt area, in the area around the airport and in west Santa Maria. The bulk of the land planned for commercial development is found in the city of Lompoc along the 'H' street corridor and to a lesser extent in the Buellton area.

Infrastructure

Expanded Vandenberg AFB activities will result in increased demands for various public services such as education, water, wastewater treatment, and public health and safety services (Table 2.5.2-19).

Primary and secondary educational facilities have historically been able to provide services to much larger enrollments than are currently existing or projected. The effect of the in-migrating school-age population will add enrollments to districts that have historically experienced declining enrollments and will help reduce school closures

Table 2.5.2-19. SELECTED INFRASTRUCTURE REQUIREMENTS DUE TO VANDENBERG AFB, NORTH SANTA BARBARA COUNTY, 1981-1988[5]

Requirement Category	1981	1982	1983	1984	1985	1986	1987	1988
Education[1]								
Enrollments	1,070	1,785	1,847	2,260	2,571	2,331	1,995	1,992
Teachers	47	78	80	98	112	101	87	87
Water Demand[2]								
Acre-ft/yr (urban use)	1,307	2,182	2,257	2,762	3,143	2,849	2,439	2,434
Wastewater[3]								
Million gallons/day	0.69	1.15	1.19	1.46	1.66	1.50	1.29	1.28
Health and Safety[4]								
Police	12	20	21	25	29	26	22	22
Fire	10	16	17	21	24	21	18	18
Hospital Beds	24	40	41	50	57	52	44	44
Physicians	9	15	16	19	21	19	17	17
Nurses	27	45	46	57	64	58	50	50

Source: Henningson, Durham & Richardson, 1981.(79)

1 Assumes 18 school age children per 100 population and a student/teacher ratio of 23:1.

2 Based on .22 acre-ft per capita per year. Does not include estimated agricultural use 151,414 ac-ft/yr in 1990 and 151,494 ac-ft/yr in 2000 and on-base use of 5,660 ac-ft/yr in 1990, and 7490 ac ft/yr in 2000.

3 Assumes 116 gallons per capita per day.

4 Police personnel is estimated at 20 per thousand population; fire personnel is 1.65 per 1,000 population; hospital beds at 4.0 per 1,000 population; physicians at 1.5 per 1,000 population and nurses at 4.5 per 1,000 population.

5 Based on activation optimization and IOC of 1985.

and staff layoffs. Approximately 2,571 and 1,992 additional enrollments are projected in the North County in the peak year and long-term, respectively.

Water demand would increase substantially in the North County, approximately 3,143 acre-feet per year in the peak year for urban uses. This does not include estimated increased in agricultural use of 8,300 acre-feet per year by 1990 and 888 acre feet per year in increased on-base use.(46) The North County would experience additional water demands associated with the in-migrating population, as well as the demand associated with the construction activity. The county is currently deciding what to do with its entitlement and capacity allocations from the State Water Project. Increased pressure upon local resources will result if non-local sources and/or conservation measures are not made available. Both the quantity and quality of locally supplied water will be adversely affected unless non-local sources and/or conservation measures are made available.

The anticipated increase of the average daily flow into the local wastewater treatment facilities will increase pressure for their expansion. Approximately 1.66 million gallons per day additional flow in the peak year is projected. Lompoc operates a regional wastewater treatment facility, with a five million gallon per day (MGD) secondary treatment capacity. Santa Maria operates a 6.5 mgd secondary treatment plant, with an expansion planned to 7.8 mgd. Rural parts of the Santa Maria Valley and Orcutt are served by the Laguna County Sanitation District having a 1.5 mgd secondary treatment capacity. The increased demand is not anticipated to adversely impact the facilities as design capacities and proposed expansions should be adequate for the additional demand. In addition to the above services, increased police, fire, and health care facilities and personnel would be required. Provision of police and fire services would be required from public agencies with n care facilities provided by both public and private sources. Increased costs to local governments would be anticipated from the increased demand for these services. Peak year demand are an additional approximately 29 police officers, 24 firemen, 57 hospital beds, 21 physicians, and 64 nurses.

2.5.2.4 Cumulative Effects - Vandenberg AFB and Other Projects

Other projects in the area will also substantially affect local economies. Construction of a liquified natural gas facility and outer continental shelf (OCS) petroleum exploration activities will create additional employment above levels associated with Vandenberg activities. However, the deregulation of natural gas has promoted expanded domestic supplies and reduced the immediate necessity for construction and operation of the proposed LNG facility at Point Conception. The status of the facility is very uncertain at this time and it is not expected to become operational until the 1990s at the earliest.

Liquified Natural Gas Facility (LNG)

The terminal proposed to be constructed at Point Conception will receive LNG transported by ships from Indonesia and Alaska, unload and transfer the LNG into storage tanks, regasify it, and deliver natural gas to users via transmission pipelines.

The construction schedule for the plant and pipeline in the LNG FEIS assumed a start in 1979 and completion in 1983. This schedule has subsequently slipped, and recent contact with Western LNG Associates indicates project operational capability would not occur until the 1990s. Estimates of the peak year construction labor requirements are about 1,485 workers.

Outer Continental Shelf and Offshore Petroleum Exploration Activities

Increased offshore and outer continental shelf (OCS) petroleum production and exploration activities along the California coast can have a significant impact upon the potentially affected coastal communities. While the impacts have historically been minimal in terms of induced growth in the area, increased exploration and production activities of the petroleum fields along the central Land southern California coast, beyond historic rates, are currently proposed by the Department of the Interior. The data presented reflect employment effects of the most

probable development scenerios for selected years. Annual estimates comparable to the estimates presented for Vandenberg activities have not been compiled, although 4,000 to 6,000 additional direct and indirect jobs are anticipated in the Santa Barbara County area in the 1985-1986 period.(175, 176)

Peak year direct and indirect employment associated with existing OCS leases in the Santa Barbara Channel and fields of Southern California is estimated at approximately 18,460 in the Southern California region (San Diego County to Santa Barbara County), with Ventura County expected to receive the majority of these effects. Peak year total employment in Santa Barbara County in 1986 is expected to reach 2,749 jobs due to OCS Sale No. 35. Los Angeles and Ventura Counties are expected to receive the majority of the effects anticipated from development of OCS Sale No. 48 proposed for leasing under this sale. Direct and indirect employment in Santa Barbara County will peak in 1986, at 1,572 jobs.(176)

In addition to these leasing activities, another lease sale, OCS Sale No. 53, was proposed in May 1981. OCS Sale No. 53 involves tracts north from the Point Conception vicinity to the Oregon border. Counties of interest in this sale are San Luis Obispo and Santa Barbara Counties. Direct and indirect employment associated with the most probable development of the potential resources in the Santa Maria Basin tracts peak in 1990 at approximately 855 jobs in San Luis Obispo County and 1,900 jobs in Santa Barbara County.(176)

Additional growth is anticipated through other proposed lease sales - OSC Lease Sales No. 68 and No. 73. A final EIS was released in November 1981 for Sale No. 68, and Lease Sale No. 73 is just entering the tentative tract selection procedure.

Full development of these resources can significantly affect the counties all along the California coast. However, little success in bidding for proposed tracts has been experienced by the Department of the Interior, and impacts presented in these Environmental Statements tend to overstate the economic effects historically experienced.

Current efforts to block lease sales off the California coast render the socioeconomic impacts associated with these activities highly uncertain.

2.6 ALTERNATIVES

2.6.1 FACILITIES AND OPERATIONS PLANNING

Section 6.0 of the Final EIS presents a comprehensive discussion of the alternatives considered in planning facilities, operations, and other aspects of the Space Shuttle Program at Vandenberg. The EIS examined the "no-action" alternative and others dealing with launch pad options, External Tank delivery methods, tow route alternatives, and spent Solid Rocket Booster processing options.

Since the publication of the EIS, alternatives considered in the planning of the External Tank Landing Facility have been formally documented. Two new options, in addition to the proposed action, were developed and reviewed.

2.6.1.1 External Tank Delivery Alternatives

Three alternatives were considered in the selection of the proposed action at the Point Arguello Boathouse. These have been updated and summarized in an impact assessment for the boathouse which identifies the proposed action as one of three suboptions involving direct delivery of the External Tanks to a shallow-draft harbor at the Point Arguello Boathouse. In an effort to eliminate the impact that removing the boathouse will have on the historical significance of the Coast Guard Station, the three suboptions were examined in terms of environmental impacts, engineering constraints, and project costs. The three suboptions included a) locating the harbor eastward of the boathouse to avoid the historical structure; b) dismantling and reconstructing the boathouse to the east of its present site; and c) removing the boathouse and preserving its historical significance through archival documentation.[97]

Each of these suboptions would satisfy the engineering constraints imposed on ET delivery. Direct delivery to Vandenberg would require only one ET handling activity (off-loading the barges), thereby reducing the chance of damage to the tanks. Environmental impacts and costs, however, differed among the suboptions.

Locating the new harbor to the east of the boathouse (suboption a) would leave the boathouse untouched but would require a larger cut in the 50-foot (15-m) bluff behind the harbor to make way for the access road. The bluff to the east remains undefiled, whereas the bluff directly behind the boathouse already is eroded as a result of constructing a narrow access road. A new and extensive cut in these cliffs would significantly impact the visual aesthetics of the shoreline and may endanger unknown archaeological sites on the bluffs. An extension of the breakwater would also be necessary for safe operation of the barges in the harbor facility. Additional dredging and blasting to deepen the harbor, combined with the construction of a new dock, would alter the existing marine habitat, especially the biologically productive reef area located east of the embayment.

Suboption b would relocate the boathouse 80 feet (24 m) east of its present site, thereby preserving the architecture of the boathouse structure and confining new construction to a location that has already been disturbed. However, reconstructing the boathouse under this option would be expensive. The impacts to the marine environment would be less than those for the suboption a because no extension of the existing breakwater would be required. The impacts to the terrestrial ecosystem would be the same.

Under suboption c (the proposed action), the boathouse would be dismantled and removed. The adverse impact to the historical and architectural significance of the Coast Guard Station would be mitigated through the documentation of engineering drawings of the complex, photographs, and a historical report of the complex for general public interest. The environmental impacts of this suboption would be less than suboptions a and b because the project site has already undergone some modification by construction of the pier and

breakwater in the 1930s.

The total life-cycle costs of the three suboptions are:(95)

Suboption a:	13.7 million
Suboption b:	9.8 million
Suboption c:	8.8 million

Because of lower overall costs and a minimum of environmental impact, the Air Force proposes to adopt suboption c--removal of the boathouse. This proposal is discussed in more detail in Appendix E.

2.6.1.2 Dredged Material Disposal Alternatives

In order for the ET landing facility to accommodate the barges that will carry the ETs, it will be necessary to dredge some of the shallow area in the harbor. It is expected that an area approximately 600 ft (180 m) by 300 ft (90 m) will be dredged to a depth of 12.4 ft (3.7 m) below mean sea level. Approximately 55,000 cubic yards (38,000 cubic meters) of material (mostly fractured shale) will be removed.(150)

In addition to the No Action alternative, four major categories of methods for disposal of the dredged material were considered: ocean dumping, land disposal, beach nourishment, and recycling. Because several sites were available in each of these categories, the total number of options was considerable. In addition, several combinations were evaluated, such as disposing of part of the material in one manner and part in another.

In the evaluation of the various alternatives and the determination of the preferred plan, consideration was given to several aspects of each. These include:

- Engineering Complexity and Feasibility
- Permits and Regulatory Compliance
- Environmental Impacts and Mitigation Measures
- Costs

Ocean Disposal

At least three potential sites or areas were identified for ocean disposal of the dredged materials.[152] Selection of any one would require the use of barges and tugs to transport the material from the dredge site to the dump site. Ocean dumping, whether in state or federal waters, would require a lengthy permitting process.

Option 1: Disposal in existing EPA-approved ocean dump site. The closest one to Point Arguello is offshore Point Hueneme, almost 100 miles (160 km) to the southeast. Because of the high cost involved in maintaining several barges necessary to sustain the dredge operation and due to the great distance involved, the costs of this option were found prohibitive.

Option 2: Artificial reef created within state waters from suitable dredge material. If a suitable site were located near Point Arguello, transportation costs would be relatively low. This plan had the added benefit of providing mitigation for the disruption of habitat, especially kelp, at the dredge site. However, after analyzing this option in coordination with the California Department of Fish and Game and the Army Corps of Engineers, the dredge material was determined to be unsuitable for use as an artifical reef.

Option 3: Because the dredged material was found to be relatively free of pollutants, the possibility of obtaining a special EPA dump permit was pursued. The selected site was close to Point Arguello and in federal waters, 14.4 miles (23.2 km) west of the dredge site. The permitting process has been completed for Option 1. The costs of transporting the material should be lower than for the other options.

Land Disposal

Several potential land disposal sites were identified on Vandenberg AFB; off-base landfill sites were also considered a possibility. All options for land disposal of the dredged material would require the

use of trucks for transportation of the material to its destination. Land disposal would also require the intermediate barging of the material from the dredge site to a place for transfer to trucks. Permitting would be relatively simple, and impacts would be slight since the chosen site would probably be disturbed already. Costs would be quite high if both barging and trucking were required. Complicated logistics and high cost were principal reasons for elimination of land disposal alternatives.

Option 1: Disposal in an inactive materials borrow pit at Point Pedernales, approximately 5 miles (8 km) northwest of the dredge site. The pit is large enough to hold the 55,000 cubic yards easily, it is already disturbed, the materials would be out of view of casual passers-by, and the site is relatively close via existing roads. This would be the cheapest of any land disposal schemes.

Option 2: Placement in eroded gulches along the coastal bluffs near the Boathouse. The material would be out of sight from land, would be fairly compatible with the geological formations present, and would help reduce additional or continued erosion. The lack of roads to the sites in question complicated this plan and made it more expensive than the Point Pedernales option.

Option 3: Spreading material in a fairly thin layer over a rather large area. At a depth of three feet, 55,000 cu yds would cover 11.4 acres (4.5 ha). A specific site was not identified, but an area devoid of plant life and/or already disturbed would be most desirable. This plan may be complicated by lack of adequate roads. The cost would be high because bulldozers and/or scrapers would be required to transport and spread the dredged material. Because the material is primarily Monterey shale, complete revegetation would not be anticipated unless it were covered with soil, making it even more costly.

Beach Nourishment

The possibility of recycling the dredged material by using it for beach nourishment was considered. Permitting complexity would probably be intermediate between that for ocean dumping and for land disposal. Barging of the material would be necessary in some cases and the cost would be proportional to the distance traveled to the beach selected. The following two options were considered until it was determined that the dredge material would not be suitable for this purpose.

Option 1: Placement of material on beaches/intertidal areas adjacent to the Boathouse, probably to the southeast. If the material had been appropriate, it may have been possible to place it there directly with an hydraulic dredge.

Option 2: Transport of the dredge material by barge to any other area in the vicinity where beach nourishment was needed. Cost would increase with distance from the dredged site.

Selected Alternative

After evaluating the above alternatives in regard to engineering feasibility, environmental impact, regulatory compliance, and cost, and after consultation with cognizant regulating agencies, it was decided to pursue disposal of the dredged material according to Option 3 of Ocean Disposal, above. Further details of this plan and its environmental impacts are described in Section 2.5.1.1.

2.6.1.3 Hazardous Waste Management Alternatives

After consideration of a wide range of alternative schemes (described in the Draft SFEIS) for treatment and disposal of hazardous wastes produced by the Space Shuttle Program, the alternatives have been narrowed substantially. Most types of hazardous wastes produced by the program will be treated and/or disposed of at off-base commercial facilities (see Section 2.2.5). The only remaining hazardous waste

alternatives concern treatment of SRB insulation wastewater from Port Hueneme.

The 1.5 million gallons (maximum) of sound suppression/launch pad washdown water will be neutralized and metals removed through reverse osmosis, as described in Section 2.2.5.2, and re-used for sound suppression and pad washdown. Alternative means for treatment/disposal of this water were: 1) same as the selected option, but metals removed by ion exchange; 2) treatment to remove metals and reduce acidity, evaporation of treated water in evaporation ponds, and disposal of sludge; 3) treatment of the water to meet groundwater standards followed by landspreading on an area of South Vandenberg; and 4) treatment to appropriate standards followed by ocean discharge. The selected option was chosen primarily because it minimized impacts to groundwater, waste disposal, and water supply. Reverse osmosis was selected over ion exchange as the method for removing metals because it was more cost-effective and because its start-up and operational aspects were preferable.

2.7 PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

2.7.1 UNAVOIDABLE ADVERSE IMPACTS

The following probable adverse impacts are unavoidable if the Space Shuttle Program, as presented in the Final EIS and in this Supplement, is to be implemented at Vandenberg AFB. Insignificant adverse impacts have been treated in Section 2.5.1 and 2.5.2 and are not discussed in this section.

Two impacts are considered to be "discernible" to "moderate" in importance and should join the list of impacts in Section 7.1 of the Final EIS (page 7-1).

(1) Construction of the External Tank landing facility at the Point Arguello Boathouse will result in the destruction of about 2.2 acres (0.9 ha) of subtidal marine habitat, 0.4

acre (0.2 ha) of intertidal habitat, and the excavation of a 50 to 200-foot (15-60 m) portion of the existing sea cliff for the ET tow route. These impacts will permanently alter the existing topography and habitat within the construction zone and temporarily disrupt the marine and shoreline habitat.

(2) Removing the boathouse and pier to make way for the ET landing facility at Port Arguello will adversely impact the historical and architectural integrity of the Coast Guard Station.

(3) Construction of the External Tank tow route will adversely impact 10 percent of archaeological site SBa 1542. Some site data was unavoidably lost, although data recovery was conducted by qualified archaeologists, in accordance with 36 CFR 800, to mitigate adverse impacts.

The following impact is considered "significant" in importance.

(1) Population growth associated with the Shuttle program, in conjunction with other projects within the county, will aggravate short-term problems concerning housing, and the quality and quantity of available water.

2.7.2 MITIGATION MEASURES FOR UNAVOIDABLE ADVERSE IMPACTS

The Air Force has adopted mitigation measures for many of the known specific impacts that will accompany construction and operation phases of the Shuttle Program. All practicable means to avoid or limit harmful environmental consequences from the proposed action have been adopted.

The launch constraints described in Sections 2.7.2.2 and 2.7.2.3 are for the testing phase only. Results from tests performed during this period will be used to refine the constraints to be instituted during the operational phase. It should also be noted that restrictions

decided upon for Vandenberg may be different from those to be used at Kennedy.

This section notes specific mitigation measures designed to reduce adverse impacts. The following section lists general mitigation measures. Additional detail on impact mitigation may be found in the appendices, where noted.

2.7.2.1 Air Quality Impact Mitigation

Mitigation measures designed to reduce the air quality impact of construction and operation of Shuttle program facilities in California are listed below:

(1) All vehicles and stationary piston-engine-powered equipment will have emission control systems in conformance with air pollution control regulations of California and local government regulations.

(2) Construction areas will be watered for fugitive dust control as necessary, in conformance with construction industry standards.

(3) Transfer and storage systems (e.g., fuel storage tanks, cement, sand, and aggregate storage for batch plants) will be designed, constructed, and operated to minimize air pollutant emissions.

(4) When explosives are used for blasting prior to construction, air pollutants will be reduced by using as little blasting material as possible, and by proper placement and packing of the charge.

(5) Any toxic substances in holding ponds will be degraded as soon as possible to reduce evaporation of the toxicant and consequent degradation of air quality.

(6) Operations during which air pollutants may be accidentally released will be suspended during meteorological conditions

where adverse pollutant concentrations could occur in uncontrolled or environmentally significant areas.

(7) Spills of volatile materials will be contained as soon as possible to minimize the surface area for evaporation. Removal of material will be accomplished following containment, if possible.

(8) Loading of gasoline tanks will be accomplished using a vapor collection system and a balance system for a vapor return line to the truck.

(9) Air pollutant emissions from worker transportation may be reduced by utilizing a bus system or jitney service which connects Vandenberg AFB and nearby communities.

(10) Adverse air quality impacts associated with each launch will be predicted from meteorological data. Such impact prediction will be considered by the launch director in making operation decisions. All potential adverse environmental consequences for a particular launch will be identified and summarized to allow a timely response.

(11) Low sulfur fuel types will be used as much as possible to reduce SO_2 to acceptable levels.

(12) NO_x criteria were put in specifications in order to force the use of low - NO_x emitting boilers.

(13) Research and development is being conducted to determine BACT (Best Available Control Technology) for hypergolic emissions. BACT will be utilized for all hypergolic operations.

2.7.2.2 Weather Modification Impact Mitigation

Mitigation of potential impacts from inadvertent weather modification is possible by providing guidelines for Shuttle launches under adverse weather conditions. The following guidelines have been adopted by NASA for Shuttle launches at Kennedy Space Center in Florida,[141] and are being considered for Vandenberg launches:

The Shuttle will not be launched if the following weather conditions exist at the launch site:

(1) Cloud cover is greater than 50 percent.

(2) Visibility is less than 7 nautical miles.

(3) Cloud ceiling is less than 3,000 feet.

(4) Ambient temperature is less than 31 degrees F or greater than 99 degrees F.

(5) Precipitation is present.

(6) Precipitation is forecast for the time period of start of loading of the External Tank through time of launch. The External Tank will not be loaded during rain or if rain is imminent after loading.

(7) Pre-launch surface wind is greater than 49.0 knots (steady state).

(8) Launch time surface wind is greater than 22.6 knots (steady state) or reaches peak velocity greater than 34.4 knots.

(9) The flight path will carry the vehicle within 5 nautical miles of the edge of a cumulonimbus (thunderstorm) formation.

2.7.2.3 Biological Impact Mitigation

Mitigation of adverse biological impacts at the Point Arguello Boathouse have been established. Mitigation measures to reduce construction impacts in the subtital and intertidal zones include:

(1) Human interference with the natural environment will be kept to a minimum by declaring intertidal areas away from the construction sites "off-limits" to construction workers and by restricting workers to construction zones.

(2) Abalone will be reseeded in rocky habitat adjacent to boathouse area within 18 months after construction.

(3) Marine habitat will be enhanced by placing three groups of boulders and rocks taken from the dredge site into an area

150 feet (45 m) long and 25 feet (7.5 m) wide west of the dredge area between the breakwater and the proposed dolphin locations.

(4) Blasting shall be avoided when birds or marine mammals are within the blast area.

(5) Slow-burning explosives will be used for blasting. Research has indicated that the use of slow-burning explosives (such as Nitranon) results in far less damage to fish because of the slow generation of the pressure wave accompanying the explosion.

(6) A fuel spill contingency plan shall be available in case of an accident.

(7) A biologist will be present at the site to inspect construction activities to ensure that the minimum amount of physical impact occurs.

Although no significant effects on the Channel Islands are expected from the Space Shuttle Program, mitigation measures are being considered in case future ascent measurements from STS launches and monitoring of the first launches over the Channel Islands indicate that extremely adverse, unacceptable, or catastrophic impacts might occur over San Miguel Island.

Sonic boom ascent measurements were made for Kennedy Space Center launch STS-5 and will be made for STS-7 to determine the characteristics of the focused sonic booms and verify model predictions. Although sonic boom levels may be near those predicted, biological impacts will still be verified by monitoring wildlife responses during the initial launches over the islands.

The protocol for monitoring the biological effects on the isalnds will be developed by San Diego State University and Hubbs-Sea World Research Institute. Federal and State regulatory agencies as well as selective elements of the scientific community (i.e., The Department of the Interior, National Marine Fisheries Service, Marine Mammal

Commission, California Department of Fish and Game, California Coastal Commission, Santa Barbara Museum of Natural History and other advisors from the aerospace community) will be asked to review and comment on the plan. Overall monitoring will be accomplished by the San Diego State University and Hubbs-Sea World Research Institute. Scientists from Federal and State agencies may participate in the monitoring and observations to the extent allowable by safety and security requirements for the specific launch. Agencies involved in reviewing the plan will also be asked to review and comment on the results of the monitoring effort. This will enable the Air Force, the scientific community and regulatory agencies to assess the impacts of the initial launches over the islands and decide whether any launch restrictions are warrented.

If the results of the initial launches indicate that the impacts to the Channel Islands are extremely adverse or could result in an unacceptable or catastrophic impact the following restrictions will be implemented within mission constraints:

Current mission plans will be reviewed and scheduled launch dates, azimuths, and/or ascent trajectories may be modified. Mission requirements will dictate the degree of modification, if any, to be made. Future mission planning will use the rules described below before assigning specific launch dates to a particular mission.

During the months of May through July, with special consideration for peak breeding periods in March and April, launch azimuths near 150° (or those affecting San Miguel) will not be planned for use by any STS mission launches from Vandenberg. If the required orbital parameters are such that a prohibited launch azimuth would be necessary, the use of a "Dog Leg" maneuver will be considered to avoid impacting the Channel Islands in the area of the prohibited azimuths.

However, there are mission problems associated with using the Dog Leg. For example, to launch on a 180° azimuth (90° inclination that avoids overflying the islands) and then rotating to 150° azimuth (a 63.4° desired inclination requiring launching over the island directly) would result in a 20,000 pound payload restriction; this could mean a 2/3 loss for payload weight. For each degree change there is a loss of roughly 540 pounds of payload capability. Minor adjustments for inclinations and azimuths can be made with some losses in weight capability, but such flexibility may be limited with payloads that are performance critical.

Shuttle performance, and range safety concerns must all be weighed before accepting a Dog Leg maneuver to mitigate impacts to the Channel Islands. External tank (ET) must be jettisoned into the ocean. With Dog Leg maneuvers there are potential problems with dropping this tank in designated areas.

Some Shuttle Flights may necessitate Dog Leg maneuvers to satisfy mission requirements, and hence, any further maneuvering could degrade the Shuttle's ability to safely achieve orbit. Other range safety concerns that must be evaluated for all maneuvers are: debris footprints, SRB (Solid Rocket Boosters) impact areas, and ET impact areas.

If the mission is performance critical such that a Dog Leg is not feasible every other possible avenue of rescheduling the mission to a less critical seasonal window will be explored before accepting impacts to the Channel Islands. No mission which violates this ground rule will be scheduled without consultation on the impacts with the Environmental Planning Function at Space Division, which will maintain close liaison with the Federal and State agencies as well as staying current on the Channel Island biological conditions to assure timely environmental information is used during mission planning.

These restrictions, and recommendations made by reviewing agencies to mitigate any unacceptable impacts, will be implemented unless operational mission constraints necessary to meet vital national security requirements preclude the use of alternative launch dates or flight trajectories.

2.7.2.4 Archaeological and Historical Resource Impact Mitigation

As a result of coordinated siting of Orbiter and ET tow routes, archaeological impacts are limited to four sites out of more than 460 sites identified at Vandenberg AFB. Three sites will be disturbed by the realignment of Coast Road for the Orbiter tow route and one site will be marginally impacted by the construction of the new ET tow route. Mitigation measures include:

(1) Reroute Orbiter tow route to avoid four archaeological sites, and to reduce impacts to three other sites (SBa 539, 670, and 931).

(2) Perform data recovery operations on SBa 539, 670, and 931 to retain as much archaeological data as possible.

(3) Reroute External Tank tow route to avoid five archaeological sites, and to minimize impacts to one other site (SBa 1542).

(4) Perform data recovery operations on SBa 1542 to mitigate damage to artifacts and site information.

Mitigation measures adopted for reducing impacts of the historical integrity of the Boathouse complex have been listed in Appendix E. Briefly, they include:

(1) Prepare archival documentation consisting of a historical report, photographs, and architectural drawings of the complex.

(2) Prepare a historical report written for the layman covering items of general public interest.

(3) Restore and refurbish remaining structures at the Coast Guard Station.

Impacts related to developing the ET tow route have received consideration. Mitigation measures include:

(1) Landscape side of cliff cut and revegetate to match existing bluff vegetation.

2.7.2.5 Socioeconomic Impact Mitigation

The level of population in-migration in the communities of the North County will put a strain on the public and private sectors' abilities to provide the goods and services demanded by the in-migrating population. Of particular concern is the private sectors' ability to provide housing and the public sectors' ability to provide for the health and safety concerns of both the existing and projected population in the communities.

The major problem with the difficulty of providing housing for the level of population in-migration projected for the area is the relatively high cost of housing vis a vis anticipated salary levels of the in-migrating labor force. Much of this effect is due to high interest rates which results in inordinately high monthly payments and prevents many of the workers from buying homes in the area. Several suggestions were presented at the Housing Conference at Vandenberg, AFB, 10 June 1981, and depend principally upon private sector responses. These include.

- Housing development joint ventures among lenders and major contractors at Vandenberg AFB.
- Provision of primary and/or secondary financing by major contractors at Vandenberg AFB.
- Expedition of the permit process and minimization of restrictions on new developments by local planning agencies in an effort to lower housing costs.
- Provision of leased land by Vandenberg AFB for mobile home sites for temporary workers.

- Purchase of mortages generated in the area by the Federal National Mortgage Association.

The cost for provision of public services to be demanded by the in-migrating population is another problem which will require mitigation measures. Typically, rapid growth in a community results in public expenditure requirements (both capital outlay requirements and operating bosts) in advance of revenue generated by new development in the form of increased property, sales, and other tax sources. Front-end monies for construction of infrastructure systems are necessary to prevent service level degradation in the early years of growth. Just as necessary is comprehensive planning well in advance of projected population in-migration. Sources of planning aid, as well as implementation aid, has typically come from the federal government. However, some programs have been eliminated by the current administration, effective October 1981, and many have suffered funding reductions as well as transferral to block-type grants to be administered by the states. While the exact status of the potentially affected program is undetermined at this time financial aid from the following programs (through continued federal administration or through state-administered block grants) may be available:

- Economic Development--Grants and Loans for Public Works and Development Facilities

  Assistance in the form of project grants and direct loans is available to assist in the construction of public facilities needed to promote long term economic growth in designated geographic areas. Funds may be used for public facilities such as water and sewer systems, access roads to industrial parks and areas, public tourism facilities and vocational schools. Eligible applicants include states, cities, counties, and other political subdivisions.

- Economic Development--States and Local Economic Development Planning (302 (a) Grants--State and Urban Planning Programs)

  Assistance in the form of project grants is available to enable state and local governments to undertake comprehen-

sive economic development planning in coordination with the planning activities of other levels of government. Funds may be used for planning staff salaries and related administrative expenses. Eligible applicants include the governor of a state and the chief executive officers of cities and counties meeting EDA eligibility criteria.

- Community Economic Adjustment

  Assistance in the form of provision of specialized services and advisory services and counselling is available to provide coordinated federal assistance to help communities, regions, and states resolve serious social and economic impacts resulting from defense program changes. Resources of federal agencies are used to augment state, local, and private-sector resources to develop and implement a feasible consensus plan.

- School Assistance in Federal Affected Areas--Construction (Impact Aid/Disaster Aid)

  Assistance in the form of project grants is available for the construction of urgently needed minimum school facilities in school districts which have had substantial increases in school membership as a result of new or increased federal activities. Funds may be used to construct and equip minimum school facilities. Eligible applicants include local educational agencies which provide free public elementary or secondary education in federally-impacted areas.

- School Assistance in Federal Affected Areas--Maintenance and Operation (Impact Aid/Disaster Aid)

  Assistance in the form of formula grants is available to provide financial support to local education agencies when enrollments or availability of revenue are adversely affected by federal activities, including a sudden and substantial increase in school attendance. Funds may be used for maintenance and operation expenditures.

- Highway Research, Planning and Construction (Federal-Aid Highway Program)

  Assistance in the form of formula grants (apportionments) and project grants is available for construction and rehabilitation of the interstate highway system and building or improving primary, secondary, and urban systems, roads and streets. Funds may be used for planning, surveying, engineering, acquisition of right-of-ways, new construction, repair, restoration, resurfacing, roadside beautification, and recreation. Eligible applicants are state highway agencies.

- Construction Grants for Wastewater Treatment Works

  Assistance in the form of project grants (cooperative agreements) is available to aid in construction of municipal sewage treatment works which are required to meet state and federal water quality standards. Funds may be used for construction of municipal wastewater treatment works, including privately owned individual treatment systems if a municipality applied on behalf of a number of such systems. A project may include but not be limited to treatment of industrial wastes. Eligible applicants are municipalities, intermunicipal agencies, states or state agencies having jurisdiction over waste disposal.

2.7.3 GENERAL MEASURES FOR MITIGATING POTENTIAL ADVERSE IMPACTS

Several adverse environmental effects fall into the category of general impacts, that is, effects that may accompany a number of activities and are not specifically associated with one action or resource. Mitigation of these impacts usually involves general policies of environmental protection--measures that prevent or reduce the severity of adverse effects should they arise. A mitigation program has been prepared especially for the Shuttle ground support systems at Vandenberg and Port Hueneme, and a comprehensive set of specifications

has been compiled for mitigating potential adverse impacts. These specifications are contained within the Environmental Protection Plans (EPP),[55] developed in coordination with The Space Shuttle Final EIS. Key areas of mitigation are noted below.

2.7.3.1 Construction Impact Mitigation

General Requirements

(1) All practicable means will be used to avoid or minimize possible adverse effects by implementing sound engineering practices and complying with established environmental regulations. Construction activities will comply with Air Force directives, the National Environmental Policy Act, and all other federal environmental laws, executive orders, regulations, and standards published by the U.S. Environmental Protection Agency. The intent of state and local pollution abatement laws, regulations, criteria, and standards shall also apply.

(2) All practicable efforts will be made to control environmental pollution through design.

(3) All construction work will be monitored by a designated, on-site environmental inspector, whose job it is to implement and enforce adopted mitigation measures to minimize adverse effects during construction.

(4) Activities will be planned for the prevention of accidents. Contingency plans to deal with safety hazards or accidental environmental damage will be prepared and reviewed by the environmental inspector to assure that adequate preservation measures are included.

(5) The construction and operating contractors shall institute adequate measures for storage and disposal of debris and other waste products. Storage and disposal of debris shall be in accordance with applicable codes.

(6) The Construction Contractor shall not locate temporary facilities or perform construction operations, within areas designated as environmentally significant (including wetlands). Further, such facilities, installations and operations shall not be located or performed such that environmentally significant areas are degraded.

Cultural Resource Impact Mitigation

(1) A qualified archaeologist will be on-site or on-call during Shuttle construction activities. Construction can be halted by the construction contracting officer when significant features or artifacts are unearthed.

(2) Construction crews are instructed on the recognition of archaeological evidence during construction. The environmental inspector or archaeologist will be immediately notified of the discovery of potential archaeological finds. If human-like bones or other unusual features are unearthed, construction activities will be halted immediately and will not resume until an evaluation of the material is made by a qualified archaeologist.

(3) An Emergency Response Plan has been developed that defines the proper actions to be taken should construction activities unearth potential archaeological remains. The plan forbids disturbance of the site following discovery until it can be evaluated by a qualified archaeologist. If the site is assessed as being significant, a data recovery plan will be developed in coordination with the State Historic Preservation Office, the Advisory Council on Historic Preservation, local Native American groups, and the Interagency Archaeological Services.

Terrestrial Habitat Impact Mitigation

(1) Construction areas will be investigated and mapped to show the actual construction site; peripheral areas used for tem-

porary storage of vehicles, equipment, materials, soils, or wastes; and transportation routes. The construction plan will clearly indicate the limits of the area where heavy equipment will be used.

(2) The construction area will be surveyed and mapped to show the location of significant environmental resources so that the construction contractor may prepare plans to assure avoidance of these significant areas (refer to Appendix A).

(3) Construction contractors will be required to adopt adequate measures for storage and disposal of debris and other wastes. Disposal will be in accordance with established procedures.

(4) Interference with natural drainage systems will be minimized through the adoption of site designs that utilize existing drainage patterns to the maximum extent.

(5) Upon completion of construction, the nonoperation site area will be returned to the preconstruction state through revegetation, preservation of natural drainage channels, removal or replacement of excavated materials and appropriate resloping and grading. All measures will comply with recommendations of the Soil Conservation Service and other agencies.

Wetland Habitat Impact Mitigation

(1) Design of drainage systems will preclude direct flow of potential operational spills into any wetland areas, including San Antonio Creek, the Santa Ynez River, and Honda Creek. Catchment basins or other suitable methods will be employed to contain potential spills.

(2) Interference with natural drainage systems shall be minimized through design which utilizes existing drainage patterns to the maximum extent and, where possible, avoidance of temporary interference during construction.

(3) Construction limits will be established to prevent inadvertent activity or impacts in or near wetlands.

Noise Impact Mitigation

(1) Personnel within designated construction zones will be protected from adverse noise exposure through the use of certified noise protection equipment.

(2) All construction vehicles will have approved operational noise suppression systems in conformance with environmental safety regulation.

(3) Construction activities that result in noise levels perceivable to the human ear within areas utilized for mating and nesting by local endangered or rare wildlife species be scheduled to coincide with noncritical reproductive periods.

2.7.3.2 Operation Impact Mitigation

General Requirements

(1) Operations will adhere strictly to safety plans to minimize the potential for accidents. Containment and accident prevention measures will be incorporated in facility design and operational procedures. Contingency plans will be prepared to deal with accidents to ensure adequate environmental preservation measures.

(2) An on-site authority responsible for the maintenance of environmental quality during Shuttle operations will be designated. The representative will assure rapid response during emergencies to preserve the existing environment. Experts and equipment will be on-call to meet these objectives.

Wetland Habitat Impact Mitigation

(1) In the event of an accidental spill, measures have been devised for removing contaminants from wetland areas. These measures have been incorporated to the Vandenberg AFB Spill Prevention Control and Countermeasure (SPCC) Plan.

(2) Effective fire retardants will be used that have minimal adverse environmental effects.

Monitoring the progress of all mitigation measures is a key activity in ensuring their success. A monitoring and enforcement program is being prepared under the provision of Section 1505.2 of the CEQ regulations. Monitoring plans will cover potential impacts to air quality, water quality, biota, soils, noise, and the seismic environment.

2.7.4 PERMITS AND OTHER ENTITLEMENTS

2.7.4.1 Air Quality Permits

Air quality permits will be required for all new and modified equipment and facilities associated with the Shuttle program which will release air contaminants. Permits will be required for 1) boilers and heaters, 2) burners and scrubbers, 3) paint spray booths, 4) sandblasting equipment, and 5) cement concrete and asphaltic concrete batch plants.(208) Air quality permits are issued directly by federal and local agencies; the state agency has a secondary role of reviewing local permit applications. Recent coordination has focused on the Santa Barbara County Air Pollution Control District (APCD).

In total, 66 sources of air pollutant emissions will require air quality permits. Twenty (30%) of these permits have been obtained, four applications are pending, and the remainder of the applications (42) are in preparation. Thirteen sources have been found exempt from permit requirements, seven applications for exemption are pending, and four additional exemptions are expected, for a total of 24 exemptions.

The Santa Barbara APCD has indicated that the Shuttle program is considered a single new source and is currently undergoing a New Source Review (NSR). A NSR is a reviewing process undertaken by the APCD for applicants seeking permits to construct or modify pollution sources. Although a NSR is not an actual permit, it must accompany other permit applications in the review process. An "Authority to Construct" is prior to all new construction and a "Permit to Operate" is required once the facilities are complete.(216)

2.7.4.2 Dredging Permits

Required permits have been received for dredging, spoil disposal, and other activities related to construction of the External Tank Landing Facility at the previous site of the Point Arguello Boathouse. The Army Corps of Engineers has issued a permit under Section 10 of the Rivers and Harbors Act of 1899 (work in navigable waters of the U.S.), Section 404 of the Clean Water Act (discharge of dredged material into waters of the U.S.), and Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (transport of dredged material for discharge in ocean waters) (see Appendix H). This permit has been reviewed and approved by EPA, which has also approved one-time use of the ocean disposal site, as described in Section 2.5.1.1.

The State Lands Commission has issued a permit for dredging in submerged state lands, and the California Department of Fish and Game has issued a permit and associated conditions for the use of explosives in the dredging and pier removal process (Appendix H).

2.7.4.3 Hazardous Waste Permits

Permits will be required from federal, state, and local agencies for the handling of hazardous waste products associated with Shuttle operations. Through directives in the Resource Conservation and Recovery Act (RCRA) of 1976 (PL 94-580) the Environmental Protection Agency (EPA) has developed a nationwide program to regulate hazardous wastes from generation to final disposal. These regulations are not

industry-specific; all industries, including Department of Defense facilities which generate, store, transport, treat, or dispose of hazardous wastes are affected by RCRA.

Section 3006 of RCRA provides for individual states to operate their own hazardous waste program (HWP) in lieu of the federal program. Title 40 CFR Part 123 establishes minimum requirements which state HWPs must meet in order to receive EPA approval. The State of California Department of Health Services (DHS) and the State Water Resources Control Board have received Phase II authorization from EPA to administer a state HWP. Although federal requirements will not preempt California law, they will impose a second layer of control on California generators and handlers of hazardous waste, who must comply with the most restrictive standard, whether federal or state. In addition, Executive Orders require federal agencies (e.g., the Air Force) to comply with the standards of state and local agencies.

Under RCRA, Vandenberg AFB and its tenant programs, including the Space Shuttle are considered a hazardous waste treatment, storage and disposal facility, primarily because wastes will be stored on the base for more than 90 days. As such, the base must receive a Treatment, Storage and Disposal (TSD) Facility Permit from the California DHS for the Hazardous Waste Storage Facility. In order to receive this permit, the base will comply with all relevant DHS (or EPA) standards regulating the generation, handling, transfer, storage, and disposal of hazardous wastes. A Hazardous Waste Handling Plan for the Space Shuttle Project Vandenberg AFB has been developed to assure Shuttle program compliance with these standards.

Because it is considered hazardous solely due to pH (less than 2.0) which will be treated, the sound suppression/pad washdown water treatment facility to be built at SLC-6 will be exempt from EPA regulation under 40 CFR 122.21(d), and from DHS regulations as well.(214, 51) In order for the SRB interior water, the SRB detergent washwater, and the treated insulation wastewater generated at the Port Hueneme facility to be discharged to the POTW, a permit must be issued by the Ventura Regional County Sanitation District. This permit will not be issued

until the Sanitation District is assured that the discharged water meets the more stringent of the City of Port Hueneme's or the City of Oxnard's standards for various metals, hydrocarbons, pH, BoD, dissolved and suspended solids, and other pollutants.[49, 84] This facility and process is exempt from RCRA regulation under 40 CFR 261.4(a).[214]

Some wastes generated by Shuttle operations are designated as extremely hazardous. Handling and disposal of such wastes will require an Extremely Hazardous Waste Disposal Permit issued by the State of California.

State and federal hazardous waste regulations are currently being interpret and revised by EPA and the State Department of Health Services.

2.7.4.4 Memorandums of Agreement

Data recovery programs for archaeological sites SBa 539, 670, and 931 established research goals, data requirements, and data collection and evaluation procedures before any field work was done. On the basis of data recovery plans, a Memorandum of Agreement was signed by the Air Force, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation in 1978.[112] A similar Memorandum of Agreement is being coordinated for a data recovery program for SBa 1542.

2.7.4.5 Historic Resource Coordination

In April 1979, plans for the removal of the boathouse and pier at the new site of the External Tank Landing Facility were reviewed with the State Historic Preservation Office, the National Park Service, and the Heritage Conservation and Recreation Service. Mitigation measures were developed with recommendations from these agencies. Such measures include the transfer of one boat carriage from the Boathouse to the museum at the Point Reyes Life Saving Station, the preparation

of a historical report for the public, and an archival report for the Historic American Engineering Record. These documents have been prepared and have been reviewed with a case study report on the impact of Shuttle activities on the Point Arguello Boathouse. A Memorandum of Agreement for the proposed removal of the boathouse has been ratified by the Air Force, the Adivsory Council on Historic Preservation, and the State Historic Preservation Officer.(111)

2.7.4.6 Marine Mammal Permit

A formal request for a Letter of Authorization for the incidental taking (including harassment) of marine mammals has been filed with the National Marine Fisheries Service as required by the Marine Mammal Protection Act of 1972, as amended, for Shuttle launches over the Channel Islands.

2.7.4.7 Coastal Consistency Determination

The California Coastal Commission has concurred with the Air Force's determination, as amended, that all aspects of the Space Shuttle Program are as consistent as practicable with the California Coastal Zone Management Program (See Appendix G and attachments).

2.7.4.8 Endangered Species Consultation

The Air Force has completed consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, as required by Section 7 of the Endangered Species Act, concerning the potential impacts of the Space Shuttle Program on endangered species (refer to Appendix H and Letter B in the Responses to Comments Section).

2.8 RELATIONSHIP BETWEEN LOCAL SHORT TERM USE OF MAN'S EXISTING ENVIRONMENT AND THE MAINTENANCE OF LONG TERM PRODUCTIVITY

The Space Shuttle will effectively expand the nation's capability for engaging in future space activities, at a reduced cost compared

with the current fleet of expendable launch vehicles. The proposed changes in the construction and operation of Shuttle ground support facilities at Vandenberg and Port Hueneme will result in few additional significant impacts over those discussed in earlier environmental impact documents. There will be minimal interruption of the current short term uses of the environment, and the adverse consequences of this action are acceptable when one considers the potential long term gains expected to be realized. Removal of the pier and boathouse at the Point Arguello Coast Guard Station will result in adverse impacts which will persist long after the Shuttle Program has been discontinued. The loss of archaeological site information will have long term effects that will be minimized by data recovery activities and close construction monitoring by qualified archaeologists. Adverse impacts are more than compensated by the expected employment benefits generated by the Shuttle construction and operation phases, and by the expanded capability for access to space.

2.9 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Few major commitments of resources accompany the proposed changes in the Shuttle program. About 56 additional acres (22.4 ha) of Vandenberg property will be used for the development of the new facilities addressed in this study. The land could be returned to open space use if structures were removed and the area revegetated. No other major commitments of resources will be required by the proposed changes.

2.10 CONSIDERATIONS THAT OFFSET THE ADVERSE ENVIRONMENTAL EFFECTS

The major benefits and uses of the Shuttle program that offset adverse effects have been recounted in Section 10.0 of the Final EIS. No significant alteration of this discussion is warranted by the proposed program changes. Additional significant adverse effects are few and are favorably balanced by considerations of Shuttle benefits.

2.11 ENERGY CONSERVATION

Energy conservation provisions of the Shuttle program were largely addressed in the Final EIS (Section 11.0). The energy systems and programs used throughout the project will be based on the most feasible economic conservation measures using onbase facilities to balance public utility systems. Although the electrical demand required during Shuttle operations has been revised since 1978, new projections are not yet available.[106] However, it is unlikely that the total power demand will exceed 10 percent of the unused commercial power available from the Orcutt Divide substation of the Pacific Gas and Electric Company.

3.0 DETAILS OF UNRESOLVED ISSUES

A number of concerns will be resolved as the Shuttle program continues to develop at Vandenberg. The availability of water for industrial processes at Vandenberg is being evaluated. Sonic booms from initial launches at Vandenberg over the Channel Islands will be monitored to verify conclusions of no significant impact. The potential for the modification and installation of security facilities (fences, clear zones, etc.) in the vicinity of SLC-6 to impact archaeological sites, and the need (if any) for related mitigation measures, are yet to be determined, since these facilities are still in the design phase.

Refining methods for predicting the behavior and environmental effects of the Shuttle exhaust cloud will be a continuing process through the initial launches at Vandenberg. The REEDM multi-layer diffusion model used at Kennedy Space Center is being improved and modified for application at Vandenberg. With these improvements, the model will predict cloud behavior from the moment of launch to the point of cloud stabilization, including terrain influences for far-field dispersion. Results from initial launches and monitoring at the Kennedy Space Center will be used to verify or determine the exhaust products, cloud behavior, and environmental effects. Data from initial Shuttle launches are being analyzed and conclusions would be premature for inclusion in this supplement. Based on these continuing efforts, appropriate procedures will be established to mitigate or avoid adverse environmental effects at Vandenberg.

Concern for the safety of residents and property at Bixby Ranch is another unresolved issue. Bixby Ranch owners would like to be free to develop their property in order to receive what they perceive to be a reasonable return on their investment. Santa Barbara County generally favors limited cluster development in the area in order to retain a majority of the existing undeveloped land for agriculture and open space. The Air Force considers public safety to be a key concern in this issue and has formally proposed amendments to local plans in order to limit development in missile debris fallout zones. It is

uncertain if Santa Barbara County will take action to protect future residents at Bixby Ranch from the hazards of space launches from Vandenberg AFB. Air Force officials at Vandenberg are continuing to work directly with Bixby Ranch planners and representatives of Santa Barbara County to find a mutually acceptable solution to this problem.

Hazardous waste management planning for the Shuttle program is continuing with studies to address environmental impacts of alternatives, environmental protection plans, and soil monitoring requirements. Commercial treatment/disposal facilities and waste transport plans are being evaluated. The results of these and other related studies will be considered by the Air Force in finalizing hazardous waste management plans.

Of particular concern to the local communities potentially affected by expansion of Vandenberg AFB activities is the ability of the local labor, housing, and financial markets to respond to the proposed increased economic activity in the region. Estimation of the markets' response necessarily affects the projections of labor and population in-migration due to the increased economic activity proposed for the region. Several studies over the past year released projections of the estimated impact of Vandenberg activities. However, the reports vary as to the level of population in-migration projected for the North County area. The local communities need to establish a coordinated effort in order to plan for the anticipated growth in their communities.

One of the unresolved issues which affects ability of the local communities to establish a coordinated planning effort is formulation of a consensus on the level of population in-migration anticipated in the region. The difficulty arises due to the incompatibility of results as presented in each report. The City of Lompoc projects population in-migration only for the Lompoc area itself and for the effects of the Shuttle and MX programs at Vandenberg AFB (10,438 persons in the peak year). The General Research Corporation predicts a total civilian population impact of approximately 22,000 persons due to Shuttle and MX activities through 1986, although allocation to specific com-

munities is not presented and the figures do not represent new households or persons (some of the labor requirements could be met by existing labor and thus reduce the total population impact). The Planning Group, Inc., reports a population increase of approximately 34,800 through 1985 in the North County due to the activities of Vandenberg AFB (Shuttle and MX) as well as LNG and OCS activities.

Many of the differences can be attributed to differing methodologies, household and population factors, and assumptions regarding the anticipated responses of the local labor, housing, and financial markets. For example, this report assumes that the available labor pool will be able to fill 50 percent of the indicated jobs generated in North Santa Barbara County by activities at Vandenberg. Changing this assumption to zero percent increases the estimate of new persons in the North County by about 25 percent, from 14,285 to 17,860, with associated increases in population projections for the local communities.

Another unresolved issue is the availability of water resources to support the growth anticipated in the area. Augmentation of local supplies and/or conservation measures will be necessary if they are not to deteriorate to unacceptable levels. Additional sources have been identified in the Supplemental Water Study for Vandenberg Air Force Base. However, decisions regarding water supply alternatives remain with the County of Santa Barbara. Vandenberg Air Force Base will submit a water conservation plan to the California Coastal Commission for its review and recommendation. Vandenberg AFB will implement Coastal Commission recommendations which are consistent with Department of Defense wat.· conservations policies (Appendix G).

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8.0 ACRONYMS AND OTHER ABBREVIATIONS

Al - Aluminum
AFB - Air Force Base
APCD - Air Pollution Control District
AQIA - Air Quality Impact Analysis
Ba - Barium
BACT - Best Available Control Technology
BOD - Biochemical Oxygen Demand
CARB - California Air Resources Board
Cd - Cadmium
CD&G - California Department of Fish and Game
CEQ - Council on Environmental Quality
CFR - Code of Federal Regulations
CHP - California Highway Patrol
CNPS - California Native Plant Society
COE - U.S. Army Corps of Engineers
Cr - Chromium
Cu - Copper
dBA - A-weighted decibels
DHS - California Department of Health Services
DLA - Defense Logistics Agency
DPDO - Defense Property Disposal Office
EIAP - Environmental Impact Analysis Process
EIS - Environmental Impact Statement
E.O. - Executive Order
EPA - Environmental Protection Agency
EPP - Environmental Protection Plan
ET - External Tank
Fe - Iron
FWS - U.S. Fish & Wildlife Service
FY - Fiscal Year
GPS - Global Positioning System
ha - hectare (1 hectare = 2.471 acres)
HC - Hydrocarbon
HCl - Hydrogen chloride: hydrochloride gas or hydrochloric acid
HMCF - Hypergolic Maintenance and Checkout Facility
HWP - Hazardous Waste Program
ICS - Inner Continental Shelf
IOC - Initial Operational Capability
IW - Insulation Wastewater
KSC - Kennedy Space Center
LCP - Local Coastal Plan
LNG - Liquified Natural Gas
MCP - Military Construction Program
M/DF - Mate/Demate Facility
MGD - Million Gallons per Day

ACRONYMS AND OTHER ABBREVIATIONS
(continued)

MSFC - Marshall Space Flight Center
MX - Missile X
NAAQS- National Ambient Air Quality Standards
NASA - National Aeronautics and Space Administration
NEPA - National Environmental Policy Act of 1969
Ni - Nickle
NMFS - National Marine Fisheries Service
NO_x - Nitrogen Oxides, Oxides of Nitrogen
NSR - New Source Review
OCS - Outer Continental Shelf
OFT - Operational Flight Testing
OHSPC - Oil and Hazardous Substance Pollution Contingency Plan
OLF - Orbiter Lifting Frame
OMCF - Orbiter Maintenance and Checkout Facility (V19)
Pb - Lead
PCR - Payload Changeout Room
pH - A measure of acidity
PL - Public Law
ppmv - parts per million by volume
POTW - Public Owned Treatment Works
psf - pounds per square foot
RCRA - Resource Conservation and Recovery Act of 1976
RIMS - Regional Industrial Multiplier System
SAB - Shuttle Assembly Building
SAC - Strategic Air Command
SAMSO- Space and Missile Systems Organization (now called Space Division)
SAMTEC - Space and Missile Test Center
SBa - Santa Barbara County archeological site designation
SBAPCD - Santa Barbara Air Pollution Control District
SCCAB - South Central Coast Air Basin
SD - Space Division
SDSU - San Diego State University
SHPO - State Historic Preservation Officer
SIOH - Supervision, Inspection, & Overhead Personnel
SLC-6- Space Launch Complex Number 6
SO_x - Oxides of Sulfur; Sulfur Oxides
SO_2 - Sulfur Dioxide
SPCC - Spill Prevention and Countermeasure Plan
SRB - Solid Rocket Booster
SRSF - Solid Rocket Booster Refurbishment and Subassembly Facility (V31)
STS - Space Transportation system (the Space Shuttle Program)
TCF - ET Storage and Checkout Facility
Ti - Titanium
TPF - Thermal Protection Facility
TSD - Treatment, Storage and Disposal
TSP - Total suspended particulates

TTS - Temporary Threshold Shift
TVC - Thrust Vector Control System
USFWS- U.S. Fish & Wildlife Service
VAFB - Vandenberg Air Force Base
VLS - Vandenberg Launch Site
V17 - Orbiter Landing Facilities (Runway)
V18 - Orbiter Lifting Frame (Mate/Demate Facility)
V19 - Orbiter Maintenance & Checkout Facility (OMCF)
V21 - Hypergolic Maintenance & Checkout Facility (HMCF)
V23 - Launch Pad Vicinity
V28 - Launch Control Center
V31 - SRB Refurbishment & Subassembly Facility
V32 - SRB Retrieval & Disassembly Facility
V33 - External Tank Processing & Storage Facility
V80 - Orbiter Tow Way
V88 - Logistics (Supply and Service Facilities)
Zn - Zinc

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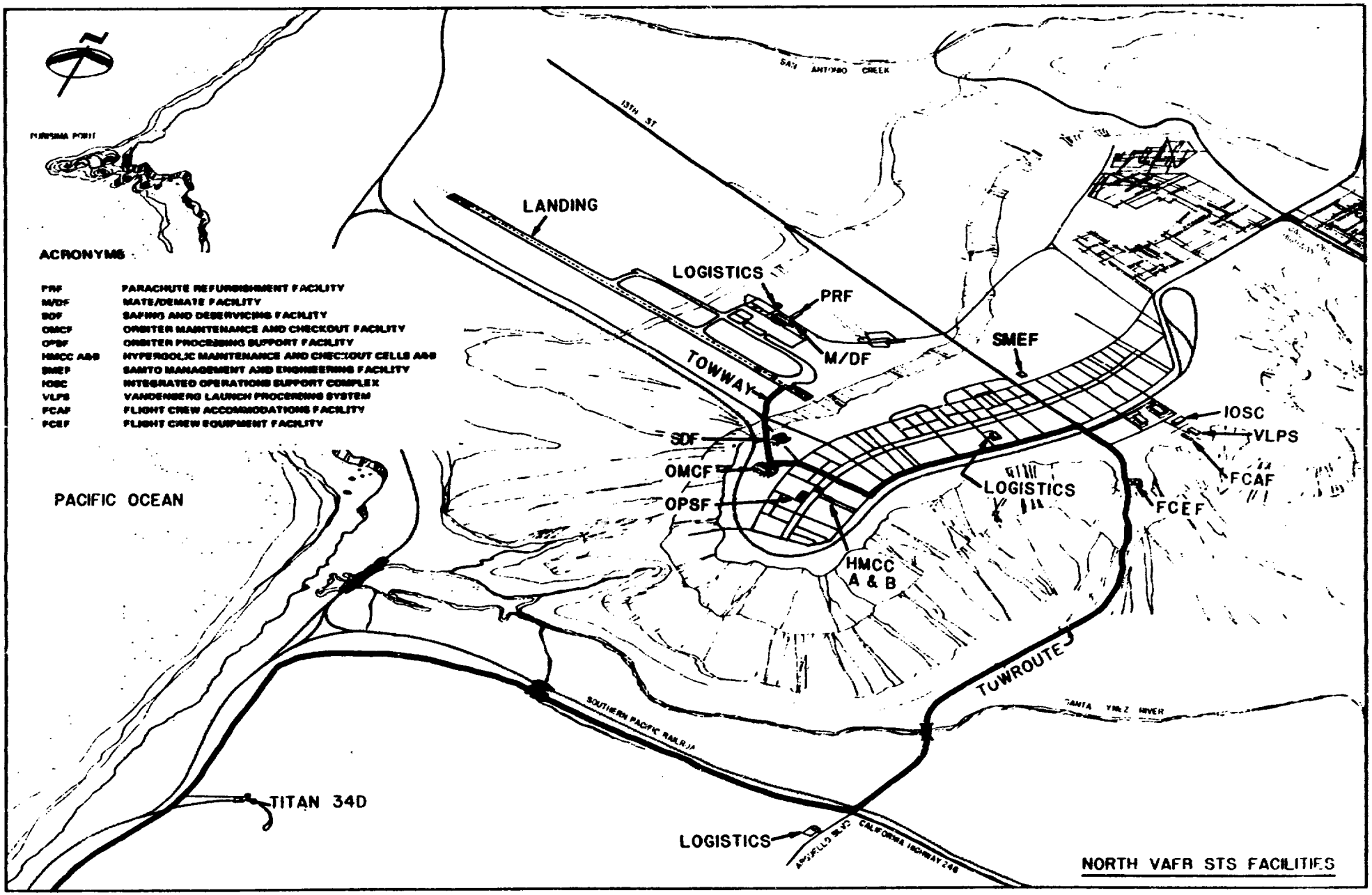
APPENDIX A

TECHNICAL SUPPORT MATERIAL

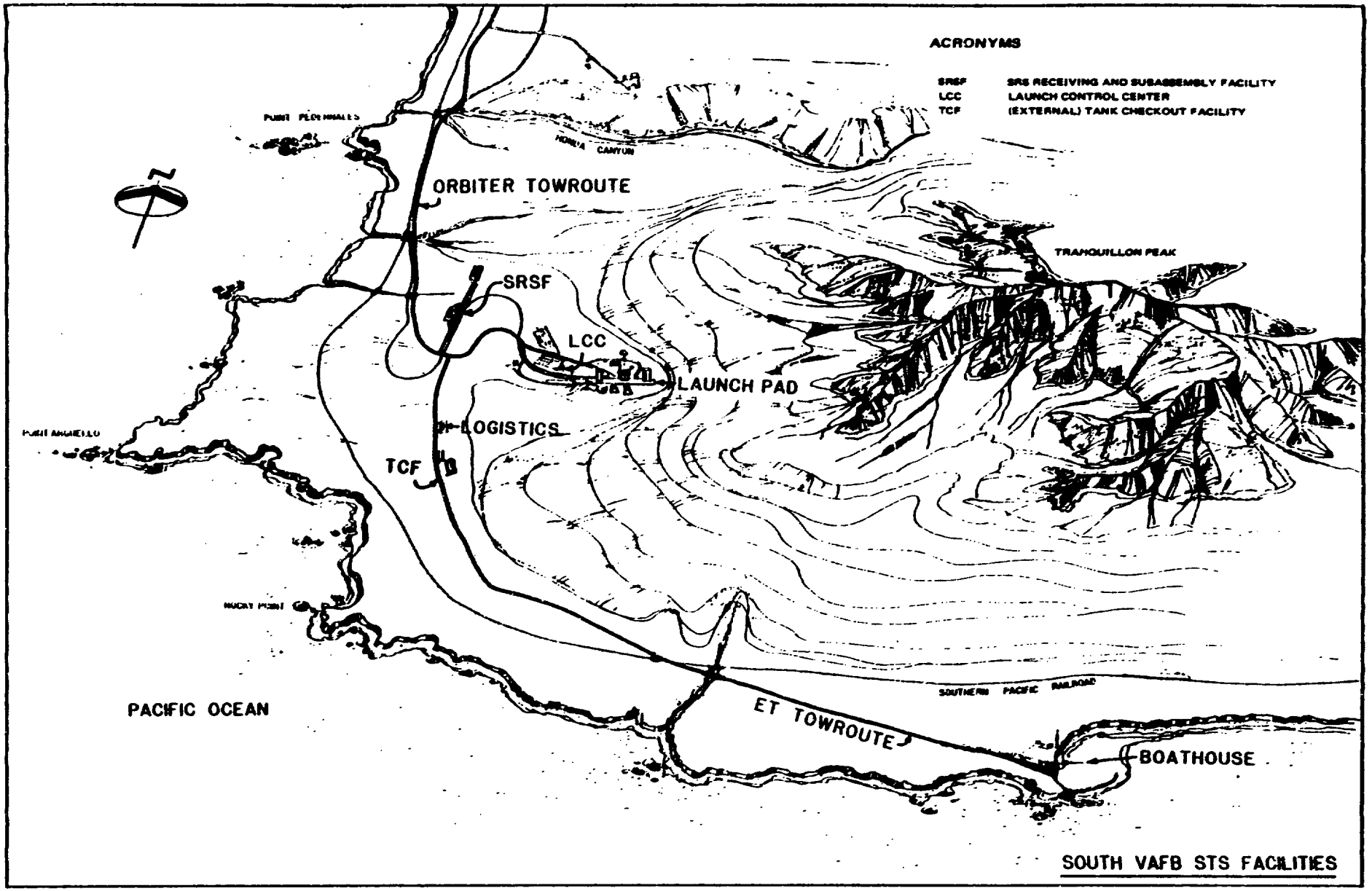
DATA BRIEFS, RENDERINGS, RESOURCE MAPS

AND

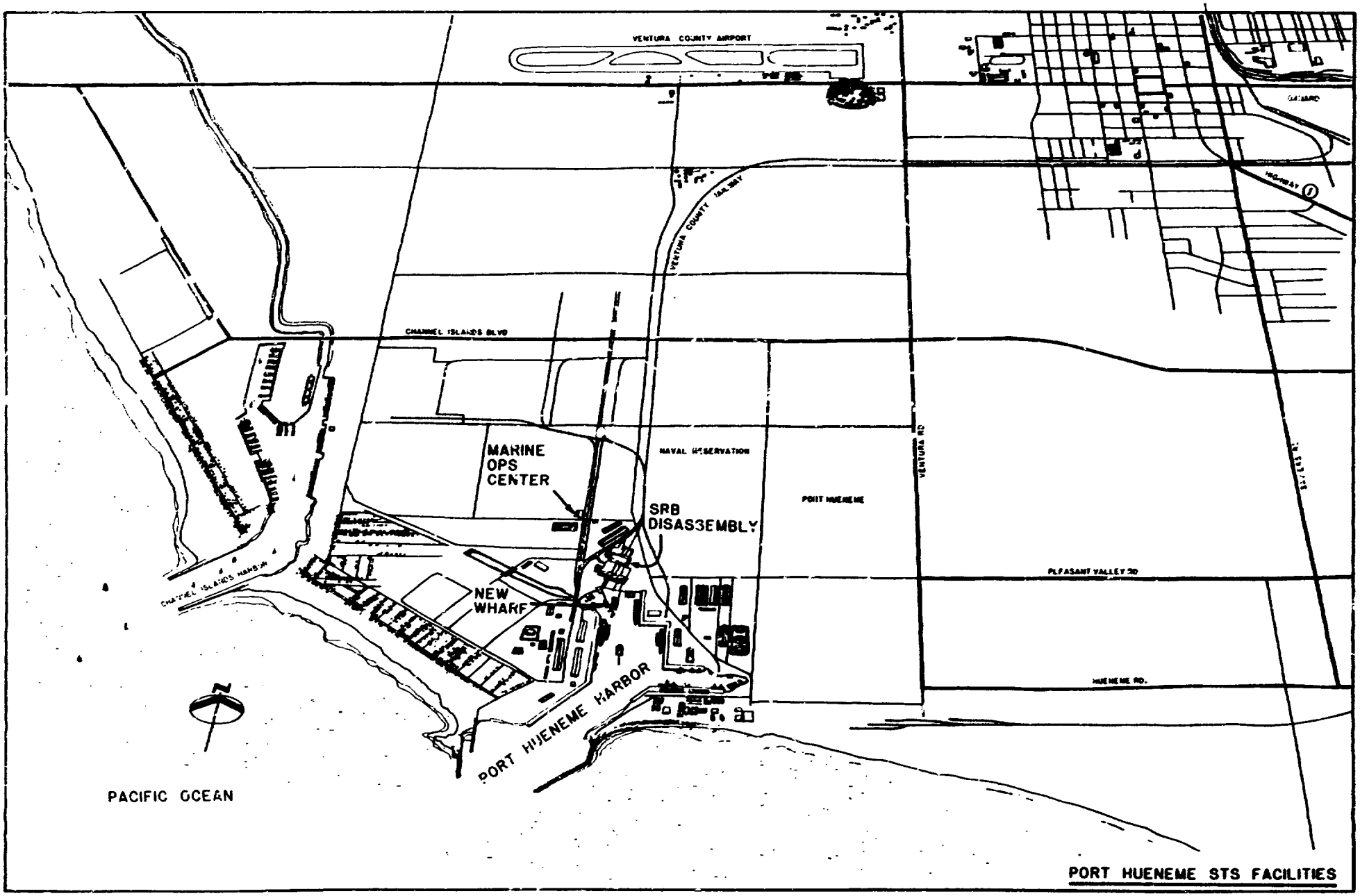
SOCIOECONOMIC METHODOLOGY



RENDERING 1.1 SPACE SHUTTLE PROGRAM GROUND SUPPORT FACILITIES, NORTH VANDENBERG AIR FORCE BASE



RENDERING 1.2 SPACE SHUTTLE PROGRAM GROUND SUPPORT FACILITIES, SOUTH VANDENBERG AIR FORCE BASE



RENDERING 1.3 SPACE SHUTTLE PROGRAM GROUND SUPPORT FACILITIES, PORT HUENEME

DATA BRIEF 2.1 - AIRFIELD LANDING FACILITY (FORMERLY DB 2.1-6)

DESCRIPTION

Improved runway: 15,000 ft by 200 ft wide with 200 ft shoulders (10 ft of which will be paved and 190 ft will be graded) on each side and a 1,000 ft by 200 ft overrun on each end. Taxiway is a 35 foot wide rigid pavement with 25 ft wide asphalt shoulders. Relocate 1,200 ft long segment of Tangair Road. Refer to Rendering 2.1.

CONSTRUCTION

- Activity - Facility Modification: Remove approximately 1.4 million sq ft of 10-inch thick existing runway surface (asphalt and stabilized base course) to disposal area and remove underlying material; erect concrete batch plants; transport and stockpile materials; clear, grub and grade 16 million sq ft; relocate underground utilities; compact and pave 3.2 million sq ft with 14- to 15-inch thick portland cement concrete and 1.7 million sq ft with 3-inch thick asphalt; cut grooves in runway; install electrical equipment.

- Noise - Sources: Pavement breaker, ripper, loaders, trucks, other mobile construction equipment, pavement grooving machines, and concrete batch plants.

- Natural Features to be Altered - Construction activities will remove the following special interest plants:

Arctostaphylos viridissima	30,000 individuals
A. Rudis	14,000 individuals
Ceanothus impressus	17,600 individuals
Scrophularia atrata	5,000 individuals

  A unique, relatively undisturbed canyon area may be adversely impacted as a result of use as a disposal site. Refer to Resource Map 2.1.

- Emissions - Dust from concrete batch plant and cleared land areas; dust raised by equipment on graded roads; silt from pavement grooving; solid wastes; gaseous emissions from asphalt.

- Manpower - Construction Peak: 160.

- Construction Schedule - January 1981 to January 1983.

- Other - Possible disruption to aviation activity.

OPERATION

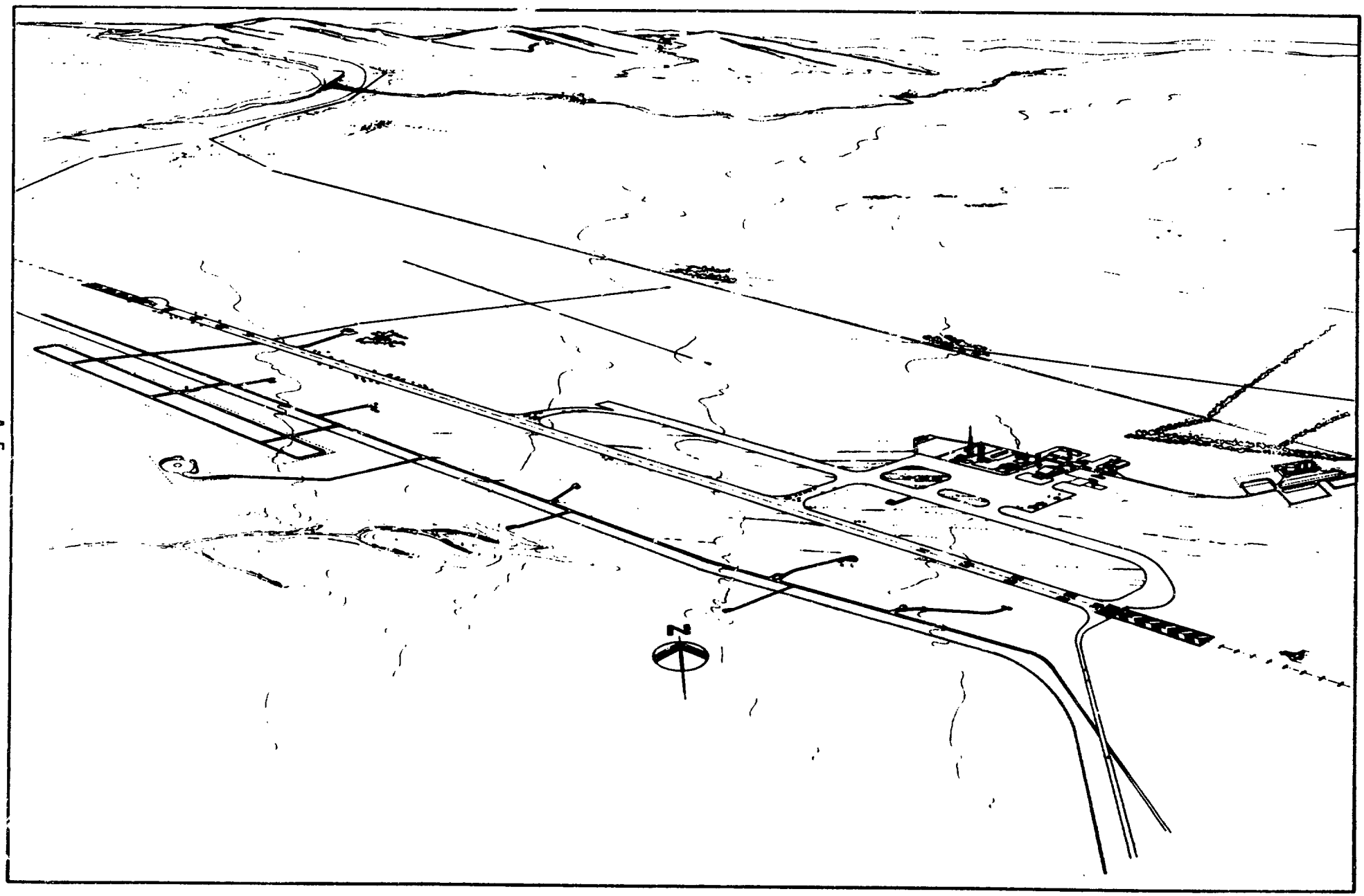
- Activity - Landing of Orbiter vehicle; delivery of Orbiter by 747 aircraft; delivery of materials, personnal, and supplies; conventional aircraft takeoff and landing.

- Noise - Sound conventionally associated with takeoff and landing of large, fixed-wing aircraft.

- Solids/Liquids/Gases - Liquid fuels and emissions associated with aircraft operations.

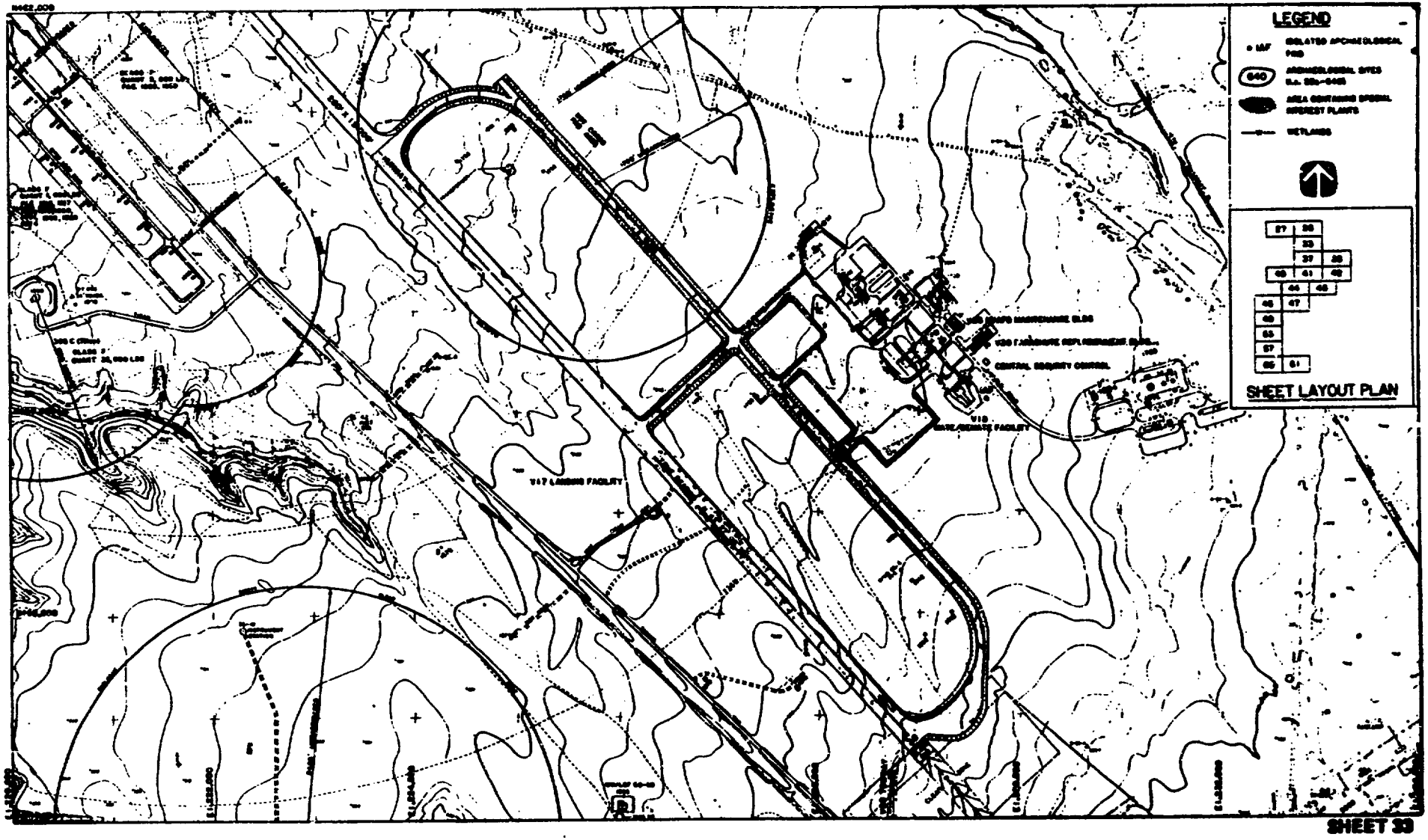
- Emissions - Gasoline and diesel fuel spills; accidental fire; explosion.

- Manpower - Operations: 72.



RENDERING 2.1 AIRFIELD LANDING FACILITY

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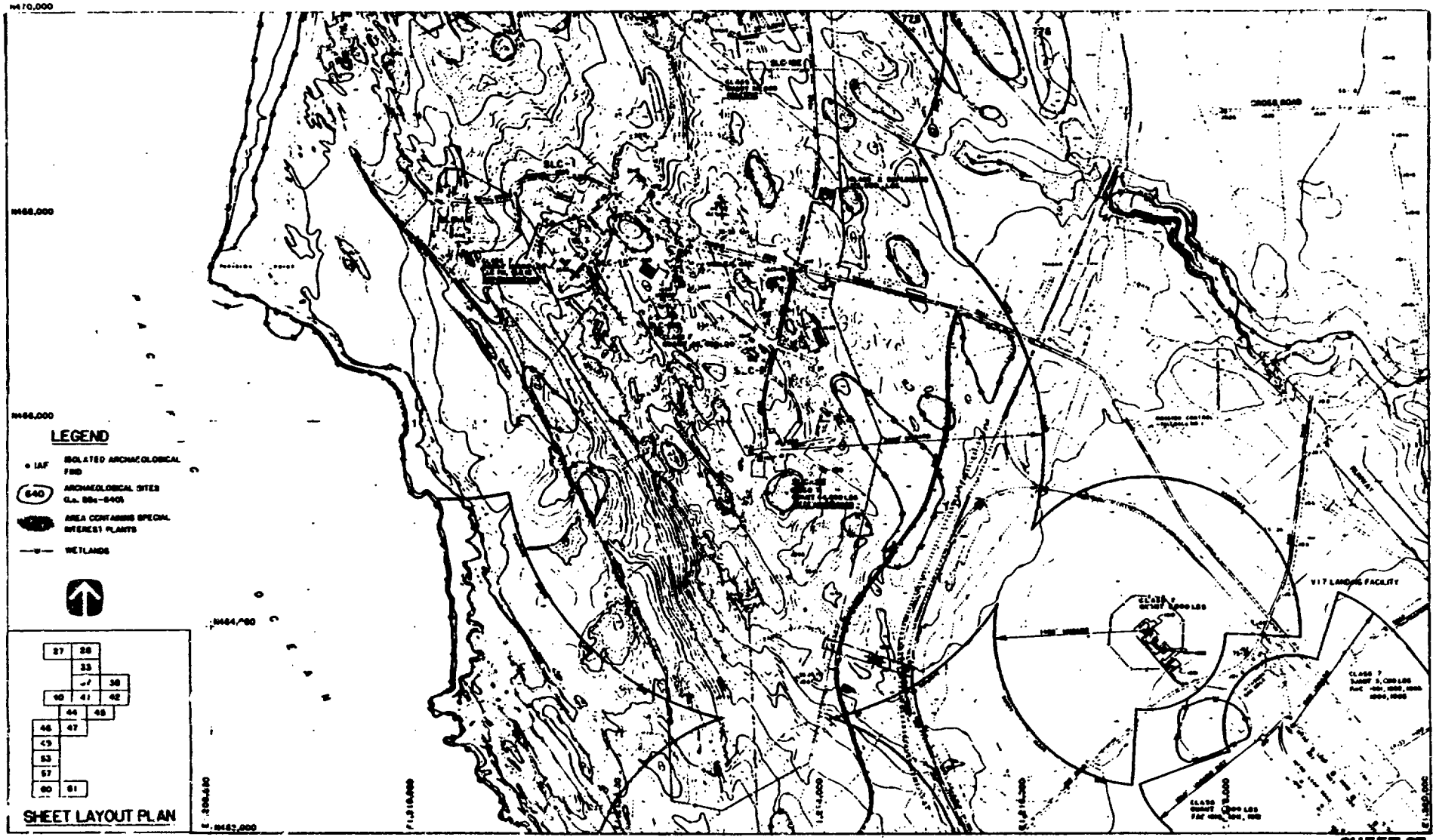


RESOURCE MAP 2.1 AIRFIELD LANDING FACILITY (SHEET 1 OF 3)

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RESOURCE MAP 2.1 AIRFIELD LANDING FACILITY (SHEET 2 OF 3)

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RESOURCE MAP 2.1 AIRFIELD LANDING FACILITY (SHEET 3 OF 3)

DATA BRIEF 3.1 - ORBITER MAINTENANCE AND CHECKOUT FACILITY (FORMERLY DB 2.1-9)

DESCRIPTION

Steel frame building consisting of two areas: A 203 by 348 by 101 ft high hangar and a 204 by 160 by 18 ft high shop and technical area; 52 ft high concrete blast wall separates hangar and shop/office area. Payload deservicing area is also completely blast protected by heavy concrete wall and ceiling. Refer to Rendering 3.1.

CONSTRUCTION

- Activity - Construct steel frame structure using conventional materials and erection procedure.
- Noise - Construction noise commonly associated with building erection and heavy equipment operation.
- Natural Features to be Altered - Facility will be constructed on level area with low vegetation adjacent to existing airfield facilities. Refer to Resource Map 3.1.
- Manpower - Construction Peak: 180.
- Construction Schedule - March 1980 to February 1982.

OPERATION

- Activity - Position Orbiter and attach supporting power/electrical connections; inspect Thermal Protection System (TPS) by solvent wipe-down and nondestructive testing; as necessary, repair/replace Thermal Protection System tiles; perform detailed inspection of subsystems; payload removal/installations; test fuel cells; service active Thermal Control System, Atmospheric Revitalization System and other systems; replenish consumables, pressurize gas bottles; connect ordnance; perform integrated preflight test. Orbiter towed from Maintenance and Checkout Facility to SLC-6 launch pad on wheeled transporter by diesel tractor.
- Noise - Light industrial
- Solids/Liquids/Gases - Centralized storage facility for gaseous nitrogen; gaseous helium; liquid nitrogen trailers for gaseous oxygen; gaseous hydrogen.

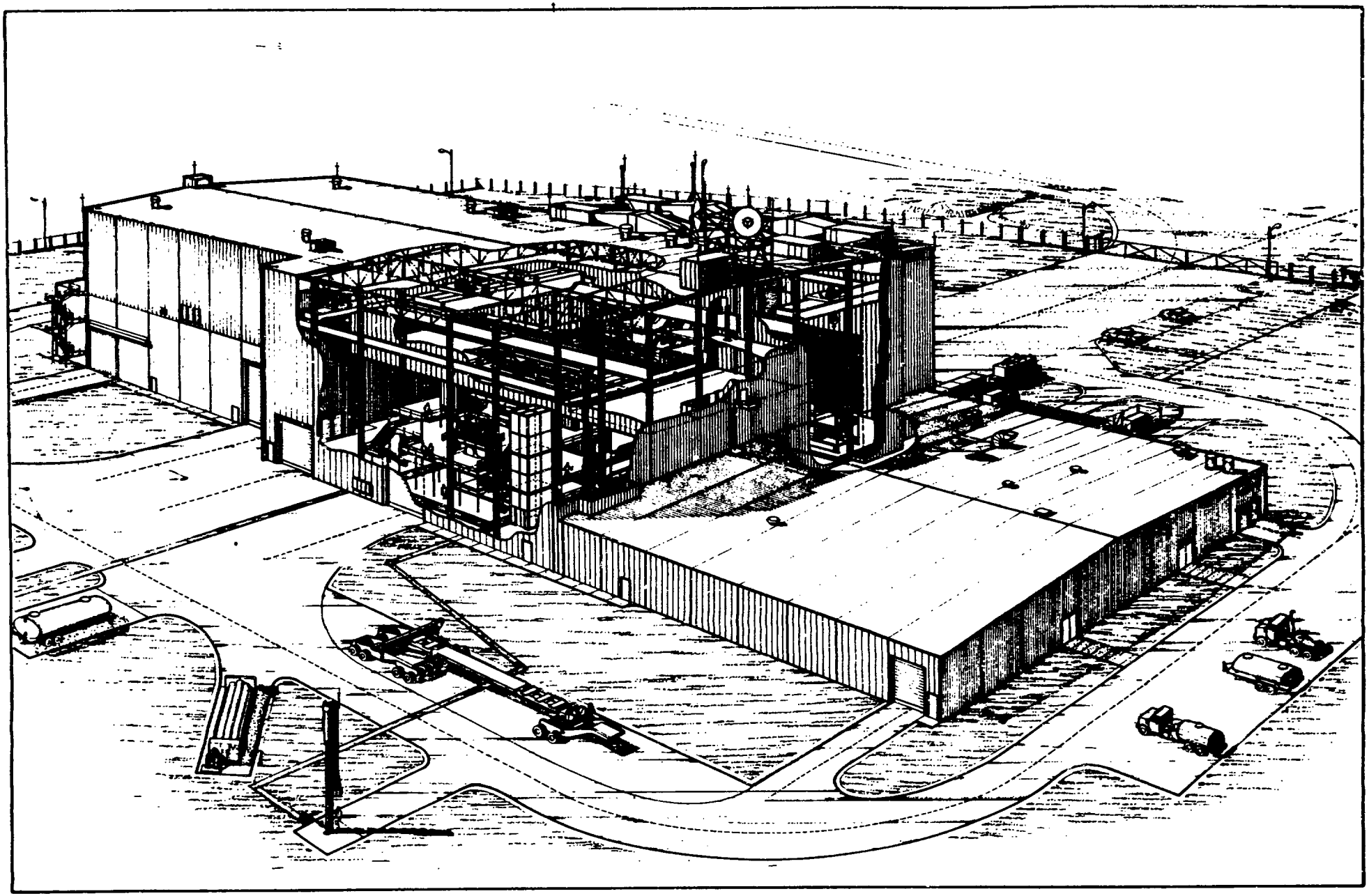
Monomethylhydrazine (MMH)	Gaseous nitrogen (GN_2)	Ammonia
Nitrogen tetroxide (N_2O_4)	Gaseous helium (GHe)	Carbon dioxide (CO_2)
Hydrazine (N_2H_4)	Gaseous hydrogen (GH_2) Liquid hydrogen (LH_2)	TPS bonding material
Isopropyl alcohol	Gaseous oxygen (GO_2) Liquid oxygen (LO_2)	TPS inter-tile insulation material
Freon TF Freon 21 FC-40 coolant	Compressed air Hydraulic fluid	Lube oil Potable water

- Emissions -

Operational: Solvent vapors; drained liquids and gases in mobile tanks.
Nonoperational: Accidental release of gases and liquids listed above; accidental fire/explosion; contaminated waste water from spill cleanup.

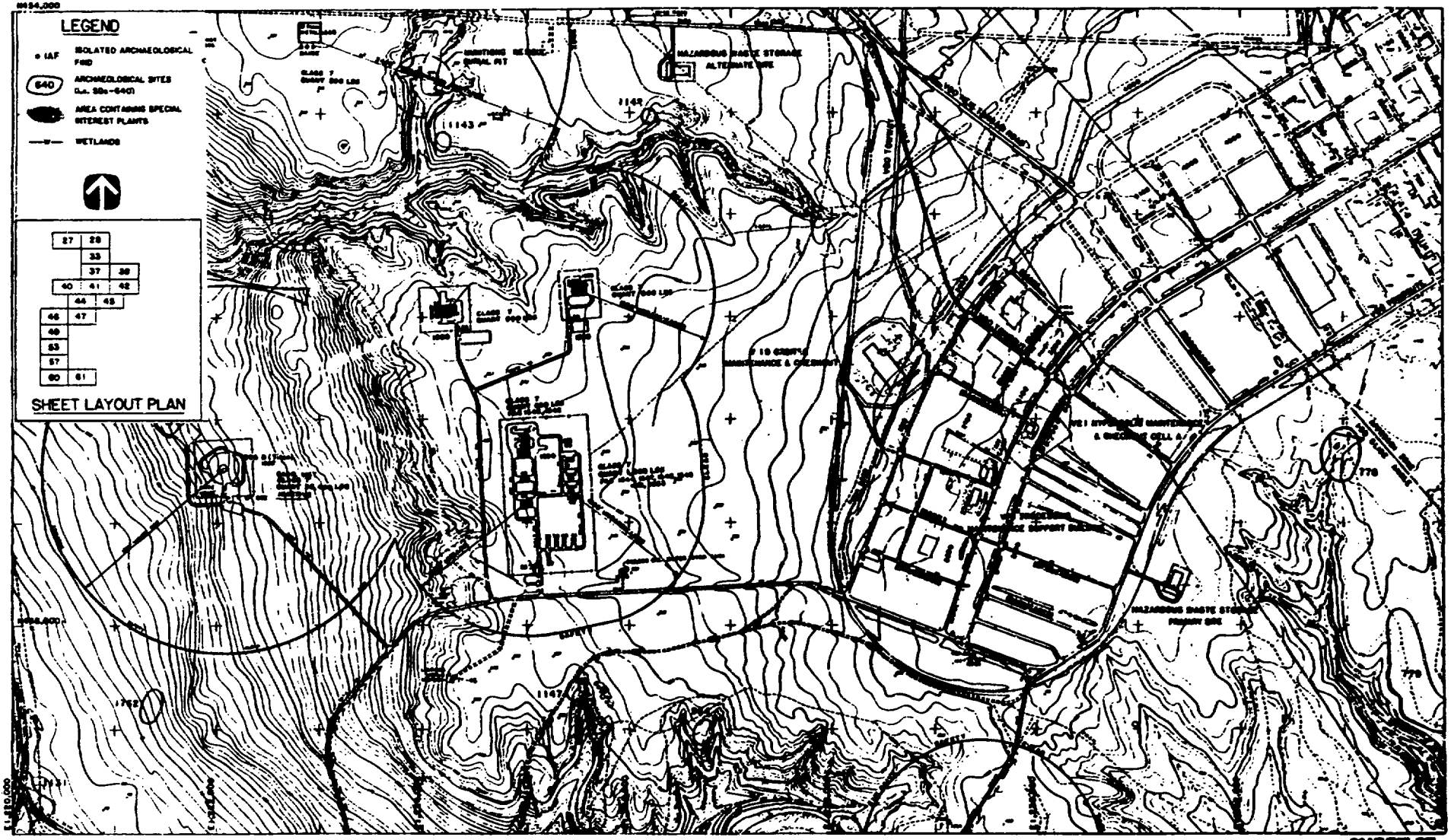
If damage or leakage is detected, residual gases and liquids will be offloaded to mobile tanks. If required, the following operations will be performed: Remove hypergolic modules, change main engine, remove/replace Orbiter components, install/remove air ferry kit. Vapor scrubbers and hypergolic water flush system will be installed for gas or propellant leaks.

- Manpower - Operations: 61 per shift (2 shifts); increasing to 109 per shift at peak load.



RENDERING 3.1 ORBITER MAINTENANCE AND CHECKOUT FACILITY

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION



SHEET 37

RESOURCE MAP 3.1 ORBITER MAINTENANCE AND CHECKOUT, SAFING AND DESERVICING, AND HYPERGOLIC FACILITIES

DATA BRIEF 4.1 - ORBITER SAFING/DESERVICING FACILITY (FORMERLY DB 2.1-8)

DESCRIPTION

Steel frame building consisting of two areas: A 46 ft by 192 ft by 76 ft high hangar and a 60 by 192 ft by 10 ft high office and shop area. Refer to Rendering 4.1.

CONSTRUCTION

- Activity - Construct steel frame structure using conventional materials and erection procedures.
- Noise - Construction noise commonly associated with building erection and heavy equipment operation.
- Natural Features to be Altered - Facility to be constructed on level area with low vegetation adjacent to existing airfield facilities. Refer to Resource Map 4.1.
- Manpower - Construction Peak: 100.
- Construction Schedule - January 1984 to September 1985.

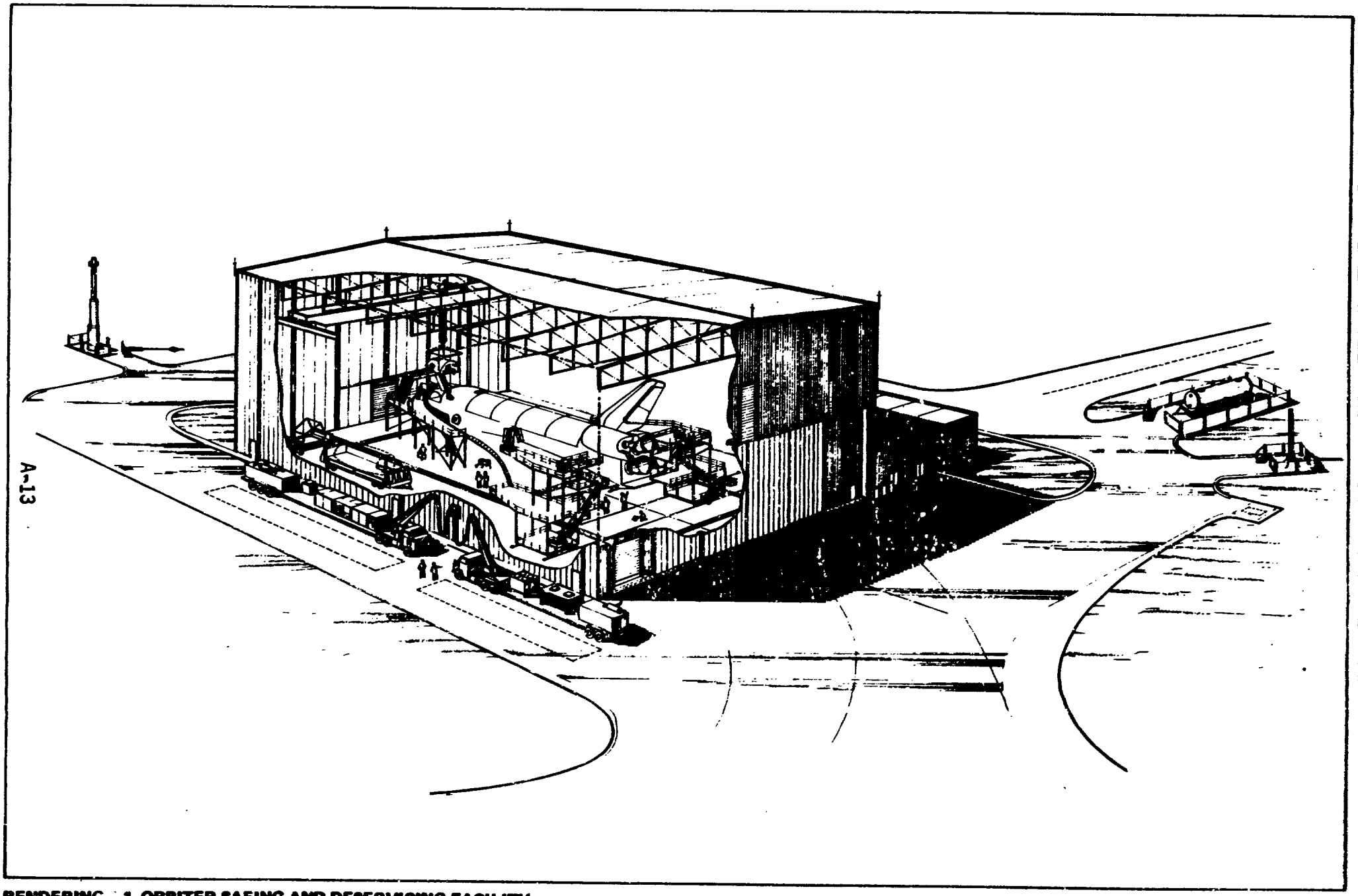
OPERATION

- Activity - Orbiter ordnance safing and fluids/gases deservicing following touchdown. Cool Orbiter interior with blowers, drain residual fuels, purge tanks and systems. Tow Orbiter to Maintenance and Checkout Facility following deservicing.
- Noise - Light industrial.
- Solids/Liquids/Gases - Residual quantities of hydrazine (N_2H_4), liquid oxygen (LO_2), liquid hydrogen (LH_2), gaseous helium (GHe), and gaseous nitrogen (GN_2). Gaseous nitrogen, helium, hydrogen, and oxygen piped directly from CMCF; no on-site storage, except for ammonia (NH_3).
- Emissions -

  Operational: Vent air from building; drained liquids and gases in mobile tanks. Nonoperational: Accidental release of residual quantities of liquids and gases; accidental fire or explosion; toxic gas emissions.

- Manpower - Operations: 91 per shift (2 shifts).

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION



A-13

RENDERING 4.1 ORBITER SAFING AND DESERVICING FACILITY

REFER TO RESOURCE MAP 3.1

DATA BRIEF 5.1 - ORBITER HYPERGOLIC SERVICING FACILITY (FORMERLY DB 2.1-0)

DESCRIPTION

One 188 ft by 86 ft support building for technical and office space. Two 71 ft by 71 ft by 47 ft high steel and concrete buildings containing shop, technical and module storage areas, test cells and adjacent deservicing pads. Refer to Rendering 5.1.

CONSTRUCTION

- Activity - Construct steel and concrete structures using conventional materials and procedures.
- Noise - Construction noise commonly associated with building erection and heavy equipment operation.
- Natural Features to be Altered - Facility will be constructed on level area with low vegetation adjacent to existing airfield facilities. Refer to Resource Map 5.1.
- Manpower - Construction Peak: 100.
- Construction Schedule - Phase (I): June 1980 to December 1981. Phase (II): January 1984 to March 1985.

OPERATION

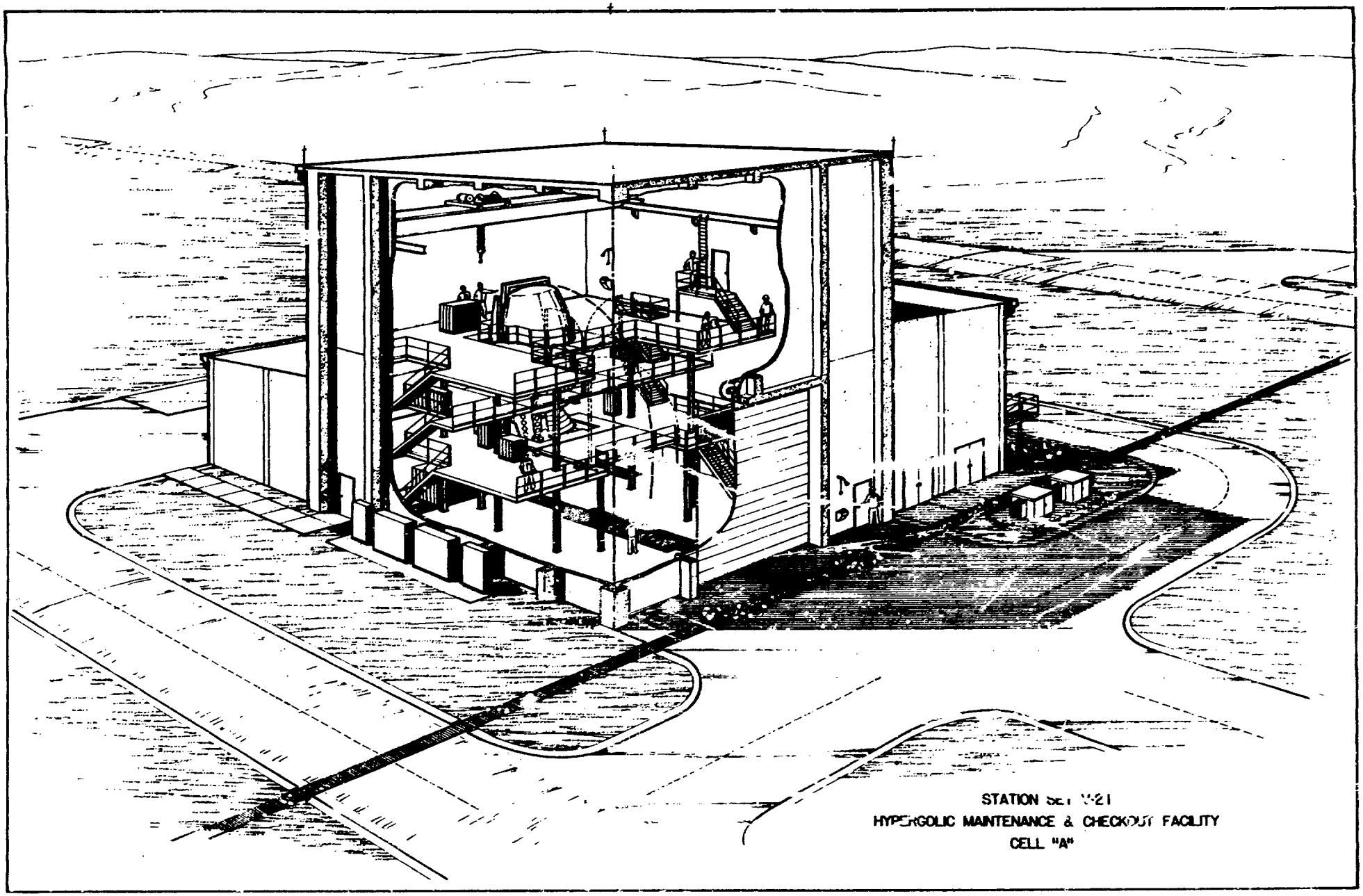
- Activity - Orbiter hypergolic propellant module and component servicing. Tear down, inspect, clean, reassemble and test the Orbiter payload bay kit, forward reaction control subsystem, aft propulsion subsystem, auxiliary power unit subsystems and hypergolic propulsion and altitude control systems aboard upper stages. Components hauled by truck from and to Orbiter Maintenance and Checkout Facility or Safing and Deservicing Facility.
- Noise - Light industrial.
- Solids/Liquids/Gases - Gaseous nitrogen (GN_2) and helium (GHe) piped directly from Orbiter Maintenance and Checkout Facility central supply. Other facilities included hypergolic and oxidizer waste tanker and hydrazine (N_2H_4) waste tanker pad. Compounds characteristically present on site are:

Gaseous helium (GHe)	Isopropyl alcohol
Monomethylhydrazine (MMH)	Freon TF
Nitrogen tetroxide (N_2O_4)	
Hydrazine (N_2H_4)	
Gaseous nitrogen (GN_2)	

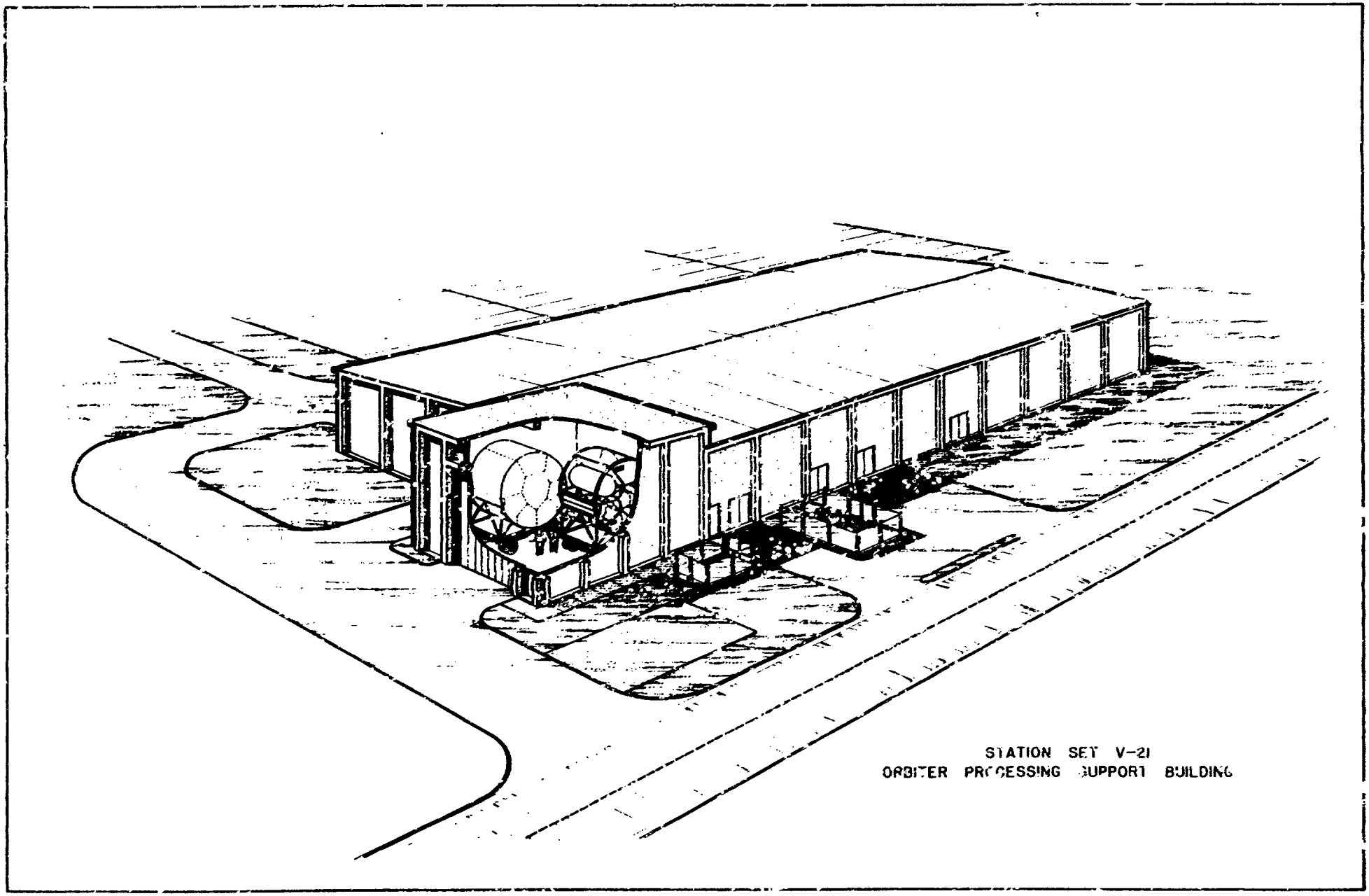
- Emissions -

  Operational: Solvent vapors - drained liquids and gases in tanks.
  Nonoperational: Accidental release of gases and liquids; release of contaminated waste waters from spill washdown; fire explosion.

- Manpower - Operations: 107 per shift (2 shifts).
- Other - Test cells will be maintained at less than ambient pressure. Other areas will be maintained at greater than ambient pressure. Fuel vapor detection units and oxidizer vapor detection units will be installed. Fuel vapor scrubbers, water deluge, and washdown will be utilized for spills, leaks, or fire.



RENDERING 5.1 HYPERGOLIC MAINTENANCE AND CHECKOUT FACILITY



RENDERING 5.2 ORBITER PROCESSING SUPPORT BUILDING

REFER TO RESOURCE MAP 3.1

DATA BRIEF 6.1 - LAUNCH PAD FACILITY (FORMERLY DB 2.4-I)

DESCRIPTION

Space Launch Complex No. 6, an existing launch pad facility developed for the cancelled Manned Orbiting Laboratory Program, will be modified to serve as the Space Shuttle Vehicle launch pad. Refer to Rendering 6.1.

CONSTRUCTION

- Activity - extensive modification of existing complex including refurbishment of existing facilities, construction of new facilities, roads, and utility systems and extensive earthwork. Development of new launch mount and rocket exhaust ducts.
- Noise - Heavy construction noise.
- Natural Features to be Altered - Burrow and spoil disposal areas required.
- Manpower - Construction Peak: 480.
- Construction Schedule: January 1979 to June 1983.

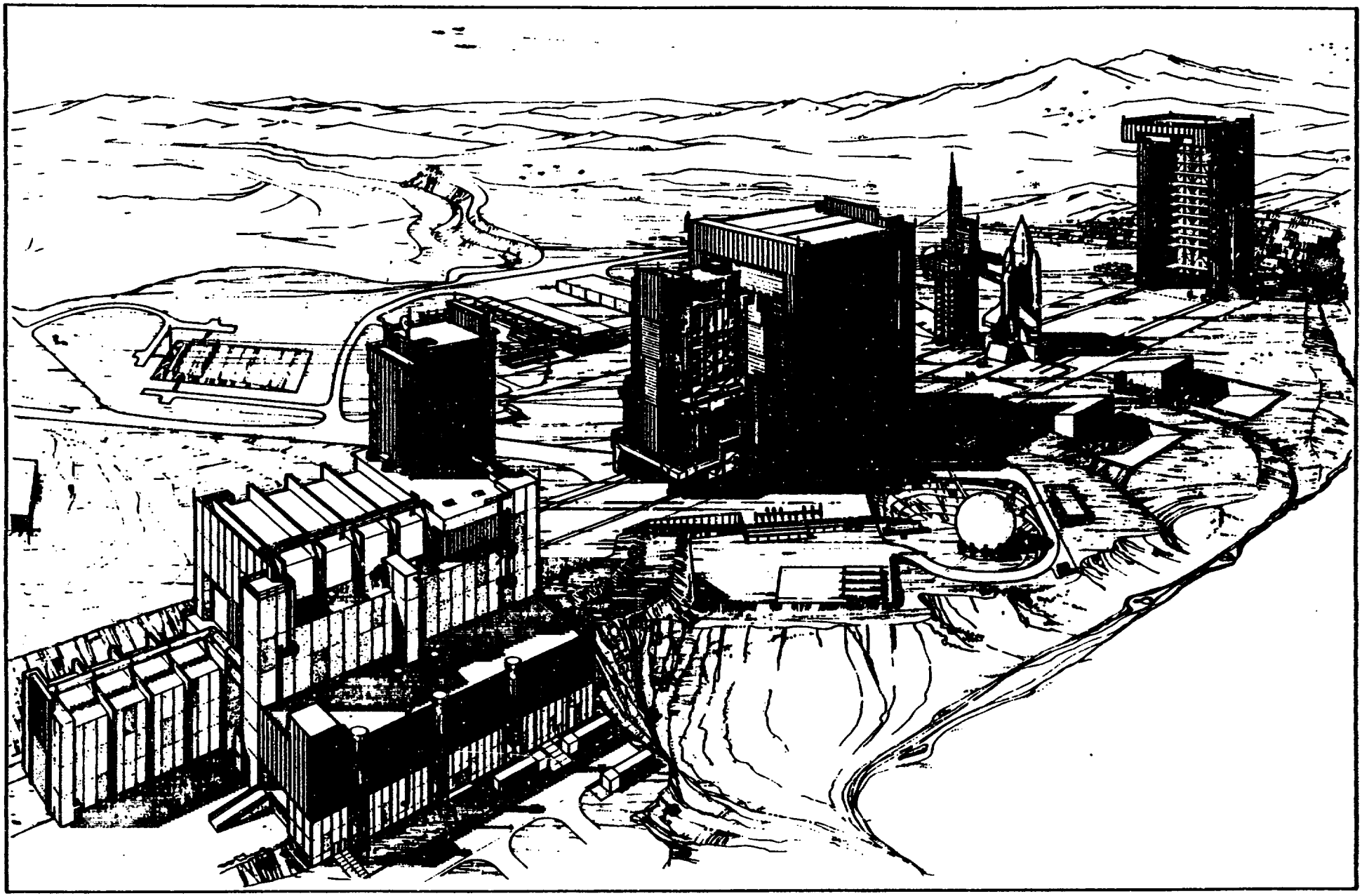
OPERATION

- Activity - Servicing and buildup of Space Shuttle Vehicle, prelaunch and launch activities.
- Noise - Launch preparation: Light industrial noise. Launch: Rocket engine noise.
- Solids/Liquids/Gases:

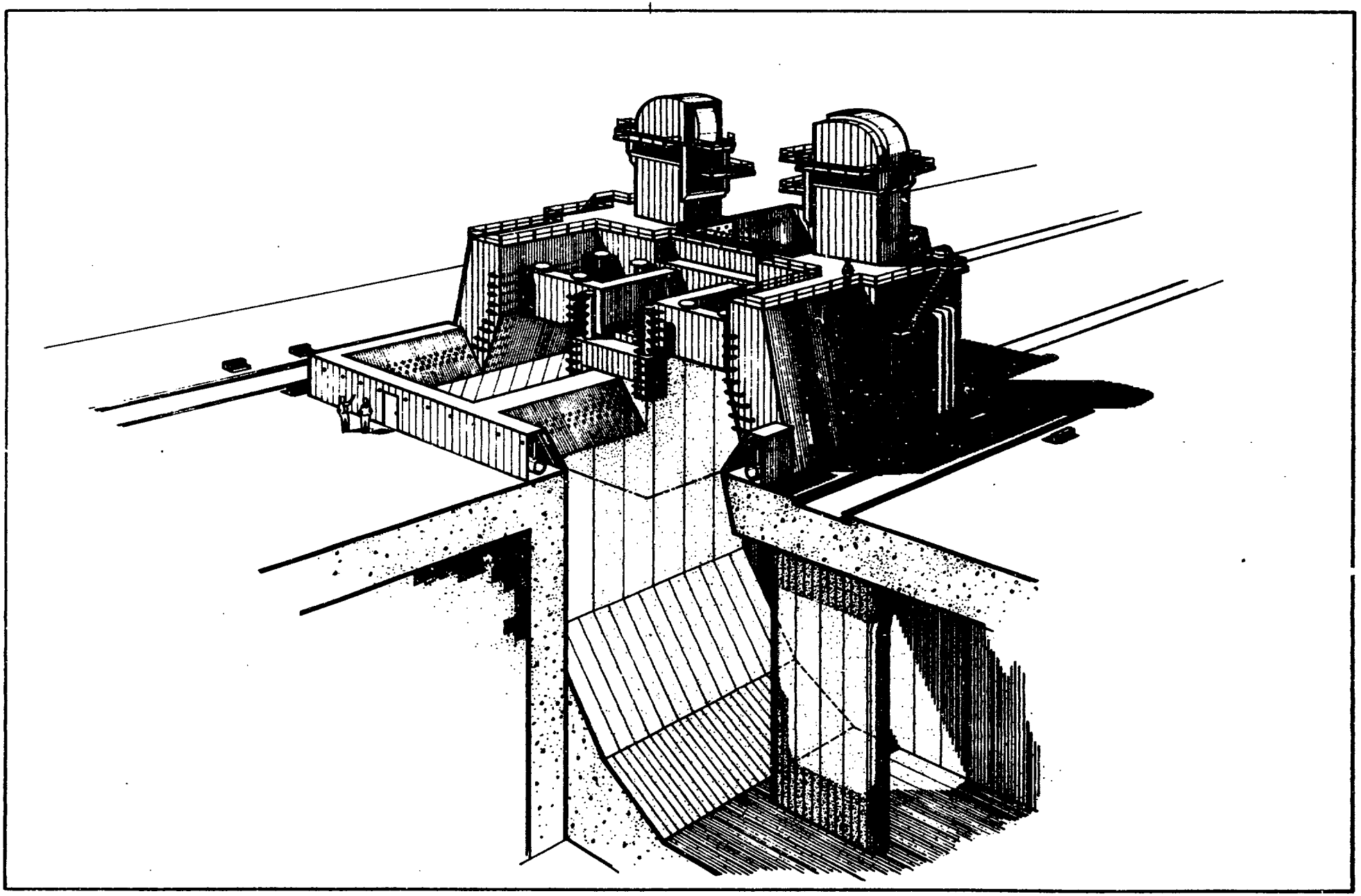
*Liquid oxygen (LO_2)	*Hydrazine ($N_2 H_4$)	FC-40 Coolant
*Liquid hydrogen (LH_2)	Hydraulic fluid	Freon 21
*Monomethylhydrazine (MMH)	Portable water	Ammonia (NH_3)
Halon 1301	*Nitrogen tetroxide ($N_2 O_4$)	
Diesel fuel	**Liquid nitrogen (LN_2)	
Mixed oxides of nitrogen (Mon-10)*		
Deionized water	Freon 113	
*Deluge water	Isopropyl Alcohol	

*Stored in tanks near launch complex.
**Piped from LN_2 facility.

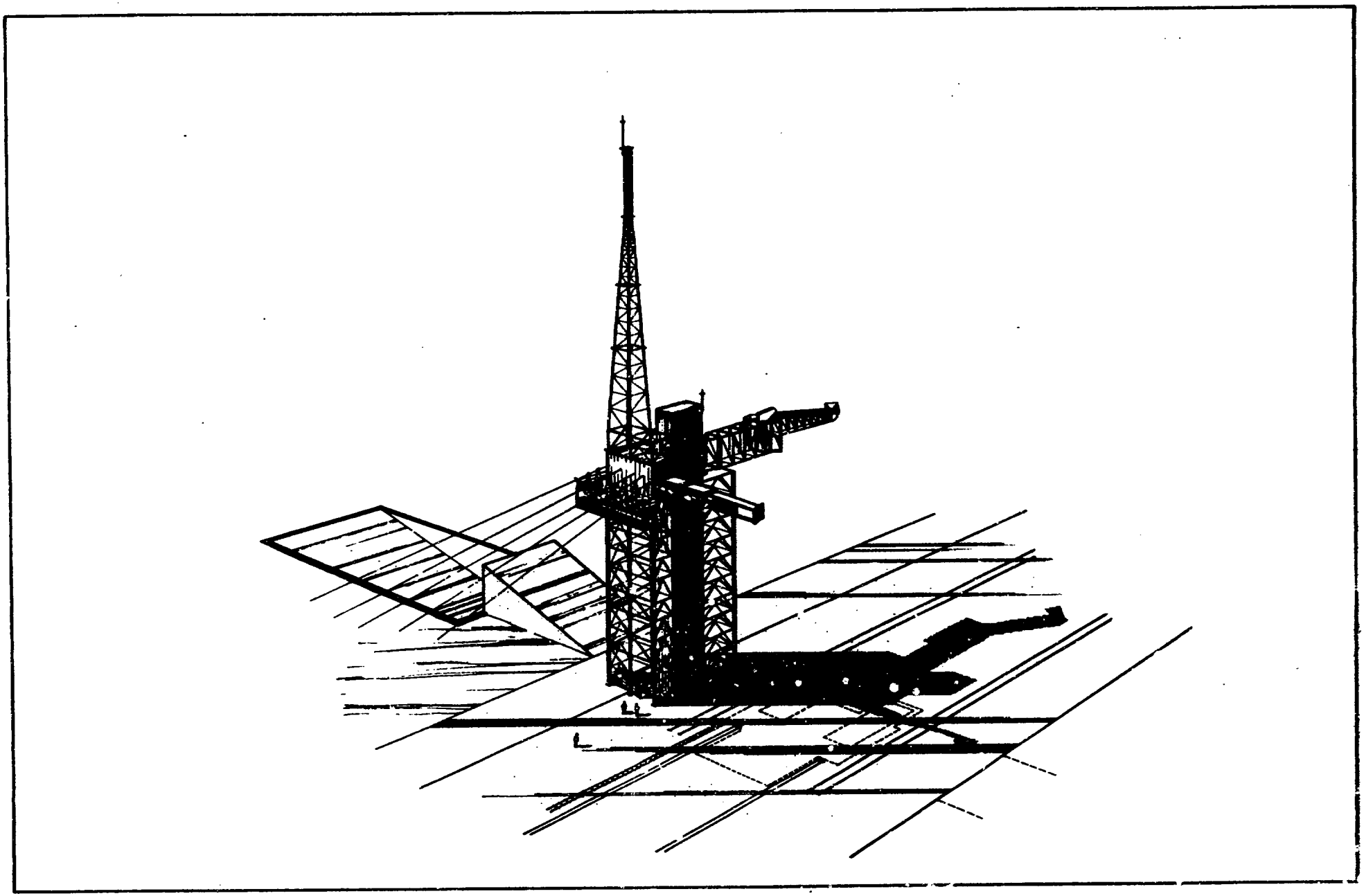
- Emissions - Refer to emissions shown on data briefs for specific launch pad facilities.
- Manpower - Operations: 514 (total SLC-6 area).



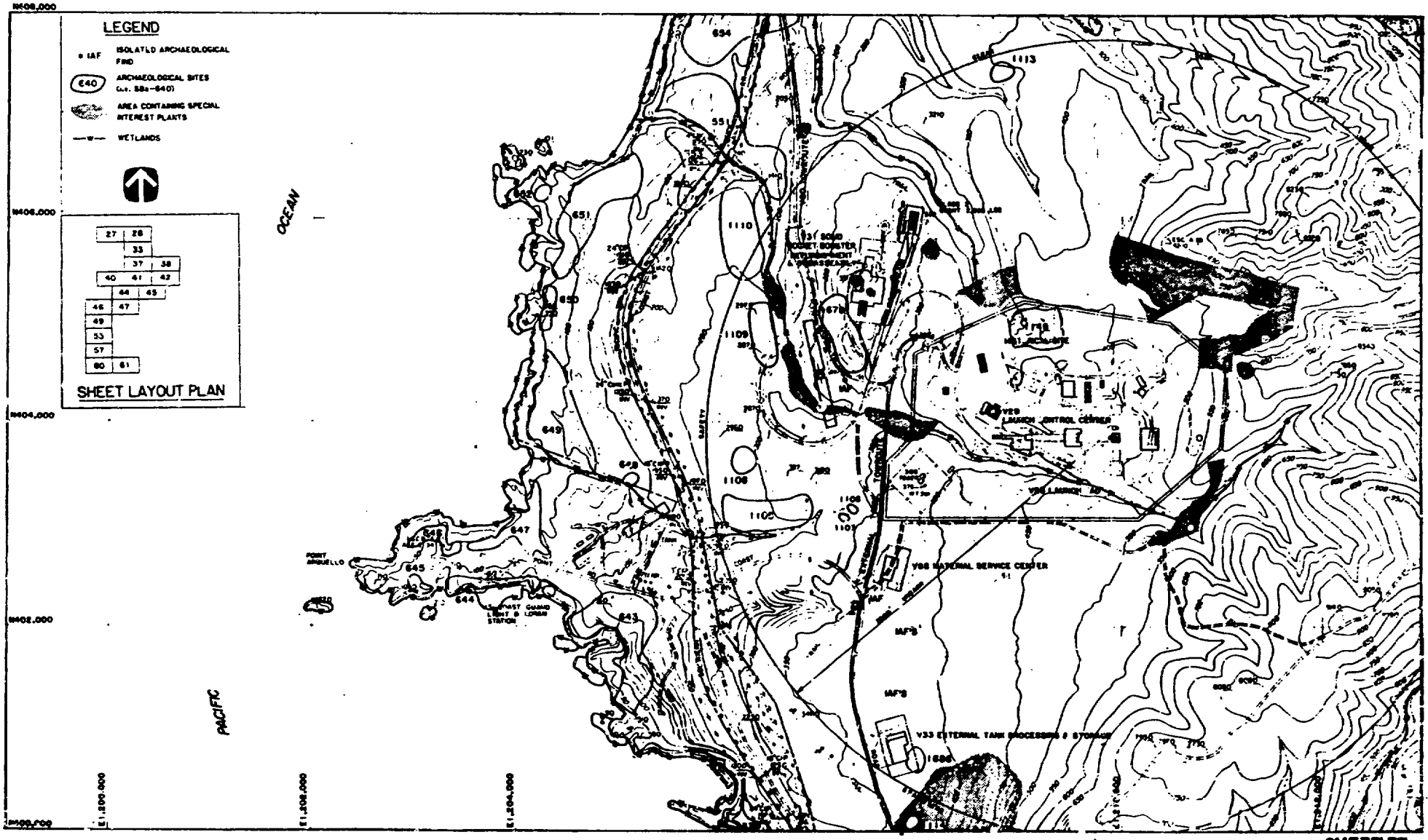
RENDERING 8.1 LAUNCH PAD FACILITY



RENDERING 6.2 SHUTTLE VEHICLE LAUNCH MOUNT



RENDERING 6.2 ACCESS TOWER



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RESOURCE MAP 6.1 LAUNCH PAD FACILITY

DATA BRIEF 6.2 - MOBILE SERVICE TOWER FACILITY (FORMERLY DB 2.4-2)

DESCRIPTION

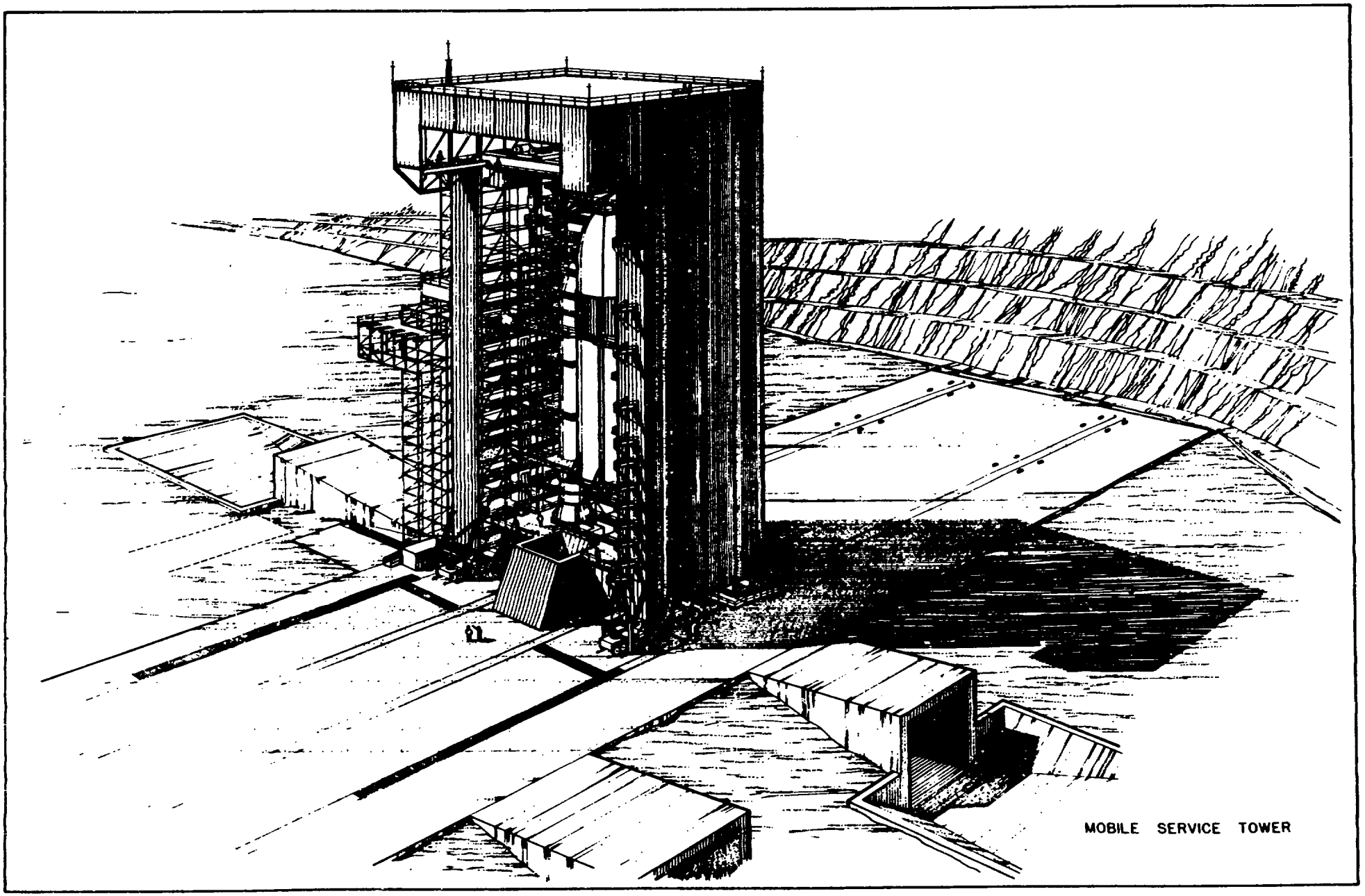
Existing 82.5 by 135.5 by 275 ft high steel frame enclosed structure capable of movement over rails. Refer to Rendering 6.4.

CONSTRUCTION

- Activity - Extensive structural modification of existing Manned Orbiting Laboratory Program Mobile Service Tower, provide new tie-down anchor points, extend rails approximately 150 ft east, excavate hillside located immediately east of the launch pad to extend existing 430 ft elevation at east edge of pad to a point coinciding with existing 480 ft elevation. Provide drainage control above new cut. Modify interior of tower to provide access platforms compatible with Space Shuttle Vehicle, increase height 21 ft to accommodate new cranes, extend tower railway to the east, provide increased structural strength, replace existing space vehicle doors.
- Noise - Heavy construction noise.
- Natural Features to be Altered - Extensive excavation and recontouring of hillside located east of the launch pad. Alteration of existing drainage patterns. Refer to Resource Map 6.1.
- Manpower - Construction peak included in total launch pad requirements.
- Construction Schedule - Included in total launch pad schedule.

OPERATION

- Activity - Mobile Service Tower encloses launch mount to facilitate Space Shuttle Vehicle buildup and checkout. Rolls east to parking position for launch.
- Noise - Light industrial noise.
- Solids/Liquids/Gases - Refer to data Brief 6.1 for Launch Pad Facility.
- Emissions - None from Mobile Service Tower.
- Manpower - Operations: Included in total launch pad requirements. Refer to DB 6.1.



RENDERING 6.4 MOBILE SERVICE TOWER

DATA BRIEF 6.3 - PAYLOAD PREPARATION AND CHANGEOUT FACILITIES (FORMERLY DB 2.4-6)

DESCRIPTION

Mobile 92 ft by 81 ft by 184 ft high payload changeout room and 102 ft by 300 ft by 116 ft high payload preparation room. Refer to Renderings 6.5 and 6.6.

CONSTRUCTION

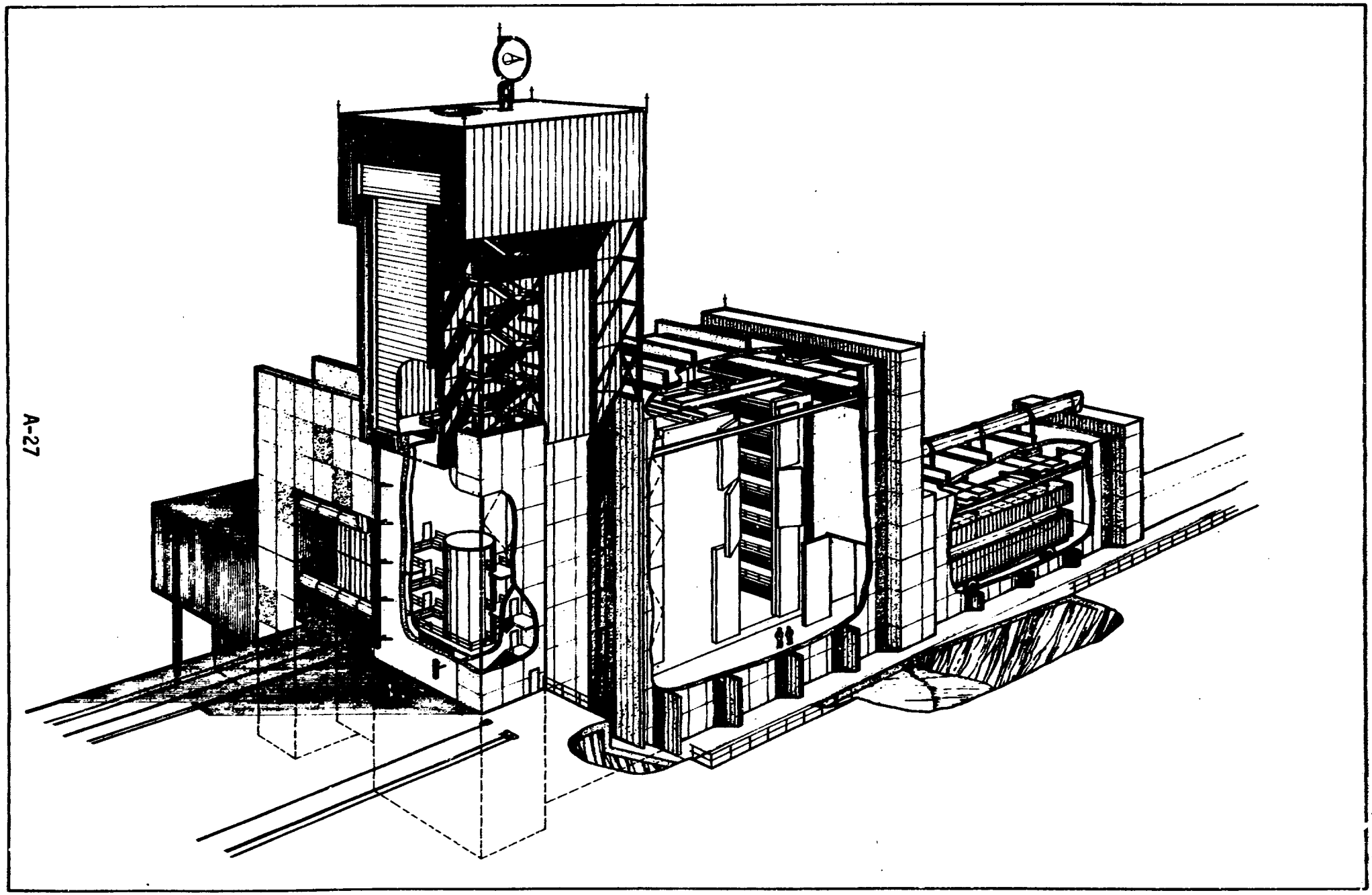
- Activity - Clear area, construct reinforced concrete preparation room and associated 310 ft long by 40 ft wide ramp leading from surface to floor. Construct steel frame mobile changeout room tower, install tracks from preparation room to launch mount, provide new access road to ramp.
- Noise - Heavy construction noise.
- Natural Features to be Altered - Facility will be constructed at the already developed SLC-6 area. Refer to Resource Map 6.1.
- Manpower - Construction peak included in total launch pad requirements. Refer to Data Brief 6.1.
- Construction Schedule - Included in total launch pad schedule. Refer to Data Brief 6.1.

OPERATION

- Activity - Payloads delivered by truck down ramp, through airlock into payload preparation room to be serviced and hoisted into mobile payload changeout room. Room rolls on rails to launch mount. Seals to Orbiter, inserts payload into cargo bay, and returns to position over preparation room. Changeout room also used to hoist and mate External Tank and Orbiter at launch pad.
- Noise - Light industrial noise.
- Solids/Liquids/Gases - Liquid hydrogen (LH_2) and liquid oxygen (LO_2).
- Emissions -

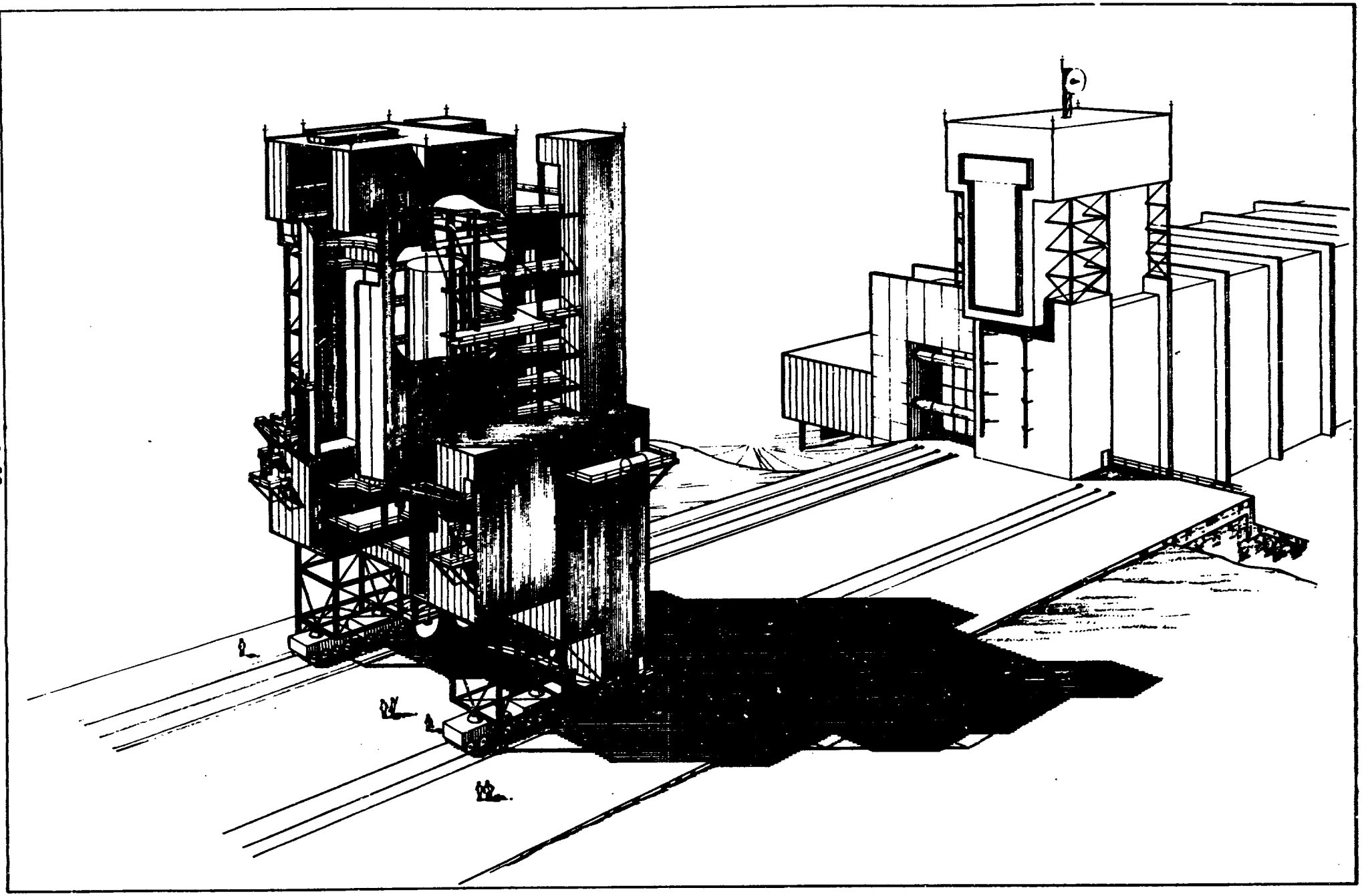
  Operational: None
  Nonoperational: Accidental leakage of oxygen and hydrogen — reaction of leaked gases could cause explosion.

- Manpower - Included in total launch pad requirements.



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RENDERING 6.5 PAYLOAD PREPARATION ROOM



RENDERING 6.6 PAYLOAD CHANGEOUT ROOM

DATA BRIEF 6.4 - LAUNCH PAD PROPELLANT SYSTEM (FORMERLY DB 2.4-6)

DESCRIPTION

Liquid hydrogen storage tank of 850,000 gallon capacity; liquid oxygen storage tank of 300,000 gallon capacity; gaseous oxygen storage tank of 2,070 gallon capacity; pumps, and distribution system.

CONSTRUCTION

- Activity - Earthwork (exc., fill, grading, trenching), concrete and steel tanks, install pumps, manifolds, distribution piping, utilities/instrumentation, and access roads.
- Risks - Construction risks associated with dewatering and installing heavy steel structures.
- Natural Features to be Altered - Liquid hydrogen (LH_2) tank areas to be cut from existing hillside southwest of launch pad. Liquid oxygen (LO_2) tank areas to be developed by placing fill on slope southeast of launch pad. Gaseous oxygen (GO_2) tank adjacent to LH_2 tank area. Slope remaining will be contoured between LH_2 tank and launch pad.
- Manpower - Construction crew included in total launch pad requirements. Refer to Data Brief 6.1.
- Construction Schedule - Included in total launch pad schedule. Refer to Data Brief 6.1.

OPERATIONS

- Activity - Fill tanks from trailer trucks, ensure propellants, and supply propellants to Space Shuttle Vehicle at the launch pad.
- Risks - Propellant pumps, vapor boil-off.
- Solids/Liquids/Gases - Liquid hydrogen (LH_2); liquid oxygen (LO_2); gaseous oxygen (GO_2).
- Emissions -

  Operational: Flared gaseous hydrogen (GH_2); vented gaseous oxygen.
  Nonoperational: Gaseous hydrogen (GH_2) could react with gaseous oxygen (GO_2) to cause an explosion.

- Manpower - Control is from launch control center.

DATA BRIEF 6.5 - SUPPORT EQUIPMENT BUILDING AND AIR CONDITIONING SHELTER (FORMERLY DB 2.4-II)

DESCRIPTION

Existing two-story concrete Manned Orbiting Laboratory Program "AGE Building" and adjacent structure approximately 46 by 130 ft.

CONSTRUCTION

- Activity - Support equipment building and air conditioning shelter are existing buildings located at SLC-6 adjacent to the existing launch platform. Minor modifications will be made to interior, exterior, and facility services.
- Noise - Light construction noise; equipment delivery.
- Natural Features to be Altered - None.
- Manpower - Construction peak included in launch pad requirements. Refer to Data Brief 6.1.
- Construction Schedule - Given in total launch pad scheduled. Refer to Data Brief 6.1.

OPERATION

- Activity - Equipment maintenance.
- Noise - None.
- Solids/Liquids/Gases - Not applicable
- Emissions - Not applicable.
- Manpower - None.

DATA BRIEF 7.1 - LAUNCH CONTROL CENTER FACILITY (FORMERLY DB 2.4.3)

DESCRIPTION

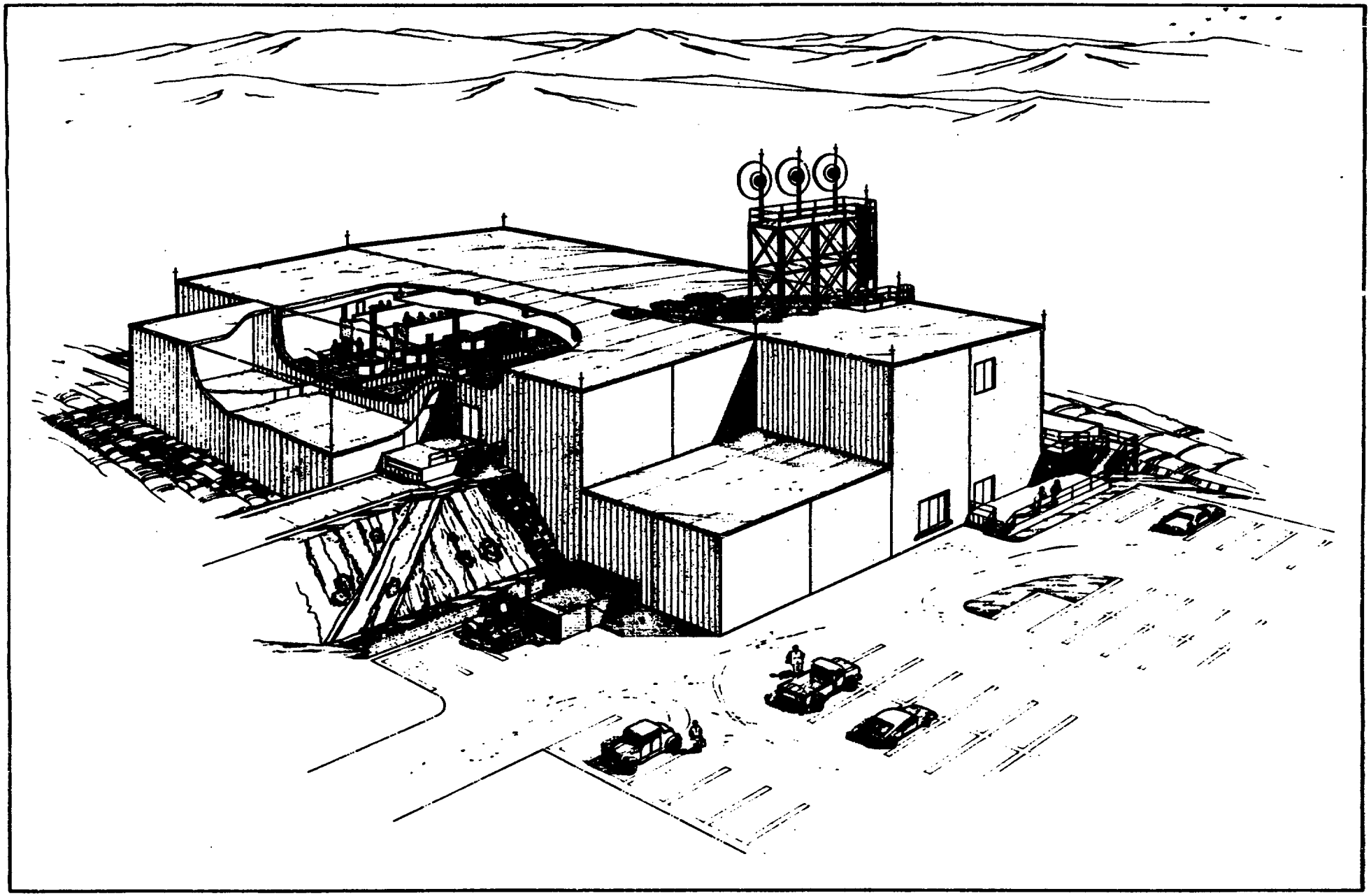
Existing 100 sy 160 by 40 ft high partially buried reinforced concrete wall building. Refer to Rendering 7.1.

CONSTRUCTION

- Activity - Erection of blast barricade between building and launch pad. Removal and reinstallation of interior walls and floors, installation of mechanical systems, installation of electrical equipment.
- Noise - Earthmoving equipment noise for earthen blast barricade construction, equipment delivery, and installation activity noise.
- Natural Features to be Altered - None.
- Manpower - Construction Peak: 40.
- Construction Schedule - May 1980 to March 1981.

OPERATION

- Activity - Monitor component and launch vehicle testing, control countdown and launch.
- Noise - Ventilation system, hazard warnings, paging systems.
- Solids/Liquids/Gases - None.
- Emissions - None.



RENDERING 7.1 LAUNCH CONTROL CENTER FACILITY

REFER TO RESOURCE MAP 6.1

DATA BRIEF 8.1 - FLIGHT CREW ACCOMMODATIONS FACILITY

DESCRIPTION

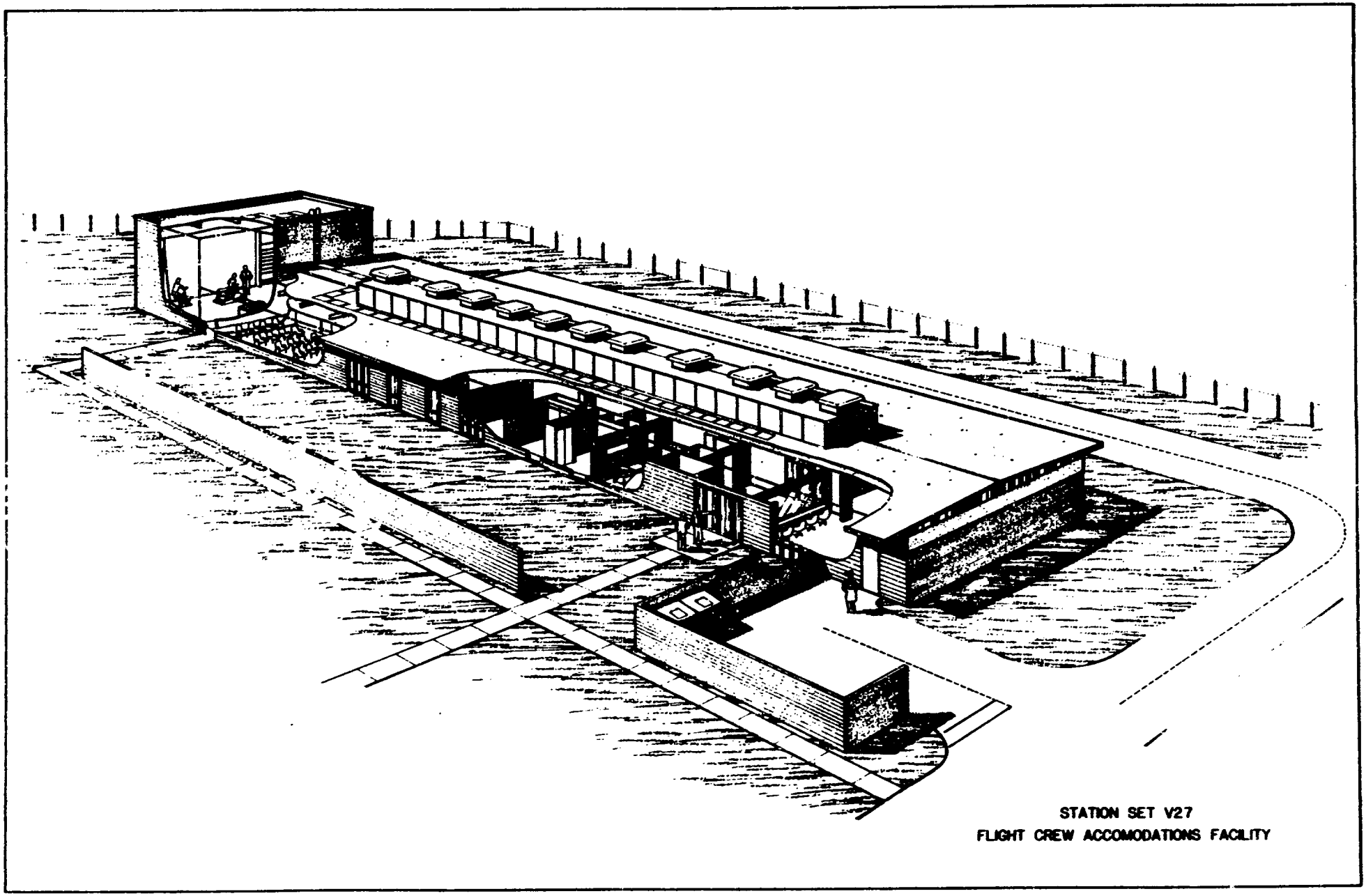
Facilities and services to provide technical and logistic support of flight crew equipment and flight crew members when resident at Vandenberg AFB. Refer to Rendering 8.1.

CONSTRUCTION

- Activity - Interior modifications to existing buildings 8505 and 6710; parking lot, new water lines, paved areas. Flight crew accommodation facility: Modify existing building 8505 (209 by 43 ft). Flight crew equipment facility: Modify existing building 6710 (122 by 50 ft).
- Noise - Light construction noise.
- Natural Features to be Altered - To be constructed in a chaparral habitat area (approximately 19,000 square ft to be removed). Refer to Resource Map 8.1.
- Manpower - Construction Peak: 15.
- Construction Schedule - July 1983 to October 1983.

OPERATION

- Activity - Residential and health care support of flight crew.
- Noise - None.
- Solids/Liquids/Gases - Typical hospital/medical supplies.
- Emissions - None.



RENDERING 8.1 FLIGHT CREW ACCOMODATIONS FACILITY

REFER TO RESOURCE MAP 12.1, SHEET 1

DATA BRIEF 9.1 - PARACHUTE REFURBISHMENT FACILITY (FORMERLY DB 2.2-6)

DESCRIPTION

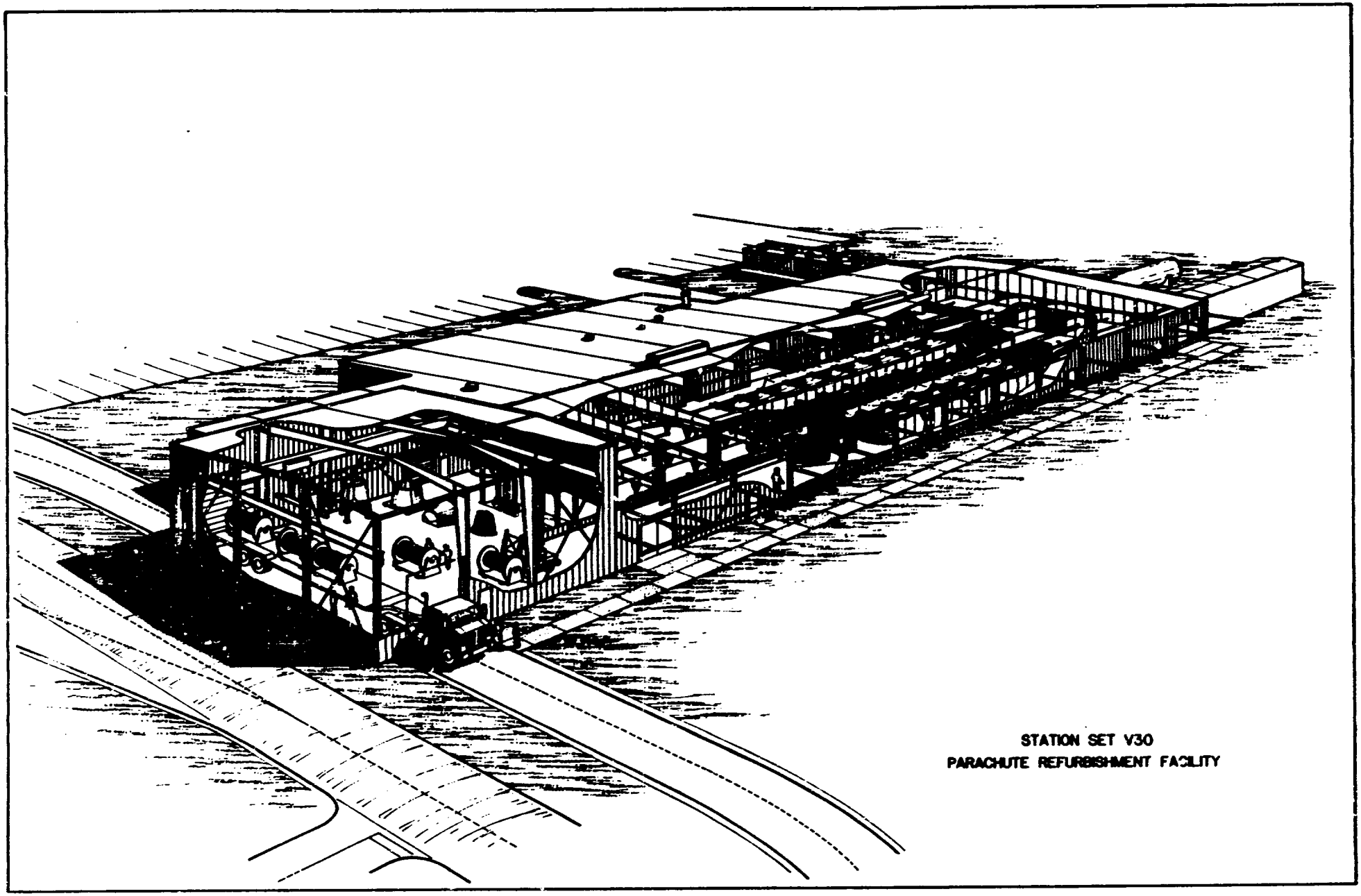
Modify interior of Vandenberg AFB existing building 1728. Add washer and dryer units. Refer to Rendering 9.1.

CONSTRUCTION

- Activity - Assembly of equipment for monorail transporter, modification of utilities, erection of tanks, installation of washer and dryer units. Possible demolition/reconfiguration of building interior.
- Noise - Minor construction noise.
- Natural features to be Altered - None. Refer to Resource Map 9.1.
- Manpower - Construction Peak: 25.
- Construction Schedule - July 1983 to December 1983.

OPERATION

- Activity - Each Solid Rocket Booster has three parachutes which are 122 ft in diameter, and have 122 suspension lines which are 143 ft in length. The parachutes are collected on reels by the Solid Rocket Booster Recovery Vessel, received at Port Hueneme, and transhipped to the Vandenberg AFB Parachute Refurbishing Facility where the parachutes are defouled, rinsed, dried, repaired, and repacked. The recovery float is also refurbished and shipped to the Solid Rocket Booster Receiving and Subassembly Facility.
- Noise - Engine noises from shipping vehicle. Force air fans and wash water pumps.
- Solids/Liquids/Gases - Only water is used in the parachute cleaning process.
- Emissions - Dryer exhaust air; wastewater containing salts, oil, sand, marine residue, and possibly some solid rocket propellants which had been absorbed by parachutes.
- Manpower - Operations: 25 per shift (2 shifts).



RENDERING 9.1 PARACHUTE REFURBISHMENT FACILITY

REFER TO RESOURCE MAP 2.1

DATA BRIEF 10.1 - SOLID ROCKET BOOSTER RECEIVING, REFURBISHMENT, AND SUBASSEMBLY FACILITY (FORMERLY DB 2.2-6)

DESCRIPTION

Modify existing steel framed structure consisting of two main areas: An 80 by 534 by 40 ft high Low Bay; and an 80 by 260 by 80 ft high High Bay. All onsite Solid Rocket Booster segment operations excluding spent Booster disassembly and buildup of the Booster are accomplished within this facility. Refer to Rendering 10.1.

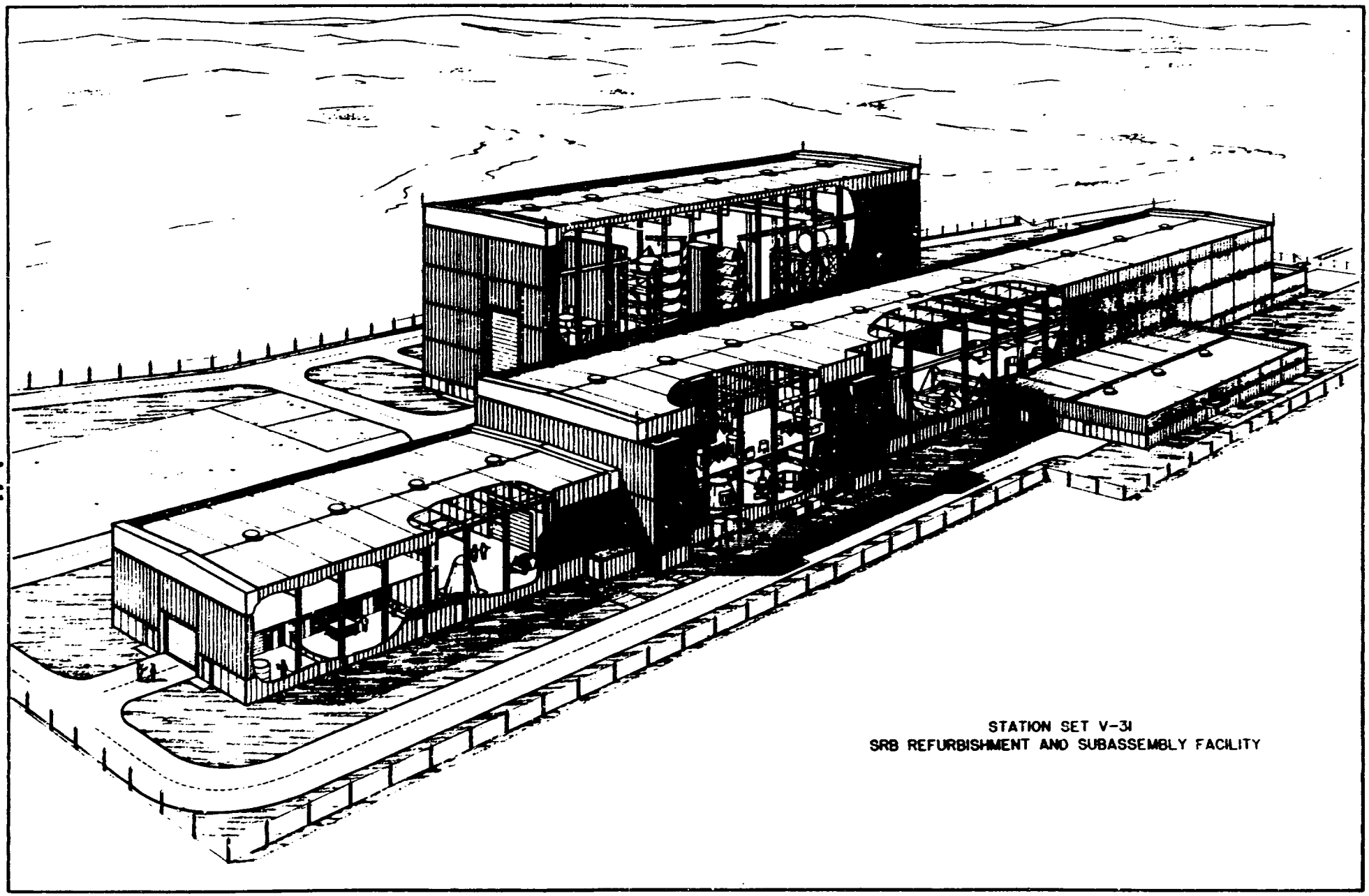
CONSTRUCTION

- Activity - Expand existing building with 205 ft extension of 55 ft high Low Bay facility, and add 66 ft to High Bay facility. Install new cranes and support equipment. Existing parking area adjacent to the building on the east side of Road C will be enlarged.
- Noise - Characteristic of erecting a steel frame structure, including operation of heavy equipment.
- Natural Features to be Altered - None. Refer to Resource Map 10.1.
- Manpower - Construction Peak: 180.
- Construction Schedule - May 1981 to June 1983.

OPERATION

- Activity - Receive aft and forward skirt subassemblies from the Booster Disassembly Facility, along with various other subassemblies, and refurbish. Receive Solid Rocket Booster propellant segments (horizontal on railroad cars) and subassemblies from manufacturer, prepare for vertical storage on special railroad cars stored at SLC-6 Storage Facility, and inspect. Subassemble total aft and forward skirts in preparation for Solid Rocket Booster assembly on launch pad.
- Solids/Liquids/Gases:

Gaseous nitrogen (GN_2)	Deionized water
Gaseous helium (GHe)	Paint
Compressed air	Metal preservatives
Hydraulic fluids	Pyrotechnics
Potable water	Ammonium perchlorate, Al with PBAN binder-Solid Rocket Booster propellant



RENDERING 10.1 SOLID ROCKET BOOSTER RECEIVING, REFURBISHMENT AND SUBASSEMBLY FACILITY

REFER TO RESOURCE MAP 6.1

DATA BRIEF 11.1 – TITAN III D RECEIVING, INSPECTION, AND STORAGE FACILITY (FORMERLY DB 2.2–7)

DESCRIPTION

New structural frame/metal siding structure with 143 ft by 85 ft by 55 ft High Bay assembly/storage area and 22 ft by 31 ft and 42 ft by 32 ft by 20 ft high Low Bay support/storage area. Refer to Rendering 11.1.

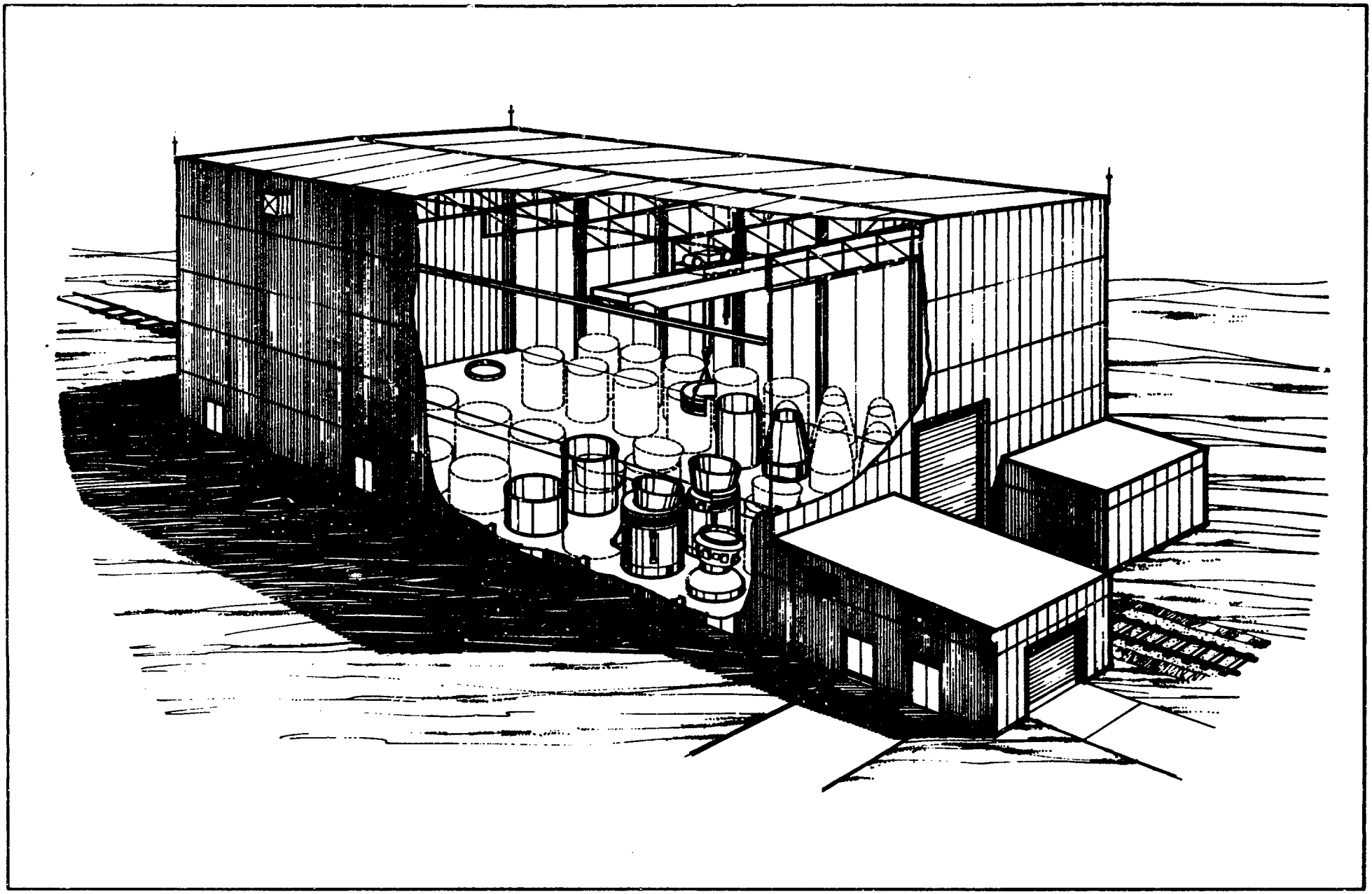
CONSTRUCTION

- Activity – Construct new building; provide access roads, paved parking area, fencing, railroad spur, utilities, fire protection system, and 50-ton monorail crane.
- Noise – Construction noise commonly associated with building erection and heavy equipment operation.
- Natural Features to be Altered – Sloping natural terrain requires excavation and grading.
- Manpower – Construction Peak: 40.
- Construction Schedule – March 1980 to April 1981.

OPERATION

- Activity – Receive, inspect and store Titan IIID Solid Rocket Motor segments. Transport segments to Space Launch Complex No. 4 on an as-needed basis.
- Noise – Light industrial; vehicle, rail and crane noise during operations.
- Solids/Liquids/Gases – Solid propellant, fuel/oil.
- Emissions – Chemical spillages, accidental ignition and burning of solid propellant, fuel/oil leaks.
- Manpower – Operations: No change from current levels.

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RENDERING 11.1 TITAN IIID RECEIVING, INSPECTION, AND STORAGE FACILITY

DATA BRIEF 12.1 - SPACE TRANSPORTATION SYSTEM TOW ROUTE (FORMERLY DB 2.1-11)

DESCRIPTION

Develop tow route for transporting Orbiter from airfield processing area. Tow route is approximately 16 miles long and uses existing roadways.

CONSTRUCTION

- Activity - Roadbed and road surface (asphaltic concrete overlays) improvements; road realignment and widening - minimum paved width 24 ft; strengthen underground culverts/conduits; remove/relocate roadside features penetrating Orbiter clearance envelope; clear and grade land 5 ft from edge of cuts/fills; some modification of 13th Street bridge; possibly modify Highway 246 bridge; relocate interfering overhead electrical lines to underground conduits.
- Noise - Typical heavy equipment construction noise.
- Natural Features to be Altered - Excavation along roadways and adjacent terrain. Possible disruption to natural features adjacent to roads including archaeological sites. Drainage patterns and road grades will be substantially unaltered. Refer to Resource Map 12.1.
- Manpower - Construction Peak: 45.
- Construction Schedule - May 1981 to April 1982.

OPERATION

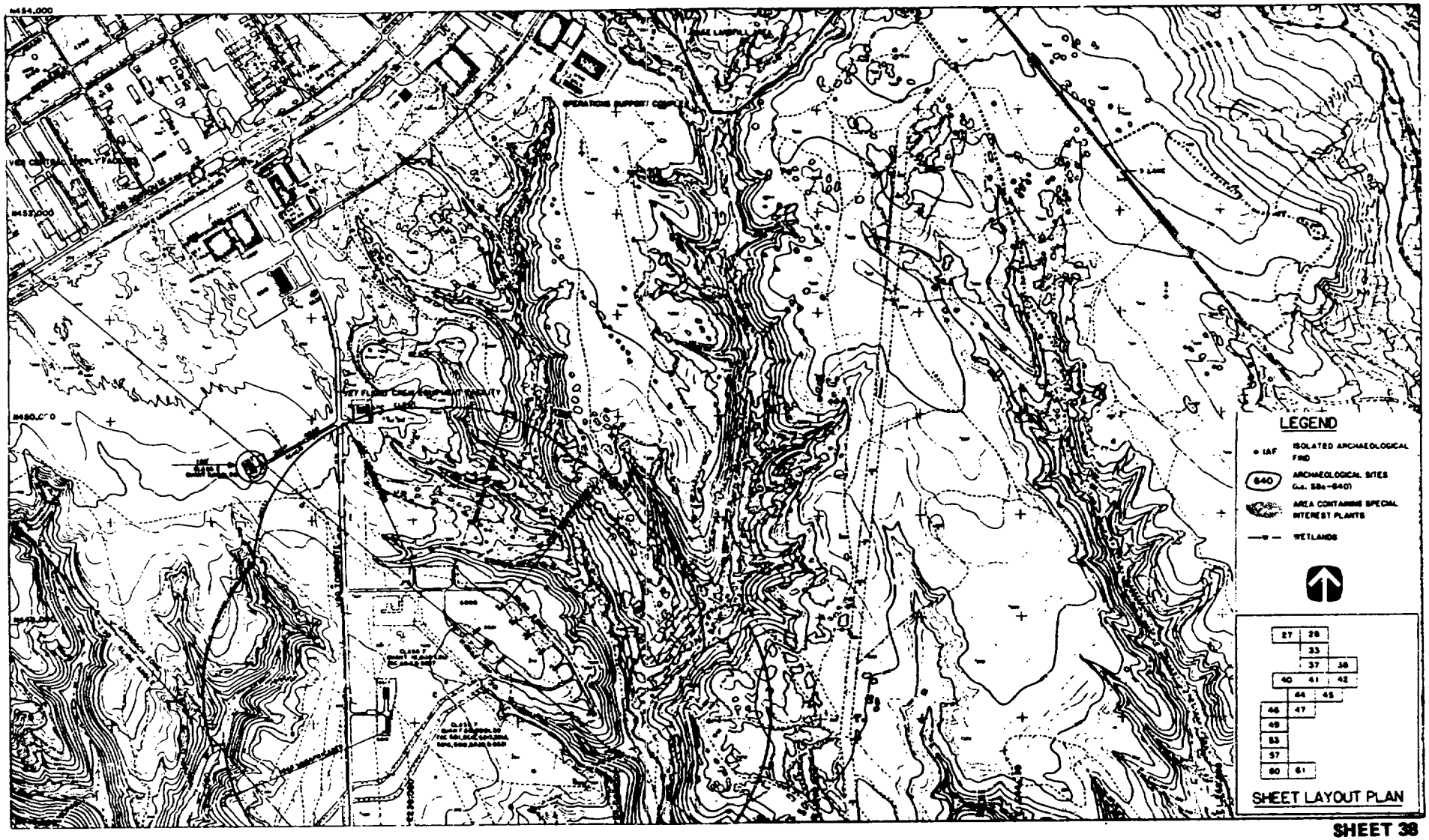
- Activity - Tow operations.
- Noise - Heavy to light diesel and gasoline powered vehicles.
- Solids/Liquids/Gases - Propellants and other materials onboard the Orbiter.
- Emissions -

  Operational: Accidental release of residual propellants and gases; accidental fire, explosion.
  Nonoperational: Leakage or spill of gases or liquids.

- Manpower - Operations: 20 per tow operation.

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COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION



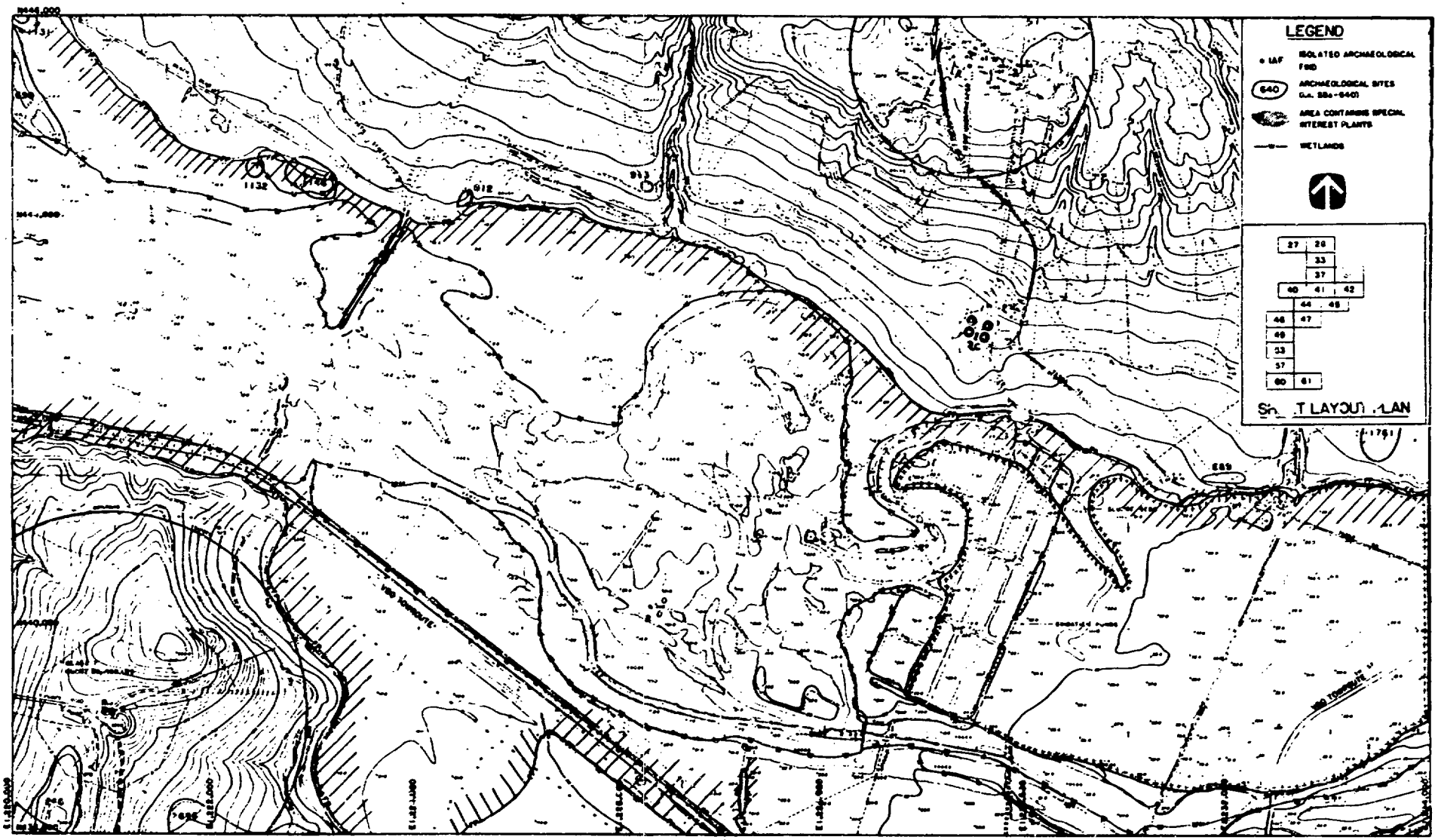
SHEET 38

RESOURCE MAP 12.1 SPACE TRANSPORTATION SYSTEM TOW ROUTE (SHEET 1 OF 10)

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION

SHEET 42

RESOURCE MAP 12.1 SPACE TRANSPORTATION SYSTEM TOW ROUTE (SHEET 2 OF 10)

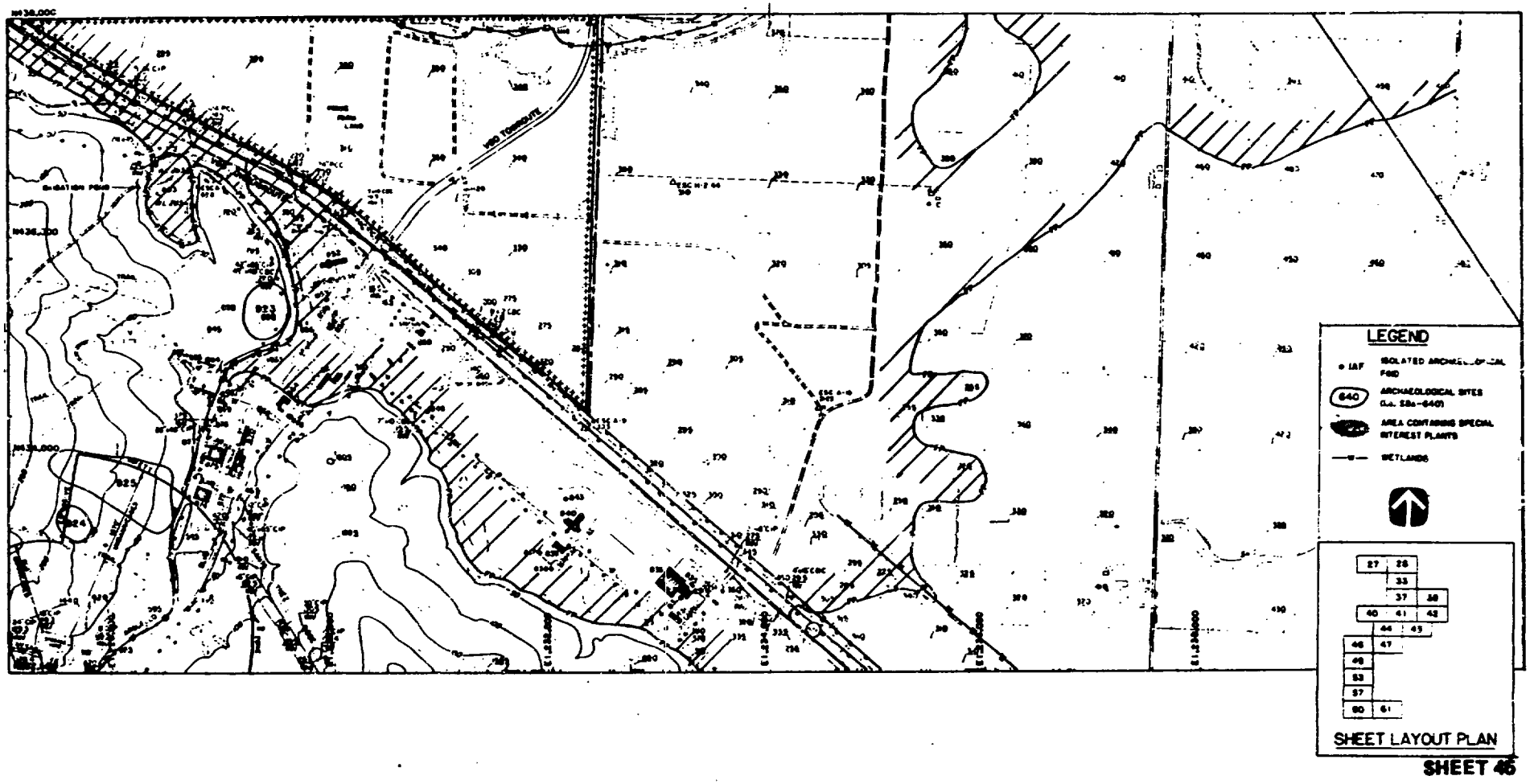


SHEET 41

RESOURCE MAP 12.1 SPACE TRANSPORTATION SYSTEM TOW ROUTE (SHEET 3 OF 10)

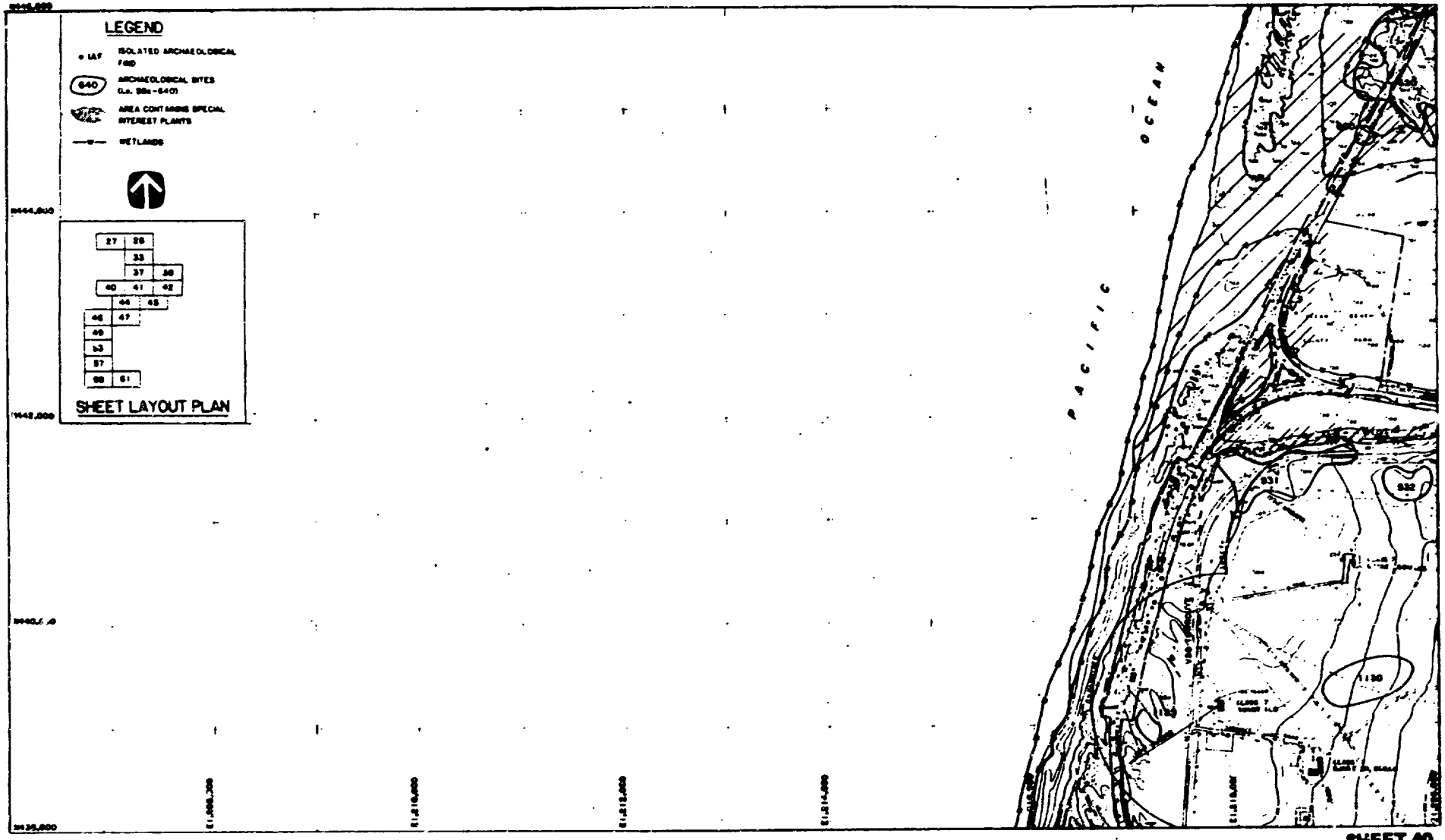
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RESOURCE MAP 12.1 SPACE TRANSPORTATION SYSTEM TOW ROUTE (SHEET 4 OF 10)

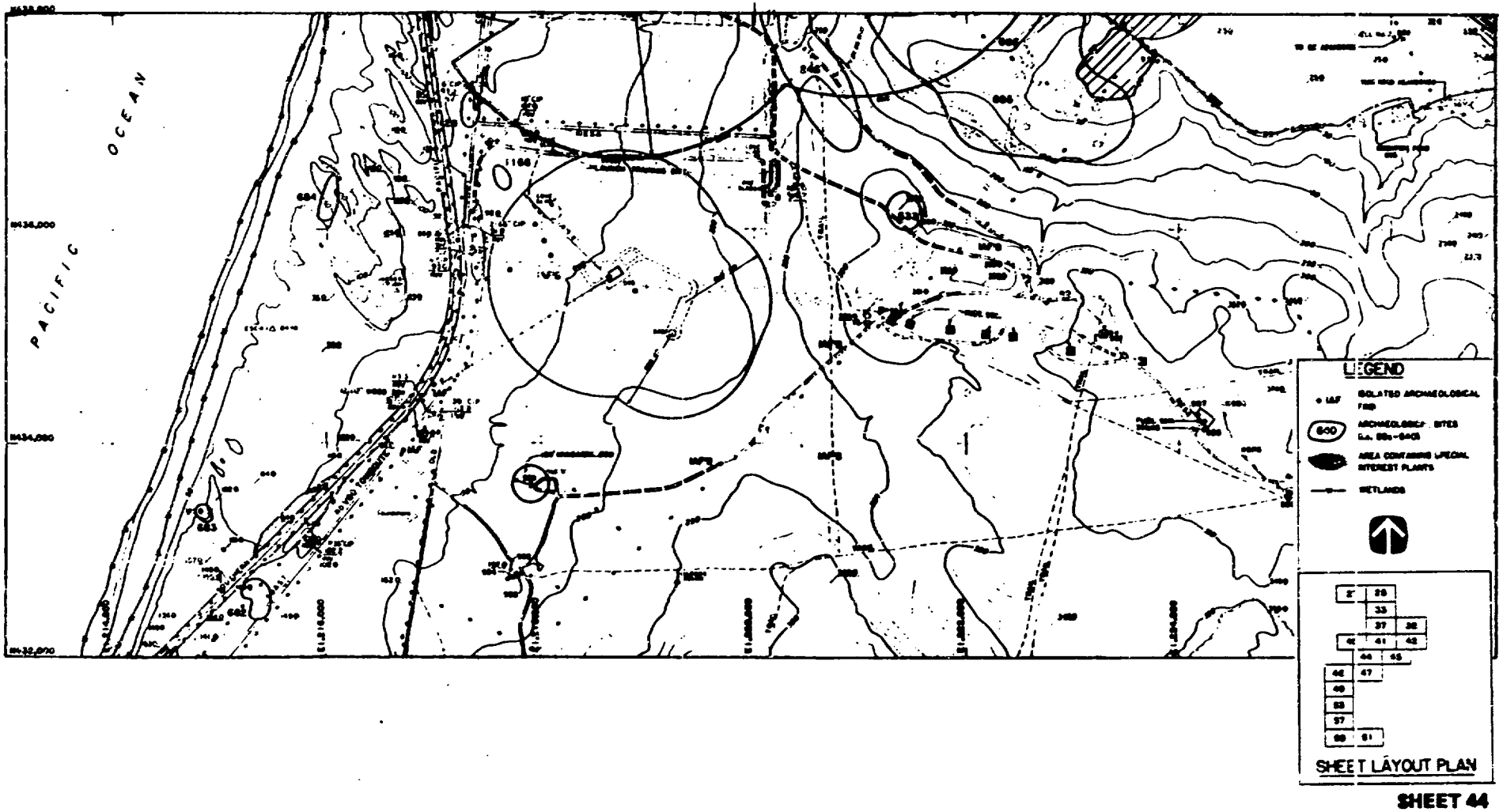
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SHEET 40

RESOURCE MAP 12.1 SPACE TRANSPORTATION SYSTEM TOW ROUTE (SHEET 5 OF 10)

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION



SHEET 44

RESOURCE MAP 12.1 SPACE TRANSPORTATION SYSTEM TOW ROUTE (SHEET 6 OF 10)

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION

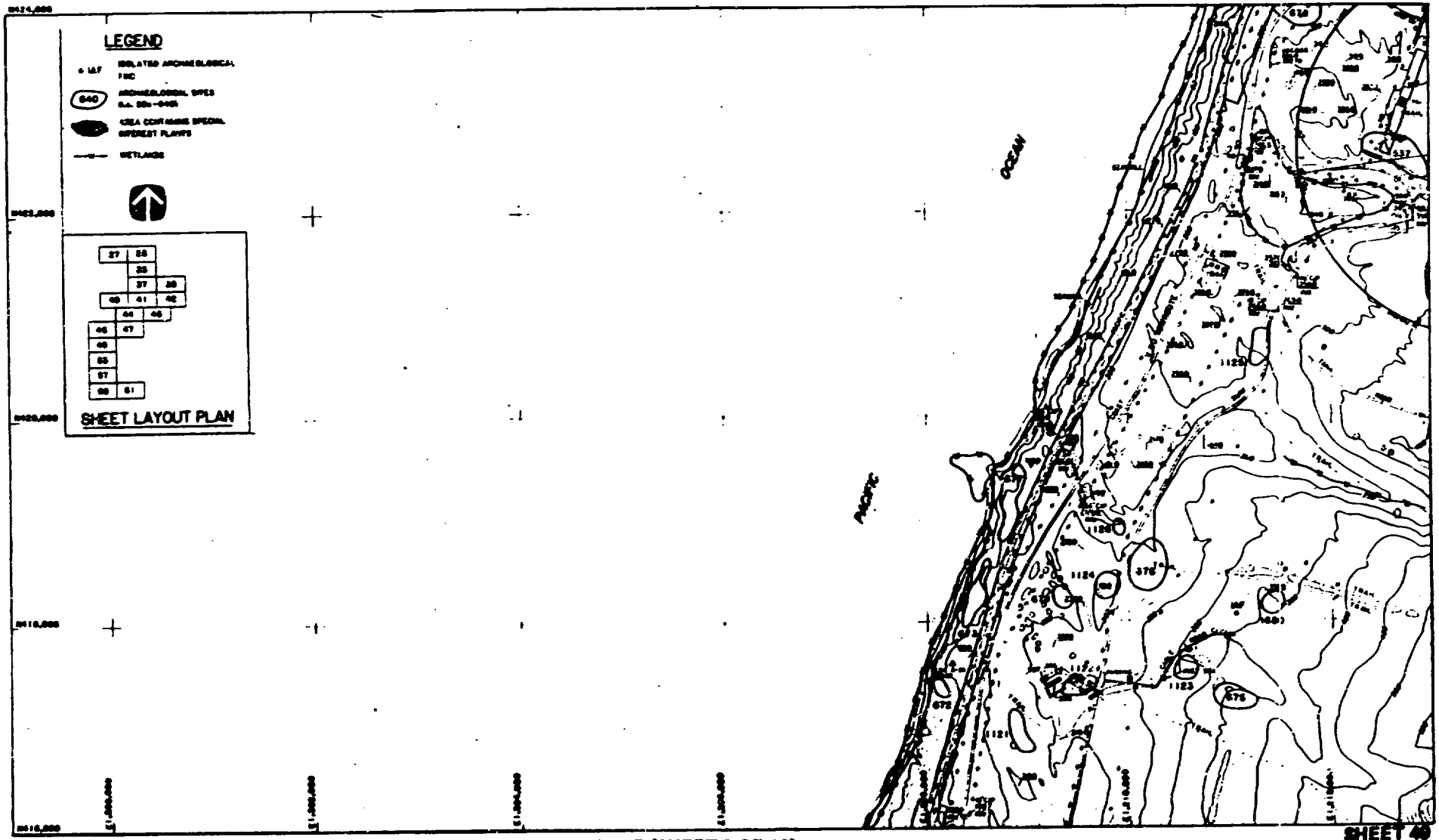
RESOURCE MAP 12.1 SPACE TRANSPORTATION SYSTEM TOW ROUTE (SHEET 7 OF 10)

SHEET 47

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION

RESOURCE MAP 12.1 SPACE TRANSPORTATION SYSTEM TOW ROUTE (SHEET 8 OF 10)

SHEET 46



RESOURCE MAP 12.1 SPACE TRANSPORTATION SYSTEM TOW ROUTE (SHEET 9 OF 10)

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RESOURCE MAP 12.1 SPACE TRANSPORTATION SYSTEM TOW ROUTE (SHEET 10 OF 10)

SHEET 53

DATA BRIEF 13.1 - PORT HUENEME HARBOR – SOLID ROCKET BOOSTER RECOVERY (FORMERLY DB 2.2-2)

DESCRIPTION

A 320 ft by 245 ft by 280 ft triangular shaped wharf area equipped with utilities, water, and a connecting dockside railline leading to Initial Wash Facility and Booster Disassembly Facility. Refer to Renderings 13.1 and 13.2.

CONSTRUCTION

- Activity - Remove existing condemned wharves B and C, each approximately 250 to 300 ft in length, and part of existing Landing Ship Tank (LST) ramp, dredged to 18 ft below Mean Lower Low Water (MLLW) at face of existing wharves. Excavate for new 50 ft wide by 100 ft long LST ramp. Compact, embank, and grade approximately one acre. Install storm drainage, utilities. Construct new concrete wharf and LST ramp. Install interfacility connecting rail line.

- Noise - Sounds released by heavy equipment such as bulldozers, backhoes, shiploaders, compactors, dredgers, and trucks.

- Natural Features to be Altered - Bottom topography changes near existing wharves B and C and LST ramp. Disruption of bottom sediments, generation of floating debris, localized increased turbidity and water quality degradation; localized biota and habitat damage.

- Manpower - Construction Peak: 125.

- Construction Schedule - May 1982 to January 1984.

OPERATION

- Activity - Workboats rendezvous with Solid Rocket Booster recovery vessel; position Booster casing alongside recovery vessel, move into port, and position Booster at dockside. Ship berthing and maintenance. Hoisting of front cone assembly and parachutes from recovery vessel to dock. Hoisting of floating Solid Rocket Booster from water and positioning on transporter; ordnance safing; preliminary external rinse; Solid Rocket Booster towed to Wash Facility.

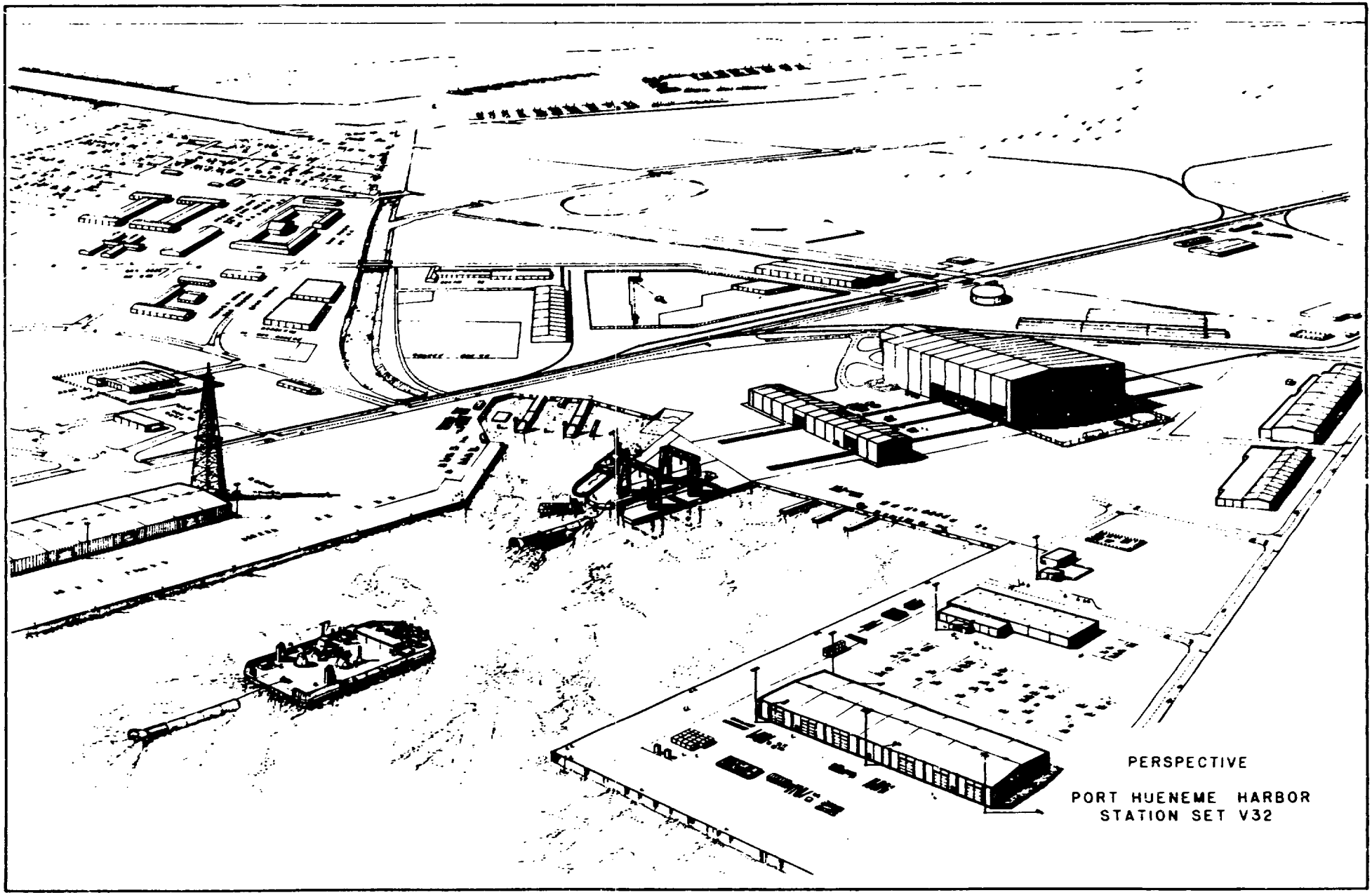
- Special Equipment - Two recovery vessels, each with one floating spent Solid Rocket Booster under tow; two workboats. Two straddle cranes; 10-ton mobile crane on dock; and 2 transporters.

- Noise - Ship engine noise from manuevering operations. Voice hailers. Crane engine noise.

- Solid/Liquids/Gases - Residual contaminated ocean water sealed inside Solid Rocket Booster Spent casing. Also residual hexraine and four spent separation motor solid propellants.

- Emissions -

  Operational: Exhaust from ship and boat engines. Preliminary external booster casing rinse water. Contaminated ocean water inside casing may have to be released to ocean to deballast for hoisting. Nonoperational: Potential contaminated ocean water leakage from plugged booster casings. Accidental diesel fuel spills. Accidental explosion of ordnance during safing operations.



RENDERING 13.1 PORT HUENEME HARBOR

DATA BRIEF 13.2 - SOLID ROCKET BOOSTER WASH FACILITY AT PORT HUENEME (FORMERLY DB 2.2-3)

DESCRIPTION

270 by 42 by 30 ft high initial wash building with associated water storage tanks and wastewater treatment system. Solid Rocket Booster on Transporter.

CONSTRUCTION

- Activity - Conventional building and water tank construction (each tank has a capacity of 40,000 gallons).
- Noise - Typical of building construction.
- Natural Features to be Altered - Facility will be constructed on existing graded area at the U.S. Navy Construction Battalion Center, Port Hueneme.
- Manpower - Included in total SRB disassembly requirements (See DB 13.1).
- Construction Schedule - Included in May 1982 to January 1984 schedule shown in DB 13.1.

OPERATION

- Activity - Automated wash of external surfaces of recovered spent Solid Rocket Booster casings. External wash of Booster casing with heated deionized water while Booster is on transporter. Complete ordnance and hypergolic systems safing. Nozzle plug removed and interior of Booster casing drained. Nozzle plug shipped to recovery vessel berth. Water displacing preservative applied to scratched or base metal surfaces.
- Noise - High noise levels from high pressure pumps and water spray; air compressors.
- Solids/Liquids/Gases - Potable water; deionized water; surfactants (detergents); wastewater contaminated with solid propellant and solid propellant combustion products; hydrazine (N_2H_4); gaseous nitrogen (GN_2) purge, and residual contaminated ocean water.

  Solid Rocket Booster is safed by bleeding and flushing residual hypergolic fuel from Thrust Vector Control System and removal of destruct ordnance. Booster Thermal Protection System insulation removed by high pressure water sprays. Casing is rinsed with potable water and then deionized water.

- Emissions -

  Operational: Treated wastewater discharged to port wastewater system. Periodic disposal of accumulated solid residue.
  Nonoperational: Accidental release of hydraulic fluid, hydrazine. Release of contaminated water. Accidental explosion from ordnance safing. Spillage of metal preservative chemicals.

- Manpower - Operations: 15 per shift (2 shifts).

DATA BRIEF 13.3 - SOLID ROCKET BOOSTER DISASSEMBLY FACILITY AT PORT HUENEME (FORMERLY DB 2.2-4)

DESCRIPTION

A 160 ft by 317 ft by 50 ft High Bay structure having an attached 60 ft by 225 ft by 27 ft Low Bay storage module and an attached 60 ft by 200 ft by 18 ft Administrative Facility. Refer to Rendering 13.3.

CONSTRUCTION

- Activity - Conventional steel frame building construction with installation of exterior bridge crane supports.
- Noise - Construction noise commonly associated with building erection and heavy equipment operation.
- Natural Features to be Altered - Facility will be constructed on existing, graded area at the Construction Battalion Center, Port Hueneme.
- Manpower - Included in total SRB disassembly requirements (See DB 13.1).
- Construction Schedule - Included in May 1982 to January 1984 schedule shown in DB 13.1.

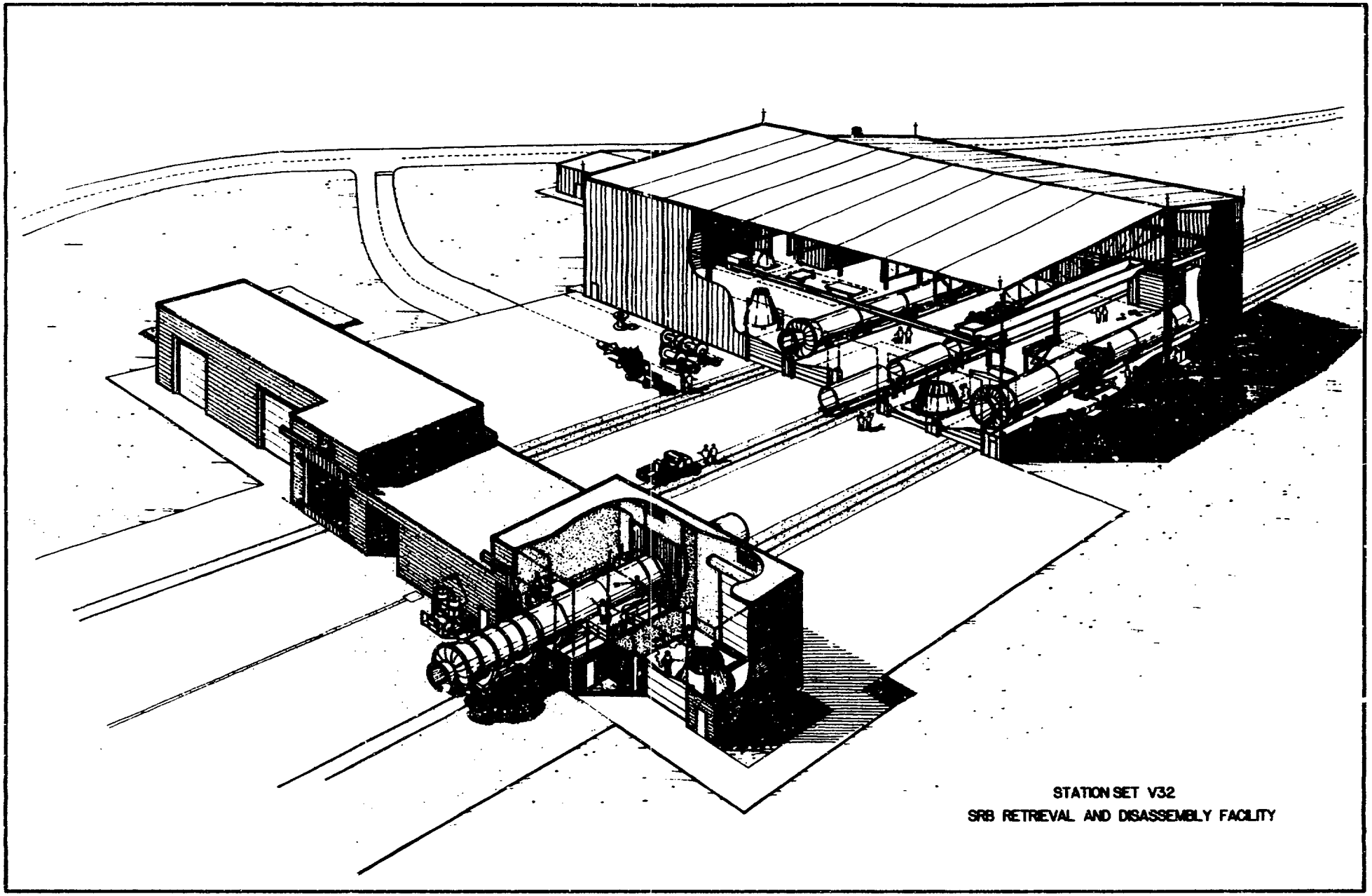
OPERATION

- Activity - Disassembly of spent Booster casing, final wash, dry and application of preservative to metal surfaces, transport of propellant and nonpropellant, components, casing towed to facility from Initial Wash Facility. Propellant segments shipped out by rail. Non-propellant components transported by rail or truck to Solid Rocket Booster Refurbishment Facility at Vandenberg.
- Noise - Light industrial noise. High pressure wash water system; forced air blowers.
- Solids/Liquids/Gases - Booster Thermal Protection System insulation; spent or residual solid rocket propellant, surfactant, potable and deionized water, metal preservatives, wastewater contaminated with solid propellant and solid propellant combustion products.
- Emissions -

  Operational: Diesel engine exhaust from tractor and locomotive used to transport Solid Rocket Booster casing and components. Wash and rinse water. Exhaust air from hot forced-air dryers.
  Nonoperational: Accidental release of contaminated wash/rinse water. Spillage of metal preservative chemicals.

- Manpower - Operations: 40 per shift (2 shifts).
- Other - Solid Rocket Boosters are disassembled by jacking apart major booster segments and final disassembly of components. Nozzle, propellant sections, and various smaller subassemblies shipped to Booster manufacturer by railroad on dedicated railcars. Aft and forward skirt, frustum, and various small subassemblies transported to SLC-6 Booster Refurbishment Facility. Various other subassemblies scrapped.

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RENDERING 13.2 SOLID ROCKET BOOSTER RETRIEVAL AND DISASSEMBLY FACILITY

DATA BRIEF 14.1 - EXTERNAL TANK STORAGE AND CHECKOUT FACILITY AT VANDENBERG AIR FORCE BASE (FORMERLY DB 2.3-2)

DESCRIPTION

Steel frame building: Storage cell 180 ft by 175 ft; checkout cell 200 ft by 86 ft; support space 51 ft by 200 ft; 40,000 square ft asphalt storage apron; and 20,000 square ft asphalt parking area. Refer to Rendering 14.1.

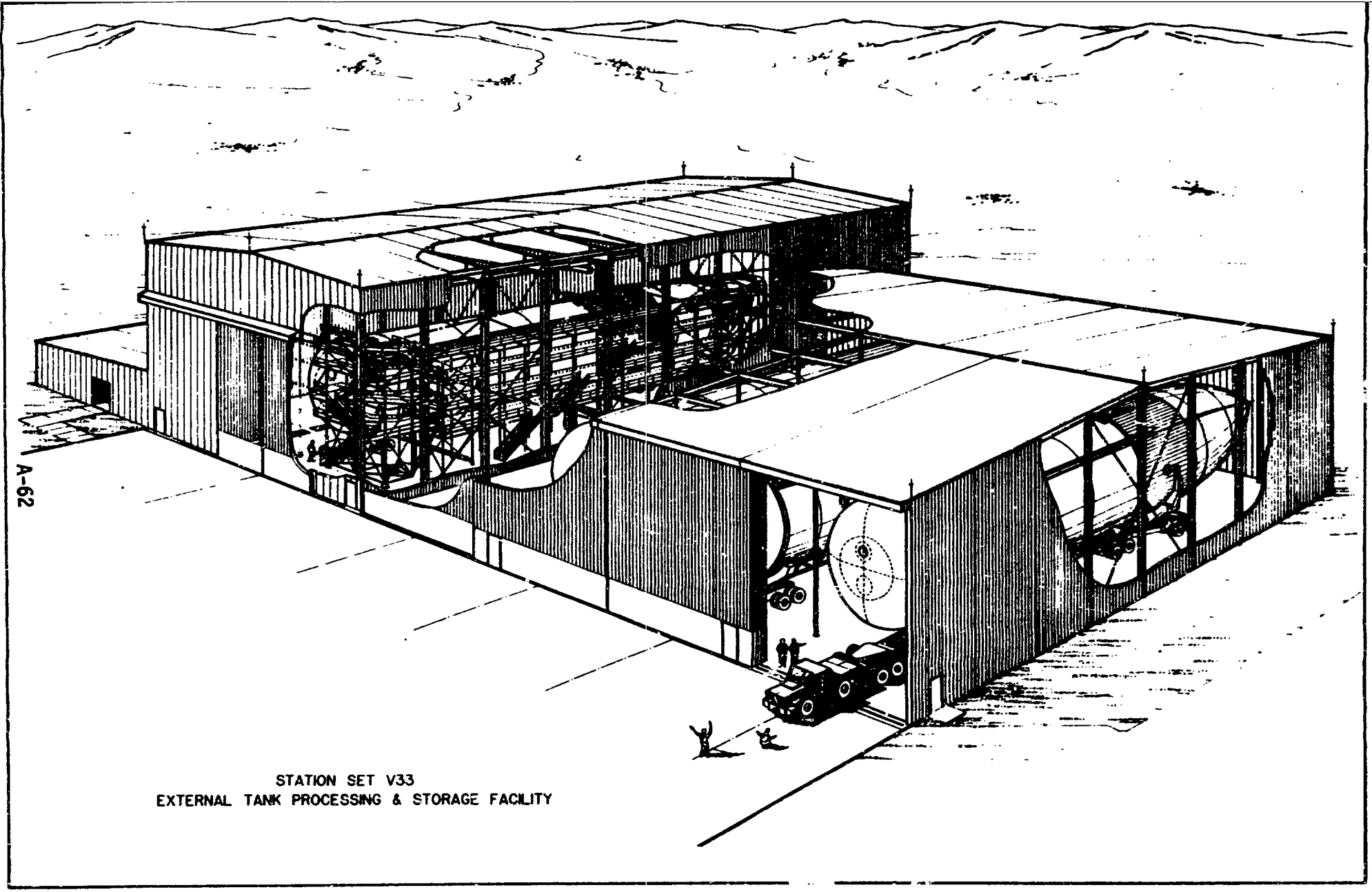
CONSTRUCTION

- Activity - Construct new steel frame industrial building using conventional materials and procedures; install asphalt pavement.
- Noise - Construction noise commonly associated with building erection and heavy equipment operation.
- Natural Features to be Altered - Facility to be constructed on existing gently sloping terrain near SLC-6. Refer to Resource Map 14.1.
- Manpower - Construction Peak: 100.
- Construction Schedule - May 1981 to May 1983.

OPERATION

- Activity - Visual inspection and initial storage of External Tanks immediately following receipt at Vandenberg from manufacturer. Electrical and instrumentation test. Leak test of liquid oxygen and hydrogen tanks. Tank pressure and humidity tests. Tanks stored until needed. Tanks individually towed on wheeled transporter to launch pad by diesel tractor on as-needed basis.
- Noise - Light industrial.
- Solids/Liquids/Gases - Gaseous nitrogen at 6 $\pm$ 0.5 psig for liquid oxygen tank leakage tests. Gaseous helium at 6 $\pm$ 0.5 psig for hydrogen tank test. Above pressures reduced to 3.7 $\pm$ 1.3 psig for storage. Freon gas tracer for leak test.
- Emissions - Purged gaseous nitrogen from test pressure to storage level with traces of freon. Purged helium from pressure tests. Accidental releases of gaseous nitrogen, helium, and freon.
- Manpower - Operations: 33 per shift (2 shifts).

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RENDERING 14.1 EXTERNAL TANK PROCESSING AND STORAGE FACILITY

REFER TO RESOURCE MAP 6.1

DATA BRIEF 15.1 - SHALLOW DRAFT BARGE DELIVERY FACILITY (FORMERLY DB 2.3-3)

DESCRIPTION

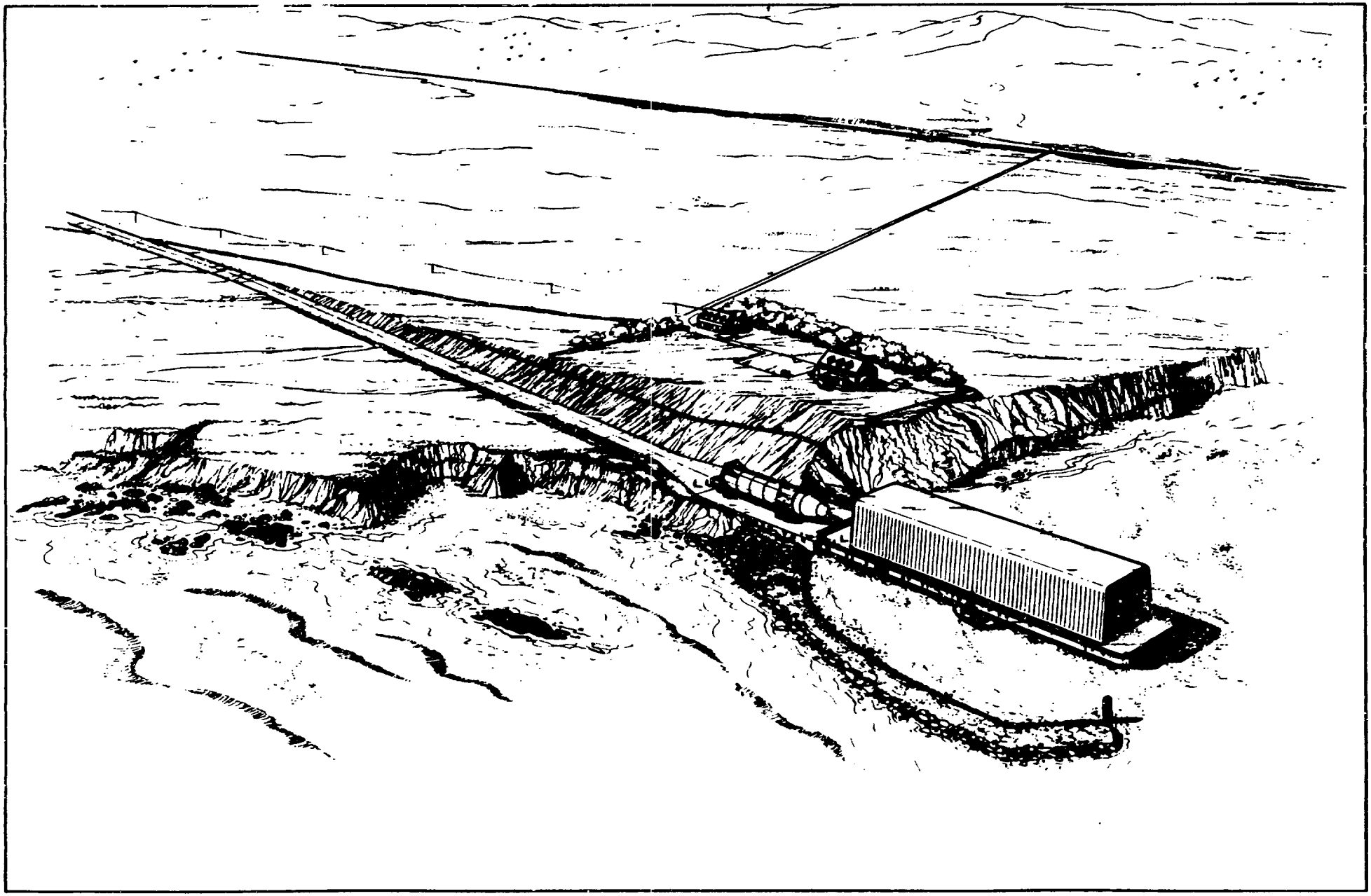
Receiving dock 100 ft wide by 200 ft long. Two road, 24 ft wide with 4 ft shoulders. Navigational aids. Ballastable barge, 86 ft wide by 428 ft long. Refer to Rendering 15.1.

CONSTRUCTION

- Activity - Remove existing embayment pier and attached boathouse. Dredge approximately 10,000 cubic yards of material from about 5 acres of subtidal bottom. Excavate 78,000 cubic yards of material from 110,000 square ft of coastal terrace for tow road cut. Erect dock consisting of sheet piling, earthfill, and aspnaltic cover. Pave tow road with asphalt.
- Noise - Blasting and dredging; diesel engine noise from excavation and roadway construction equipment.
- Natural Features to be Altered - Embayment submarine topography; 1,000 ft long cut through shoreline bluff into coastal terrace (disposal area required); localized increased turbidity and water quality degradation, floating demolition debris, biota and habitat damage.
- Manpower - Construction Peak: 60.
- Construction Schedule - January 1983 to January 1984.

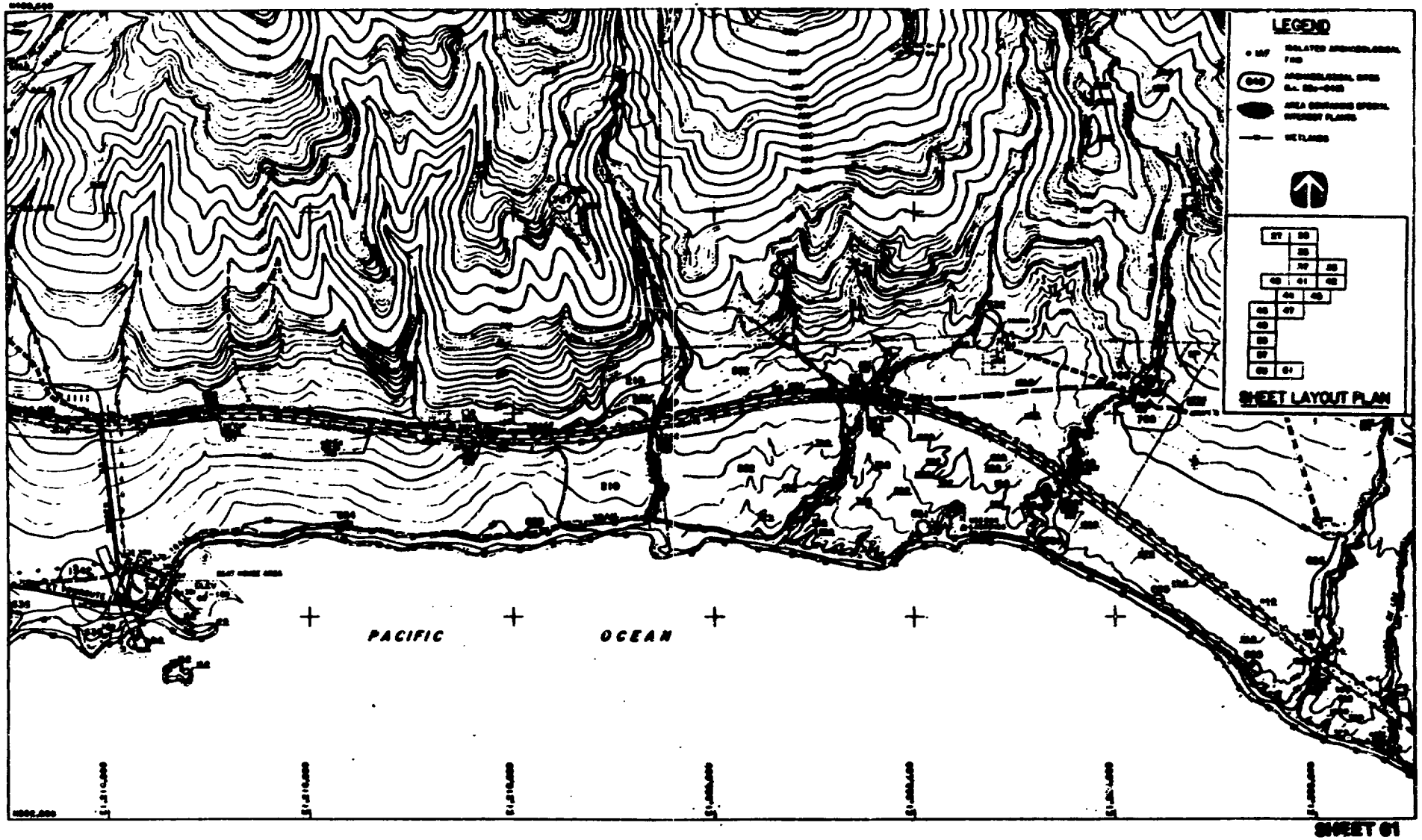
OPERATION

- Activity - Deballast transshipment barge outside harbor. Maneuver barge to dock using shallow draft tug vessels. Unload ETs and tow to TSCF. Reload empty ET transporters. Deballast barge and maneuver seaward for link-up with ocean-going tug vessel.
- Noise - Tugs, tow tractor, and other equipment noise.
- Solids/Liquids/Gases - Diesel fuel and oil leakage.
- Emissions - Vehicle emissions.

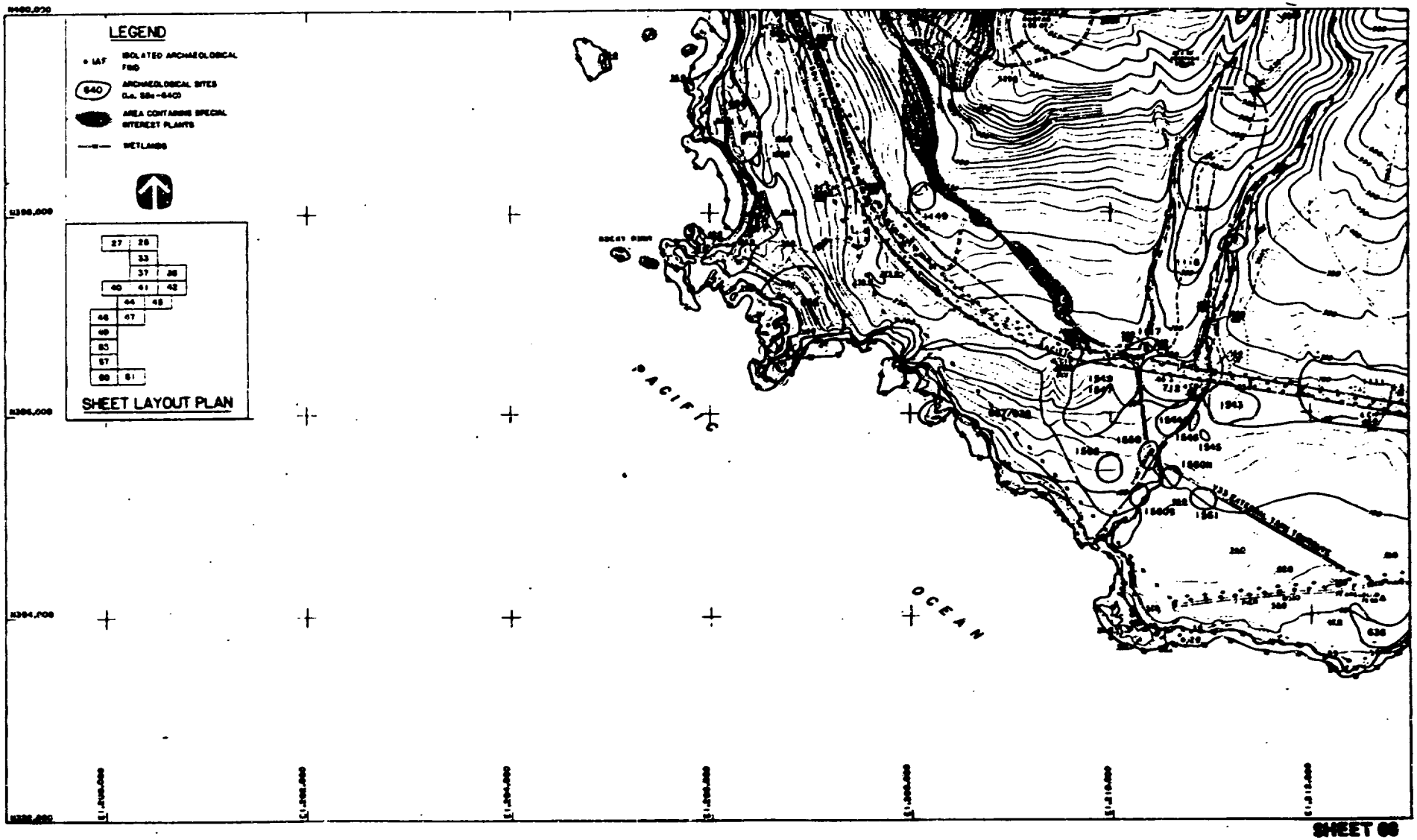


RENDERING 15.1 EXTERNAL TANK LANDING FACILITY AT POINT ARGUELLO BOATHOUSE

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RESOURCE MAP 13.1 EXTERNAL TANK LANDING FACILITY AND TOW ROUTE (SHEET 1 OF 2)



RESOURCE MAP 15.1 EXTERNAL TANK LANDING FACILITY AND TOW ROUTE (SHEET 2 OF 2)

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DATA BRIEF 16.1 - UTILITIES

DESCRIPTION

Extension of base utilities and services to provide these services to the ground operations station sets. Facilities services supplied include electrical power, fire suppression water, and sanitary sewers.

CONSTRUCTION

- Activity - New facilities include dual power supply lines to North Vandenberg AFB Orbiter processing area and South Vandenberg AFB, sewage pumping stations at North Vandenberg AFB and South Vandenberg AFB, and air pump station at North Vandenberg AFB.
- Natural Features to be Altered - Excavation for new water service and sewer lines will alter existing topography. Archaeological sites are located near the South Vandenberg AFB construction area. The overhead powerline will closely parallel Coast Road, although some clearing may be required for the narrow power line right-of-way. Refer to Resource Map 16.1.
- Manpower - Construction Peak: 60.
- Construction Schedule - Electrical: May 1980 to December 1981. Civil: September 1980 to April 1981.

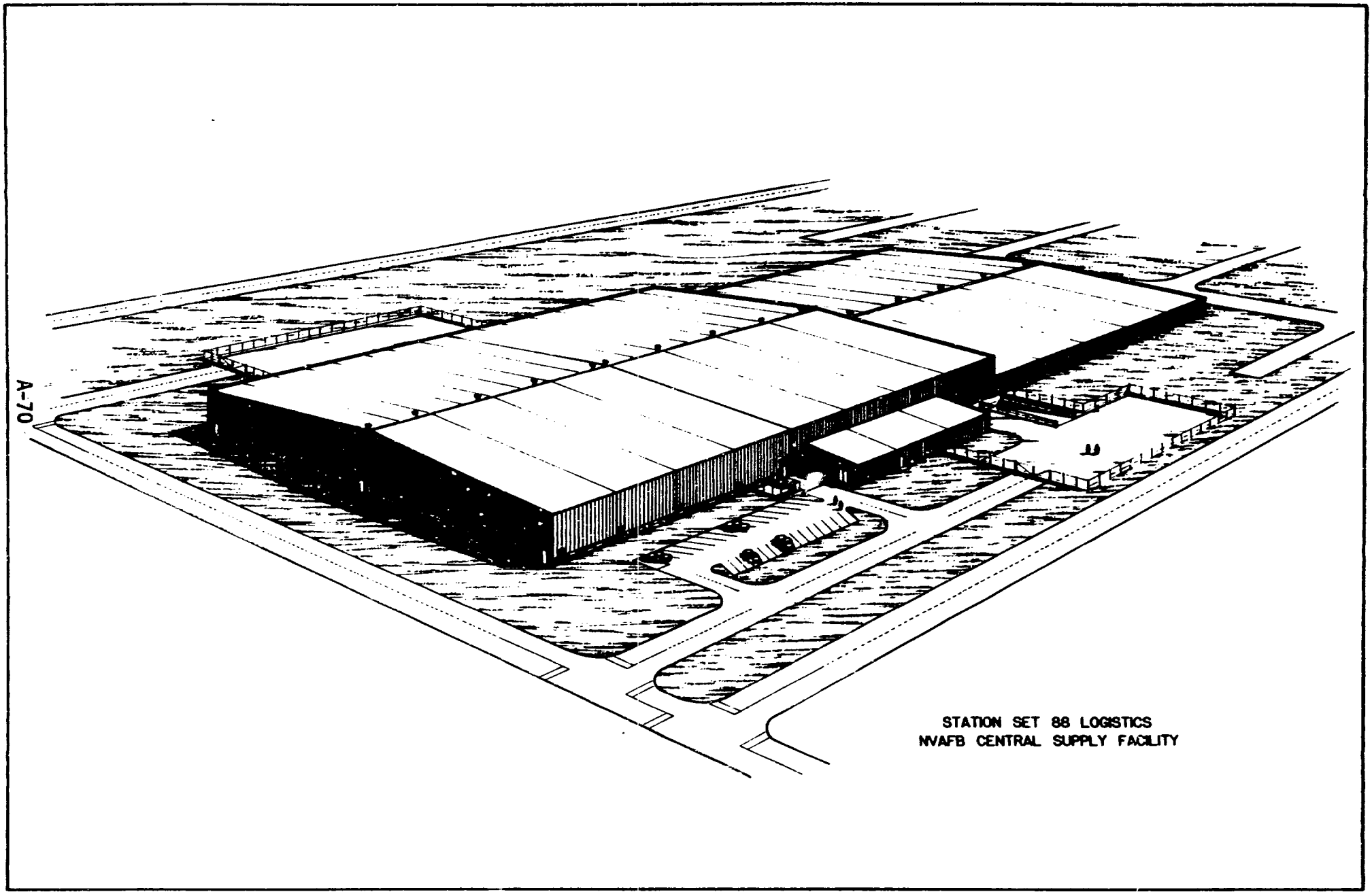
DATA BRIEF 16.2 - LOGISTICS

DESCRIPTION

Equipment, facilities, and services required to provide material acquisition, control and warehousing; logistics transportation; propellant and ordnance management; and line replaceable unit maintenance management.

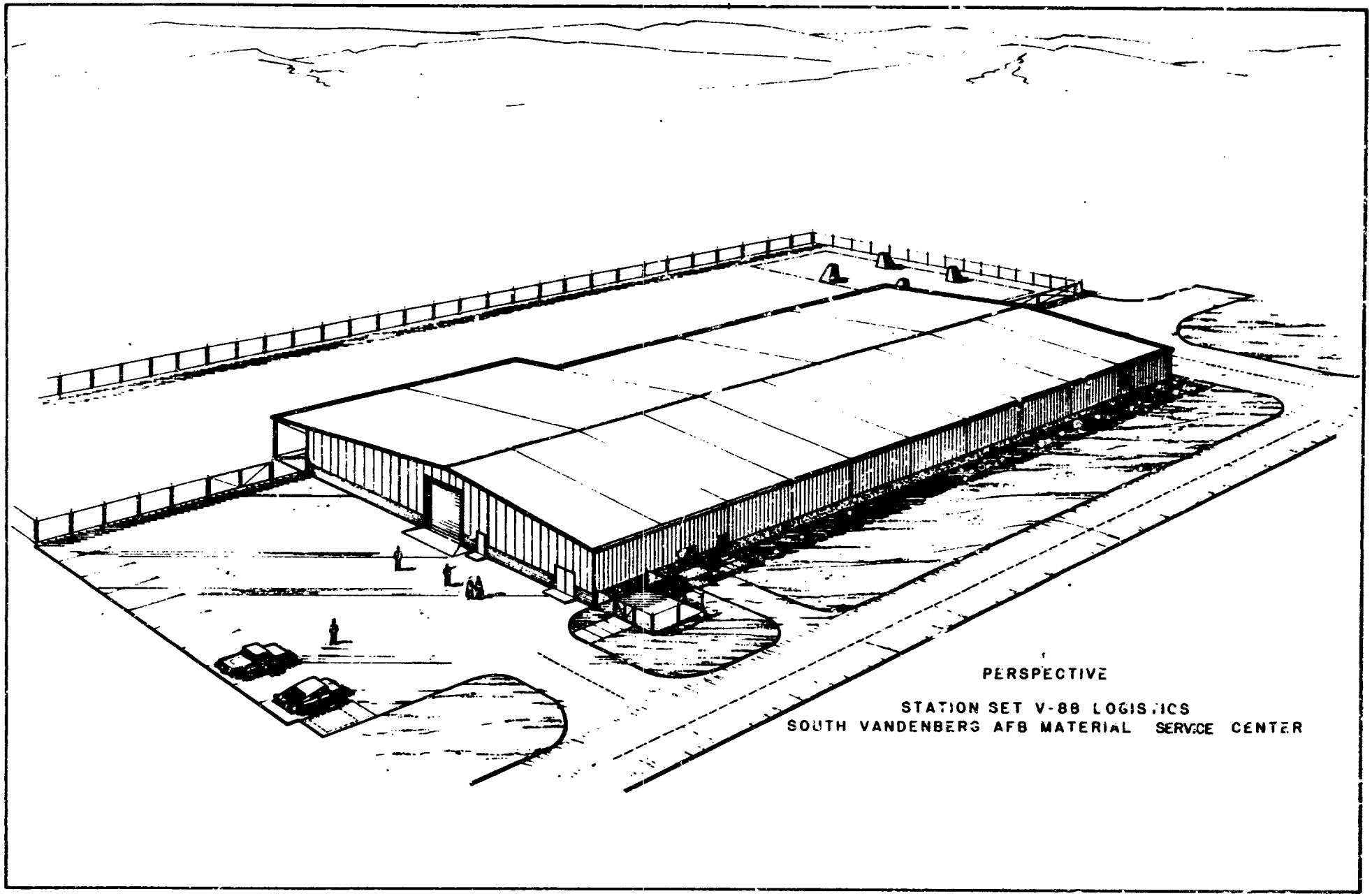
CONSTRUCTION

- Activity - Construction: Interior modifications to existing buildings 871 and 1731; construction of 2 new steel structures, access roads, paved areas.
- Natural Features to be Altered - Will remove vegetation (approximately 494,000 sq ft of coastal sage scrub, grassland, chaparral habitat), alter drainage patterns. Archaeological sites exist near the construction area. Refer to Resource Map 16.1.
- Manpower - Construction Peak: 40.
- Construction Schedule - May 1982 to April 1983.



RENDERING 16.1 CENTRAL SUPPLY FACILITY, NORTH VANDENBERG AIR FORCE BASE

REFER TO RESOURCE MAP 12.1, SHEET 1



RENDERING 16.2 MATERIAL SERVICE CENTER, SOUTH VANDENBERG AIR FORCE BASE

REFER TO RESOURCE MAP 6.1

REGIONAL INDUSTRIAL MULTIPLIER SYSTEM

(RIMS)

Introduction

The total economic effect of a project is substantially greater than the direct cost of building and operating the facility since the total includes secondary economic effects as well as the initial investment. The additional, or secondary, effect is estimated through a multiplier relationship: the ratio between the total increase in economic activity as a result of a project and the initial project investment. The initial effect, known as the final-demand change, represents the change introduced into the economy by the project itself. The secondary effect is the sum of the additional economic activity generated in the region by the initial effect. The analyses are particularly important since economic stimulation and new jobs created are often the key benefits of a construction or operations project, while lost jobs are a major source of controversy when an ongoing project must be terminated.

During construction of a new power generating facility, for example, the initial economic effect is represented by expenditures for equipment and materials purchased from local manufacturers and distributors, and for labor. The local direct suppliers in turn purchase goods and services from other, secondary suppliers (for example, wholesalers). The secondary suppliers in turn rely on other suppliers farther removed from the project. These successive rounds of inter-industry purchases and sales are the secondary economic effects of the project.

The size of the regional multiplier depends on the proportion of direct and indirect input requirements that can be supplied by the region's economy, which in turn depends on both the specific needs of the project and the ability of the regional economy to supply the inputs. Conceptually, therefore, there is a different multiplier for every specific combination of industry and site in the nation.

RIMS Multiplier

The RIMS system* was developed to overcome the cost and/or small-area data limitations associated with traditional approaches, and to provide both geogrpahic and industrial flexibility. It is a system of interrelated data files and computer programs designed to estimate input-output (I/O) type regional multipliers for any of the 484 industries specified in the Bureau of Economic Analysis (BEA) national I/O model, and for any region that can be defined as one or more counties in the United States.

The system combines several advantages of the economic base and I/O approaches to regional impact analysis to produce regional multipliers that are conceptually similar to I/O multipliers. RIMS relies on secondary data sources; is sensitive to differences between industries; and operates at a detailed industrial level. Furthermore, RIMS allows disaggregation of the resulting impacts for analysis of the industrial composition of the total regional economic change.

The regional multiplier estimates the portion of succeeding waves of expenditures that occur within a defined region, thus providing a measure of the increased economic activity within the region. RIMS estimates project-specific multipliers needed to estimate changes in regional gross output, regional employment, and regional earnings by first computing the study industry's dependence on other regional industries. The relationship is used to estimate the multiplier effect of an increase in final demand in a given industry on the regional gross output. Earnings-to-gross-output ratios are then available to translate the output increase into increases in earnings. For any given region, the ratio of employment to earnings is also known, which permits an estimate of the total increased employment within the region.

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* The RIMS system was developed in the Regional Economic Analysis Division of the Bureau of Economic Analysis, U.S. Department of Commerce.

Each industry requires inputs that are converted to an output, which serves as input to other industries. For example, the manufacture of electric motors requires, as some of its inputs, copper, electricity, labor, and transportation. When the electric motors are completed (are an output) they are purchased by (become inputs to) the copper industry, the electric appliance industry, and others. Some of these suppliers and some of the consumers are located in the region of interest, while others are not. An I/O model ordinarily requires the development of an entire I/O matrix to account for this interdependence. While retaining many of the analytical opportunities of the I/O framework, RIMS avoids the need for this costly process by viewing the gross-output multiplier as comprising four elements: the initial change, the direct effect, the indirect effect, and the induced effect.

The initial change component in the multiplier represents project expenditures that will occur in the study region. Since this initial change is exactly equal to project expenditures, it is always represented in the multiplier by unity (1.000). The remaining components, the secondary economic effects, are added to the initial economic effect to provide the total economic effect.

The direct effect component accounts for both the industry input requirements and the ability of the area to meet them. The former is obtained from the national I/O model; the latter is derived from data relating to the study region (U.S. Bureau of the Census, County Business Patterns Program). Inputs required by the study industry but not produced in the region (or produced in insufficient quality) must be imported by the region, thus reducing the direct effect component of the regional multiplier. The input requirements, essentially for each 4-digit SIC* industry, are identified in the BEA national I/O

* Standard Industrial Classification is a taxonomy for grouping industries based on similarities. The digits are significant in that each industry identified NNXX is part of a larger set identified as NN. The specific industry used in RIMS is identified at the 4-digit level while the supplier industries are grouped to the 2-digit level.

model. The first step in regionalization is the evaluation of this set of requirements in light of what is known about the project or specific industry. The suitability of the national model industry for the project analysis is assessed and project-specific adjustments made in the national model input requirements on the basis of available project descriptions or engineering information.

The input requirements that result from this first step represent the technical requirements of the industry. The second step in regionalization reconciles the technical requirements of the industry with the capacity of the region to supply the required inputs. The technical requirements are replaced by regional direct coefficients reflecting the actual purchases of inputs from suppliers within the study region. This step is accomplished with the use of the location quotient, which is a double ratio of the form:

$$\frac{\text{Industry (i) employment in study region/total employment study region}}{\text{Industry (i) employment in the nation/total employment in the nation}}$$

County business patterns data are used to estimate these location quotients. If the location quotient for a given input is zero, no production is carried on in the region. Thus, all the required input must be imported and the regional direct effect is zero. If the location quotient is equal to or greater than one, production in the region is assumed to be sufficient to supply the study industry, and the regional direct effect is equal to the national direct requirement. In cases where the location quotient is greater than zero but less than one, the region is assumed to supply some of the input requirement, the proportion being equal to the value of the location quotient.

The location quotient test is applied to each regional industry that potentially supplies inputs to the study industry. The sum of all the resulting regionalized coefficients is the direct component of the region multiplier.

The indirect component and the induced component are computed as a single combined value in RIMS. The indirect-induced effects are those

resulting from expansion of supplier and service industries to meet the needs of the directly affected industry, as well as changes in local consumption expenditures. The indirect interactions measure additional rounds of expenditures and production that result from the initial stimulus. Local consumer's incomes are increased by direct and indirect effects, and some part of the income increases will be spent in the region, stimulating additional economic activity. This effect of increased incomes to local consumers is the induced effect, and is an extension of the indirect component. Estimation of the indirect-induced component is possible through the finding that in an I/O model, under empirically common conditions, the indirect-induced component can be estimated as linear homogenous function of the direct component. A sample of 117 I/O models containing 500 observations was used to develop the relationship.

To make the utility of RIMS comparable to I/O multipliers developed in the more costly traditional way, the RIMS procedure also includes disaggregation of the multiplier. This makes it possible to allocate the total increase in regional gross output, earnings, and employment to the specific industries of the regional economy.

Table A-1 presents the gross output multipliers, household coefficients (earnings/gross output ratios), and the personal consumption expenditure multipliers for the three regions of influence and the industries which are determined to be affected by the economic activity at Vandenberg AFB. The new military construction industry serves as the industry proxy for the Shuttle and MX construction activities at Vandenberg. Activities associated with the general base improvements utilize the industries designated as new other nonfarm buildings, new highways and streets, new dormitories, and new hospital and institutional buildings. Procurement associated with operations activities at Vandenberg utilize the wholesale trade industry as a proxy. LNG related construction utilizes the gas utility facilities and pipeline construction multipliers in determining secondary economic effects.

Table A-1. GROSS OUTPUT MULTIPLIERS (M), HOUSEHOLD COEFFICIENTS (HH), AND PERSONAL CONSUMPTION MULTIPLIERS USED IN ESTIMATING SECONDARY EFFECTS DUE TO ECONOMIC ACTIVITIES AT VANDENBERG AFB AND PORT HUENEME, LNG FACILITIES, AND OCS EXPLORATION IN THE THREE REGIONS OF INFLUENCE.

Industry	Santa Barbara County		Tri-Counties Region		Five-County Region	
	M	HH	M	HH	M	HH
New Military Construction	2.263	.302	2.455	.302	3.699	.302
New Other Nonfarm Buildings	2.232	.294	2.493	.294	3.622	.294
New Highways and Streets	2.370	.353	2.643	.353	3.541	.353
New Dormitories	2.238	.299	2.416	.299	3.578	.299
New Hospital and Institutional Buildings	2.285	.323	2.434	.323	3.649	.323
Wholesale Trade	2.300	.392	2.397	.392	3.154	.392
New Gas Utility Facilities	2.105	.249	2.293	.249	3.652	.249
New Pipeline Construction	2.024	.249	2.146	.249	3.358	.249

The measure of the secondary impact is derived for the two basic employment classes of military personnel and civilian/contractor employment, and the additional locally supplied support equipment and other business services (installation) required for the Shuttle program. Procurement per worker estimates for the military work force, multiplied by the appropriate gross output multiplier (Whole sale/retail trade and maintenance and repair of military facilities) result in estimates of the secondary effects of the military personnel located at Vandenberg AFB. Procurement estimates are based upon 4,600 per direct military worker for supplies, commissary items, equipment, etc. and 1,000 per direct military worker for base maintenance and repair activities (4392 AEROSG, Management Information Summary Facts Book, 30 September 1980). The effect of the civilian/contractor work force is estimated by applying the appropriate personal consumption expenditure multiplier against the estimates of the disposable income (gross payrolls less tax and savings leakages) of this work force. The effect of support equipment procurement is based upon the level of procurement supplied locally multiplied by the appropriate gross output multiplier.

APPENDIX B

SUMMARY ASSESSMENT

AIR QUALITY IMPACT

APPENDIX B
SUMMARY ASSESSMENT
AIR QUALITY IMPACT

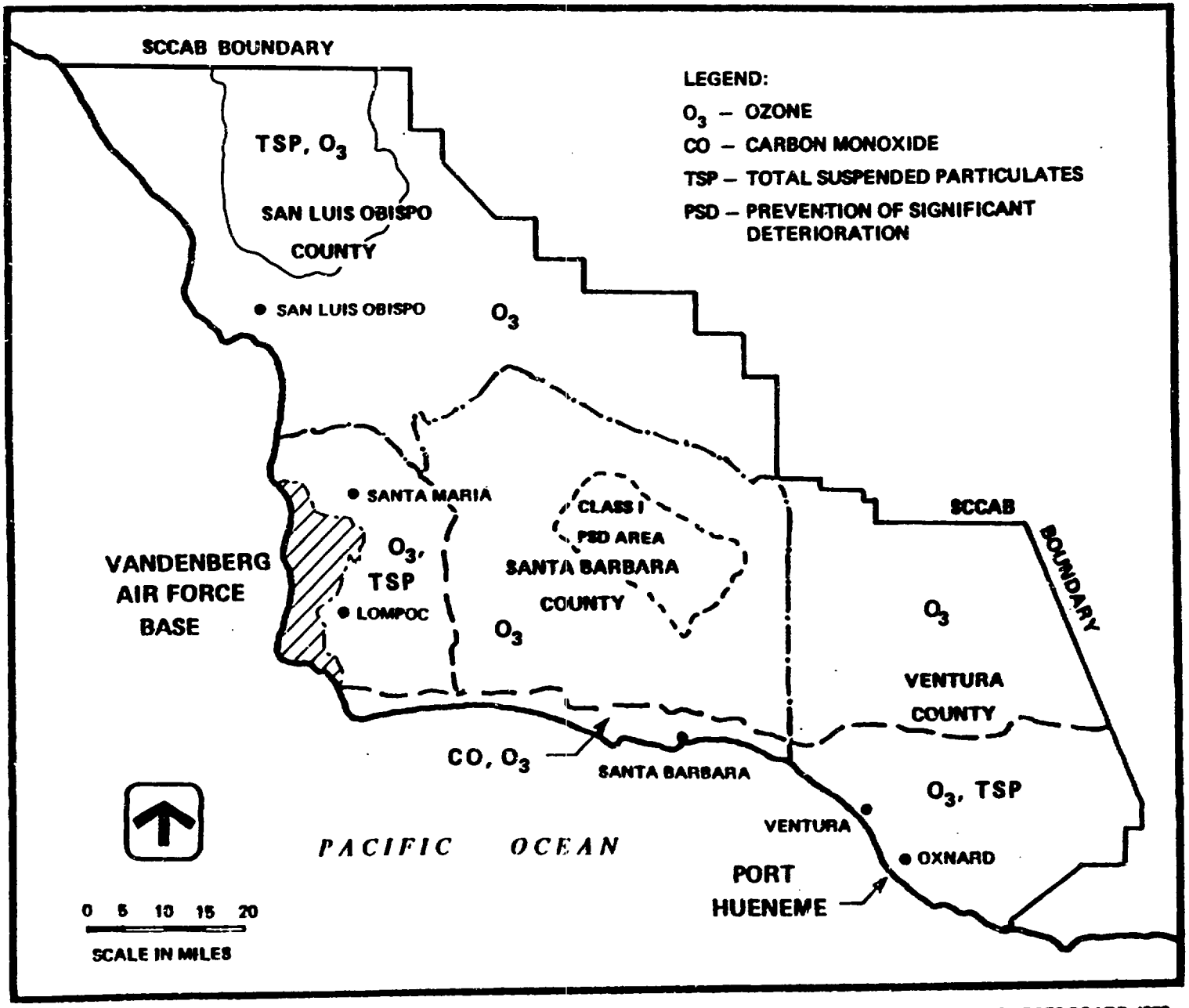
B.1 BACKGROUND

Since the publication of the Final EIS, several studies have been conducted to examine the effects of Shuttle Program air pollutants on ambient air quality. These studies include a detailed inventory of construction and operation emissions identifying the major sources of air pollutants and outlining mitigation measures that would reduce impacts. The Santa Barbara APCD and the EPA, as well as other concerned agencies, were consulted during the preparation of the emissions inventory. An estimation of local and regional impacts resulting from the Shuttle Program was included in the inventory, along with discussions of permit requirements and toxic air emissions. In an effort to quantify air quality impacts, an Air Quality Impact Analysis (AQIA) was conducted in cooperation with the Santa Barbara APCD, the results of which are discussed in this appendix. A review of available air quality models was initiated to gain confidence in the assessment of impacts resulting from the rocket exhaust ground cloud.

B.2 AFFECTED ENVIRONMENT

Vandenberg Air Force Base lies on the western coast of the South Central Coast Air Basin (SCCAB), which includes the three counties of San Luis Obispo, Santa Barbara and Ventura. Figure B.2-A illustrates the location of Vandenberg AFB and Port Hueneme within the SCCAB.

The Clean Air Act Amendment of 1977 required each state to determine its status with respect to meeting or exceeding National Ambient Air Quality Standards (NAAQS). California's Air Quality Control Regions reported either attainment or nonattainment for each of six pollutants recognized in the national standards: carbon monoxide (CO); hydrocarbon compounds (HC); oxides of nitrogen (NO_x), sulfur dioxide (SO_2), total suspended particulates (TSP), and ozone (O_3). Figure B.2-A



REFERENCE: CALIFORNIA AIR RESOURCES BOARD, 1979

FIGURE B.2-A AREA MAP OF REGIONS WITHIN SCCAB WHERE NATIONAL AMBIENT AIR QUALITY STANDARDS ARE EXCEEDED FOR SPECIFIC POLLUTANTS.

shows those regions within the SCCAB where national standards are exceeded for specific pollutants. Vandenberg AFB operates within a region that has been designated as nonattainment for total suspended particulates and photochemical oxidants. A similar situation exists for Port Hueneme; the surrounding southern half of Ventura County is in nonattainment for particulates and oxidants.(90) The Air Pollution Control Districts for Santa Barbara County and Ventura County have provided recent emission inventories for mobile and stationary sources. Both counties have prepared detailed plans for controlling air pollution sources and impacts within the respective counties.

Current operations at Vandenberg AFB result in air pollutant emissions that account for less than two percent of the total emissions within Santa Barbara County. The combustion of fuels and the operation of on-road motor vehicles and aircraft are the primary sources of CO, HC, NO_x, and SO_2 emissions for the base. Exhaust products from missile launches comprise a large portion of TSP emissions, and all of the HCl released into the Vandenberg environment.

B.3 ALTERNATIVES INCLUDING THE PROPOSED ACTION

B.3.1 NO ACTION ALTERNATIVE

There is only one alternative to the proposed action that would eliminate air quality impacts--the selection of the no project alternative at Vandenberg AFB. This would involve cancelling the Air Force Shuttle Program altogether or selecting another site for program development. Both options have been evaluated and discussed in Section 6.1 of the Final EIS. If the Shuttle Program is not developed, increased use of expendable launch vehicles at Vandenberg would probably be needed to satisfy national defense requirements.

B.3.2 PROPOSED ACTION

Constructon of Shuttle ground support facilities began in the spring of 1979 and is expected to continue through 1984. Most construction activities are scheduled for 1981 and 1982. Air pollutant emissions result from processes and equipment typically associated with large scale construction projects. New facility sites require clearing and grading with the use of heavy equipment; batch plants supply asphaltic and portland cement concrete; and workers require transportation to and from their jobs. Three major sources of air pollution are associated with Shuttle Program construction: 1) general construction activities such as land clearing and grading, 2) the use of construction equipment, and 3) off-base sources expected to accompany Shuttle-induced community growth. Fugitive dust produced during general construction activities accounts for 88 percent of the TSP emissions for Vandenberg AFB in 1981. The use of construction equipment results in significant emissions of NO_X--317 tons in 1981--comprising 99 percent of the total NO_X emissions estimated for that year. Heavy-duty equipment will also be responsible for more than 92 percent of the SO_2 produced during construction. Secondary sources in offbase areas generate large quantities of CO, HC, and NO_X as a result of the activities of new residents moving into the tri-county area because of Shuttle construction.(96)

Shuttle Program operations at Vandenberg will also result in the release of air pollutants. Four major sources of emissions have been identified: 1) fuel combusion for heating, 2) motor vehicle operation, 3) Shuttle vehicle launches, and 4) sources related to population growth in offbase areas. Stationary sources will generate about 3 percent of the SO_2 emissions expected in 1988--the first year of the maximum number of Shuttle launches (10 launches). Emissions from motor vehicles operated on Vandenberg in that year will account for 9 percent of Shuttle-related CO pollutants, 4 percent of the HC emissions, and 6 percent of the NO_X total. Launching the Shuttle in 1987 will generate 73 percent of the total mass of TSP emissions associated with operating the program in that year. Offbase sources will

be responsible for a large majority of Shuttle emissions, comprising more than 88 percent of the totals predicted for CO, HC, and NO_x (refer to Section B.3.3.2).

A number of unique industrial processes are required to prepare the Shuttle vehicle for launch, many of which involve the use of toxic and hazardous substances and chemicals. A preliminary inventory of toxic air emissions has been compiled to identify major sources, potential mitigation measures, and control equipment. Six major ground support facilities will contain operations responsible for toxic air emissions: 1) Orbiter Maintenance and Checkout Facility, 2) Hypergolic Maintenance and Checkout Facility, 3) Launch Pad, 4) SRB Refurbishment and Subassembly Facility, 5) SRB Retrieval and Disassembly Facility, and 6) ET Processing and Storage Facility. According to current program information, four toxic chemicals may be released to the atmosphere, each in excess of 100 pounds per launch cycle. These chemicals include: 1) alcohol, used during the insulation processes for the Solid Rocket Booster segments; 2) nitrogen tetroxide, released during the purging of Orbiter propulsion systems; 3) chlorine gas, released in the exhaust cloud from the Solid Rocket Boosters; and 4) hydrogen chloride gas, also released in the booster exhaust.(90)

B.3.3 IMPACTS OF THE PROPOSED ACTION

B.3.3.1 Air Quality Impacts

The emissions inventory prepared for the Shuttle Program compares future emissions with current emissions from sources in surrounding areas. As shown in Figure B.3.3.1-A, construction and operation emissions for the Shuttle Program constitute less than 2.5 percent of the 1979 totals for the SCCAB. (This comparison, and others that follow, exclude Shuttle vehicle exhaust emissions except where noted.)

Figure B.3.3.1-B provides a similar comparison but for the Santa Barbara County area. Shuttle construction and operation emissions are generally less than 6.5 percent of the historic (1979) totals for the

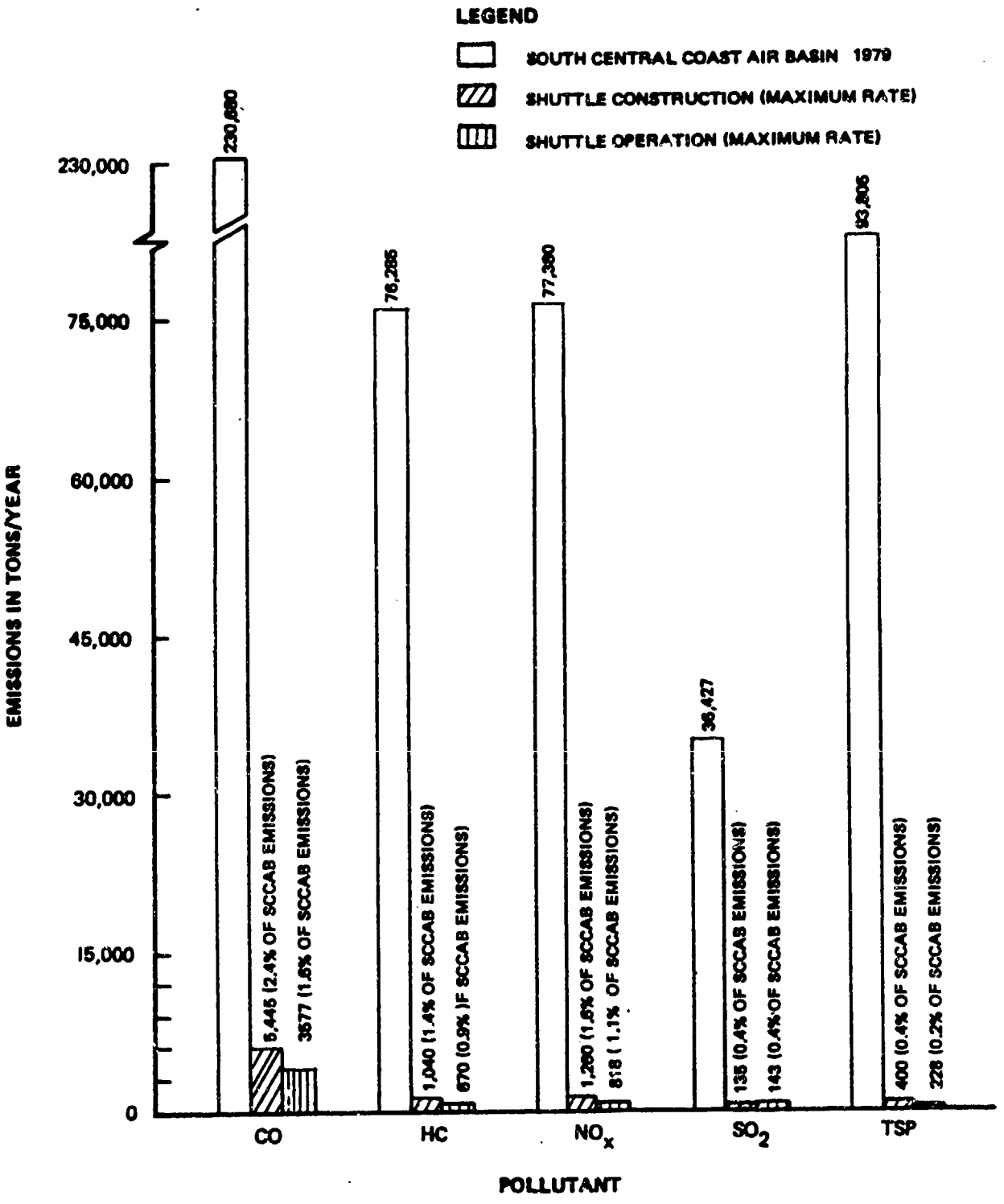


FIGURE B.3.3.1--A COMPARISON OF SHUTTLE PROGRAM EMISSIONS* WITH THOSE OF THE SOUTH CENTRAL COAST AIR BASIN

* NOTE: EXCLUDING SHUTTLE VEHICLE EXHAUST EMISSIONS

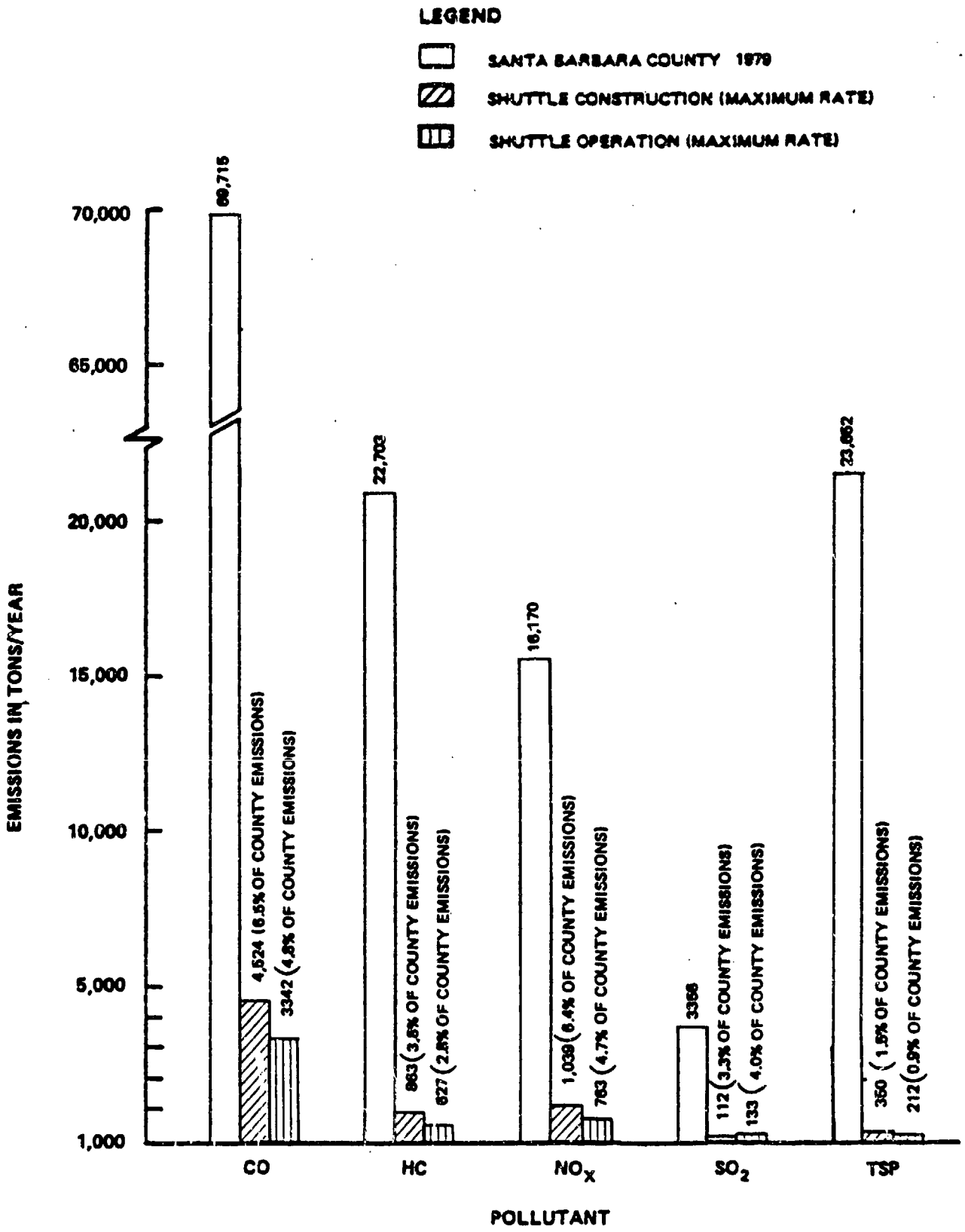


FIGURE B.3.3.1–B COMPARISON OF SHUTTLE PROGRAM EMISSIONS* EXPECTED WITHIN SANTA BARBARA COUNTY WITH THOSE OF SANTA BARBARA COUNTY

*NOTE: EXCLUDING SHUTTLE VEHICLE EXHAUST EMISSIONS

county. Suspended particulates during construction will amount to 350 tons (318 m tons) in 1982, 1.5 percent of the county's TSP emission in 1979. Nitrogen oxide emissions from program construction will result in a 6.4 percent increase.

Figure B.3.3.1-C shows the same comparison of Shuttle construction and operation emissions for the area within Vandenberg AFB. Shuttle construction will result in potential emission rates from 5.5 to 89.6 percent of Vandenberg's 1981 totals for CO, HC, NO_X and SO^2.(53) Construction is estimated to increase Vandenberg's emission rate for suspended particulates by about 200 percent during 1982. This apparently large increase in TSP is due to the relatively low emissions in the year of comparision (1981). Shuttle operation emissions may increase Vandenberg's emissions by 25.7 percent for carbon monoxide and less for other pollutants.(90)

Figure B.3.3.1-D reiterates the emission comparison illustrated in the previous figure (B.3.3.1-C) with the addition of historic (1981) and future missile exhaust emissions at Vandenberg AFB. Total estimated carbon monoxide emissions from the Shuttle Program will increase Vandenberg's CO emissions by 23.6 percent. This is because most of the carbon monoxide in rocket motor exhaust is converted to carbon dioxide during after-burning. The Shuttle Program will increase nitrogen oxide emissions from Vandenberg up to 25.3 percent due to the production of NO_X during after-burning of Shuttle vehicle exhaust, and operation of motor vehicles. In years when the largest number of Shuttle launches occur, about five and two-thirds times the quantity of suspended particulates will be released to the air compared with recent missile launch programs from Vandenberg. The particulates are primarily in the form of aluminum oxide dust (10 microns in diameter), a large quantity of which will settle out of the ground cloud within three to six miles (4.8 to 9.6 km) of the launch pad. Hydrogen chloride emissions from rocket launches at Vandenberg will increase nearly three and one-half times, compared with 1976 levels, as a result of Shuttle launches in 1988.(90)

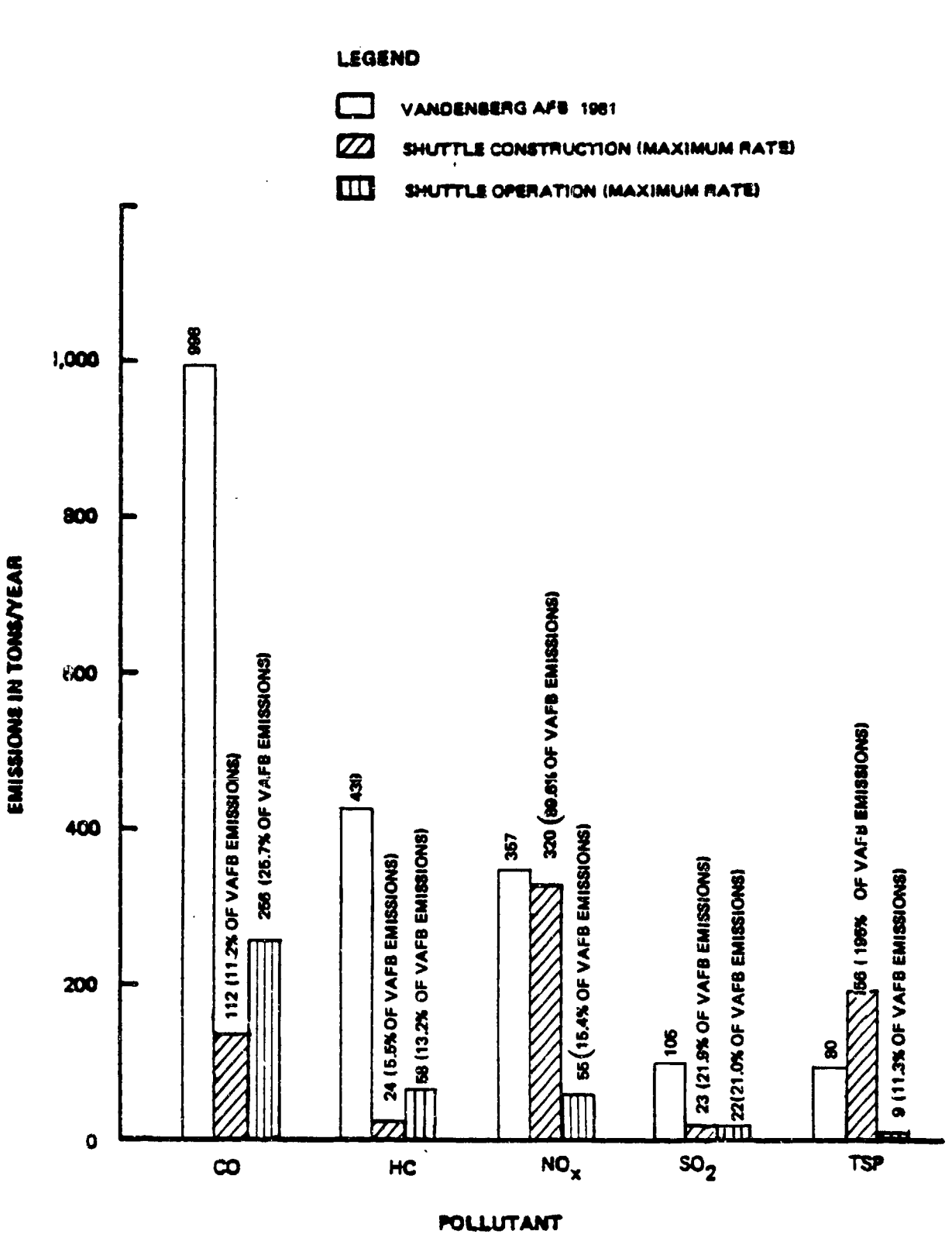


FIGURE B.3.3.1–C COMPARISON OF SHUTTLE PROGRAM EMISSIONS* EXPECTED FOR VANDENBERG AFB WITH THOSE OF VANDENBERG AFB

***NOTE: EXCLUDING SHUTTLE VEHICLE EXHAUST EMISSIONS**

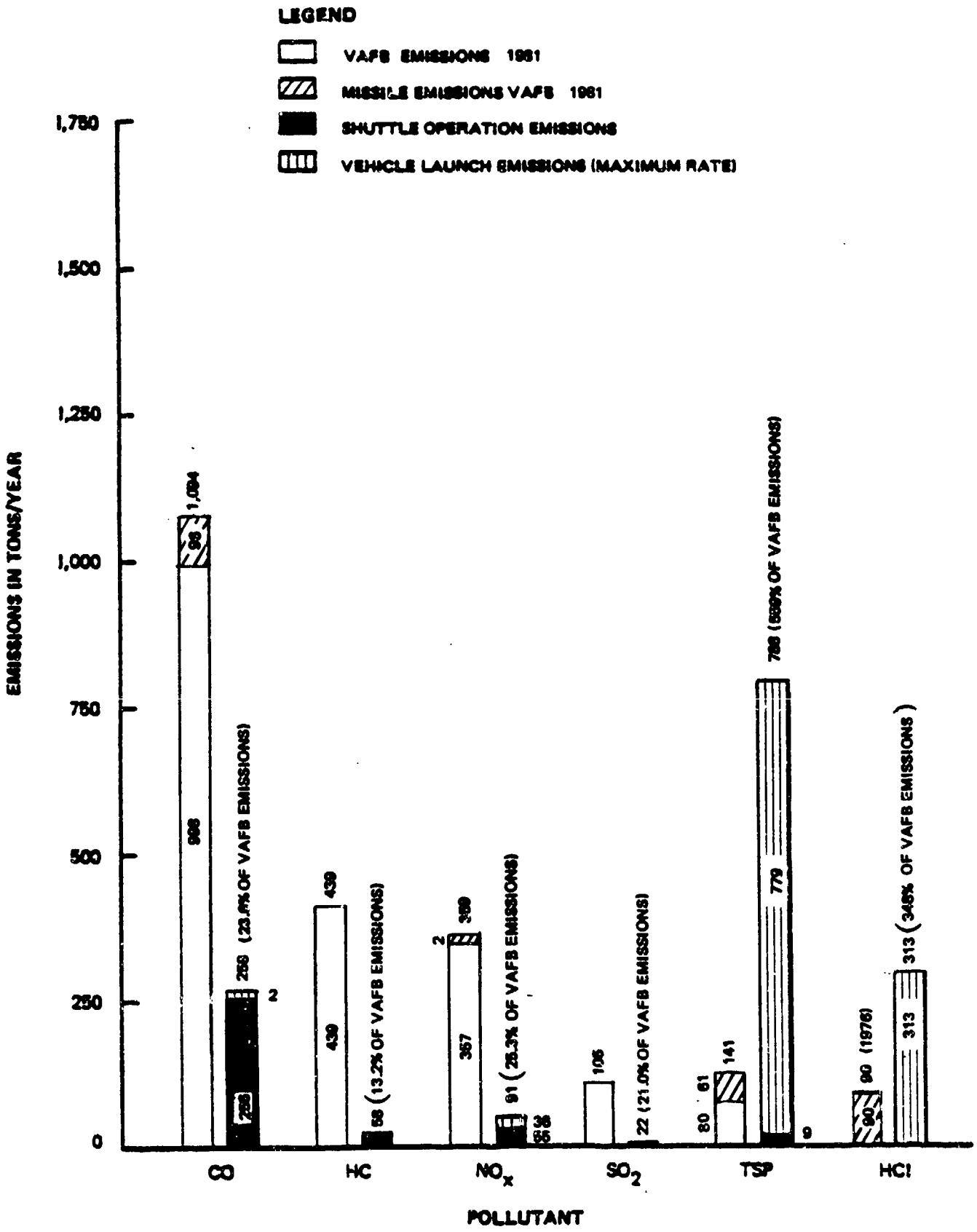


FIGURE B.3.3.1–D COMPARISON OF SHUTTLE PROGRAM EMISSIONS WITH THOSE OF VANDENBERG AFB (INCLUDING MISSILE EXHAUST POLLUTANTS)

B.3.3.2 Effects of Population Growth

The Shuttle Program will be responsible for indirect emissions from secondary sources, in addition to air pollutants directly attributable to construction and operation activities at Vandenberg AFB. General population growth, induced by program expenditures within the tri-county region, will result in air emissions from automobile use, space heating, electrical power generation, increased construction activity, and a number of other population-related sources. Total population growth in the Counties of Santa Barbara, Ventura, and San Luis Obispo will reach a peak of 21,000 new residents due to the Shuttle program. The peak will occur during construction in 1982; the Shuttle-induced population in the tri-county region will remain at an average level of about 18,000 persons throughout the years of operation.

To estimate the emissions attributable to the Shuttle Program, per capita emission rates were derived from Santa Barbara County information and applied to anticipated man-power estimates for Shuttle construction and operation. Air pollutant emissions will increase for each of the five criteria pollutants. For example, peak year emissions in 1982 are estimated to increase total emissions in the tri-county region by the following amounts:

Carbon monoxide:	4,500 tons/yr
Hydrocarbons:	700 tons/yr
Oxides of nitrogen:	802 tons/yr
Surfur dioxide:	98 tons/yr
Total suspended particulates:	245 tons/yr

In most instances, offbase emissions far exceeded the amounts expected to be directly emitted from Vandenberg AFB and Port Hueneme. During peak operation years, for example, offbase sources will be responsible for 93 percent of the total CO produced by the Shuttle Program, 91 percent of the total HC emissions, 92 percent of the total NO_x emissions, and 84 percent of the total SO_2 emissions from both direct and indirect sources.

B.3.3.3 Ventura County Impacts

Port Hueneme, located on the southern coast of Ventura County, has been selected for the site of a small but important activity for the Shuttle Program--the retrieval and disassembly of the Solid Rocket Boosters following each launch. Port Hueneme is the home of the U.S. Navy Construction Battalion Center, which operates industrial wharves for military use. Emission inventories from the Construction Battalion Center indicate that current emissions from that facility are small compared to all emission sources in Ventura County--less than 0.04 percent of the county's total.

Construction at Port Hueneme will provide Shuttle support facilities for the retrieval and disassembly of the SRBs following splashdown in the Pacific Ocean. For these operations, special facilities will be constructed on five acres of waterfront land at the Naval Construction Battalion Center. Structures will consist of a modified wharf area, an initial wash facility, and a 60,200 square-foot structure for SRB processing. In addition to these land-based facilities, activities at Port Hueneme will include two ocean-going vessels for locating and retrieving spent SRBs, and two smaller workboats responsible for maneuvering the SRBs within Port Hueneme harbor.

An inventory of air pollutant emissions for Shuttle activities at Port Hueneme suggests that construction and operation emissions will not noticeably increase Port Hueneme's effect on Ventura County's air quality. Worse-case construction emissions would be less than 1.0 percent of the county's total emissions; operation emissions would be even less and would have negligible impact.(90)

B.3.3.4 Air Quality Permit Requirements

The air quality permit process currently involves three levels of government agencies. Air quality permits are issued directly by federal and local pollution control agencies, and the state agency has a secondary role of reviewing applications for local permits. The agencies involved with the Shuttle Program at Vandenberg AFB are the

EPA, the California Air Resources Board (CARB), the Santa Barbara APCD, and the Ventura County APCD.(90) Consultation with the Santa Barbara APCD has been emphasized because the impacts in Santa Barbara County are more significant than in Ventura County.

The Santa Barbara APCD has stated that the Space Shuttle Program will be considered as a single new source and will therefore be subjected to a New Source Review (NSR). A NSR is conducted by the local agency for applicants seeking permits to construct or modify pollution sources. Although a NSR is not an actual permit, information required by the NSR must be submitted before all other permit applications can be completed. Permits will be required for the building, erecting, altering or replacing of any article, machine, equipment or other contrivance which emits air contaminants or eliminates or reduces the emission of air contaminants.(206) Air quality permits will be required for a number of basic types of equipment and their control mechanisms, including: 1) boilers and heaters, 2) burners and scrubbers, 3) paint spray booths, 4) sandblasting equipment, and 5) batch plants for asphaltic and portland cement concrete.(206)

Under current APCD rules and regulations for Santa Barbara, there are four potential permit requirements facing the Shuttle Program:

(1) If the net emission increase from Vandenberg AFB during Shuttle operations will be less than 5 pounds per hour, there will be no further NSR requirements, and permits will be issued for all new and modified equipment and air pollution control units.

(2) If the net emission increase will be greater than 5 pounds per hour for any pollutant, Best Available Control Technology (BACT) must be used on appropriate new or modified equipment.

(3) If the net emission increase will be greater than 10 lb/hour for any pollutant from all <u>new</u> facilities, an Air Quality Impact Analysis (AQIA) will be required. The AQIA must demonstrate that the emissions will not cause a violation of or interfere with the attainment or maintenance of any

national primary ambient air quality standard. The AQIA must also show that there will be no impedence of reasonable progress towards the achievement or maintenance of any national secondary ambient air quality standard.

(4) If the net emission increase will be greater than 15 pounds per hour for any pollutant from all modified facilities, an AQIA will be required.

Stationary source emissions expected for Shuttle facilities at Vandenberg have been calculated and recorded in Table B.3.3.4-1. New and modified stationary sources are expected to create emissions in excess of 10 pounds per hour for four pollutants--carbon monoxide, hydrocarbons, nitrogen oxides, and sulfur oxides. In coordination with the Santa Barbara APCD, the Air Force has analyzed the effects of Shuttle generated TSP and oxidants on ambient air quality. The results of the AQIA are noted above in Section B.3.3.1 and will be considered during new source review proceedings by Santa Barbara APCD.

B.3.3.5 Hypergolic Fuel Handling and Storage

Apart from the Shuttle Program, the Air Force has proposed to construct and operate hypergolic propellant storage facilities at Vandenberg AFB. A two- to four-year supply of hydrazine fuels and oxidizers would be stored for use by various Air Force programs on the West Coast, as well as by the Space Shuttle Program. The proposal calls for the storage of 1.1 million pounds (0.5 million kg) of hydrazine and 2.3 million pounds (1.0 million kg) of nitrogen tetroxide at two South Vandenberg locations which will also be used by other Vandenberg tenant programs. These hypergolic components would be trucked separately from manufacturers in Louisiana and Mississippi, requiring about 25 truckloads per year.

Hydrazine-based fuels are clear, oily, white liquids with a characteristic odor similar to ammonia. Three hydrazine fuels will be stored: monomethylhydrazine (MMH), unsymmetrical dimethylhydrazine (UDMH), and anhydrous hydrazine (N_2H_4). These liquid fuels are flammable and highly toxic, are classified as hepatotoxic and con-

Table B.3.3.4-1 MAXIMUM HOURLY EMISSION RATES FOR STATIONARY SOURCES AT VANDENBERG AFB

New/Modified Stationary Source	Pollutants in lb/hr				
	CO	HC	NO_x	SO_2	TSP
V-19					
3 Boilers	0.2	n	1.0	2.4	0.1
2 Hypergolic Scrubbers			n		
V-21					
3 Boilers	0.2	n	0.3	2.0	n
2 Hypergolic Scrubbers			n		
V-23					
4 Boilers	0.7	0.1	3.0	3.8	0.3
3 Hypergolic Scrubbers			n		
1 Storage Tank		n			
Ice Suppression	9.0	2.0	24.0		
V-27					
2 Boilers	n	n	n	n	n
V-28					
1 Boiler	n	n	0.2	0.1	n
V-31					
4 Boilers	0.4	0.1	1.5	3.6	0.1
Adhesive, Paint, Solvent		29.5			
1 Storage Tank		n			
V-33					
1 Boiler	0.1	n	0.3	0.7	n
Adhesive, Paint, Solvent		0.2			
V-88					
2 Boilers	0.2	n	0.8	2.2	0.1
8500					
1 Boiler	n	n	n	n	n
Power Plant 6					
5 Boilers	0.4	0.1	1.9	4.9	0.2
Security Control Facility					
1 Boiler	n	n	n	n	n
TOTAL	11.2	32.0	33.0	19.7	0.8

n = Negligible, less than 0.05 lbs/hr

Source: Unpublished emissions data

vulsigenic agents, and are suspected carcinogens. Nitrogen tetroxide is a reddish-brown liquid oxidizer which is a corrosive agent that can result in severe burns upon contact with skin and eyes, and can result in lung damage if inhaled.

There are three operations of the hypergolic storage proposal with the potential for generating emissions of hydrazine or nitrogen tetroxide: 1) storage, accidental leaks and routine emissions, 2) transfer, purge, accidential leaks and routine emissions, and 3) transportation, accidental leaks or collision rupture. Small amounts of hydrazine and nitrogen tetroxide would be routinely emitted during every transfer operation. During normal operations displaced gas will be directed through pollution control equipment, but when the connection between the storage tank and tank truck is broken, the propellant which remains in the line between the valves would be released (generally a few ounces). In addition, the storage tanks would be periodically vented, with emissions directed through pollution control equipment.

B.4 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

The largest concern for air emissions from Shuttle Program construction at Vandenberg is the amount of fugitive dust generated during construction. Most TSP emissions will result from construction activities on North Vandenberg, particularly the demolition and buildup of the airfield landing facility. Estimates are for release of about 120 tons (109 m tons) of TSP during 1981 for the construction of North Vandenberg support facilities.[71] However, an Air Quality Impact Analysis, using the EPA-approved Valley Model, indicates that TSP concentrations at Lompoc resulting from Shuttle construction essentially reach the background level within 2-3 kilometers downwind of the site.

Using the Empirical Kinetic Modeling Approach (EKMA), the ozone maxima in 1981 and 1986 - years with expected highest of hydrocarbon emissions during Shuttle construction and operations--were estimated as 0.125 and 0.100 ppm, respectively. Without the Space Shuttle

program, the predicted ozone maxima are essentially the same at 0.120 and 0.100 ppm. The fractional change in emissions due to Shuttle program is relatively small and well beyond the accuracy of the EKMA model.

There is no cause for concern for criteria pollutants and air quality impacts resulting from the operation of ground support facilities at Vandenberg. The maximum annual emissions would amount to less than one percent of the total emissions for Santa Barbara County recorded in 1979. Shuttle emissions would not impede progress toward attainment of national standards for TSP and oxidants. As noted in Section 5.1.2.1 of the Final EIS, concentrations of aluminum oxide, nitrogen oxide, and carbon monoxide released with the Shuttle ground cloud will be far below levels allowed by California and national ambient air quality standards. Ambient air quality standards for hydrogen chloride or chlorine gases have not been established.

B.5 MITIGATION EFFORTS AND MONITORING

Mitigation measures designed to reduce the impact of construction and operation of Shuttle Program facilities in California are listed below.

B.5.1 CONSTRUCTION MITIGATION MEASURES

(1) All vehicles and stationary piston-engine-powered equipment will have emission control systems in conformance with Air Pollution Control Regulations of California and local government regulations.

(2) Construction areas will be watered for fugitive dust control as necessary, in conformance with construction industry standards.

(3) Transfer and storage systems (e.g., fuel storage tanks, cement, sand, and aggregate storage for batch plants) will be designed, constructed, and operated to minimize air pollutant emissions.

(4) When explosives are used for blasting prior to construction, air pollutants may be reduced by using as little blasting material as possible, and by proper placement and packing of the charge.

B.5.2 OPERATION MITIGATION MEASURES

(1) Adverse air quality impacts associated with each launch and landing will be predicted from meteorological data. Such impact prediction will be considered by the Launch Director/Landing Director in making operation decisions. All potential adverse environmental consequences for a particular launch or landing will be identified and summarized to allow a timely response.

(2) An air pollution monitoring system will be developed for the purpose of determining the impact of Shuttle launches on air quality. A monitoring plan will specify types of pollution to be monitored, monitoring equipment, and location of environmental monitoring devices.

(3) Any toxic substances in holding ponds will be appropriately degraded as soon as possible to reduce evaporation of the toxicant and consequent degradation of air quality.

(4) Loading of gasoline tanks will be accomplished using a vapor collection system and a balance system for a vapor return line to the truck.

(5) Air pollutant emissions from worker transportation may be reduced by utilizing a bus system or jitney service which connects Vandenberg AFB and nearby cities.

APPENDIX C

SUMMARY ASSESSMENT

INADVERTENT WEATHER MODIFICATION

APPENDIX C
SUMMARY ASSESSMENT
INADVERTENT WEATHER MODIFICATION

C.1 BACKGROUND

Emissions of gases or small particles in the lower atmosphere can interact with moisture in the air and bring about weather modification. The changes can be highly localized, regional, or even global, depending on the magnitude of the emissions and their specific physical and chemical characteristics.

The potential for the 80 Shuttle launches planned for Vandenberg AFB to inadvertently alter local weather has been a major concern. At the time of publishing the EIS, it was recognized that little was known about the effects of Shuttle exhaust products on weather patterns. The National Aeronautics and Space Administration (NASA) funded a study to evaluate the potential for inadvertent weather modification from Space Shuttle launches.

Atmospheric physicists and meteorologists at the Institute of Man and Science at the State University of New York at Albany[12] were employed to specifically study the potential for weather modification due to Shuttle launches at both Kennedy Space Center in Florida and Vandenberg AFB in California. NOAA and Department of Defense Agencies have provided support by supplying appropriate meteorological information and the results of measurements of ground cloud exhausts generated by Titan III launches, which contain exhaust constituents similar to those expected for the Shuttle vehicle.

Three key points of interest have been identified concerning inadvertent weather modification: 1) the potential for weather modification, 2) the effects of weather modification, if induced, and 3) previously observed impacts of other space booster and missile launches. These concerns are addressed specifically in Section C.3.3, Impacts of the Proposed Action.

C.2 AFFECTED ENVIRONMENT

The California climate involves a stratus cloud season, Santa Ana conditions, and transient disturbances which may or may not produce precipitation. Along the coastal regions of Southern California, almost all heavy precipitation is associated with surface and lower tropospheric winds that range from the southeast to the southwest. Significant diurnal wind variations occur throughout the year both at the surface and in the lower troposphere. Offshore components, probably aided by cold air drainage, are prevalent near sunrise, especially in the winter. Onshore winds peak during early to mid-afternoon. Diurnal and local weather variations brought about by topographical and land-ocean variations dominate the regular season cycle.(12)

eather in the Vandenberg area is characterized by a warm, dry summer regime, which yields to a cool and occasionally moist winter regime. Winter fogs are most frequent during the night and early morning hours. Surface and low-based temperature inversions dominate the area, particularly in summer. The inversion base may often be below 1,000 feet (300 m) elevation, and may easily trap air pollutants released at ground level.(12)

The summer season experiences a pronounced diurnal variation in coastal fog and stratus clouds. Overall obstruction to vision is greatest near sunrise and least shortly after noon. Winds tend to flow offshore at night and onshore during the day. Night time inversions may be as low as 450 feet (150 m) above the surface. Day time inversions reach 900 to 1,500 feet (300-500 m). This typical summer regime may persist for as long as seven days. The prevailing meteorological pattern may be interrupted by a rapid increase in mixing heights eliminating the inversion (if one existed) due to occasional heat wave conditions, referred to locally as Santa Ana winds.(12) There is usually little precipitation in the summer.

The winter season for the Vandenberg area includes unsettled weather patterns, with temperature inversions occurring less-frequently than

in summer. Deep convection occurs for two or three days per year, and the freezing level is approximately 9,000 feet (3,000 m). On some occasions, freezing occurs for two or three days per year, and the levels may be as low as 3,000 feet (1,000 m). In these instances, precipitation is usually stratiform in nature, with some cumuliform convection. Heavy precipitation episodes may occur with storms coming from tropical regions near Hawaii. Normal frontal patterns are often absent in these cases. Surface temperatures are usually about 60° F (15° C) with moist adiabatic conditions (non-inversion). Pacific cold fronts may occasionally produce brief periods of heavy rain as they move southeastward.

Autumn and spring are vague transition periods between the climate regimes of summer and winter. Coastal fog and stratus become prevalent during the late spring. Hot and dry Santa Ana conditions are most likely to occur in the late summer and early autumn months. Surface temperatures can reach 95 to 105° F (35-40° C) during Santa Ana conditions.(12)

C.3 ALTERNATIVES INCLUDING THE PROPOSED ACTION

C.3.1 NO ACTION ALTERNATIVE

The only program alternative that would eliminate potential impacts from inadvertent weather modification is the option of not launching Shuttle vehicles from Vandenberg AFB. Section 6.1 of the Final EIS discusses the alternative of no action.

C.3.2 PROPOSED ACTION

The proposed Space Shuttle Program at Vandenberg will result in injections of aluminum oxide particles, hydrogen chloride gas, and other contaminants with each launch of the Shuttle vehicle. The combined exhaust of the Shuttle's Solid Rocket Boosters and main Orbiter engines will be released from the surface to an altitude of about 20 miles (32 km). Because of the Shuttle's relatively slow speed near the surface, there is more interest in the effect of the exhaust released to

the lower part of the troposphere, particularly in the region where cloud and precipitation processes occur.

A large altitude-stabilized ground cloud will result, the volume of which will be determined by time of day and meteorological conditions. The cloud may attain a volume between 6 and 100 cubic miles (25-400 cu km). This exhaust cloud will contain approximately 52 tons (47 m tons) of hydrogen chloride, 75 tons (68 m tons) of aluminum oxide particles, large quantities of water, and various other contaminants. Exhaust cloud constituents are expected to be mixed with moderate (but perhaps significant) quantities of soil debris, sea salt, and other iron, calcium, zinc, sulfur, and phosphorus-containing compounds which may affect ice-nucleation activity.

Current launch schedules call for an Initial Operational Capability (IOC) at Vandenberg AFB in 1985, followed by a moderate rate of build up to a maximum of 10 launches per year for 1988 to 1994. Mission security prevents the use of exact launch dates in this analysis, but it may be reasonably assumed that launches will be evenly spaced throughout the year, and at random hours of day or night.(12)

C.3.3 IMPACTS OF THE PROPOSED ACTION

C.3.3.1 Potential for Weather Modification

The interactions of Shuttle launch gases and particulates with atmospheric water are extremely complex, and an overall prediction of weather modification based on a physiochemical model is not possible at this time. Scientific knowledge of the dynamic character of the water cycle is still too limited to develop an all-encompassing predictive model for inadvertent weather modification. However, many of the individual physical and chemical processes by which particles, gases, cloud droplets, and precipitation elements interact with each other on a static basis are fairly well understood and can be quantified. The generally accepted procedure for evaluating the magnitude of weather modification (or the success of overt weather modification efforts) is based on statistical analysis of pre- and post-modification weather data.

Laboratory testing and rocket plume sampling were performed to aid researchers in assessing the potential for the Shuttle ground cloud to modify cold cloud formation. The evidence suggests that significant (but not alarming) concentrations of ice nuclei can be produced by solid fuel rocket boosters. Ice nuclei concentrations tend to reach peak values within the ground cloud approximately one to two hours after launch, after which the values return to background levels. It appears that potential ice nuclei, based on aluminum oxide particles, may be inhibited by interaction with other exhaust products--presumably hydrogen chloride. From the limited flight data analyzed, it appears that ice nuclei concentrations can reach maximum values of up to two orders of magnitude above background before cloud dilution and aerosol aging processes reduce their concentrations. Based on a 1978 Titan III launch, the maximum ice nuclei concentration was approximately 30 to 300 nuclei per cubic foot (10-100 per l) at -4° F (-20° C) for a one-hour period beginning about one and one-half hours after launch. This translates to about 10^7 to 10^8 ice nuclei per pound of propellent (10^5 to 10^6 per gm).

Based on the above observations and measured concentrations of ice nuclei in the Shuttle ground cloud and their relatively short duration above background levels, the potential for long term weather modification by Space Shuttle launches is not considered high. However, localized cloud seeding effects could occur, such that rocket launches are not recommended when deep convective clouds are overhead or nearby. Local showers might be induced if supercooled clouds reached temperature levels of approximately 10° F (-12° C) and colder.

The Shuttle ground cloud could influence warm rain formation in two opposing ways: the addition of some nuclei may delay precipitation, while the addition of giant nuclei may accelerate it. It is expected that convective clouds formed from the Shuttle ground cloud will contain significantly higher concentrations of droplets (over 1,000 per cc) than natural clouds for a period approaching two days. However, the natural concentration of giant nuclei will normally be dominant. Giant nuclei derived from the ground cloud are unlikely to influence warm rain formation beyond 24 hours after launch.

Under the conditions of a summer sea breeze at Vandenberg, a potential exists for modification of cloud microphysics. If a significant portion of the Shuttle ground cloud becomes trapped in the lower levels and follows the local sea breeze circulation, it may become involved in the formation of early morning fog and stratus. Under these conditions, overseeding of stratiform clouds could inhibit the formation of precipitation, and fog that formed could be exceptionally dense.

The overall influence of the Shuttle ground cloud would probably be to delay warm rain formation processes for one to two days, with the possible exception of stratiform clouds which would allow long growth times. This is expected to lead to some reduction in precipitaton. These conclusions may require modification if the rocket blast lifts large numbers of soil particles into the ground cloud. Such particles could add appreciably to the concentration of giant nuclei affecting weather processes.

Based upon meteorological and climatological information for the Vandenberg area and the physical-chemical processes influencing cloud and precipitation elements, the potential risk for inadvertent weather modification has been summarized in Table C.3.3-1. Probabilities of weather modification for eight synoptic regimes and three weather types have been assigned risks of high, moderate, and low values. Cold cloud modification potential is high for cold lows and deep summer convections. The potential for modifying warm cloud conditions is high for low latitude cyclones, deep supercooled clouds, and for mornings under winter and summer anti-cyclonic conditions. Modification of fog and haze conditions is likely under winter and summer anti-cyclonic conditions and during tropical summer storms.(12)

C.3.3.2 Effects of Weather Modification

The question of how weather modification is defined is very important in discussing the effects of Shuttle launches. Weather modification in one context may refer to the physical/chemical interactions occurring within the volume occupied by the exhaust ground cloud. In another context, weather modification may refer to specific changes

Table C.3.3-1. RISK ASSESSMENT FOR INADVERTENT WEATHER MODIFICATION AT VANDENBERG AFB

SYNOPTIC REGIME	FORECAST RANGE (Days)	FREQUENCY (Days per Month)	RISK OF WEATHER MODIFICATION		
			Cold Cloud Conditions	Warm Cloud Conditions	Fog/Haze Conditions
WINTER					
• Pacific Cold Fronts	1-2	5-6	Moderate[1]	Moderate	Low
• Cold Lows	1-2	1	High	Low/Moderate	Low
• Low Latitude Cyclones	1-2	1	Low	Moderate/High	Low/Moderate
• Stable Anti-Cyclonic Conditions	1-3	20-25	Low	Low in Afternoon High in Morning	Moderate/High
SUMMER					
• Tropical Storms	1-2	< 1 (1 per Season)	Low	Moderate	Moderate/High
• Deep Convection	1	< 1 (1 per Season)	Moderate/High	Moderate/High	Moderate
• Santa Ana Conditions	1-2	1-2	Low	Low	Low
• Stable Anti-Cyclonic Conditions	2-4	25-30	Low	Low in Afternoon High in Morning	Moderate/High

Reference: Bollay, et al, 1980 (12)

[1]High if deep embedded convection, 1-2 days per season.

Note: Spring and Autumn seasons represent a transition between above two seasons. Santa Ana frequency peaks in September and October at about 5 days per month.

in observed weather characteristics, such as rainfall amounts and storm intensity, affecting both warm rain and cold rain processes. If weather modification were measured with a rain gauge network, and climatic data collected by rain gauges were studied, no indication of weather modification would be seen because natural climatic variation is large.(145) Any decrease or increase in rainfall measured for a short-term would not be meaningful because there would be no baseline information which would be useful for comparison and because the required rain gauge network would be much denser than is presently practicable.(12)

If persistent over a long period of time, weather modification can lead to climate modification. Local water users in the Vandenberg region rely heavily upon winter storms and precipitation for agricultural and domestic water. Any long-term decrease in the amount of rainfall would have wide-spread effects on crops, livestock, natural vegetation, aquatic habitats, and general water use. Significant inhibition of regional precipitation would decrease the local supply of water. On the other hand, increased rainfall, should it occur as a result of inadvertent weather modification, would benefit the semi-arid lands of Santa Barbara County.

C.3.3.3 Previously Observed Impacts from Space Booster Launches

Based on the observations during a 13 December 1978 launch of a Titan III rocket booster, ice nuclei that modify in-cloud characteristics are generated by the combustion of solid rocket fuels. However, there have been no observed or measured changes in rainfall attributable to rocket exhaust of any kind. Even when ice nucleus seeding is used on planned weather modification projects, effects are unpredictable. When such deliberate seeding is done on a systematic and regular basis under optimum atmospheric conditions, resultant weather changes generally range from modestly significant to insignificant or inconclusive. Relatively few seeding programs have been judged effective by the scientific community.(12)

C.4 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Based on the above observations, the potential for long-term weather modificaton by Space Shuttle launches is not considered high. Although the overall impact of weather modification at Vandenberg is not directly predictable, the probability of impact can be assessed on a day-by-day basis according to observed weather conditions at Vandenberg AFB. It is apparent that modification is possible under certain weather conditions, such as deep convection summer storms and cold winter lows. However, these are weather conditons that would probably cause a postponment of Shuttle launches for reasons of vehicle tracking and safety.

C.5 MITIGATION EFFORTS AND MONITORING

Mitigation of potential impacts from inadvertent weather modification is possible by avoiding Shuttle launches under adverse weather conditions. For other reasons of vehicle safety and tracking, some launch constraints may be implemented that also reduce the potential for weather modification. Such constraints have not yet been established for launches from Vandenberg AFB. However, the following guidelines have been adopted by NASA for test phase Shuttle launches at Kennedy Space Center in Florida,[141] and are being considered for Vandenberg launches:

> The Shuttle will not be launched if the following weather conditions exist at the launch site:
>
> 1. Cloud cover is greater than 50 percent.
> 2. Visibility is less than 7 nautical miles.
> 3. Cloud ceiling is less than 3,000 feet.
> 4. Ambient temperature is less than 31 degrees F or greater than 99 degrees F.
> 5. Precipitation is present.
> 6. Precipitation is forecast for the time period of start of External Tank loading through time of launch. The external Tank will not be loaded during rain or if rain is imminent after loading.
> 7. Pre-launch surface wind is greater than 49.0 knots (steady state).

8. Launch time surface wind is greater than 22.6 knots (steady state) or reaches peak velocity greater than 34.4 knots.
9. The flight path will carry the vehicle within 5 nautical miles of the edge of a cumulonimbus (thunderstorm) formation.

No single condition or set of conditions will be considered an absolute constraint in reaching a decision to launch. The final decision will be based on instrumentation and observations at the time of launch. Results of tests conducted during the initial launches will be used in refining launch constraints for the operational phase of the program. Restrictions for Vandenberg will probably differ from those for Kennedy launches.

APPENDIX D

SUMMARY ASSESSMENT

ARCHAEOLOGY IMPACT

APPENDIX D
SUMMARY ASSESSMENT
ARCHAEOLOGY IMPACT

D.1 BACKGROUND

Knowledge of archaeological resources at Vandenberg AFB has increased considerably since the publication of the Space Shuttle Final EIS. The Air Force has worked closely with the National Park Service, the State Historic Preservation Office, local Native American groups, qualified archaeologists, and facility design consultants in further defining and protecting Vandenberg's archaeological environment. As the result of consultation with these and other agencies through the EIS process, the Air Force has initiated several additional archaeological surveys that are addressed in this appendix.

Additional studies were needed to identify potential archaeological resources in the vicinity of the External Tank Tow Route, leading from the ET Landing Facility to the Coast Road, and in underwater regions adjacent to the Point Arguello Boathouse. Data recovery operations have been accomplished for the three archaeological sites impacted by the Orbiter Tow Route. Air Force planners have realigned the tow route to avoid impacting four other sites, and developed mitigation and monitoring plans to reduce the potential for impacts to known sites during the construction.

In addressing new archaeological information, this assessment discusses five key points of interest: 1) data recovery operations for the Oribter Tow Route, 2) archaeological activities along the proposed External Tank Tow Route, 3) underwater archaeology in the vicinity of the External Tank Landing Facility, 4) resource along the route of an electrical transmission line, and 5) emergency response plans and construction monitoring.

D.2 AFFECTED ENVIRONMENT

D.2.1 ORBITER TOW ROUTE

The road-widening and realignment of Coast Road on South Vandenberg will cause impacts to three delineated archaeological sites. Alteration of Coast Road is necessary to allow the Orbiter to be towed from the airfield to Space Launch Complex No. 6 (SLC-6). The three impacted sites are SBa 539, 670, and 931. (SBa is the official California designation for archaeological sites in Santa Barbara County.)[155] Site SBa 931 is the northernmost of the three, located on an elevated terrace near the Santa Ynez River. The site was moderately disturbed by the construction of Highway 246. This site may have served as a base camp for the hunting of large sea mammals as well as other game.[63] Resurvey and excavations at SBa 931 uncovered additional shellfish remains, chert flakes, and what appears to be a roasting pit of earth and stone construction, adjacent to a graded living area. No other distinguishing features were noted in the course of data recovery.[61]

The other two impacted sites lie close to the mouth of Honda Creek. Site SBa 539 has been largely disturbed by roads, a railroad, and buried cable lines, and perhaps served as a seasonal base camp for the local population. Midden deposits at this site are similar to many of the other coastal deposits in the Vandenberg region, with a high density of shellfish remains and evidence of chipped stone tools. SBa 539 investigations also revealed a badly disturbed human burial--the only burial discovered in the course of tow route investigations. An in-field analysis of the remains was followed by reburial near the site at the request of Chumash descendants and under the authorization of the Interagency Archaeological Services.[61]

SBa 670 appears to have been a seasonal habitation site or intermittent campsite. Although the site has been moderately disturbed by road construction, large portions remain intact. A wide range of subsistence activities were apparently carried on here, as well as tool preparation for hunting.[63] Excavations revealed no distinct

features at site SBa 670; archaeologists encountered mostly shellfish remains and chert flakes.(61)

D.2.2 EXTERNAL TANK TOW ROUTE

An access road is needed to connect the Coast Road with the proposed External Tank (ET) Landing Facility, where the tanks will be delivered from a Gulf Coast manufacturer. An archaeological survey of a tract of land along the proposed route of the ET Tow Route revealed the presence of eleven previously unrecorded archaeological sites (SBa 635, 712, 1106, 1117, 1542, 1543, 1544, 1545, 1546, 1547). Nine of the sites appear to be related to three large midden sites that were previously recorded. Some of these sites have a high density and diversity of stone tools, animal remains, and other evidence of tool making. The deposits probably represent seasonal settlements. Site SBa 1542, the only site expected to be impacted, is located in a chert outcrop near the deactivated Coast Guard Station, and contains an extremely high density of stone tools and flakes.(42) All sites have been found to be significant in terms of National Register eligibility criteria.

D.2.3 UNDERWATER ARCHAEOLOGY

Delivery of the External Tanks to Vandenberg by ocean-going barge will require the construction of a shallow landing harbor at the existing Point Arguello Boathouse area. An intertidal and underwater archaeological survey of the boathouse embayment was conducted as the first interagency cooperative underwater archaeological survey along the California coast. Participants in the survey included representatives from the Channel Islands National Monument (NPS), the NPS Inundation Studies Team, the U.S. Army Corps of Engineers, the Interagency Archaeological Services Division, the National Park Service, and the U.S. Air Force.

Examination of the intertidal zone and underwater area of the boathouse area revealed no cultural resources within the project impact area. Additional underwater survey work was not recommended by the National Park Service.(39)

D.2.4 ELECTRICAL TRANSMISSION LINE

The proposed construction of a Shuttle-related 69 KV electrical transmission line on South Vandenberg will cause impacts to three delineated archaeological sites. The electrical transmission corridor is necessary to facilitate the operation of various proposed Shuttle facilities. The three impacted sites are SBa 534, 680, and 923.(71) The cultural assemblage collected from these sites consists almost entirely of chipped stone artifacts, primarily reduction flakes resulting from various knapping and tool-use activity. The almost total absence of faunal materials from these sites clearly limits the extent to which these artifacts can provide data on the range of activities which occurred at the sites. All of the locations tested appear to represent limited or special activity sites, since materials recovered consist almost entirely of lithic waste. Procurement of raw materials in the form of chert and the subsequent production of flake stone tools appear to have been primary activities at these sites. No other distinguishing features were noted in the course of data recovery.

D.3 ALTERNATIVES INCLUDING THE PROPOSED ACTION

D.3.1 NO ACTION ALTERNATIVE

The selection of the no action alternative would eliminate all potential archaeological impacts resulting from the Shuttle Program at Vandenberg. The options of having no Shuttle Program or developing the program at a site other than Vandenberg were addressed in Section 6.1 of the Space Shuttle Final EIS.

D.3.2 PROPOSED ACTION

The proposed realignment of the Coast Road section of the Orbiter Tow Route remains essentially unchanged from the action described in the Final EIS. Minor adjustments in the route right-of-way have been made to avoid four archaeological sites. Three other sites could not be avoided and will be affected.

Construction of the ET Tow Route will involve about 6,000 feet (1,800 m) of previously undisturbed land north of the proposed ET Landing Facility. The Tow Route will cross gently undulating land to reach the Coast Road. Construction will require the filling of a small portion of Oil Well Canyon, a small ravine which formerly drained a perennial stream that has been diverted to provide water for cattle. Culverts for drainage will be provided.

A large cut in the sea cliff adjacent to the ET Landing Facility will be required to provide access from the facility to the coastal terrace above. The cut will be from 50 to 200 feet (15 to 60 m) wide and about 1,000 feet (300 m) long.

Recent archaeological surveys prior to design of the ET Tow Route have revealed additional sites of interests. To avoid impacting most of these sites, the route of the proposed transporter way has been realigned under the supervision of qualified archaeologists. This action constitutes a mitigation measure and is discussed in subsequent sections.

One proposed action calls for the construction of a 69 KV electrical transmission line approximately 10 miles in length, extending from an existing electrical substation at South Gate near the intersection of Highway 246 and Arguello Boulevard to the launch pad.(71) The proposed action will involve construction of augered concrete pads and erection of transmission line support towers. The right-of-way for the transmission line corridor remains essentially unchanged from the action described in the Final EIS. Minor adjustments in the route right-of-way have been made to avoid two extremely sensitive archaeological sites, SBa 662 and SBa 663.

D.3.3 IMPACTS OF THE PROPOSED ACTION

D.3.3.1 Orbiter Tow Route Impact

Three identified archaeological sites will receive specific impacts as a result of modifying Coast Road along the Orbiter Tow Route: SBa

539, 670, and 931. Road widening at these sites has been modified in response to mitigation measures suggested in the Final EIS. At Site SBa 539, a cut of approximately 7 to 8 feet (2.1 to 2.4 m) will be required on only the west side of the road; shifting the route center line will avoid a possible burial site. SBa 670 impacts will be decreased by realigning the route centerline to avoid dense archaeological deposits. Road alignment at SBa 931 will require a small cut on the southeast side of Highway 246; the route centerline will also be adjusted here to minimize the size of the required cut.(123) Recovery of archaeological data and artifacts will be conducted prior to construction at all three sites by the Office of Public Archaeology at the University of California at Santa Barbara and in cooperation with local Native American groups and the Advisory Council on Historic Preservation. While some data will be irretrievably lost despite approved data recovery, a considerable portion of sites SBa 539, 670, and 931 remain for future investigation when archaeological techniques and historical/cultural perspective are even further refined than at present.

D.3.3.2 External Tank Tow Route Impact

Impacts were substantially reduced with the adoption of an alternative route, developed in coordination with qualified archaeologists. A survey was specifically designed and undertaken to provide data that aided realignment efforts.(42) The currently proposed route would impact one recently discovered site, SBa 1542, which has already been disturbed by an access road, power transmission structures, and fencing. The proposed route would cross the southern margin of the site, and approximately 10 percent of the site will be disturbed.

Data recovery has been conducted on the impacted area of site SBa 1542 and has satisfactorily mitigated any adverse impacts. This recovery was conducted under the direction of the Interagency Archaeological Services in accordance with a "No Adverse Effect" determination between the State Historic Preservation Officer and the Advisory Council on Historic Preservation Officer and the Advisory Council on Historic Preservation (Appendix H). All plans were reviewed, and

ancestral resources were protected. The "No Adverse Effect" determination also supported the finding that the other Oil Well Canyon sites would not be impacted adversely.

D.3.3.3 Underwater Archaeology Impact

The proposed development of an ET Landing Facility would require dredging and perhaps blasting of a 2.2 acre (0.9 ha) area at the Point Arguello Boathouse. A recent National Park Service survey revealed no evidence of submerged archaeological sites within the proposed construction zone.(30) No impacts to underwater archaeology are expected. However, construction activities will be monitored to protect cultural resources should they be uncovered.

D.3.3.4 Electrical Transmission Line Impact

Three archaeological sites (SBa 534, 680, and 923) were potentially impacted by pole placement for a 69 kv electrical transmission line. Re-routing the line reduced impacts, including avoiding site SBa 923 completely.(76) A survey was specifically designed and carried out to provide data which aided the realignment. In sites SBa 534 and 680, data was recovered from both test pits near the pole holes and from the holes themselves that supported a determination of no significant impact.(76)

D.4 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Archaeological impacts are limited to 4 sites out of more than 80 identified on Vandenberg AFB, as a result of coordinated siting of Orbiter and ET Tow Routes. Three sites will be disturbed by the realignment of Coast Road for the Orbiter Tow Route. One site will be marginally impacted by the construction of the new ET Tow Route. Data recovery will be accomplished at all sites to minimize the impacts on archaeological resources.

D.5 MITIGATION EFFORTS AND MONITORING

Archaeological impacts have been mitigated in a number of ways. As noted above, several impacts have been avoided altogether by careful siting of facilities. Impacts to sites that could not be avoided were reduced by shifting the route away from critical artifact areas.

An Environmental Protection Plan (EPP) has been established by the Air Force to ensure the preservation of environmental quality during Shuttle construction activities.(55) Existing archaeological resources, as well as other ecological, geophysical, socioeconomic, and cultural resources, are protected through the implementation and enforcement of mitigation measures and monitoring programs. One objective of the surveillance plan is to make possible the recovery of any historical remains or artifacts which may be discovered during construction. Archaeological resources were defined and incorporated into Environmental Resource Maps for each ground support facility (see Appendix A). These maps have assisted in developing construction practices and limitations, and in clearly identifying to construction personnel the surface areas which are off-limits.

As part of the surveillance effort, qualified archaeologists will monitor all construction activities. Each construction area has been categorized in terms of the likelihood of unearthing archaeological resources. This information will be used as a planning tool to effectively deploy monitoring personnel during construction activities.(115) Archaeological orientation lectures are given to construction equipment operators so that they recognize potential resources if they are uncovered during clearing, excavation, or grading activities. An Emergency Response Plan has been developed, as required by federal and state regulations, that defines the proper actions to be taken should construction activities uncover potential archaeological or paleontological remains. The plan forbids disturbance of the site following discovery until it can be evaluated by a qualified archaeologist. If the site is assessed as being significant, a data recovery plan will be developed in coordination with the

State Historic Preservation Office, the Advisory Council on Historic Preservation, local Native American groups, and the Interagency Archaeological Service.[121] Figure D.5-A summarizes the steps established under the Emergency Response Plan.

D.5.1 ORBITER TOW ROUTE IMPACT MITIGATION

In addition to the general mitigation and monitoring efforts outlined above, measures have been developed to reduce impacts to specific archaeological sites. As noted earlier, the Orbiter Tow Route has been rerouted in a number of places to avoid four sites and to reduce impacts to three other sites. Data recovery operations are being developed to gain as much information as possible about the sites prior to construction. Archaeological sites SBa 539, 670, and 931 will be carefully monitored during construction to ensure protection of these resources, according to a Memorandum of Agreement between the State Historical Preservation Officer, the Advisory Council on Historic Preservation, and the Air Force (Appendix H).

D.5.2 EXTERNAL TANK TOW ROUTE IMPACT MITIGATION

Data recovery has been conducted for site SBa 1542, which is the only archaeological site that will receive direct impacts from ET Tow Route construction. The route passes the margin of several other identified sites; these will be monitored closely during construction to protect possible hidden resources. The route itself has been altered in response to suggestions by survey-team archaeologists to avoid several sites along the previously proposed route. A finding of "No Adverse Effect" (Appendix H) determined that these data recovery and other protective measures would satisfactorily mitigate impacts to this site.

D.5.3 ARCHAEOLOGICAL SURVEILLANCE ACTIVITIES

Beginning with launch pad demolition in January of 1979, archaeological surveillance activities have accompanied Shuttle construction for the protection of known and undiscovered resources. Surveillance and

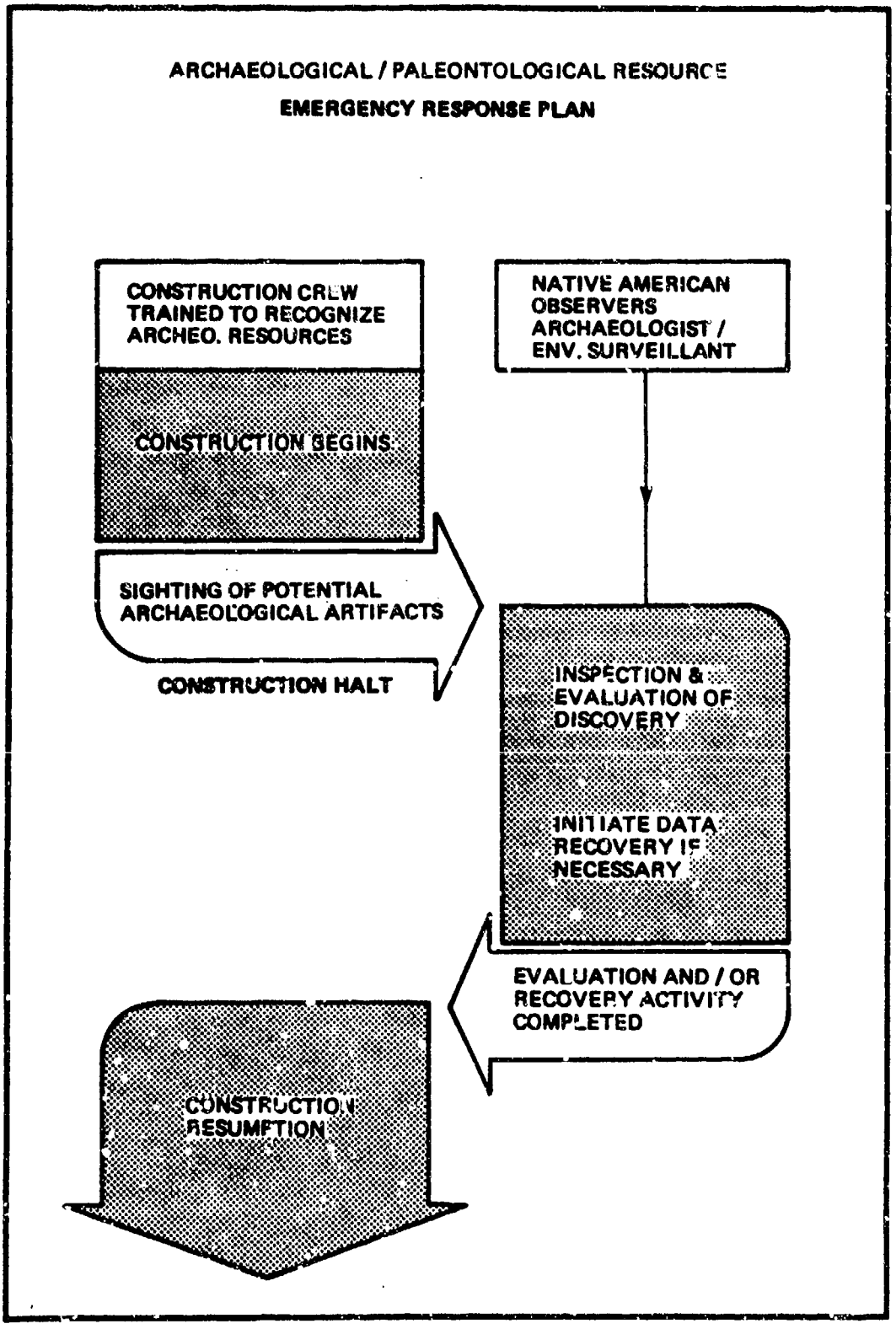


FIGURE D.5-A EMERGENCY RESPONSE PLAN FOR THE PROTECTION OF ARCHAEOLOGICAL AND PALEONTOLOGICAL RESOURCES.

monitoring have been instigated at sites to date: 1) the Orbiter Maintenance and Checkout Facility (OMCF), located south of the airfield, 2) the Titan IIID Receiving, Inspection, and Storage Facility on South Vandenberg, and 3) the Launch pad, 4) the External Tank Storage and Checkout Facility, and 5) the Orbiter Runway.

Construction of the OMCF began with site clearing and preparation in March of 1980. Periodic monitoring of construction activities revealed no archaeological artifacts. Construction of the Titan IIID facility also began in March. During continuous monitoring of construction activities, no archaeological resources were discovered. Following an orientation lecture on May 19, 1980, excavation began at the SLC-6 launch pad area. Full-time monitoring throughout the concentrated excavation period resulted in no sightings of archaeological or paleontological resources.

During construction of the External Tank Storage and Checkout Facility (TCF), a new archaeological site, SBa-1686. SBa-1686 is an extensive aboriginal site composed of one or more occupational components. The paricity of lithic remains more closely resemble lithic assemblages of local hunting stations common throughout the south coast of Vandenberg AFB, as opposed to a more specialized quarry or chert processing. The exact nature of SBa-1686 activities are difficult to determine due to the lack of tools, hearths and faunal remains, distinct occupational zones, and adequate chronological markers including resolvable stratigraphy found at the site.(143)

Additionally, during extension of the runway, resource monitoring activities identified a new historic site and two new paleontological sites.(122) The historic site involved a U.S. Army Occupation site from the late World War II or Korean War Period. A concrete foundation and other small wooden structures built during the 1940's and 1950's were observed, as well as glass and ceramic fragments, and tin cans of this vintage. The two paleontological localities included shale bedding planes yeilding a variety of fossil imprints. The fossils imprints of paleobotanical, invertebrate, and vertebrate types includ fossils of fish, crabs, algae (kelp), and coprolite (fecal)

materials. These finds are not unique, as similar fossil material from the Monterey Formation in this locality is present at numerous, visible sites throughout this region.(72)

APPENDIX E

SUMMARY ASSESSMENT

POINT ARGUELLO BOATHOUSE

APPENDIX E

SUMMARY ASSESSMENT

POINT ARGUELLO BOATHOUSE

E.1 BACKGROUND

A portion of a deactivated Coast Guard Station located approximately three miles (5 km) southeast of Point Arguello is proposed for removal. A boathouse and pier structure will be dismantled and removed to make way for a barge landing dock, capable of receiving the large External Tanks and their transport barge. The Air Force recognizes the unique character of the boathouse, and has initiated a number of st s to mitigate the expected impact of removing this structure. Alternatives to removing the boathouse have been carefully evaluated in coordination with the State Office of Historic Preservation, the Advisory Council on Historic Preservation, and the National Park Service.

Since the publication of the Space Shuttle Final EIS, the deactivated Coast Guard Station has been evaluated in a case study, which documents the alternatives and mitigation measures considered by the Air Force in developing the proposal. Appendices to the case study include a historic report prepared for the public record, and an archival report prepared for the historical American Engineering Record.(97)

The major emphasis of this appendix is the evaluation of alternatives for delivering the External Tanks to Vandenberg. The impacts of the proposed action are discussed, and mitigation measures are outlined that will reduce the severity of unavoidable adverse impacts.

E.2 AFFECTED ENVIRONMENT

The Coast Guard Station at Point Arguello consists of three major buildings: a boathouse, an administration/barracks building, and a garage (refer to Figure E.2-A). The boathouse facility consists of a dock and large storage structure capable of sheltering three boats,

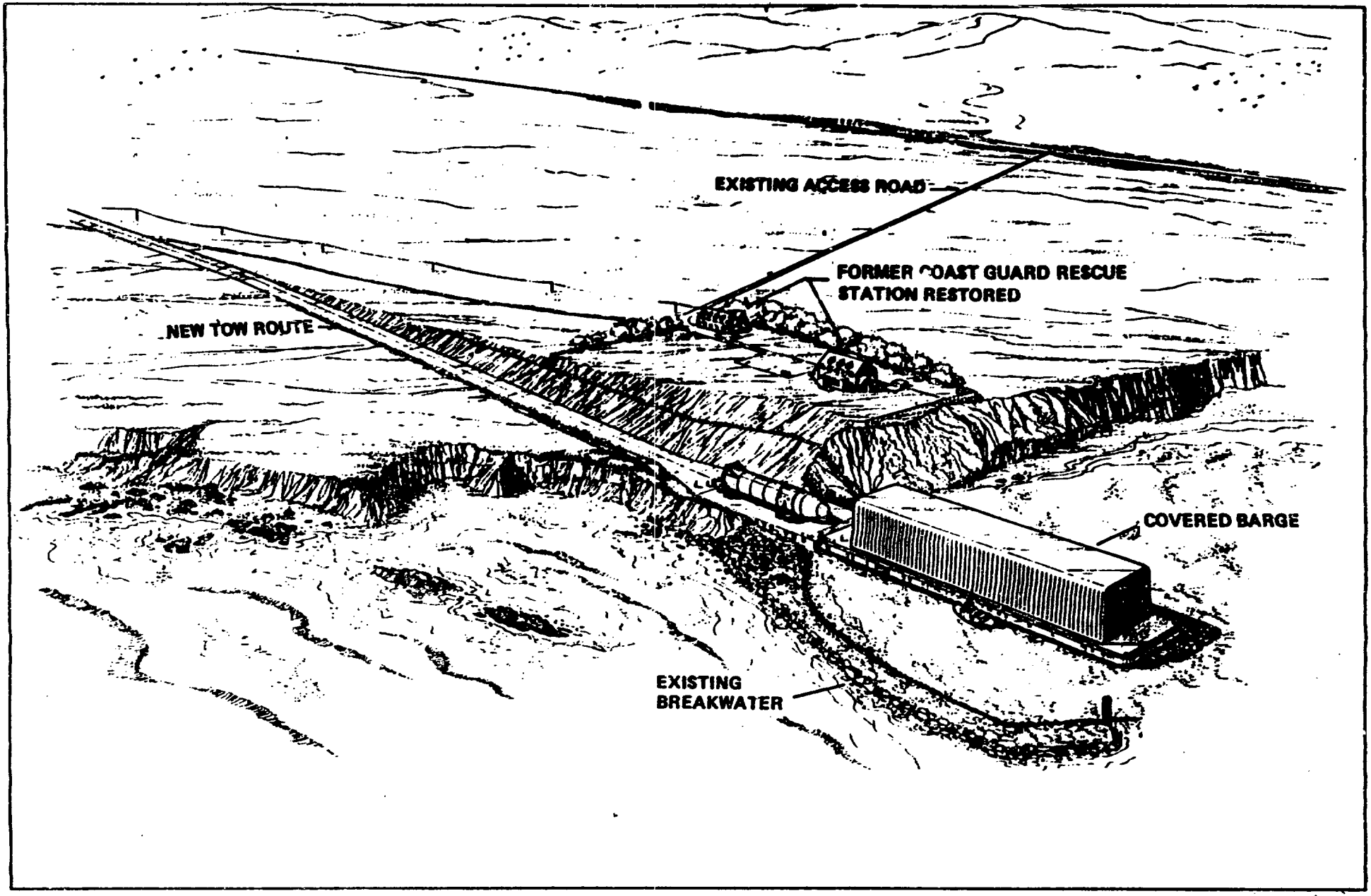


FIGURE E.2–A. ARTIST'S CONCEPTION OF EXTERNAL TANK LANDING FACILITY AT THE POINT ARGUELLO COAST GUARD STATION DURING OPERATIONS.

rails and ramp used for launching and retrieving life boats, and a small pier partially enclosed on the west by an arched, quarry-stone breakwater. On the 50-foot bluff over the boathouse is a two-and-one-half story administration building with an architectural style characteristic of the Colonial-revival of the 1920s. The style is repeated in the design of the one-and-one-half story garage, situated about 50 yards (46 m) north of the administration building. The garage was designed with four overhead doors with space provided for two trucks and two passenger autos. Other miscellaneous structures at the Coast Guard facility include: two open-work metal towers, a helicopter landing pad, a small water treatment building, cold storage building, and various roadways, walkways, fences, and gates.(97)

The Point Arguello Coast Guard Rescue Station was constructed primarily between 1936 and 1938, and was deactivated in 1952. During the 14 years of operation, the facility offered lifesaving services along the dangerous Point Arguello coastline, including brief participation in World War II rescues. In and of themselves, none of the existing buildings at Point Arguello possesses architectural significance. However, as a complex designed in the 1920s Colonial-revival style, the Coast Guard facility establishes a symbolic link to the architectural traditions of the eastern United States, and therefore gains value as an illustration of a federal government interpretation of a style. The entire complex has been declared eligible for inclusion in the National Register of Historic Places based on the facility's historical contribution to understanding California's architecture, the 1920s Colonial revival, and the unique use of rails for launching and retrieving life boats.(97)

Three other Coast Guard rescue stations on the California coast exhibit qualities similar to those of the Point Arguello station. These facilities include: 1) the Coast Guard Facility at Fort Point, near San Francisco, 2) the Point Reyes Life-Saving Station, and 3) the Humboldt Bay Life-Saving Station.

The Fort Point Coast Guard Station was built 20 years before the Point Arguello facility, and the architectural style is not as distinctly

New England as the design at Point Arguello. The Fort Point station includes a boathouse, garage, and barracks, and was originally built to accommodate three large boats, with a railway leading into the surf. However, the railway was dismantled years ago, and the boathouse is not currently in use.

The Life-Saving Station at Point Reyes, about 30 miles (48 km) northwest of San Francisco, was established in 1927. The station consists of well-built, wood frame buildings, including a five-bedroom dwelling, garage, boathouse, and other smaller buildings. A rail-and-ramp system is used for launching and retrieving the life boats from a small dock, which is supported by a wooden pile pier. The Point Reyes Station was deactivated in 1968. It has now become part of the Point Reyes National Seashore, administered by the National Park Service. The National Park Service has nominated the station to the National Register of Historic Places. The station is planned for conversion into a museum with public access; the boathouse facility will be fully restored.

The Coast Guard Station at Humboldt Bay was built in 1936, replacing an old life-saving station erected in 1978. The major architectural features are very similar to those of the Coast Guard Station at Point Arguello--suggesting that both stations were designed by the same architect-engineer. The 25-man crew was housed in the north end of a large multi-purpose facility; the southern portion provided living quarters for the chief officer and his family. A large central bay was used to shelter three life boats, which were drawn along rails into the storage area by a gasoline engine powered winch. Historical significance associated with the Humboldt Bay Station is attributed to its role in life-saving services, especially the Coast Guard beach patrols established during World War II. The Humboldt Bay Station has been nominated for inclusion in the National Register of Historic Places. The entire complex is being renovated to maintain its historical interest and significance.

E.3 ALTERNATIVES INCLUDING THE PROPOSED ACTION

E.3.1 NO ACTION ALTERNATIVE

The alternative of no action at Vandenberg AFB would eliminate all impacts to environmental and cultural resources. This alternative has been evaluated and discussed in Section 6.1 of the Space Shuttle Final EIS.

E.3.2 PROPOSED ACTION

The FEIS discussion of alternatives includes an analysis of most of the External Tank delivery alternatives. Each alternative was re-evaluated in the case study document in terms of meeting engineering constraints, minimizing environmental impacts, and reducing necessary expenditures. Table E.3.2-1 summarizes these concerns for each of ten major alternatives and their suboptions. Consideration of these and other factors led to the selection of Alternative 10c as the proposed action. This involves direct delivery of ETs to the boathouse area by shallow-draft barge, with the complete removal of the boathouse.

Under the proposed action, four ETs would be delivered to Vandenberg with each shipment on a ballasted, tug-towed barge capable of deballasting to a shallow-draft configuration. Accompanying tug boats would then maneuver the barge into the small harbor and position it over a special above-water ledge built into the dock (Figure E.2-A). The barge would take on water until the bow rested firmly on the dock ledge. The ETs would then be towed from the barge directly to the ET Storage and Checkout Facility.

With the aim of mitigating adverse impacts of developing an ET Landing Facility in the vicinity of the boathouse, three suboptions were recently examined in the planning process. Major emphasis was placed on reducing the impact of removing the boathouse on the historical significance of the Coast Guard Station. The three suboptions include: a) locating the harbor eastward of the boathouse to avoid the historical structure, b) dismantling and reconstructing the boathouse to the east of its present site, and c) removing the

Table E.3.2-1 SUMMARY COMPARISON OF ALTERNATIVES FOR DELIVERY OF EXTERNAL TANKS

ALTERNATIVE	ENGINEERING CONSTRAINTS	ENVIRONMENTAL IMPACTS	COST[a]
1. Delivery Vehicles Other than Waterborne	Must realign roads or railways; modify carrier aircraft; ETs would not survive delivery atop 747	Considerable terrestrial impacts from realignment of roads or railways; no significant impacts from air delivery	Very high; no details available
2. Onsite ET Fabrication	Reproduce extensive ET assembly facility; low risks to ETs	Terrestrial and air quality impacts from construction and operation of large-scale facility	Very high; no details available
3. Delivery to Port San Luis; Overland Transport to VAFB	Construct new harbor at Port San Luis; realign route to VAFB; increased risk to ETs	Impacts to marine environment from new harbor; terrestrial impacts from route realignment; traffic congestion	$ 29.9[b]
4. Delivery to Cojo Bay; Overland Transport to VAFB	Construct new harbor at Cojo Bay; clear rail route; acquisition of private land may delay project; increased risk to ETs	Impacts to marine environment from new harbor; terrestrial impacts from route modifications	$ 38.4[b]
5. [illegible] Transfer to VAFB	Concepts are unproven and would require an unknown amount of development; risks to ETs are high	Minimal environmental impacts; no major facilities required	
a) [illegible] crane			$ 33.8[b]
b) By [illegible]-Stat			$ 35.8[b]
c) By Heavy-Lift Helicopter			$201.7[c]
6. Direct Delivery by Deep-Draft Barge to VAFB	Construct new deep-draft harbor; provide access to road; potential operational risk in delivery delay; risk to ETs minimized	Marine impacts from construction and existence of harbor;	
a) At Ocean Beach		a) terrestrial, endangered species impacts	$ 58.5[b]
b) At Point Arguello Boathouse		b) terrestrial and historical impacts	$ 36.0
7. Delivery to Port Hueneme; Hovercraft Transport to VAFB	Provide for interim storage at Port Hueneme; construct hovercraft landing facility; increased risk to ETs	Potential archaeological and terrestrial impacts in vicinity of landing facility; aesthetic impact	$ 20.7
8. Direct Delivery to VAFB by Air Cushion Barge	Construct ACB landing facility at Ocean Beach; risk to ET minimized	Nearshore impacts to terrestrial and archaeological resources; impact on shoreline aesthetics	$ 19.7
9. Delivery to Port Hueneme; Shallow Draft Barge to VAFB	Provide for interim storage at Port Hueneme; construct new shallow-draft harbor; increased risk to ETs	Minimal marine impacts from construction and existence of harbor;	
a) At Ocean Beach		a) terrestrial, endangered species impacts	$ 50.4
b) At Point Arguello Boathouse		b) terrestrial, historical impacts	$ 24.8
10. Direct Delivery to Point Arguello Boathouse by Shallow-Draft Barge	Construct new shallow-draft harbor; provide access road; risks to ETs minimized	Minimal marine impacts from construction and existence of harbor under all sub-options; terrestrial impacts;	
a) Locate Harbor East of Boathouse		a) new cut in pristine cliff required; potential archaeological impact	$ 9.2
b) Move Boathouse Eastward		b) minor additional impacts to nearshore marine environment	$ 9.8
c) Remove Boathouse		c) minor impacts to historical significance of site, mitigated through documentation	$ 9.0

[a]Reported in millions of 1980 dollars.

[b]Based on partial life-cycle costs, which exclude maintenance.

[c]The Army Engineering Development Program would require millions of additional dollars to support this concept.

boathouse and substantiating its historical significance through archival documentation.

Locating the new harbor to the east of the boathouse under suboption a would leave the boathouse untouched, but would also require a more substantial cut in the 50 feet (15 m) bluff behind the harbor to make way for an access road. The bluff in this vicinity remains undefiled, whereas the bluff directly behind the boathouse currently shows the impacts of erosion caused by construction of the narrow access road. A new and extensive cut in these cliffs would significantly impact the visual aesthetics of the shoreline and may endanger unknown archaeological sites found on the bluffs. An extension of the breakwater is also necessary for safe operation of the barges in the harbor facility. Additional dredging and blasting required to deepen the harbor and construction of a new dock would alter the existing marine habitat, especially the biologically productive reef area located east of the embayment.

Suboption b would relocate the boathouse 80 feet east of its present site to make way for the new harbor, thereby preserving the architecture of the boathouse structure and confining new construction to a locality that has already suffered from man's influence. However, this alternative could lead to a loss of the site's historical and architectural integrity. The impacts on the marine environment would be slightly less than those for the suboption a since no extension of the existing breakwater would be required. The impacts on terrestrial ecosystems would be the same in either.

Suboption c (the proposed action) is similar to b above with the exception that the boathouse would be simply dismantled and removed. The adverse impact to the historical and architectural significance of the Coast Guard Station would be mitigated through the documentation of engineering drawings of the complex, photos, and a historical report for general public interest. The environmental impacts of this suboption would be less than those of the suboptions a and b. The areas to be directly impacted are less rich ecologically than the areas nearby. Moreover, the project site has already undergone some

modification by construction of the pier and breakwater in the 1930s.

The total life-cycle costs of the three suboptions under Alternative 10 have been estimated to be:

Suboption a:	13.7 million
Suboption b:	9.8 million
Suboption c:	8.8 million

Because of lower overall costs and a minimum of environmental impact, the Air Force proposes to adopt suboption c--removal of the boathouse--as the proposed plan for ET delivery.

E.3.3 IMPACTS OF THE PROPOSED ACTION

The impact of primary concern to this study is the loss of the boathouse and pier structures as they relate to the historical significance of the Point Arguello Coast Guard Station. The station has been declared eligible for nomination to the National Register of Historic Places based upon the site's:

(1) Historical contribution to understanding California architecture;

(2) Representation of architecture within the federal style of the 1930s; and

(3) Contribution of historic engineering features (rails for boat launch and retrieval).

The removal of the boathouse would disrupt the historical and architectural integrity of the station and could lead to a loss of the site's overall character. Mitigation measures have been proposed and are discussed in a following section.

Other environmental impacts are expected from the proposed action, including adverse effects to the intertidal and shallow subtidal areas within the boathouse embayment. Increased human activity may harass harbor seals that occasionally use the vicinity as a hauling out area.

The visual impact of the proposed cut in the bluff for road access will degrade the pristine visual aspect of the site, though to a lesser extent than if the cut was made in a previously untouched portion of the scenic bluffs. Construction and operations will interfere with current recreational use of the area, which is managed on a restricted basis by Vandenberg AFB. Additonal impacts associated with constructing the transport route between the harbor and the ET storage site would also occur.

Other impacts are of minimal significance, as discussed in Section 2.5 of the Supplement. These include impacts to soils, water quality, air quality, archaeology, terrestrial flora and fauna, and noise.

E.4 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Construction of an ET Landing Facility at the Point Arguello Coast Guard Station will require the removal of the unused boathouse. The historical integrity of the station would be jeopardized and the overall character of the site would be impacted. Additional impacts to subtidal biology and visual aesthetics would result from the proposed action.

E.5 MITIGATION EFFORTS

A number of mitigation measures have been designed to alleviate or minimize the severity of the adverse impacts of the proposed action. In April 1979, mitigation measures were reviewed with recommendations from the State Office of Historic Preservation, the National Park Service, and the Heritage Conservation and Recreation Service. These measures include:

(1) Preparation of archival documentation consisting of a historical report and various photographs, and architectural and engineering drawings of the complex; such documentation will comply with standards established by the Historical American Building Survey (HABS) and the Historical American Engineering Record (HAER).

(2) Salvage and storage of appropriate hardware (marine railroad, launching railroad car, and launching winch and motor) for later historical and museum reuse. These items will be stored for two years on Vandenberg Air Force Base while their availability is being advertised.

(3) Preparation of a historical report written for the layman covering items of general public interest concerning the boathouse at Point Arguello.

(4) Transference of one boat carriage from the Point Arguello Boathouse to the Point Reyes Life Saving Station in Marin County, which is being restored as a museum.

(5) Because the architectural integrity of the buildings has not been modified, the restoration work consists mainly of painting and repairing or replacing certain architectural elements as well as routine facility maintenance. The restoration to be accomplished is briefly described as follows:

(a) Remove, replace existing gutters at Building 302.

(b) Restore and paint all interior walls, ceiling and trim at Building 302.

(c) Restore and paint exterior walls and trim at Buildings 302, 304, 305, and 306.

(d) Remove, replace all broken glass in Buildings 302 and 304.

(e) Repair and paint existing shutters on Building 302 and 304.

(f) Minor repair in Building 302:

(1) Interior plumbing to include fixtures.

(2) Interior flooring to include moldings.

(3) Interior electrical to include fixtures.

(4) Exterior sidewalks on site.

(g) Sheet rock attic spaces in Building 302.

(h) Repair and paint perimeter fence.

(i) Landscape to retain aesthetic values as necessary.

The restoration work is scheduled for 1982.

A Memorandum of Agreement (Figure E.5-A) specifies action to satisfactorily mitigate adverse impacts on the affected property.(109) Participants in the agreement include the Heritage Conservation and Recreation Service, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation.

Advisory Council On Historic Preservation

1522 K Street, NW
Washington, DC 20005

MEMORANDUM OF AGREEMENT

WHEREAS, Space Division, the United State Air Force Systems Command, Department of Defense, proposes to construct an External Tank Landing Facility associated with the proposed Space Shuttle construction, Vandenberg Air Force Base, California; and,

WHEREAS, the Air Force, in consultation with the California State Historic Preservation Officer (SHPO), has determined that this undertaking may have an adverse effect on the U.S. Coast Guard Rescue Station and Lookout Tower, Point Arguello, California, a property eligible for the National Register of Historic Places; and,

WHEREAS, pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320), Section 2(b) of Executive Order 11593, "Protection and Enhancement of the Cultural Environment," the Air Force has requested the comments of the Advisory Council on Historic Preservation (Council) in accordance with the Council's regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800); and,

WHEREAS, representatives of the Council, the Air Force, and the California SHPO have consulted and reviewed the undertaking to consider feasible and prudent alternatives to avoid or satisfactorily mitigate the adverse effect; and,

WHEREAS, the Interagency Archeological Services-San Francisco, Heritage Conservation and Recreation Services, Department of the Interior, was invited and participated in the consultation process;

NOW, THEREFORE, it is mutually agreed that the undertaking will be implemented in accordance with the following stipulations to mitigate the adverse effects.

Stipulations

The Air Force will ensure that the following measures are carried out.

1. The Air Force will select, in consultation with the California SHPO and representatives of the National Park Service, one boat carriage from the boathouse, U.S. Coast Guard Rescue Station and Lookout Tower, and transfer it to the Point Reyes Life Saving Station, Marin County, California, where it will be displayed in that facility which is being restored as a museum by the National Park Service.

2. The Air Force will ensure that an historical report, covering items associated with the history and use of the facility that are of general public interest, will be completed in consultation with the California SHPO. This report will be made available to the public through its distribution to local and regional libraries. A copy of the report will also be submitted to the National Technical Information Service (5285 Port Royal Road, Springfield, Virginia 22161).

FIGURE E.5–A MEMORANDUM OF AGREEMENT CONCERNING THE POINT ARGUELLO BOATHOUSE, 1980

3. Prior to the demolition of the boathouse and dock, the California SHPO, or his designee, will be given a reasonable opportunity to select architectural elements from these structures for curation and use in other projects. The Air Force will be responsible for ensuring the careful removal of these elements and will deliver them without cost to the California SHPO or his designee.

4. Prior to the demolition of the boathouse and dock, the Air Force will select and salvage, in consultation with the California SHPO, the mechanical accessories of the boathouse and dock (e.g., marine railroad, launching railroad car, and launching winch and motor). These will be curated by the Air Force for historical and museum use while their availability for dispostion are advertised.

5. Prior to demolition of the boathouse and dock the Air Force will record these structures so that there will be a permanent record of their history and present appearance. The Air Force will first contact the National Architectural and Engineering Record (NAER) (Heritage Conservation and Recreation Service, Department of the Interior, Washington D.C. 20234; (202) 343-6217) to determine what documentation is required. All documentation must be accepted, in writing, by NAER, and the Council in receipt of a copy of the acceptance, prior to demolition. The Air Force will also provide copies of this documentation to the California SHPO.

6. The Air Force will ensure that, in consultation with the California SHPO, all modifications, rehabilitation, or restoration of the remaining structures of the Coast Guard Station and Lookout Tower are carried out in accordance with the Secretary of the Interior's "Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings (Attachment I). Prior to alteration, final plans and specifications for modification must be approved in writing by the California SHPO; copies of which will be provided to the Council by the Air Force.

Robert Barrey Oct 3, 1980
Executive Director (date)
Advisory Council on Historic Preservation

Robert L. Ruck 10 Oct 80
ROBERT L. RUCK, Colonel, USAF
Commander, 4392 Aerospace Support Group

10 Oct 80
U.S. Air Force, Colonel (date)
Space Division, Director of Civil Engineering

10/24/80
California State Historic (date)
Preservation Officer

12/8/80
Chairman (date)
Advisory Council on Historic Preservation

FIGURE E.5–A CONTINUED

APPENDIX F

SUMMARY ASSESSMENT

SONIC BOOM IMPACT

APPENDIX F
SUMMARY ASSESSMENT
SONIC BOOM IMPACT

F.1 BACKGROUND

The return of the Orbiter vehicle to earth and certain Shuttle launches are expected to produce sonic booms over some of the Northern Channel Islands, particularly San Miguel Island. At the time of publication of the FEIS, it was recognized that the available evidence was insufficient to adequately predict the impact of these sonic booms on potentially sensitive features of the natural environment of the Northern Channel Islands. The principal areas of concern were:

(1) Effects on marine mammals, including auditory damage, non-auditory physiological damage, and behavioral effects (startling of large groups of pinnipeds could cause stampedes to the water and, during pupping season, trampling or displacement of pups).

(2) Effects on seabirds, including physiological effects on adults or eggs, crushing of eggs, and behavioral effects (startled adults could crush eggs when leaving the nest; eggs left untended could be subject to predation). Of particular concern was the brown pelican, an endangered species whose only western U.S. nesting areas are on Anacapa Island, Santa Barbara Island, and Scorpion Rock, Santa Cruz Island.

(3) Effects on the peregrine falcon, an endangered species, which has been sighted on San Miguel Island.

(4) Effects on sensitive geological features, including caliche (carbonate deposits) forests and the burrows of some seabirds.

In response to these concerns, the Air Force contracted with the Center for Regional Environmental Studies, San Diego State University (SDSU), to further define the problem and to conduct the necessary studies to assess the potential of Shuttle-generated sonic booms for impacting marine resources. Their results are presented in the following reports, published by the Center for Marine Studies, San Diego State University.

Historic and Current Disturbances to the Natural Resources of San Miguel Island.
James R. Holbrook, Hubbs/Sea World Research Institute

Geologic Hazards from Space Shuttle Sonic Booms.
Donald Johnson, University of Illinois and Santa Barbara Museum of Natural History

Peregrine Falcon: Status on the Channel Islands, 1979-1980.
Joseph E. Jehl, Jr., Hubbs/Sea World Research Institute

Seasonal Abundance and Distribution of Pinnipeds on San Miguel Island, California.
Brent Stewart, Hubbs/Sea World Research Institute

Disturbances to Pinnipeds and Birds on San Miguel Island During 1979 and 1980.
Ann Bowles, Hubbs/Sea World Research Institute and Scripps Institute of Oceanography; and Brent Stewart, Hubbs/Sea World Research Institute

Effects on Impulse Noise on the Seabirds of the Channel Islands, California.
Elizabeth A. Schreiber and Ralph W. Schreiber, Los Angeles County Museum of Natural History

Effects of Sonic Booms on Reproductive Performance of Marine Birds: Experimental Studies on Domestic Fowl as Analogues.
Edward Cogger and E.G. Zegarra, California State Polytechnic University, Pomona

Possible Effects of Space Shuttle Sonic Booms on Physiology of Channel Island Marine Mammals.
Mark. A. Chappell, University of California, Los Angeles

Baseline acoustical Measurements on San Miguel Island, March 1979-March 1980.
Frank Awbrey, SDSU

Synthesis Volume: Expected Population Effects of Sonic Booms on Channel Islands Fauna.
Charles F. Cooper, SDSU; Joseph E. Jehl, Jr., Hubbs/Sea World Research Institute

Studies on the Pinnipeds of the Southern California Channel Island, 1980-1981. Brent S. Stewart, Hubbs-Sea World Research Instutite.

The Perils of Success: Implications of Increasing Marine Mammal Populations in the Southern California Bight. Charles F. Cooper, SDSU; Brent S. Stewart, Hubbs-Sea World Research Institute. Presented at the Ocean Study Project Symposium, November 7-10, 1982.

The findings of these reports and other relevant evidence are used in the following assessment.

F.2 AFFECTED ENVIRONMENT

F.2.1. INTRODUCTION

The Northern Channel Islands are the above-surface projections of a western, largely submarine extension of the Santa Monica Mountains. The four islands (also called the Santa Barbara Channel Islands), are, from west to east, San Miguel, Santa Rosa, Santa Cruz, and Anacapa (Figure F.2.1-A). These islands lie between 11 and 28 miles (17 and 45 km) from the mainland and together comprise approximately 200 square miles (518 sq km) of land. Santa Cruz Island and Santa Rosa Island are the largest and second largest, respectively, of all the California Channel Islands. These two islands exhibit considerable topographic relief, while the two smaller islands, San Miguel and Anacapa, are relatively flat.

In May 1980, San Miguel, Santa Rosa, Santa Barbara, Anacapa, and approximately 10 percent of Santa Cruz Island were designated as the Channel Islands a National Park. In September 1980, the area six nautical miles (11 km) surrounding San Miguel, Santa Rosa, Anacapa, Santa Cruz, and Santa Barbara Islands was designated as a National Marine Sanctuary, administered by NOAA. Prior to this, San Miguel Island was controlled by the U.S. Navy and managed by the U.S. National Park Service; the island was used for sheep ranging from the mid-1890s to the 1920s. Santa Rosa Island, now designated for acquisition from private owners, has long been used as a cattle ranch. Much of Santa Cruz Island is still used for cattle ranching.

The Nature Conservancy owns approximately 90 percent of Santa Cruz Island, and the remaining 10 percent will be acquired as National Park land. Before its inclusion in the National Park, Anacapa Island constituted, along with Santa Barbara Island, the Channel Islands National Monument.

F.2.2 SIGNIFICANT RESOURCES

The Northern Channel Islands mark the southern breeding limit of some northern cold-temperate species of marine mammals and seabirds and the northern limit of some southern warm-temperate species. This results in a diverse assemblage of these animals on the islands.

F.2.2.1 Marine Mammals

F.2.2.1.1 Pinnipeds (Seals and Sea Lions)

Approximately 75 percent of the estimated 74,000 seals and sea lions which occur in the Southern California Bight spend at least part of the year in the Northern Channel Islands, primarily at San Miguel Island (Table F.2.2.1.1-1).

Six pinniped species occur in these islands, which are the northern limit of the Guadalupe fur seal and the southern limit of the Northern fur seal and the Steller sea lion. All of the islands are used by pinnipeds for some purposes, but most of the breeding and pupping occurs on San Miguel (Table F.2.2.1.1-2). At some places on this island (Point Bennett, for example), the rookery areas of all five breeding species (the Guadalupe fur seal does not breed in the Channel Islands) are virtually side by side. Figure F.2.2.1.1-A shows the location of the pinniped rookeries of San Miguel Island.

The populations of most of these pinnipeds were severely depleted by hunting in the latter part of the nineteenth century, but more recent has permitted recovery by some. For example, the Northern elephant seal has increased in abundance from about 20 individuals in 1892 to

approximately 75,000 worldwide in 1980.[36,151] This is currently the second most abundant pinniped in the Southern California Bight. In fact, this species has become so abundant that an abrupt leveling off in population size is expected in the near future.[36, 151]

The San Miguel Island population is increasing exponentially, and the California sea lion, the most abundant pinniped in the Southern California Bight, is also increasing in abundance.[37] The Southern California harbor seal population is also growing.[37]

Pupping seasons for these pinnipeds range from mid-December for the Northern elephant seal to early August for the Northern fur seal, and there are few periods during this span of time when some pinniped reproductive activity does not occur:[51,144,155]

California Sea Lion	May 20 - August 1
Steller Sea Lion	May 20 - August 1
Northern Elephant Seal	December 20 - February 20
Harbor Seal	February 26 - May 1
Northern Fur Seal	May 20 - August 1

Because of their present or recent low population levels, the pupping periods of the Northern elephant seal (December 20 through February 20), and of the Northern fur seal and Steller sea lion (May 20 through August 1), have generally been considered the most sensitive.[38,54,162] The latter period, which also includes most of the pupping time of the California sea lion should probably still be considered sensitive. Due to the current very healthy and expanding population of the Northern elephant seal, however, disturbances of this species during pupping would not adversely affect the population. The pupping period of the Northern elephant seal, therefore, probably does not warrant sensitive status. Similarly, the pupping period of the harbor seal should probably not be considered sensitive, due to its relatively large and growing population, although this species is known to be more easily distributed than some other pinniped species.

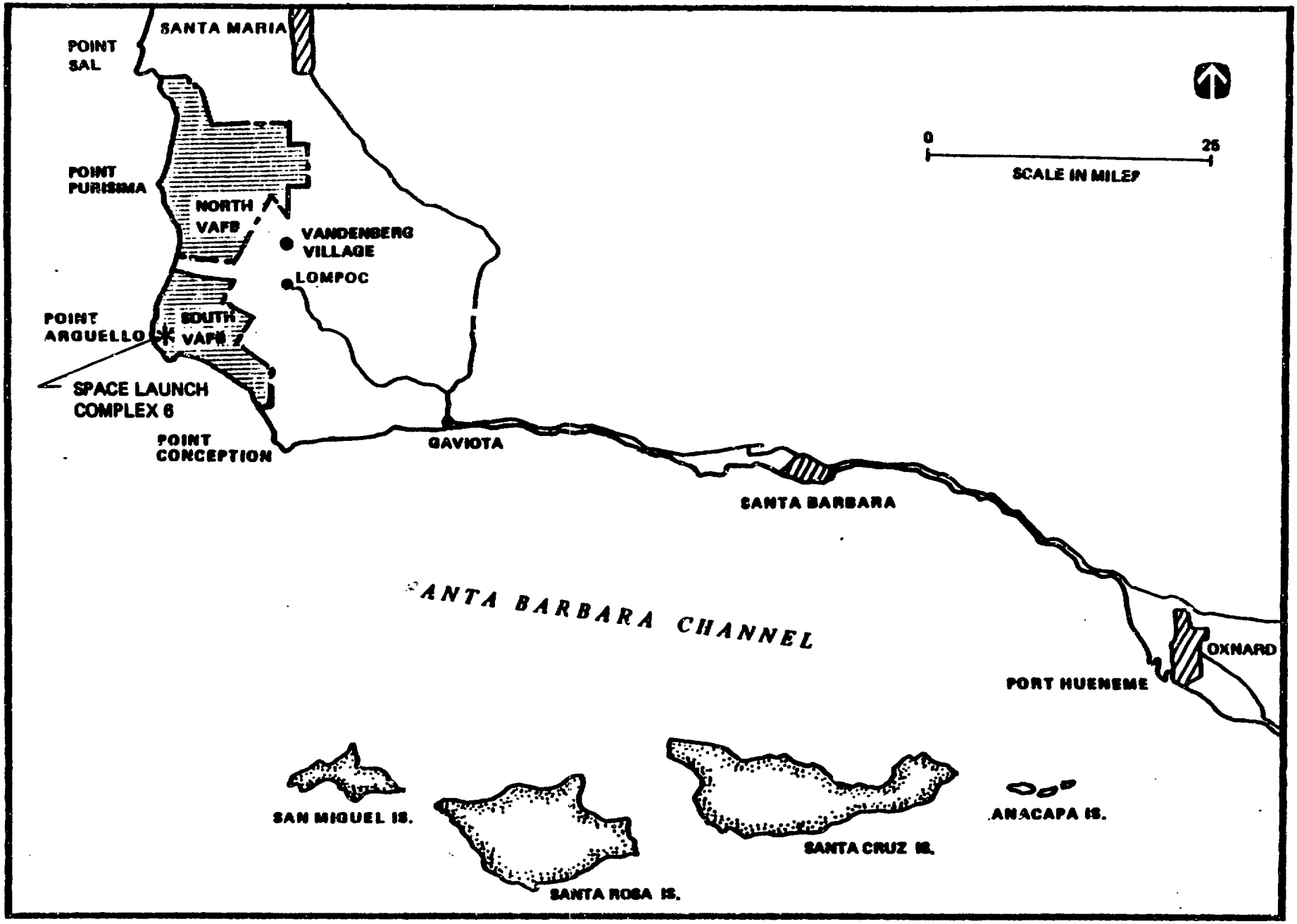


FIGURE F.2.1–A VICINITY MAP SHOWING RELATIONSHIP OF NORTHERN CHANNEL ISLANDS TO VANDENBERG AFB

Table F.2.2.1.1.-1 ABUNDANCE, BY SPECIES OF PINNIPEDS IN THE SOUTHERN CALIFORNIA BIGHT AND SAN MIGUEL ISLAND

Species	World	Southern California Bight	San Miguel Island (Breeding Season)
California Sea Lion *Zalophus californianus*	125,000	44,000	18,000
Steller (Northern) Sea Lion *Eumetopias jubata*	250,000*	5-20	7
Northern Elephant Seal *Mirounga angustirostris*	5,000	28,000	23,000
Harbor Seal *Phoca vitulina*	100,000*	3,000	780
Northern Fur Seal *Callorhinus ursinus*	1,765,000	3,000	3,000
Guadalupe (Southern) Fur Seal *Arctocephalus townsendi*	2,000	1-5	1
TOTAL	2,317,000*	78,000	44,788

* Approximate

Sources: University of California, Santa Cruz, 1979(204); Evans, et. al., 1979(54); U.S. NOAA, 1980(201); Stewart, 1980(151).

Table F. 2.2.1.1-2 PINNIPED ROOKERY AND HAULOUT AREAS OF THE NORTHERN CHANNEL ISLANDS

LOCATION	SPECIES PRESENT	ACTIVITY
Richardson Rock (San Miguel Island)	California sea lion	Breeding-pupping*
	Northern fur seal	Breeding-pupping
Castle Rock (San Miguel Island)	California sea lion	Breeding-pupping
	Northern fur seal	Breeding-pupping
	Steller sea lion	Breeding-pupping*
Point Bennett Rock (San Miguel Island)	Guadalupe fur seal	Haulout only
Point Bennett-Adams Cove (San Miguel Island)	Northern fur seal	Breeding-pupping
	California sea lion	Breeding-pupping
	Northern elephant seal	Breeding-pupping
Otter Harbor-Otter Point (San Miguel Island)	Harbor Seal	Breeding-pupping
	Northern elephant seal	Breeding-pupping
Northwest Point-West Cove (San Miguel Island)	California sea lion	Breeding-pupping
	Northern elephant seal	Breeding-pupping
	Steller sea lion	Breeding-pupping
Landing Cove (San Miguel Island)	Northern elephant seal	Breeding-pupping
	Harbor seal	Haulout only
Judith Rock-Tyler Bight (San Miguel Island)	Northern elephant seal	Breeding-pupping
	Harbor seal	Haulout only
Elephant Seal Beach-Crook Point (San Miguel Island)	Northern elephant seal	Breeding-pupping
	Harbor seal	Breeding-pupping
Cardwell Point (San Miguel Island)	Harbor seal	Breeding-pupping
	Northern elephant seal	Breeding-pupping
Nichols Point-Hoffman Point (San Miguel Island)	Harbor seal	Breeding-pupping
Harris Point (San Miguel Island)	Harbor seal	Breeding-pupping
Sandy Point-Blockhouse Beach (Santa Rosa Island)	Harbor seal	Breeding-pupping
Beachers Bay (Santa Rosa Island)	California sea lion	Breeding-pupping*
Fraser Point (Santa Cruz Island)	California sea lion	Breeding-pupping*
Arch Rock East (Santa Cruz Island)	Harbor seal	Breeding-pupping
Scorpion Anchorage (Santa Cruz Island)	Harbor seal	Breeding-pupping
Kinton Point South/Horse Point (Santa Cruz Island)	Harbor seal	Breeding-pupping
Gull Island (Santa Cruz Island)	California sea lion	Breeding-pupping*
	Harbor seal	Breeding
Anacapa Island	California sea lion	Breeding-pupping*
	Harbor seal	Breeding-pupping

* The use of these areas as rookeries by California sea lion is only speculative; however, all are definitely used as haulout areas.

Sources: University of California, Santa Cruz, 1979[204]; U.S. NOAA, 1980 (201); Stewart, 1980 (151).

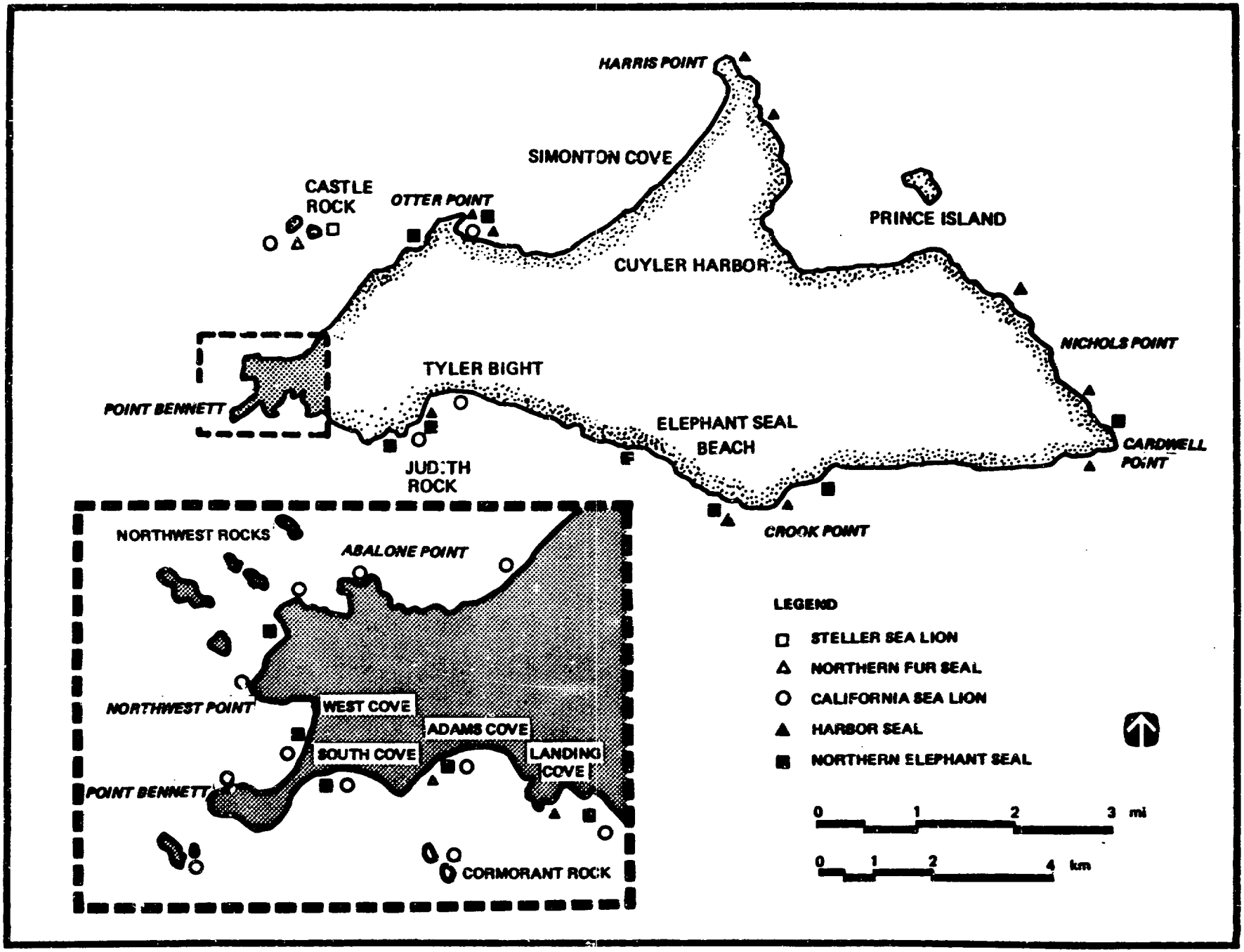


FIGURE F.2.2.1.1 - A LOCATION OF PINNIPED ROOKERIES ON SAN MIGUEL ISLAND

F.2.2.1.2 Cetaceans (Whales and Dolphins)

The cetaceans most frequently sighted in the Southern California Bight and the vicinity of the Northern Channel Islands are:

Common dolphin	Delphinus delphis
Pacific bottlenose dolphin	Tursiops gilli
White-sided dolphin	Lagenorhynchus obliquidens
Northern right whale dolphin	Lissodelphis borealis
Pacific pilot whale	Globicephala scammoni
California gray whale	Eschrichtius robustus

These species are either transient or migratory (gray whale) in the area and make no direct use of the islands themselves. See F.2.2.3.3 Endangered Species, Gray Whale, below.

F.2.2.2 Seabirds

The Southern California Bight supports a diverse seabird fauna, and the Northern Channel Islands are one of the most important seabird areas, both for nesting and for feeding, on the West Coast of the U.S. Nine species nest in the islands (Table F.2.2.2-1).

San Miguel is by far the most important of the islands as a seabird rookery. The second largest world colony of the ashy storm petrel is found on San Miguel Island, as are the majority of the Channel Islands' nesting populations of the double-crested cormorant, Brandt's cormorant, pelagic cormorant, pigeon guillemot, and Cassin's auklet.(201) Figure F.2.2.2-A shows the location of major seabird rookery areas on San Miguel Island.

The most common burrow-nesting bird on the Northern Channel Islands is Cassin's auklet, although other alcids such as pigeon guillemot and Xantu's murrelet often nest in burrows. All three species nest in cracks and crevices as well. The total Cassin's auklet population is estimated at 105,000 pairs; approximately 10,000 pairs nest on San Miguel Island.(140) Auklet burrows are often built in loose soil and

Table F.2.2.2-1 KNOWN MARINE BIRD COLONIES LOCATED ON THE NORTHERN CHANNEL ISLANDS AND ESTIMATED POPULATIONS 1975-76.

SPECIES	LOCATION						
	San Miguel Island	Prince Island (S.Mig.Is.)	Castle Rock (S.Mig.Is.)	Santa Rosa Island	Gull Is. (Santa Cruz Is.)	Scorpion Rock (Santa Cruz Is.)	Anacapa Island
Western gull *Laurus occidentalis*	-	1,200	-	-	62	200	200 - 6,000
Brandt's cormorant *Phalocrocorax penicillatus*	84	1,720	432	400	46	-	2
Double-crested cormorant *Phalocrocorax auritus*	-	40-80	-	-	-	-	-
Pelagic cormorant *Phalacrocorax pelagicus*	62	100	30	10	34	-	2
Pigeon guillemot *Cepphus columba*	280	400	80	100	-	-	8
Cassin's auklet *Ptychoramphus aleutica*	-	20,000	n/a	-	138	-	-
Xantu's murrelet *Endomychura hypoleuca*	-	-	50	-	-	-	2
Ashy storm petrel *Oceanodroma melania*	-	n/a	-	-	-	-	-
Brown pelican *Pelecanus occidentalis*	-	-	-	-	-	80	2,600 (1980)

Sources: University of California, Santa Cruz, 1979[204]; NOAA, 1980[201]; California Department of Fish and Game[91].

n/a: data not available.

commonly collapse due to natural causes. These birds are adapted to this condition and usually re-excavate burrows quickly.

F.2.2.3 Endangered Species

F.2.2.3.1 Brown Pelican (Pelecanus occidentalis)

For several years the only western U.S. nesting place of the brown pelican was Anacapa Island. This population has grown steadily, from 76 nesting pairs in 1977 to 1300-1400 nesting pairs in 1980.(91) In the last few years pelicans have also started nesting on Santa Barbara Island and on Scorpion Rock, near the eastern end of Santa Cruz Island. About 40 pairs currently nest there.(201) The nesting period of the brown pelican varies from year to year depending on the seasonal abundance of fish and other factors, but usually starts after the first of March and ends before the end of July. This March through July period also encompasses the nesting time of most of the other seabirds in the Northern Channel Islands.

F.2.2.3.2 Peregrine Falcon (Falco peregrinus)

The peregrine falcon previously nested on all of the Northern Channel Islands. Depletion of this species' population has been severe and widespread in the United States; no breeding adults have been seen in the islands since at least 1949. All of the Northern Channel Islands and especially San Miguel (considered most likely to be recolonized), were surveyed extensively for the presence of this species.(88) No nesting birds or evidence of current nesting were found. A few peregrines migrate through the islands each year, and one or two overwintered 1978-1979 and 1979-1980 on San Miguel Island. The likelihood of recolonization of the islands is not known.

F.2.2.3.3 Gray Whale (Eschrictius robustus)

The gray whale, believed near extinction for many years, has shown strong population recovery under protection. The size of the eastern

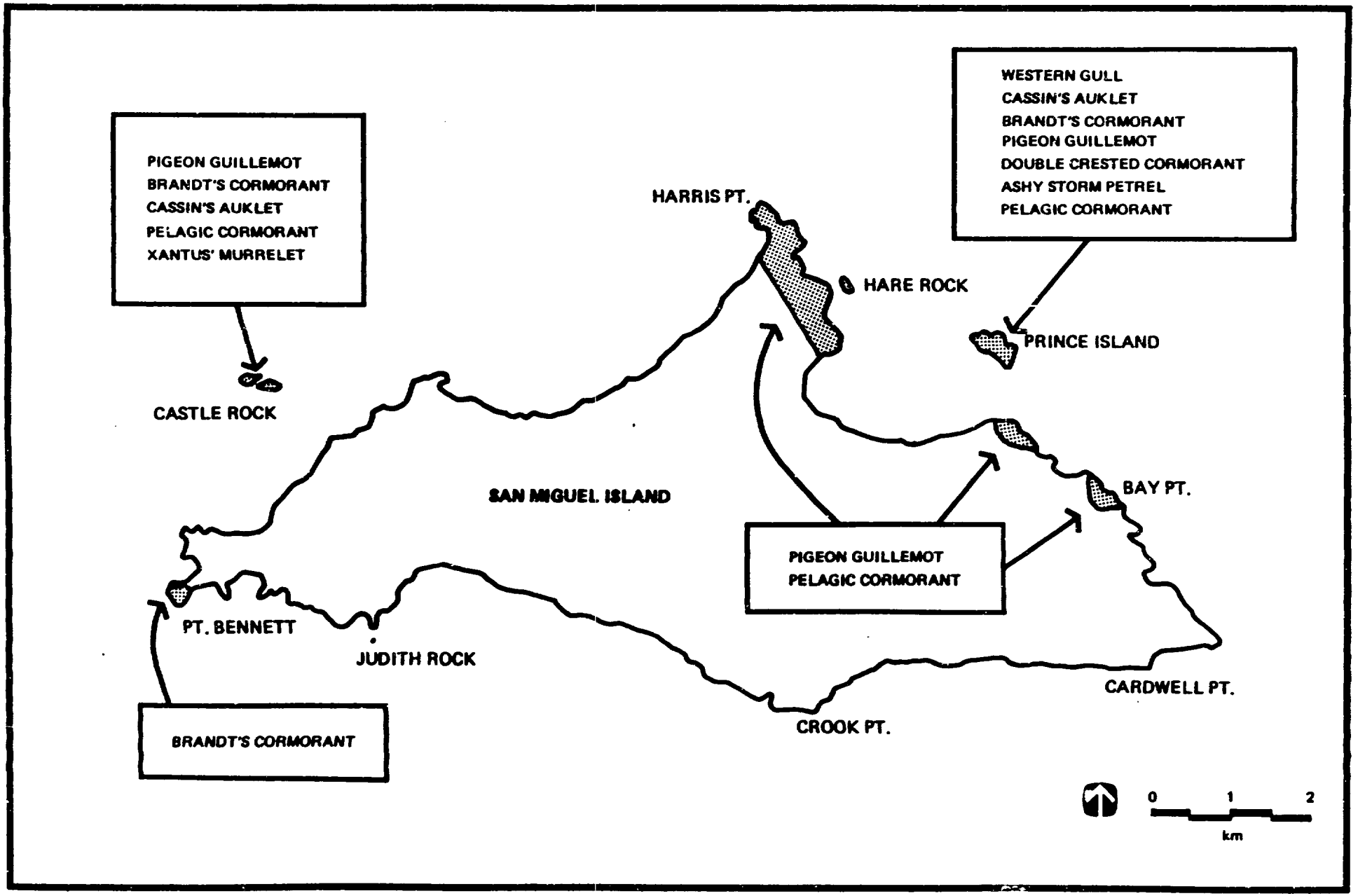


FIGURE F.2.2.2 – A LOCATIONS OF PRINCIPAL SEABIRD COLONIES ON AND NEAR SAN MIGUEL ISLAND

Pacific population is currently believed to be 11,000-18,000.[195] Most of these animals migrate through the Southern California Bight twice a year, between summering areas off Alaska and Canada and wintering areas in the lagoons of Baja California, where most births occur.

F.2.2.4 Geology

There are three geological features of the Channel Islands that could potentially be affected by Shuttle sonic booms:

(1) Landslides and rockfalls
(2) Caliche plant fossils
(3) Bird burrows

Landslides and other mass movements of soil and rocks are frequent in certain areas of San Miguel Island.[38]

Caliche plant fossils, also called rhizoconcretions, are an important scientific and aesthetic resource. They number in the tens of thousands and cover approximately 1,000 acres (400 ha) (or about 10%) of San Miguel Island, the only Channel Island on which they occur.[52] One site of approximately 500 acres (200 ha) is one of the largest in the U.S. These fossils range in size from pencil-sized and a few inches (cm) high to 2.5 feet (0.75 m) in diameter and 8 feet (2.5 m) high. Some of the smaller ones are very fragile; caliche fossils are commonly broken by wind, blowing sand, and animals. Older specimens are abraded and weathered by wind and rain, while new ones are constantly being formed and exposed as covering sand dunes are stripped away.[38]

F.2.2.5 Historical and Current Disturbances

The Northern Channel Islands have been subjected to considerable disturbance by humans. All of the islands were occupied for thousands of years by Indians, who made moderate use of their natural resources, including marine mammals, birds, fish and invertebrates. In the

1800s, the hunting of seals, sea lions, and sea otters severely depleted the populations of these species in the Channel Islands and along the California coast in general. At present, commercial shipping and oil exploration and recovery occur or are planned in the Santa Barbara Channel, and the waters adjacent to the Channel Islands are used for commercial and sport fishing, diving, and boating.(201)

Santa Rosa Island has been used since the mid-1880s as one of California's largest cattle ranches. This use altered the vegetation of the island, which is largely devoid of trees, except for a few stands of the rare Torrey Pine. Several buildings, roads, wharfs, and an airstrip have been built on the island.(98)

Santa Cruz Island has been used for ranching of both cattle and sheep. It has the most complex topography and vegetation of the four islands, with several small mountain ranges and stands of a variety of trees. Like Santa Rosa, Santa Cruz Island has several buildings, roads, wharfs and an airstrip.

Little use has been made of Anacapa Island, except for the construction of a lighthouse and a few associated buildings on the eastern end of the island. The rugged terrain of this island supports low, sparse vegetation.

Considerable information is available on the human disturbance of San Miguel Island.(83) From the mid-1880s to 1924, drought and overgrazing by sheep severely damaged the island's vegetation. The island was under military control from 1942 to 1963 and for part of this time was used as a bombing range. This caused faunal mortality, accelerated erosion, and the destruction of vegetation, archaeological sites, geological features, and natural habitat in general.(83) Since 1963, when the island came under the management of the National Park Service, human disturbance has been limited.

Nevertheless, marine mammals and seabirds on San Miguel Island currently experience considerable disturbance. The shores of the island are quite noisy, with principal noise sources being surf, wind,

animal vocalizations, boats, aircraft, and sonic booms (an average of eight per month). A-weighted 24 hour cumulative sound levels range from 56 to 69 dB; maximum fast sound levels frequently exceed 80 dB, and corresponding sound exposure levels exceed 75 dB.(5) Major disturbances (causing at least half the animals to leave the beach) occur about 48-60 times per year for harbor seals and about 24-36 times per year for other pinniped species on the island. These major disturbances appear to be caused primarily by combined visual and auditory stimuli such as humans and low-flying aircraft. Sonic booms and boat noise sometimes cause such disturbances; approximately 50% of current sonic booms cause major disturbances to harbor seals, while about 25% cause major disturbances to other pinnipeds.(38) Birds appear to be less sensitive to disturbance.(14)

F.3 ALTERNATIVES INCLUDING THE PROPOSAL ACTION

F.3.1 NO ACTION ALTERNATIVE

In light of the civilian and military uses planned for the Space Shuttle, the alternatives permitting no action on the Shuttle Program at Vandenberg Air Force Base are 1) use at Vandenberg of expendable vehicles, such as Atlas and Titan, and 2) relocation of Shuttle launch to another site. These alternatives have been found unacceptable for a variety of reasons, as discussed in the Final Environmental Impact Statement, Space Shuttle Program, Vandenberg Air Force Base.(162)

F.3.1.1 Impact of No Action

No action for the Space Shuttle Program at Vandenberg would, of course, eliminate the possibility of related sonic booms over the Northern Channel Islands.

F.3.2 PROPOSED ACTION

Space Shuttle launches from Vandenberg AFB are currently scheduled to begin in late 1985. The number of launches per year will increase at a moderate rate to a maximum of 10 per year by 1988 and remain near that level through 1994, for a total of approximately 80 launches. Almost all of these launches will occur at launch azimuths greater than 180°, primarily 193°. (A 180° azimuth represents due south; larger azimuths are west of south, and smaller azimuths are east of south.) The flight paths of these launches will be substantially west of the Channel Islands. A maximum of seven launches, however, at lower azimuths (180°-147.5°) are currently scheduled for 1985 to 1994, the last year for which lower azimuth launch plans are complete. The flight paths of vehicles launched at azimuths near 150° pass over the Northern Channel Islands. In addition, on end-of-mission return to Vandenberg after each launch, the Orbiter will pass over the Northern Channel Islands.

F.3.2.1 Impact of the Proposed Action

F.3.2.1.1 Resulting Sonic Booms

Any body that moves through the air faster than the speed of sound creates a continuous shock wave that moves at the speed of the body. The abrupt changes in pressure caused by this wave are perceived by the human ear as an impulse noise called a sonic boom. That part of the surface of the earth that experiences a shock wave produced by an aircraft is called the "footprint" of that sonic boom. Sonic booms from conventional aircraft produce pressure changes ("overpressures") in the range of 0.5 to 2.0 pounds per square foot (psf). (One psf equals approximately 50 Newtons per square meter, N/m^2.) Due to its great weight, high speed, and large exhaust plume, the Shuttle vehicle on launch will produce booms of greater magnitude than conventional supersonic aircraft.

The atmosphere has an attenuating effect on such shock waves, and the high altitude of the Shuttle will reduce the magnitude of the pressure changes occurring at the earth's surface. These changes are expected to be in the range 0 to 6 psf. The only exception to this is in an area at the uprange (nearest launch site) end of the footprint where the pitch-over of the ascending Shuttle vehicle from vertical to horizontal will result in a concentration, or "focusing", of sonic boom energy. In this "focal region", expected to be approximately 1,000 feet (300 m) long (uprange - downrange), 80 miles (130 km) wide, and located approximately 40 miles (65 km) downrange of the launch site, peak overpressures could reach 30 psf at the center of the region and 10 psf at the edge. Immediately downrange of the focal region, peak overpressures will decrease abruptly to 4-6 psf. Further downrange, the continuing pitch-over of the vehicle will result in a wider footprint, while overpressures will diminish steadily due to the increasing altitude of the vehicle (Fig. F.3.2.1.1-A). Overpressures will become negligible approximately 50 miles (80 km) downrange of the focal region.

The expected location of these sonic boom footprints was the subject of an in-depth study that took into account the physical characteristics of the vehicle, vehicle speed and maneuvers, trajectory, atmospheric effects, and meteorological conditions, principally wind profiles up to 100,000 feet (35,000 m) elevation.[75] This study predicted the location of the footprints in 106 test cases of various combinations of representative environmental conditions for each of three launch azimuths (150°, 180°, 193°). The results of this study are summarized in Table F.3.2.1.1-1 in terms of the probability of areas of special interest lying within the footprint and within the focal region. Only at azimuths near 150° is there a significant likelihood of a sonic boom over the Northern Channel Islands (Figure F.3.2.1.1-A). At this azimuth there is a high probability (over 85%) of a sonic boom of some magnitude occurring over each of the islands. In addition, there is a high probability (81%) of San Miguel Island lying within the focal region, and moderate probability (15%) of a focused boom over some part of Santa Rosa Island. The probabilities

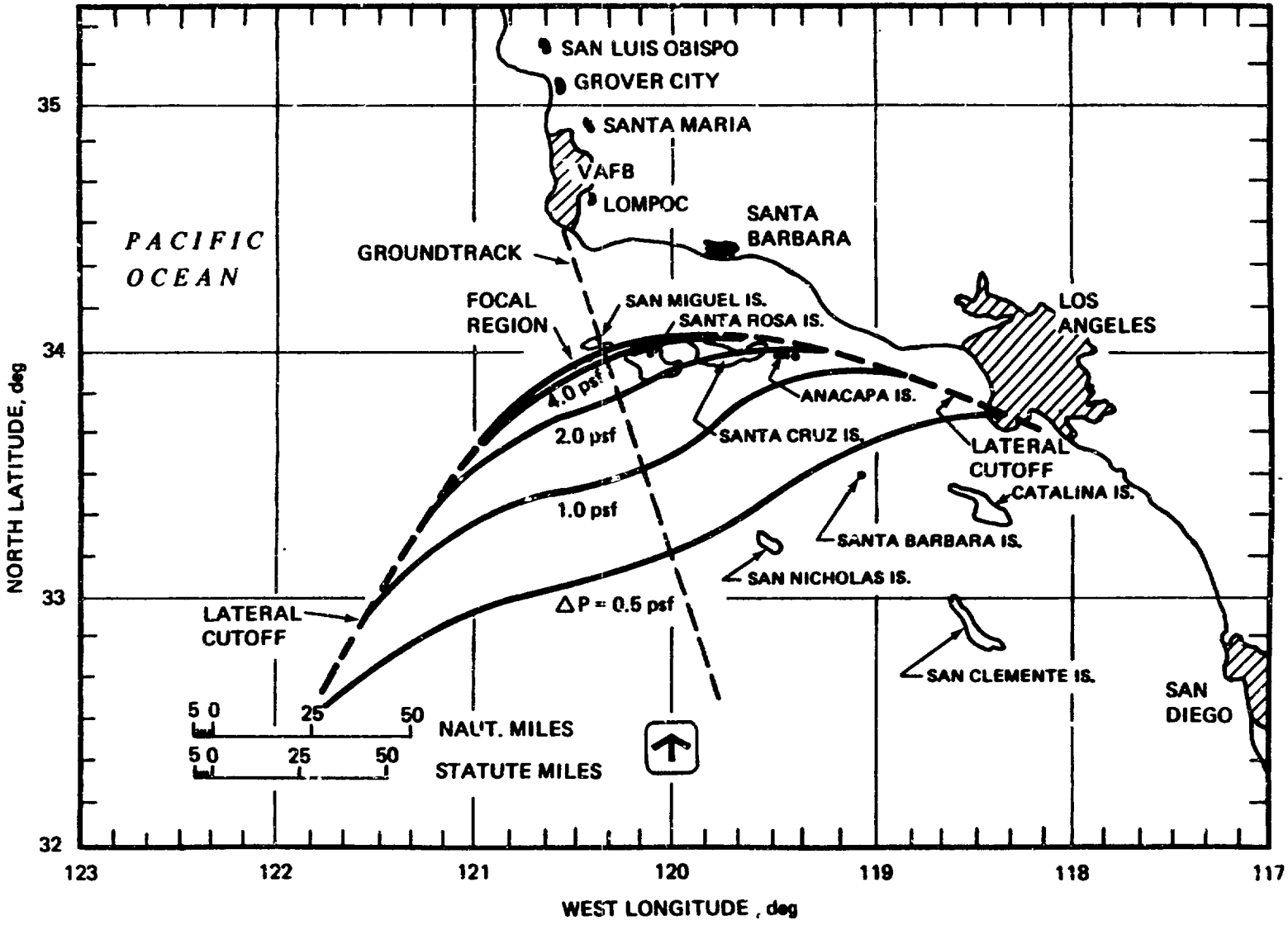


FIGURE F.3.2.1.1–A PREDICTED SEA LEVEL FOOTPRINT OF SONIC BOOM OVERPRESSURES RESULTING FROM VAFB SHUTTLE LAUNCHES FROM SLC–6 INTO AN ORBIT OF 150° AZIMUTH

Table F.3.2.1.1-1 SUMMARY OF SONIC BOOM OCCURRENCE PROBABILITIES. NINETY PERCENT CONFIDENCE LIMITS ARE SHOWN IN PARENTHESES. PROBABILITIES ARE BASED ON SAMPLE SIZES OF 106.

REGION	FOCAL REGION		
	LAUNCH AZIMUTH		
	150^{o}	180^{o}	193^{o}
CHANNEL ISLANDS	0.96 (0.92-0.99)	0.09 (0.05-0.15)	0.00 (0.00-0.03)
SAN MIGUEL	0.81 (0.72-0.86)	0.06 (0.02-0.11)	0.00 (0.00-0.03)
SANTA ROSA	0.15 (0.10-0.22)	0.06 (0.02-0.11)	0.00 (0.00-0.03)
SANTA CRUZ	0.08 (0.04-0.13)	0.00 (0.00-0.03)	0.00 (0.00-0.03)
ANACAPA	0.00 (0.00-0.03)	0.00 (0.00-0.03)	0.00 (0.00-0.03)
SONIC BOOM FOOTPRINT			
REGION		LAUNCH AZIMUTH	
	150^{o}	180^{o}	193^{o}
CHANNEL ISLANDS	1.00 (0.96-1.00)	0.09 (0.05-0.15)	0.00 (0.00-0.03)
SAN MIGUEL	0.86 (0.79-0.91)	0.06 (0.02-0.11)	0.00 (0.00-0.03)
SANTA ROSA	1.00 (0.96-1.00)	0.08 (0.04-0.14)	0.00 (0.00-0.03)
SANTA CRUZ	1.00 (0.96-1.00)	0.00 (0.00-0.03)	0.00 (0.00-0.03)
ANACAPA	0.98 (0.94-1.00)	0.00 (0.00-0.03)	0.00 (0.00-0.03)

Source: Haber, 1981. (75)

of focused booms are low for Santa Cruz (8%) and Anacapa (essentially zero). As launch azimuth increases beyond 150°, the resulting footprints move progressively westward of the Channel Islands (Figs. F.3.2.1.1-B,C).

This study's investigation of the effect of wind profiles on footprint location is a major improvement over the footprint analysis of the Final EIS (Table F.3.2.1.1-2). This investigation shows, however, that the original analysis was essentially correct and that most wind conditions will have little effect on footprint location. The most significant of these effects is that, at the 150° azimuth, high winds from the northwest or south could push the focal region off San Miguel Island.(75)

The return of the Orbiter to Vandenberg at the end of each mission is expected to produce moderate sonic booms over San Miguel Island (1.0 to 1.5 psf) and Santa Rosa (0.5 to 1.0 psf), while Santa Cruz and Anacapa should not be affected (Figure F.3.2.1.1-D).

All of the Northern Channel Islands, then, will experience a maximum of seven moderate sonic booms from Shuttle launches over a 10-year period. A maximum of seven high-magnitude, focused sonic booms will occur over San Miguel Island during the same period. One or two focused booms may occur over Santa Rosa and Santa Cruz. Anacapa should not experience focused booms. In addition, San Miguel and Santa Rosa will experience mild booms from Orbiter return approximately every four to five weeks for most years of the program, but considerably less frequently from 1985 to 1987.

It is important to remember that this is a "worst case" analysis of Shuttle-generated sonic booms. Because some of the seven launches will probably be at azimuths closer to 180° than to 150°, there may well be fewer focused sonic booms produced over the Northern Channel Islands than discussed above.

Sonic boom infringement on the California coast will be assessed and mitigated if future flight analyses indicate a potential problem for lower launch azimuths.

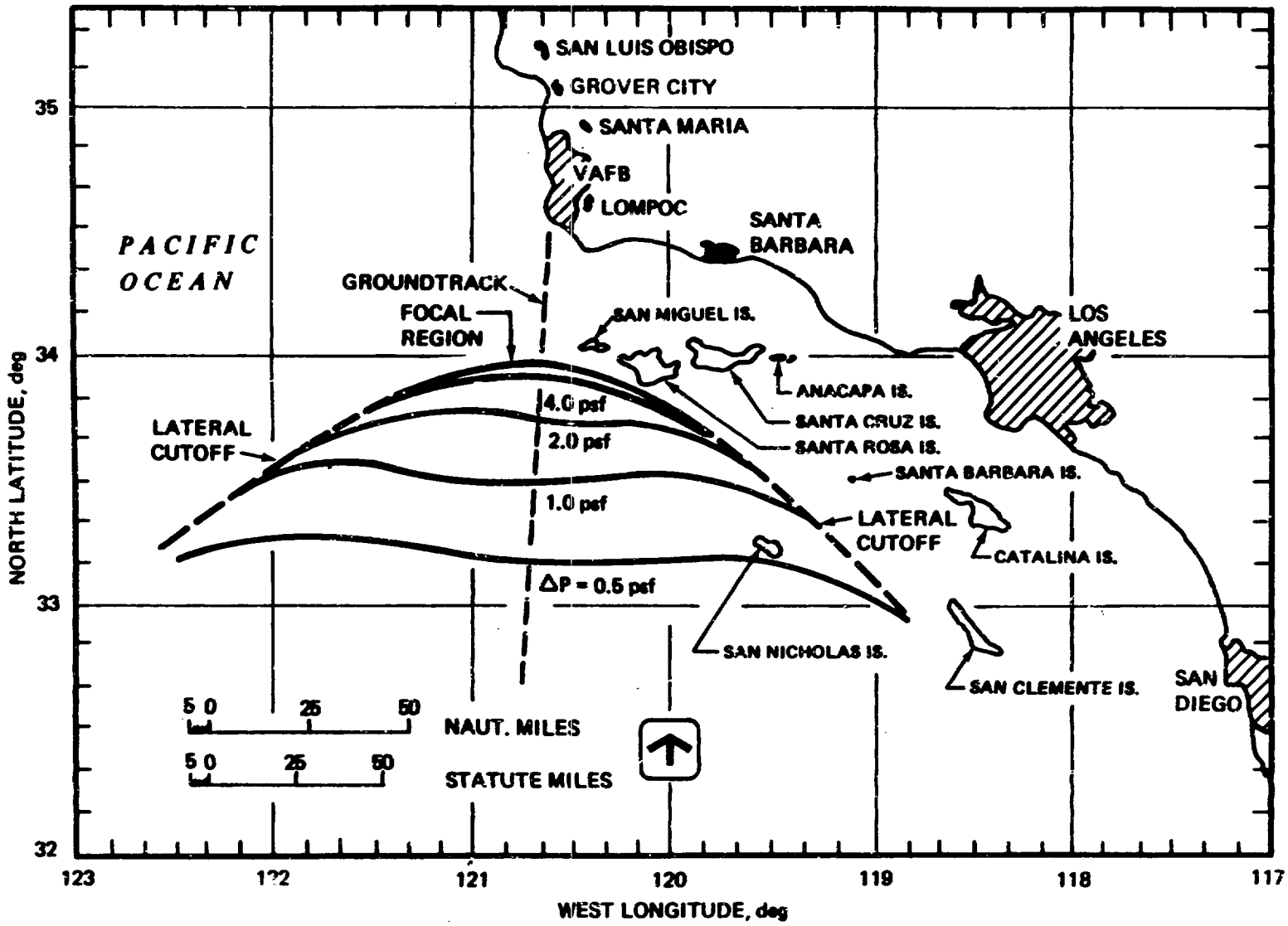


FIGURE F.3.2.1.1–B PREDICTED SEA LEVEL FOOTPRINT OF SONIC BOOM OVERPRESSURES RESULTING FROM VAFB SHUTTLE LAUNCHES FROM SLC–6 INTO AN ORBIT OF 180° AZIMUTH

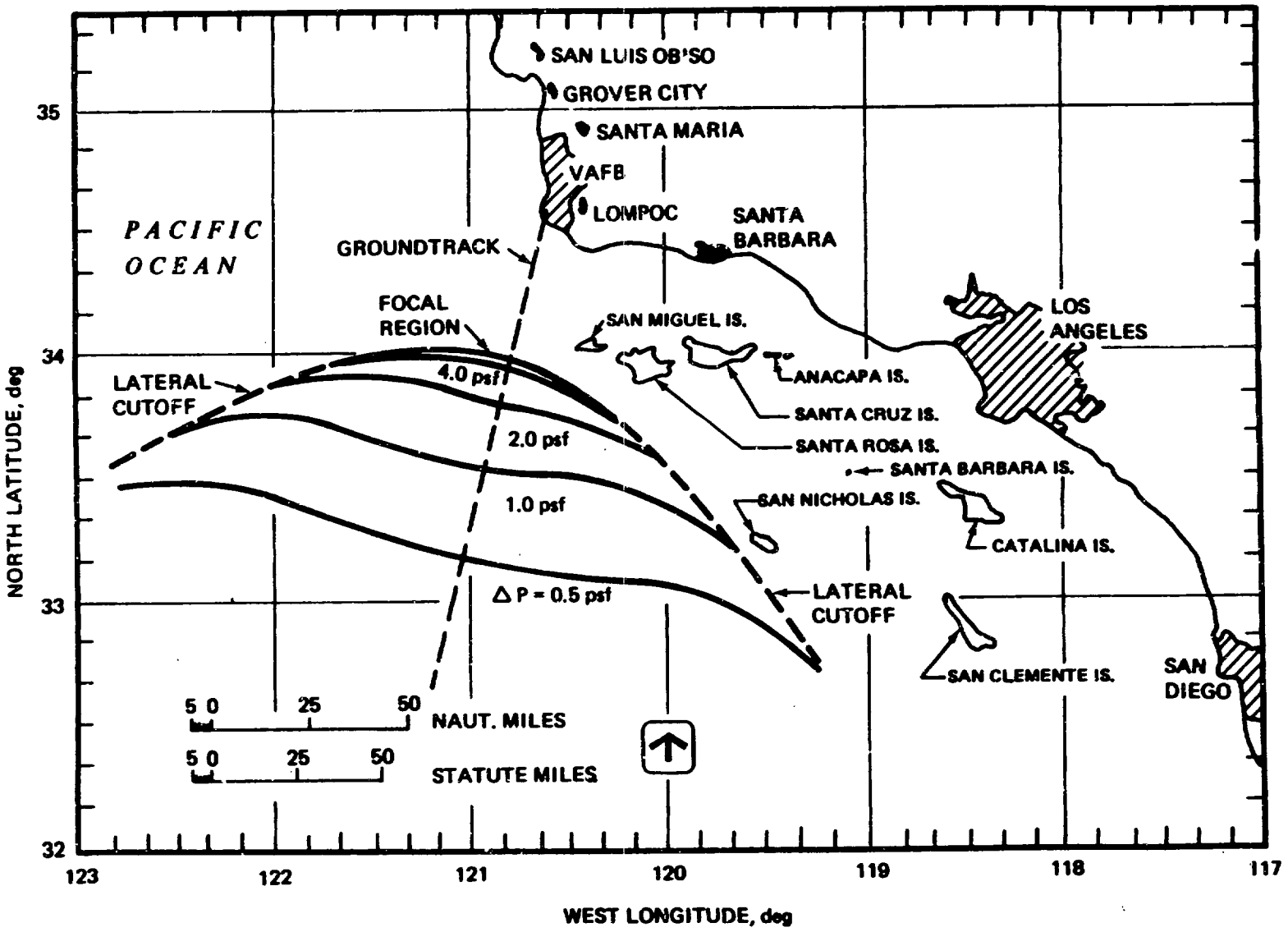


FIGURE F3.2.1.1–C PREDICTED SEA LEVEL FOOTPRINT OF SONIC BOOM OVERPRESSURES RESULTING FROM VAFB SHUTTLE LAUNCHES FROM SLC–6 INTO AN ORBIT OF 193° AZIMUTH

Table F.3.2.1.1-2 SUMMARY OF EFFECTS OF METEORLOGICAL CONDITIONS (WIND) ON SONIC BOOMS FOOTPRINTS. UNLESS OTHERWISE INDICATED, EFFECTS APPLY TO BOTH FOCAL REGION AND WEST OF FOOTPRINT

REGION	LAUNCH AZIMUTH	
	150^{o}	180^{o} 193^{o}
SAN MIGUEL	HIGH NORTHWEST WIND DECREASES PROBABILITY	HIGH SOUTHWEST WIND INCREASES PROBABILITY
	HIGH SOUTH WIND DECREASES FOCUS PROBABILITY	
SANTA ROSA	HIGH NORTH WIND DECREASES FOOTPRINT PROBABILITY	HIGH SOUTHWEST WIND INCREASES PROBABILITY
	MODERATE NORTH WIND INCREASES FOCUS PROBABILITY	
SANTA CRUZ	HIGH NORTH WIND DECREASES FOOTPRINT PROBABILITY	HIGH SOUTHWEST WIND INCREASES PROBABILITY
	MODERATE NORTH WIND INCREASES FOCUS PROBABILITY	
ANACAPA	HIGH EAST WIND DECREASES FOOTPRINT PROBABILITY	

Source: Haber, 1980.(74)

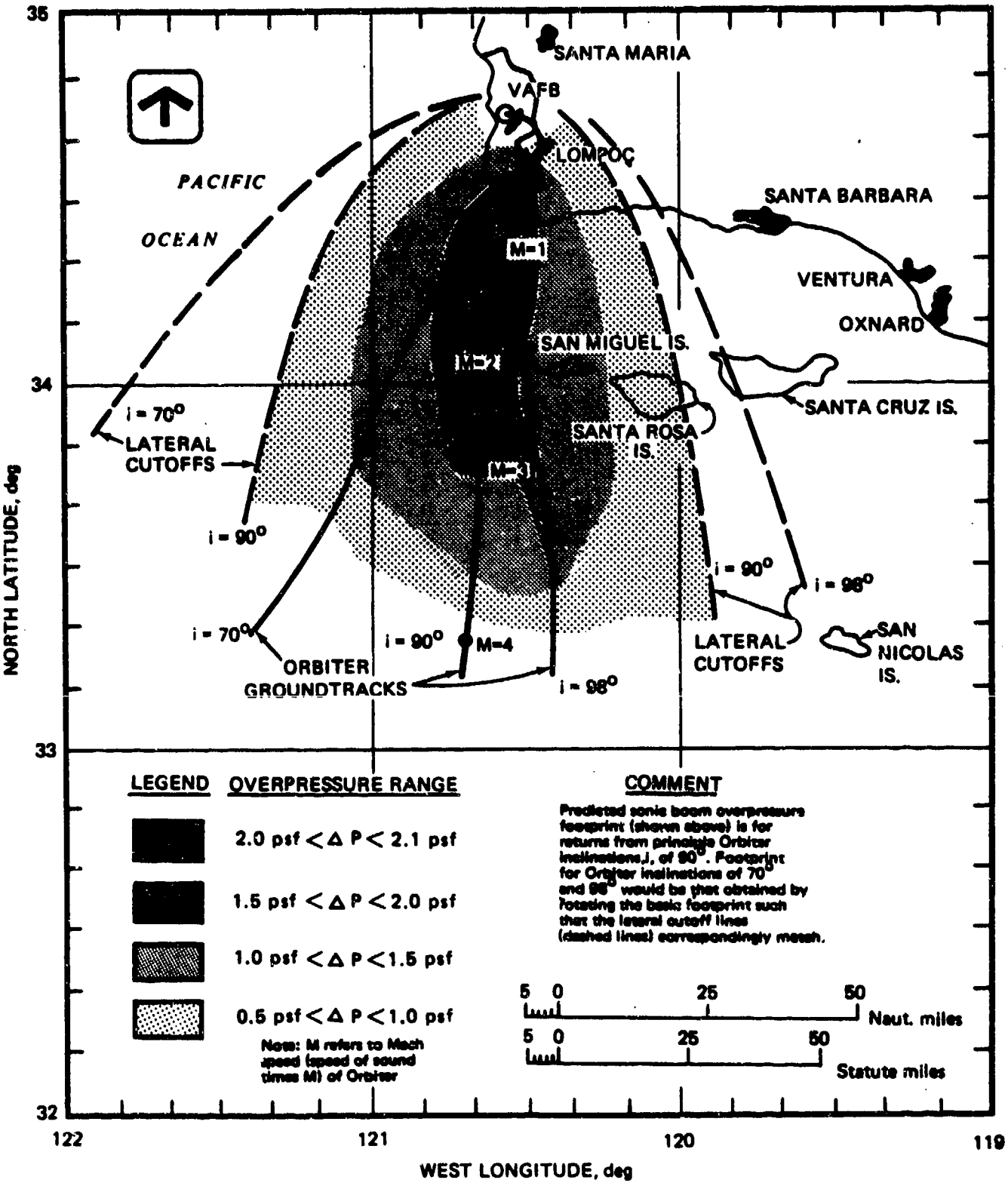


FIGURE F3.2.1.1–D
PREDICTED FOOTPRINT OF SONIC BOOM OVERPRESSURES RESULTING FROM NORMAL END–OF–MISSION RETURN OF ORBITER TO VANDENBERG AIR FORCE BASE

F.3.2.1.2 Impacts to Marine Mammals

The principal characteristics of an impulse noise that determines its biological effects (hearing damage, startling, etc.) are peak overpressure (discussed above), duration, and rise time. Rise time is the time the approaching shock wave takes to reach peak overpressure. Rise time and impulse duration are important because they affect the frequency of the sound in the boom and the speed of the resulting pressure changes. Short rise time and short duration usually occur together and result in higher frequency sound and faster pressure changes. These characteristics in turn have greater potential for damaging hearing and startling animals than do lower frequency sound and slower pressure changes. Because of its large size, the Space Shuttle vehicle is expected to produce booms with longer rise time and longer durations than booms from more conventional supersonic aircraft such as the Concorde. Conventional booms generally have rise times of about 1 msec and durations of about 200 msec. Shuttle booms are expected to have rise times of 10-20 msec and durations of 1,000-1,500 msec. Shuttle booms should therefore have lower frequency sound, slower pressure changes, and less potential for biological effects than conventional booms.

Existing studies on the effect of sonic booms on animals lack consistency in the measuring and reporting of the characteristics of the booms used. Peak overpressures have been measured in a variety of mostly non-comparable ways. Rise time, duration, and sound frequency often are not reported. This makes it difficult to compare the results of these studies and to make inferences about the possible effects of Space Shuttle-generated booms on the biota of the Channel Islands. Nevertheless, the nature of much of the evidence is such that tenable conclusions can be drawn about a number of these effects. The following sections attempt to do this in a reasonable and conservative manner.

Many of the studies discussed below report overpressure in decibel (dB) units, a logarithmic scale. Table F.3.2.1.2-1 shows the relationships between the psf and the dB expression of overpressure. A

Table F.3.2.1.2-1 CONVERSION OF OVERPRESSURES IN POUNDS PER SQUARE FOOT (PSF) TO DECIBELS RE MICROPASCALS (dB)

psf	dB	psf	dB
0.2	113.6	14.0	150.5
0.5	121.6	18.0	152.7
1.0	127.6	22.0	154.4
2.0	133.6	26.0	155.9
3.0	137.1	30.0	157.1
4.0	139.6	34.0	158.2
5.0	141.6	38.0	159.1
6.0	143.1	42.0	160.0
8.0	145.6	50.0	161.5
10.0	147.6	70.0	164.4
12.0	149.2	100.0	167.4

doubling of psf corresponds to an increase of about 6 dB. It should be remembered that dB is a measure of pressure only and is not synonymous with the more subjective concept of loudness, which is affected by the frequency content of the noise.

F.3.2.1.2.1 Auditory Damage

Auditory communication is important for marine mammals. In cetaceans (whales and dolphins), auditory communication among individuals is likely and many are known to find food by echolocation. In pinnipeds (seals and sea lions), mother-pup recognization is largely auditory, and sound is used for other types of social interactions, such as ritualized agonistic behavior and territorialty. There has been concern, therefore, that widespread loss of hearing could cause considerable social breakdown in marine mammal populations and impair the feeding ability of cetaceans.

The available evidence indicates quite clearly that Shuttle-generated booms are unlikely to cause hearing damage in marine mammals. First, the marine mammals that have been studied (harbor seal, harp seal, bottlenose porpoise) were found to be less sensitive (in air) than humans to the largely low-frequency sound characteristic of sonic booms.[33] Second, humans exposed to pressure changes similar to those expected from Shuttle booms suffered minor to no hearing effects. In a study on the effects of noise blasts from automobile air-bag restraint systems, impulses with mean peak overpressure of 168 dB (105 psf), median rise time of 4.5 msec, and median duration of 21 msec caused no ear pain and no eardrum damage. Fifty percent of 91 subjects suffered temporary threshold shifts (TTS-temporary reduction in hearing sensitivity) in one or both ears ranging up to 45 dB. Sixty-five percent of this TTS disappeared in 24 hours, and 95 percent was gone in 1 week. In another study on humans, 152 dB (17 psf) booms with rise times of less than 1 msec caused 10-15 dB TTS that lasted 3 to 4 hours. In a study with unreported rise times, 157 dB (30 psf) booms caused no TTS.[33] TTS was also lacking 3 to 4 hours after 169 dB (118 psf) in a similar study. It seems very unlikely, therefore,

that Space Shuttle booms will cause permanent hearing damage to marine mammals in air (most of the pinnipeds). A small fraction of the marine mammal population could experience minor TTS.

Harbor seals and bottlenose porpoises have been shown to be more sensitive to sound in water than in air, but the increased sensitivity is mainly at the high frequencies (greater than 10 KHz) that are largely absent from sonic boom sound.[33] These species in water are still less sensitive than humans in air to low-frequency sound. In addition, cetaceans apparently use very loud sounds in their communication with one another; intensities of 167 dB (94 psf) at a distance of 3 feet (1 m) have been measured.[33]

Contradicting theoretical predictions, sound entering the water has been shown to attenuate quite slowly with depth. Sound entering a water surface at greater than 13° from vertical, however, is largely deflected at the surface and very little enters the water.[33] For a Shuttle vehicle at 9 miles (15 km) altitude, significant sonic boom energy will penetrate the water in only a 4-mile (7 km) wide zone directly under the flight path. Even within this zone, which would contain a minute fraction of any marine mammal population, the likelihood of hearing damage is small.[33] For marine mammals in water in general, then, permanent auditory damage is very improbable; there is minor chance of TTS (confined to the zone under the flight path).

Space Shuttle-generated sonic booms, are therefore unlikely to cause permanent hearing damage to marine mammals in or out of the water. Minor reduction in hearing sensitivity is possible for a relative few individuals, but this effect will be temporary and should not affect their survival. Consequences for populations as a whole will be negligible.

F.3.2.1.2.2 Effect on Non-Auditory Physiology

Concern has been expressed that increased stress from Space Shuttle sonic booms might adversely affect non-auditory aspects of marine mammal physiology. The most likely such effects are of three types:

(1) Effects on reproductive physiology

(2) Effects on metabolism and general health

(3) Effects on resistance to disease

Pinniped reproductive physiology is not well known, but a several-month delay between fertilization and implantation of the zygote in the uterus wall is known to be normal in some species.(33) Disruption of timely reproductive hormone release during this delay period could result in unsuccessful pregnancy. Noise has been shown to affect such hormone release in laboratory animals.(33)

In a variety of animals, noise has been shown to impair general health, affecting such parameters as heart rate, blood pressure, and lipid biochemistry. In addition, chronic noise stress has been found to lower resistance to disease in laboratory animals.(33)

The available evidence indicates that Shuttle sonic booms are unlikely to produce non-auditory physiological effects in marine mammals. First, most of the physiological effects mentioned in the preceeding paragraphs were caused by much greater cumulative sound exposures (intense continuous noise) than those expected from Shuttle booms (infrequent, loud, short-duration noise), which have less potential for affecting physiology.(33) Second, Shuttle booms will probably add little to the natural stress environment of Channel Islands pinnipeds. The pinniped colonies on San Miguel Island are quite noisy,(5) and sonic booms already occur there at an average rate of eight per month. In addition, pinniped colonies tend to be very crowded, with individuals of both sexes engaging in a good deal of agonistic behavior, aggressiveness, and physical combat. In some species, high rates of pup mortality result from fighting and other aggressive interactions between adults.(33) This suggests that colonial pinnipeds are naturally exposed to significant, chronic "background" stress, in comparison with which a maximum of seven very loud booms in ten years and more moderate booms about once every four to five weeks are insignificant.

F.3.2.1.2.3 Behavioral Effects

Pinnipeds are known to be startled by a variety of stimuli, sometimes resulting in a mass movement of a colony to the water.(14) There has been concern that Shuttle sonic booms could cause such movements, and that the occurrence of such an event during pupping season could result in pup mortality due to trampling or to separation from mothers.

From November 1978 to June 1980, behavior of pinniped populations at San Miguel Island was intensively monitored, particularly in regard to the animals' response to external disturbances.(14) Harbor seals were the species most likely to startle and experience major disturbances (causing more than 50 percent of the animals to leave the beach - termed a "major event") 48 to 60 times per year. Major events occurred 24 to 36 times per year for California sea lions and Northern fur seals. No serious disturbance was ever recorded among northern elephant seals. Steller sea lions and Guadalupe fur seals, which occur in very low numbers in the Channel Islands, were not studied. In none of these was there any pup or adult mortality. Panicked stampedes by pinnipeds are almost unheard of at San Miguel Island. Visual disturbances, such as nearby humans and low-flying aircraft, appear to alarm pinnipeds more than strictly aural stimuli such as sonic booms.(14)

Additional studies were conducted on San Nicolas Island in 1981 to analyze the effect of loud impulse noise on pinnipeds.(152) Breeding Northern elephant seals and California sea lions were observed as they were exposed to firings of a carbide pest control cannon. The cannon was used as a substitute for actual sonic booms. In the Northern elephant seal, population simulated sonic booms did not cause the animals to stampede or leave the beach, or cause mother-pup separation or pup mortality. The California sea lions were more prone to be startled by cannon firing, but pup mortality due to the brief mother-pup separation did not occur, nor were pups trampled during panic reactions to the simulated booms. In neither species was social

organization disrupted, nor are traditional rookery areas expected to be permanently abandoned due to occasional exposure to sonic booms.

The most reasonable expectation for Shuttle-produced sonic booms is that they will usually, but not always, cause major events, with very little or no resulting mortality. The scheduled frequency of Shuttle booms is expected to increase the frequency of major disturbances to Northern Channel Islands pinnipeds by about 15 percent and to have no significant cummulative impact on pinniped population dynamics.[14,38]

F.3.2.1.3 Impacts to Sea Birds

F.3.2.1.3.1 Direct Effects on Eggs

Concern has been expressed that overpressures produced by the Space Shuttle sonic boom could crack the eggs of nesting birds of the Channel Islands or have physiological effects on eggs that would reduce their hatchability. An effect on the reproductive physiology of adults is also possible.

Direct cracking of eggs by Shuttle sonic boom overpressures is very unlikely. It has been estimated that the overpressures needed to break the eggs of these species are probably an order of magnitude (10 times) greater than the maximum overpressures expected from Shuttle booms.[60] Quail eggs exposed to violent blasts of 179 dB (374 psf) and 184 dB (666 psf) did not crack or break,[54] nor did chicken eggs exposed to 156.3 dB (27 psf) blasts.[34]

In a study designed to clarify the effect of Shuttle-produced sonic booms, a single blast from a carbide pest control cannon (156.3 dB peak flat - 27 psf) had no effect on ovulation or oviposition in chickens.[34] There was also no effect on hatchability, viability, or hatching time of chicken eggs. No eggs cracked. Some chicks exposed to blasts in the egg were lighter than control chicks, but other groups were heavier than controls. In addition, studies on a variety of both domestic and wild birds have shown that sonic booms of from 125 dB (1 psf) to 142 dB (15 psf), often repeated many times

daily, had no effect on egg hatchability.[54] Although results from experiments on one species are not necessarily transferrable to another, the universal agreement of the results from these studies makes reasonable the conclusion that the infrequent Shuttle sonic booms will have no significant effect on the reproductive physiology of marine birds.[34]

F.3.2.1.3.2 Behavioral Effects

There has been concern that startling of nesting marine birds by Shuttle-produced sonic booms could result in crushing or dislodging of eggs. Eggs in nests from which adults have been startled could be subject to predation.

Studies were conducted on San Nicolas Island on the response of Brandt's cormorants and Western gulls to shotgun blasts and blasts from a carbide pest control cannon (156 dB peak flat).[140] These impulse noises did not severely startle either species; the usual response was a head-jerk reaction and increased alertness. The most severe response was to walk a few steps away from the noise; this was exhibited only by the birds closest to the noise, if at all. No cormorant left its nest untended to the extent that predation by gulls on eggs was possible; no eggs were crushed or kicked from the nest. Nesting birds were observed to be less likely to startle than non-nesting birds. Visual stimuli, such as nearby humans, disturbed gulls and cormorants much more than did the blasts, startling all the gulls within 160 feet (50 m) and all the cormorants within 800 feet (250 m) from their nests. This permitted gull predation on cormorant eggs; no predation on gull eggs was observed. The reactions of these species, plus those of Cassin's auklet (F.3.2.1.3.3 Burrow Destruction) to loud blasts, are considered representative of the marine birds nesting in the Northern Channel Islands.[133] Although the blasts used did not mimic exactly Shuttle-produced booms, the results of these studies indicate that Shuttle booms, especially at the low frequency expected, are unlikely to have a significant impact on marine bird populations.

F.3.2.1.3.3 Burrow Destruction

Cassin's auklet and other alcids, such as the pigeon guillemot and Xantus' murrelet, nest in fragile burrows on the Northern Channel Islands. The three cormorants (double-crested, Brandt's, pelagic) nest on cliff ledges. Concern has been expressed that overpressures from sonic booms might collapse these burrows and cliffs and disrupt nesting of these species.

The burrows of Cassin's auklets are often built in loose soil and frequently collapse from natural causes, including the burrowing activity of the birds themselves. Several reports in the literature indicate that these birds are well-adapted to this condition and re-excavate burrows quickly. This was confirmed by a study done on Prince Island, in which 17 auklet burrows were collapsed by various means on the evening of April 24, 1979. By 0700 the next morning, all but one burrow had been re-excavated.(140) Another study showed that even in the event of egg loss, auklet reproduction was not seriously affected because re-laying was the usual reponse.(140) Therefore, while sonic booms from the Space Shuttle may collapse a few burrows, population consequences for Cassin's auklet and other burrowing species are expected to be minimal.(140)

Cormorants usually build their nests on stable cliff ledges that are unlikely to be affected by sonic booms.

F3.2.1.4 Impacts to Endangered Species

F.3.2.1.4.1 Brown Pelican (Pelecanus occidentalis)

Since Anacapa Island, Santa Barbara Island, and Scorpion Rock (Santa Cruz Island) are the only western U.S. nesting places for the brown pelican, there has been concern that Shuttle-produced sonic booms might have a significant negative impact on the population of this endangered species.

The evidence indicates that such an impact is extremely unlikely.

First, there is no reason to suspect that pelicans are more likely to be startled by, or suffer egg damage from, Shuttle booms than are Brandt's cormorants and Western gulls (above). The adaptation of a Puerto Rican brown pelican colony to the nearby presence of a bombing range demonstrates this species' low sensitivity to loud noise.(133) Pelican egg shells have returned to normal thickness after many years of thin shells due to DDT effects,(51) and are probably no more likely to crack when exposed to a boom than are the eggs of the species studied. The bodies of incubating adults should shield their eggs almost completely from the shock waves of sonic booms. Second, and more important, very few sonic booms are expected to occur over pelican nesting places. Even on a 150° azimuth launch, the chance of a focused boom occurring on Anacapa is minute (Section F.3.2.1.1). The predicted probability of a moderate boom on Anacapa is 98 percent for the 150° azimuth (maximum of seven launches from 1985 to 1994, while Orbiter returns are not expected to produce booms there. The probabilities of sonic booms occurring over the eastern end of Santa Cruz Island, including Scorpion Rock, are similar to those for Anacapa.(75)

The best expectation, then, is that pelican nesting places will experience a maximum of seven moderate booms (less than 2 psf) over a ten year period (120 months). Due to their low frequency of occurrence, these booms are unlikely to occur during the two month (24 months in 10 years) pelican nesting season. Since pelicans will experience little sonic boom exposure, and since they are unlikely to be very disturbed or suffer egg damage by any booms that do occur, Shuttle-produced booms will add little to the present disturbance of pelican populations, populations that are currently undergoing healthy recovery from previous low levels. Although the only western U.S. nesting places of this species are in the Channel Islands, Space Shuttle sonic booms are very unlikely to affect the continued existence of the brown pelican population.

F.3.2.1.4.2 Peregrine Falcon (Falco peregrinus)

The peregrine falcon has been observed on the Northern Channel Islands. Concern has been expressed that sonic booms from the Space Shuttle could disrupt any nesting by this species on the islands or impair recolonization of the islands if nesting does not now exist.

No peregrines nest on and very few visit the Northern Channel Islands (see Section F.2.2.3). Recolonization of the islands by the peregrine falcon is largely conjectural. Even if peregrines should colonize the Northern Channel Islands, studies on the effects of F-15 aircraft sonic booms on nesting peregrine and prairie falcons indicate little impact of infrequent Shuttle booms.[182] The Space Shuttle is therefore very unlikely to affect the continued existence of the peregrine falcon.

F.3.2.1.4.3 Gray Whale (Eschrictius robustus)

There has been concern that sonic booms could cause auditory damage to migrating gray whales. Such damage is unlikely. The marine mammals that have been studied demonstrated low sensitivity to the low-frequency sound contained in sonic booms. The overpressures produced by the Space Shuttle are not large enough to cause permanent auditory damage in marine mammals.[33] There is a minor chance of temporary threshold shift, but only in a relatively small zone where significant focused boom energy will enter the water (Section F.3.2.1.2.1). This zone would contain only a very small fraction of any cetacean populations of the Southern California Bight. This is especially true for gray whales, which tend to remain relatively close to shore, particularly on northward migration when calves are present.[195] Since only a minute fraction of the gray whale population will be exposed to significant sonic boom energy, and since even those are unlikely to experience auditory effects, there is essentially no chance of a significant impact on the gray whale population.

F.3.2.1.5 Geological Impacts

Concern has been expressed that sonic boom overpressures could collapse fragile geological features, including caliche plant fossils. Caliche deposits break naturally under the impact of strong winds, blowing sand that erodes their base, and animals. New caliche forests are constantly being exposed as the covering dunes are stripped away. Older ones are abraded and weathered by wind and rain. The sudden shock wave of a Space Shuttle sonic boom could cause some, perhaps many, of the more fragile caliche fossils to topple. This would merely speed up by weeks, months, or at most a few years, an inevitable natural process.

Landslides and other mass movements are frequent on San Miguel Island. Sonic booms may trigger movement of unstable slopes, particularly during the winter when the soil is wet. In most instances this will simply accelerate movement that would occur anyway.

F.4 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

F.4.1 MARINE MAMMALS

There is essentially no chance of permanent auditory damage to marine mammals, in or out of the water, as a result of Shuttle sonic booms. There is a small chance of minor temporary threshold shift in a small fraction of marine mammal populations. Sonic booms are expected to add little to the stress environment of marine mammals, so that reproductive and other non-auditory physiological effects are not expected.

Similarly, Shuttle-produced booms are expected to add little to the current level of disturbance of Northern Channel Islands pinnipeds. Although some of the booms, particularly the few focused ones, will probably cause a significant fraction of pinnipeds on the beach to move to the water, consequences for pinniped populations are expected to be insignificant.

F.4.2 SEABIRDS

Studies indicate that Shuttle-produced booms are unlikely to affect seabird reproductive physiology, the hatchability of eggs, or the viability of chicks. Other studies show that booms do not severely startle nesting seabirds; eggs are unlikely to be crushed, dislodged, or left unguarded by adults. While Shuttle-produced booms may collapse some bird burrows on the Northern Channel Islands, such collapse is a frequent natural occurrence to which the birds are adapted, and quick re-excavation is probable. Significant impact of sonic booms on seabird populations is very unlikely.

F.4.3 ENDANGERED SPECIES

Brown pelican nesting places will be exposed to very few, moderate sonic booms, and pelicans are not likely to be very disturbed by any booms that do occur. No significant impact on the population level is likely, and the continued existence of this species will not be jeopardized.

Since no peregrine falcons nest in, and very few visit, the Northern Channel Islands, no impact of sonic booms is expected on the continued existence of the peregrine population.

Very few, if any, gray whales will be exposed to significant sonic boom energy. Even these are very unlikely to suffer any auditory effects. No impact of sonic booms on gray whale population is expected.

Since the Space Shuttle Program at Vandenberg AFB is not expected to jeopardize the continued existence of any endangered species, it is considered to be in compliance with the Endangered Species Act of 1969. The assessment of impacts on endangered species contained in this appendix is considered to satisfy the consultation requirements of Section 7 of the Act.

F4.4 GEOLOGY

Space Shuttle sonic booms may cause a few landslides that would have occurred soon anyway and may collapse some of the more fragile caliche deposits, but only those due soon for natural collapse.

F.5 MITIGATION EFFORTS AND MONITORING

F.5.1 MITIGATIONS

Space Shuttle generated sonic booms are not expected to have significant impacts on the marine mammal and bird populations of the Northern Channel Islands. The sound pressure levels predicted by modelling to result from Shuttle sonic booms have been supported by measurements of actual booms created by Orbiter landings at Edwards AFB and by the launch of STS-5 from Kennedy Space Center. However, mitigation measures are being considered in case future sonic boom measurements (planned for STS-7 launch, for example) or monitoring of sonic booms and animal responses during initial launches over the Channel Islands indicate that extremely adverse, unacceptable or catastrophic impacts are likely. In that case, the following restrictions would be implemented, within the mission constraints described below.

F.5.1.1 Avoidance of Launch over Channel Islands During Sensitive Periods

During the months of May through July launch azimuths near 150° (or those affecting San Miguel Island) will not be planned for use by any DOD/NASA Space Shuttle mission launches from the Vandenberg Launch Site. In addition, special consideration will be given to using launch windows between sensitive breeding periods in the months of March and April. These restrictions will be honored unless operational mission constraints necessary to meet vital national security requirements preclude alternative dates or flights trajectories.

F.5.1.2 Dog Leg Maneuver

In the case that a launch during a sensitive period is unavoidable,

the use of a "Dog Leg" maneuver will be considered. The measure would involve, for launches normally scheduled for azimuths near 150°, launching at higher azimuths and then, after the danger of a boom over the Channel Islands has passed, turning the Shuttle to a more southerly direction to achieve the desired orbit. This "Dog Leg" would eliminate the very loud, focused boom over the islands resulting from launch, but would not affect booms due to Orbiter return.

However, there are mission problems associated with using the Dog Leg. For example, to launch on a 180° azimuth (90° inclination that avoids overflying the islands) and then rotating to 150° azimuth (a 63.4° desired inclination requiring launching over the island directly) would result in a 20,000 pound payload restriction; this could mean a 2/3 loss for payload weight. For each degree change there is a loss of roughly 640 pounds of payload capability. Minor adjustments for inclinations and azimuths can be made with some losses in weight capability, but such flexibility may be limited with payloads that are performance critical.

Shuttle performance, and range safety concerns must all be weighed before accepting a Dog Leg maneuver to mitigate impacts to the Channel Islands. External tanks (ET) must be jettisoned into the ocean. With Dog Leg maneuvers there are potential problems with dropping these tanks in certain designated areas.

Some Shuttle Flights may necessitate Dog Leg maneuvers to satisfy mission requirements, and hence, any further maneuvering could degrade the Shuttle's ability to safely achieve orbit. Other range safety concerns that must be evaluated for all maneuvers are: debris footprints, SRB (Solid Rocket Boosters) impact areas, and ET impact areas.

F.5.1.3 Implementation of Mitigations

If the mission is performance critical such that a Dog Leg is not feasible, every other possible avenue of rescheduling the mission to a less critical seasonal window will be explored before accepting

impacts to the Channel Islands. No mission which violates this ground rule will be scheduled without consultation on the impacts with the Environmental Planning Function at Space Division. This office will maintain close liaison with the Federal and State agencies, and will stay current on the Channel Island biological conditions to assure timely environmental information is used during mission planning.

Federal and state agencies will be furnished results from monitoring of the first and all initial launches (see Monitoring, next section). Their review and recommendations will be used to determine if mitigation measures and overflight restrictions are required for subsequent flights. To enhance the review by state agencies, the Executive Director of the Coastal Commission will coordinate the comments of the reviewers. To assure permanent protection of the Channel Island habitat, the conclusions and recommendations of the reviewing agencies will be considered in planning for subsequent Space Shuttle launches. These recommendations will be implemented unless they conflict with operational mission constraints necessary to meet vital national security requirements.

F.5.1.4 Use of Expendables at Azimuths Near 150°

A possible means of mitigating the sonic boom impact of the Space Shuttle is to use expendable vehicles (Atlas, Titan III) on launches expected to produce sonic booms over the Northern Channel Islands (azimuths near 150°). This would eliminate focused sonic booms over the islands, and slightly reduce the frequency of booms in general. The environmental impacts of the infrequent, very loud booms (due to launches) would be essentially eliminated by this mitigation measure, while the impacts of more frequent, less powerful booms (due to Orbiter retur..) would only be partially removed.

This mitigation measure is not feasible for essentially two reasons. The first is that, for a maximum of seven launches, it would require the maintenance at Vandenberg of the facilities, vehicles, personnel, material, etc. associated with the expendable vehicles. This would be

excessively costly. The second is that the expendable vehicles do not have the mission capability and flexibility of the Space Shuttle, and the purpose of the Space Shuttle Program and the U.S. Space Program in general would be considerably impaired.

F.5.2 MONITORING

Although Shuttle-generated sonic booms are expected to have no significant impacts on Channel Islands poulations, it is desirable to monitor these populations on the first few launches near 150° and on the first few Orbiter returns in order to verify this expectation.

Prior to launch, important pinniped and bird populations will be censused as appropriate, depending on season, for comparison to post-launch data. In the March-April period before the first launch, the Northern Channel Islands will be surveyed for the presence of breeding peregrine falcons or other endangered species. Actions or mitigating measures will be evaluated at that time.

Two to four weeks before launch, pinniped and bird populations will again be censused. An evaluation of mortality and life history conditions will be made for comparison to similar post-launch evaluations.

At the time of launch, the behavioral responses of pinnipeds and seabirds to any resulting sonic booms will be observed by qualified researchers. Similar observations will be made at the time of Orbiter return. Brown pelicans will be included among the species to be observed, if this can be done without unduly disturbing them.

After launch, important pinniped and seabird populations will again be censused, and surveys of mortality made, for comparison to the corresponding pre-launch data. This will be useful in evaluating the population consequences of Shuttle booms and of any behavioral responses observed at the time of launch.

This process will be repeated one or two times (first two or three launches) until it is evident that the effect of Shuttle sonic booms on the birds and pinnipeds of the Channel Islands is adequately understood. The results of these monitoring efforts will be provided to cognizant federal and state agencies for their review. In case of significant departure from expected environmental effects as reported in this document, the recommendations of these agencies concerning further means to mitigate any unacceptable impacts will be implemented by the Air Force, with the constraints described in Section F.5.1.

A photographic monitoring program of the caliche forest is planned to be conducted during the first launch over San Miguel Island. Only the large scale effects of shuttle sonic booms will be quantifiable due to the continuous small scale events which occur naturally.

In addition to biological and geological monitoring, the sound levels produced on the Channel Islands by the first few Shuttle sonic booms, including the location of the focal region, will be measured in order to validate the overpressure predictions. In addition, sound pressure levels will be measured during the first return flight of the Orbiter to Vandenberg. Measurements have been made of sonic booms resulting from Orbiter returns to Edwards AFB, and from launch of STS-5 from Kennedy Space Center. Similar measurements are planned for the STS-7 launch.

APPENDIX G

Coastal Consistency Determination
Space Shuttle Program
Vandenberg Air Force Base

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Coastal Consistency Determination
Space Shuttle Program
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COASTAL ZONE CONSISTENCY
APPENDIX G

I. BACKGROUND

This Coastal Consistency Determination is being submitted in compliance with the Federal Coastal Zone Management Act of 1972, as amended, Section 307(c)(1) and with Section 930.34 et. seq. of the National Oceanic and Atmospheric Administration (NOAA) Federal Consistency Regulations (15 CFR 930, revised).

This submittal is the latest step in the continuing process of coordination between the U.S. Air Force and the California Coastal Commission which began in 1977, concerning the Space Shuttle Program at Vandenberg Air Force Base. This process has included review of Space Shuttle environmental documents by the Commission staff, meetings between the Air Force and the Commission staff, briefing of the staff by Air Force personnel on details of Space Shuttle projects and potential effects on the coastal zone, review of these projects and potential effects by the Commission staff, and a previous Consistency Determination for some aspects of the Shuttle Program. Highlights are:

- August, 1977. Release of Draft Environmental Impact Statement (EIS) for Space Shuttle Program at Vandenberg AFB.
- November 2, 1977. Submittal of Coastal Commission comments on Draft EIS acknowledging then existing enjoinment from exercising consistency provisions of Coastal Management Act.
- January, 1978. Release of Final EIS.
- September 26, 1978. Letter from Commission to Air Force regarding decision by a U.S. District Court judge approving California's coastal management plan, including Commission's authority to review federal consistency.

- November 6, 1978. Meeting between Commission staff and the Air Force to review proposed Shuttle Program projects, including the Point Arguello Boathouse, and to discuss staff concerns.

- March 20, 1980. Consistency Determination approved for Space Shuttle facilities and activities at Port Hueneme, California. It was understood that this determination would not restrict the alternatives considered for other aspects of the Shuttle Program.

- December 5, 1980. Air Force briefing of Commission staff on marine biology studies at the Point Arguello Boathouse and potential impacts of the ET Landing Facility, historical determination and mitigation for the Boathouse, and studies on the resources of the Northern Channel Islands and potential impacts of Shuttle sonic booms. Discussion of requirements for Consistency Determination.

- February, 1982. Release of the Draft Supplement EIS.

- April 22, 1982. Submission of Commission Comments on Draft Supplement EIS.

- June 9, 1982. Meeting between Commission staff and Air Force concerning means to mitigate impacts to wetlands, dredged areas, and the Northern Channel Islands (sonic boom); and wastewater treatment (deluge water).

In addition, there have been numerous telephone conversations and other types of informal exchanges of information between the Air Force and the Commission staff.

This interaction between the Coastal Commission and the Air Force has been important to the Environmental Impact Analysis Process for the Space Shuttle Program, particularly in identifying significant environmental issues, evaluating alternatives for various actions, and developing measures to mitigate impacts to coastal resources. Many of the special scientific studies that have been conducted to strengthen predictions of the environmental effects of the Shuttle Program, including those on the marine biology of the Boathouse area and on the biota and other resources

of the Northern Channel Islands, have been motivated in part by concerns identified through interaction between the Air Force and the Coastal Commission.

The scope of this Consistency Determination is based on Shuttle activities and environmental issues for which the Commission has expressed concern, and on all other issues which directly affect the coastal zone.

II. PROJECT DESCRIPTION

A. The Space Shuttle Program

The Space Transportation System (STS), or Space Shuttle Program, was conceived and developed to provide practical, long-term use of space, as opposed to the pioneering explorations that have characterized the U.S.'s manned space flight program to date. The Space Shuttle vehicle is a manned, re-usable vehicle designed to transport satellites to and from earth orbit, and to serve as an orbiting laboratory for scientific research.

The purpose of developing a Space Shuttle program at Vandenberg AFB (Figure 1) is to provide the capability, not available from Kennedy Space Center in Florida, of launching payloads into pole-to-pole orbits. Satellites in polar orbit provide perpendicular cover of the entire planet, which is required for defense purposes, weather or earth resources surveillance, communications relay, navigational systems, and other scientific purposes.

The initial launch of the Space Shuttle from Vandenberg is planned for late 1985, with two launches expected in 1986. The annual number of launches will increase to ten by 1988 and remain near that level through 1994. Approximately 80 shuttle launches will take place from Vandenberg.

Development of the Space Shuttle Program at Vandenberg AFB and the Port Hueneme Naval Battalion Center involves the construction or modification of 27 facilities, including facilities for receiving (by sea or land), washing, refurbishing, and storing components of the Shuttle vehicle; roads

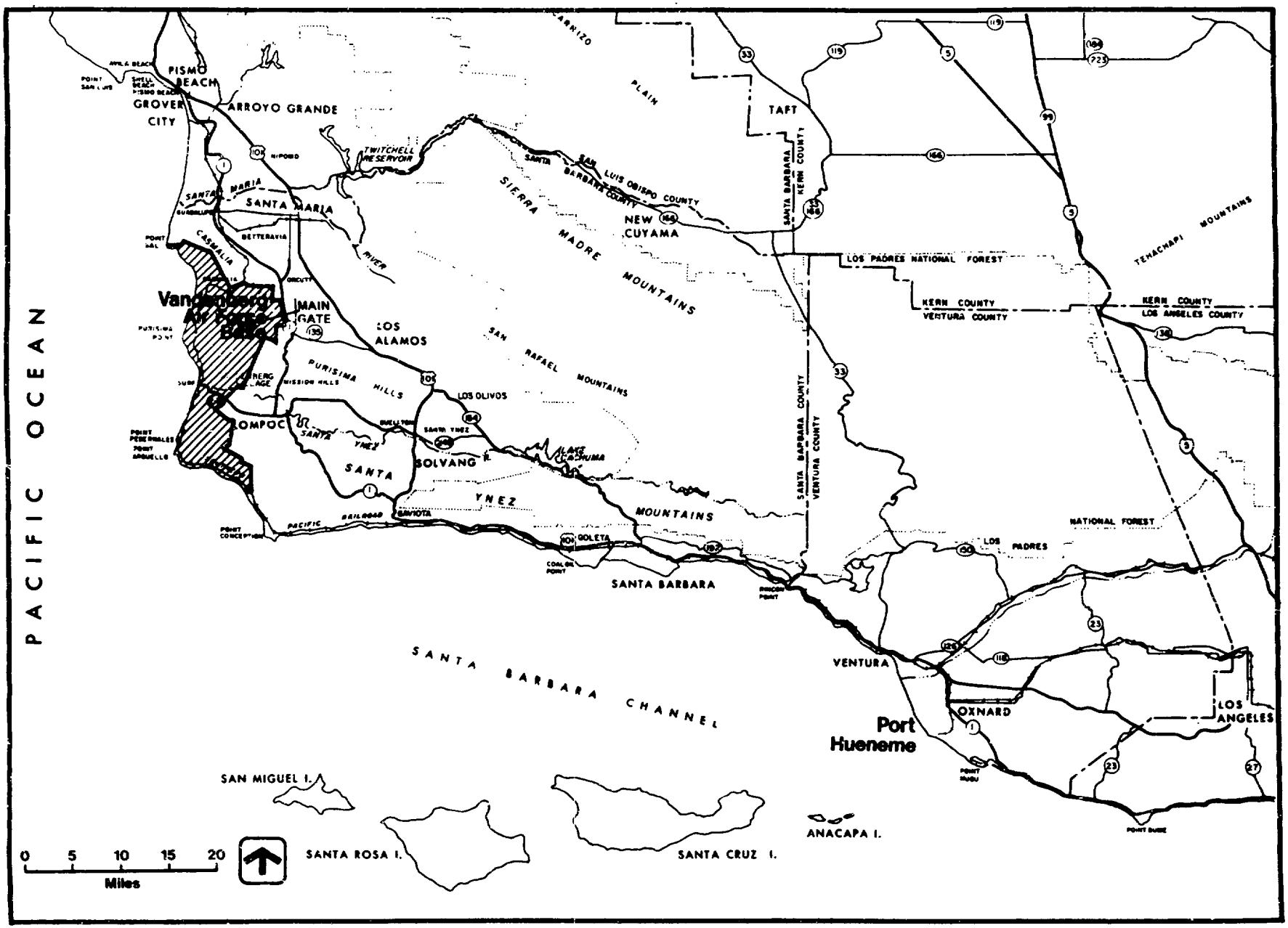


Figure 1. Vicinity map showing Vandenberg Air Force Base and surrounding communities..

for transport of these components; facilities for assembly and launch of the vehicle; and extension of the Vandenberg runway for Shuttle landings.

The Space Shuttle vehicle has three principal components: the Orbiter, the basic transporting vehicle which carries the crew and payload and which is flown back to earth at the end of each mission; the External Tank (ET), the largest component of the vehicle which contains hydrogen and oxygen for the Shuttle's main engines (in the Orbiter) and which is jettisoned into a remote ocean area and not recovered; and the two Solid Rocket Boosters (SRBs), which are attached to the ET to provide additional thrust and which are jettisoned into the ocean shortly after lift-off and recovered for re-use.

The SRBs, after being retrieved, will be towed to Port Hueneme, where they will be disassembled and washed. The fuel casings will be sent by rail to the manufacturer for re-packing with propellant and then returned by rail to Vandenberg AFB. The rest of the SRB components will be sent directly to Vandenberg, where they will be re-assembled, including the fuel casings, and eventually attached to the rest of the vehicle on the launch pad.

A Consistency Determination has been approved for the Shuttle facilities and activities at Port Hueneme. The remaining aspects of the Shuttle Program which affect the coastal zone are described in the next section.

B. Description of Space Shuttle Actions Affecting the Coastal Zone.

This section describes the Space Shuttle facilities and activities that affect the coastal zone. The impacts and mitigations related to these actions are addressed in the Supplement EIS for the Space Shuttle Program at Vandenberg and in Section III.B. of this Consistency Determination.

1. External Tank Landing Facility

The ETs will be transported by barge from the manufacturer in Louisiana, through the Panama Canal, to Vandenberg AFB. The tanks (two per barge) will be brought ashore at the ET Landing Facility, to be built at the site

of a deactivated Coast Guard Rescue Station (Point Arguello Boathouse), located approximately three miles southeast of Point Arguello. The construction of this facility will necessitate the removal of the old boathouse and pier while the administration/ barracks buildings and the garage will be restored. An earth and concrete solid fill pier, approximately 100 ft (30 m) long and 100 ft (30 m) wide will be built at the shore for transferring the ETs to land after the barge is moored to the pier. (Refer to Attachment 1) An area approximately 600 ft (180 m) x 300 ft (90 m) will be dredged to a depth of 12.4 ft (3.7 m) below mean sea level to provide sufficient draft for the barge. Approximately 55,000 cubic yards of material (Monterey shale with less than ten percent sand) will be removed and disposed in 2,100 ft (630 m) of water in the upper reaches of the submarine Arguello Canyon System, 14.4 miles (23.2 km) west of the dredge site. Six 3-pile dolphins will be emplaced in the harbor area for mooring of the barge.

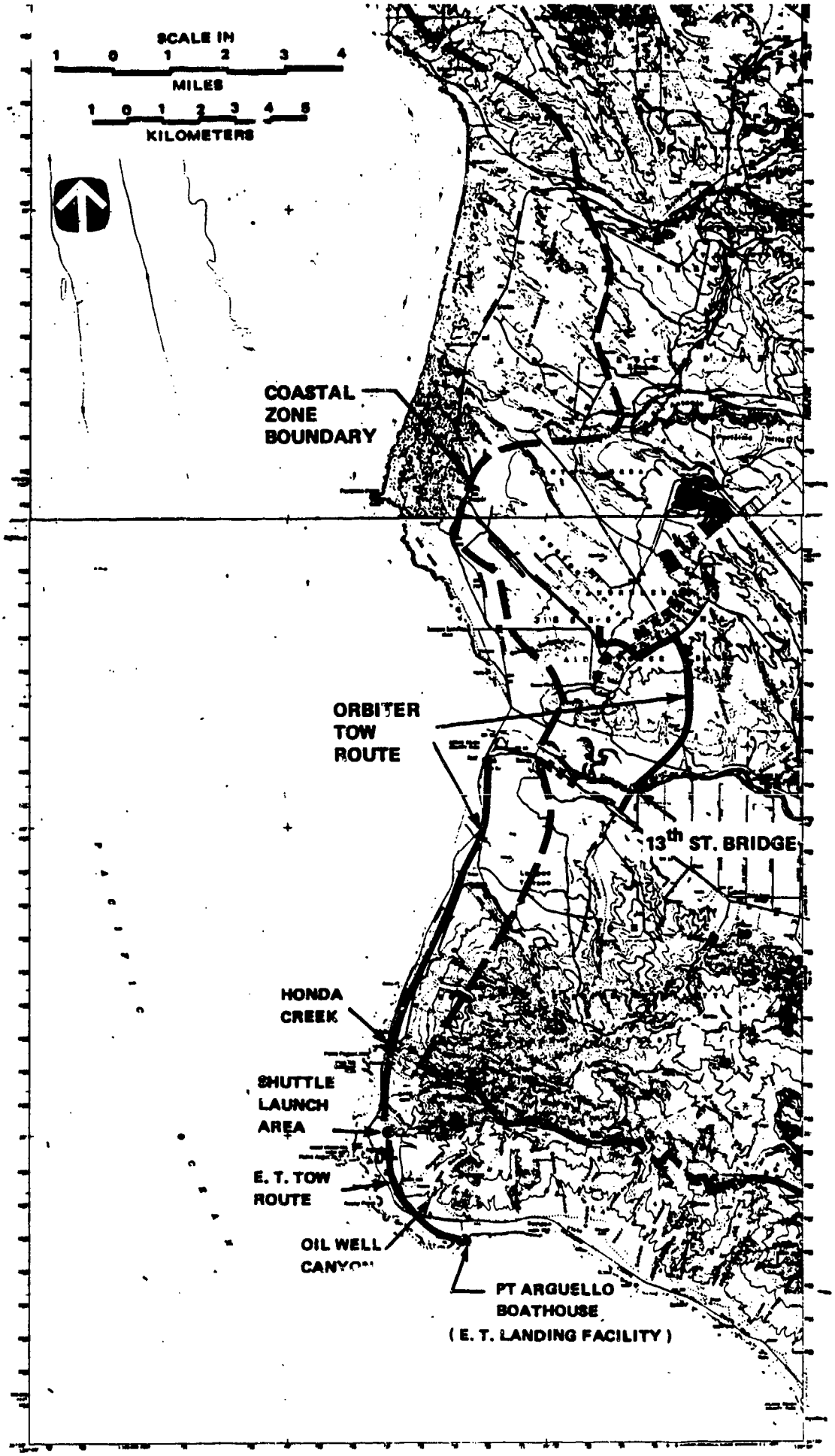
A cut, 200 ft (60 m) wide at the top and 50 ft (15 m) wide at the bottom, will be made in the bluff above the pier to accommodate the road on which the ETs will be towed to the launch site. Approximately 5,000 cu ft (140 cubic meters) of material will be removed for this cut.

2. External Tank Tow Route

Approximately 2 miles (3.2 km) of existing road and 1.2 miles (1.9 km) of new asphalt road will be used for transport of the ETs from the harbor to the launch site vicinity. Construction of the new road will require 10 feet (3 m) of fill (with a box culvert) in a small drainage (Oil Well Canyon), that has been designated as a wetland by the U.S. Fish and Wildlife Service.

3. Orbiter Tow Route

Existing paved roads will be used to transport the Orbiter to the launch site from refurbishment facilities on North Vandenberg. To assure delivery of the Orbiter to the launch site, the 13th Street Bridge cross the Santa Ynez River will be strengthened. This bridge has washed out twice, in 1969



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FIGURE 2 COASTAL FEATURES OF THE SPACE SHUTTLE PROGRAM AT VANDENBERG AFB.

and in 1978. An inverted pyramid of boulders will be sunk to depth of 40 feet (12 m) around each pier, and debris diverters will be added to each pier to protect them from floating debris and debris accumulation during floods. Engineering drawings for these improvements are contained in Attachment 2.

The Orbiter tow route will cross another designated wetland, Honda Creek, on an existing bridge. No modification of this bridge is necessary, and no impacts are expected.

4. Sonic Booms

Following launch, and on return from space to Vandenberg AFB, the Space Shuttle vehicle, like all aircraft moving at supersonic speeds, will produce shock waves called sonic booms. Because of its weight, high speed, and large exhaust plume, the Shuttle on launch will produce more powerful booms than supersonic military aircraft; overpressures of up to 4-6 pounds per square foot are expected. Conventional sonic booms have overpressures in the range of 0.5 - 2 psf. In addition, the pitch-over of the vehicle will cause "focusing" of sonic boom energy in a zone approximately 1,000 feet (300 m) long (uprange-downrange) and 80 miles (128 km) wide at the uprange end of the sonic boom "footprint" on the earth's surface. In this "focal region" overpressures could reach 30 psf. Just downrange of the focal region, the overpressures will drop abruptly to the 4-6 psf range and then diminish steadily downrange as the increasing altitude of the vehicle allows greater attenuation of the shock waves by the atmosphere. Near the end of its return from space, the Orbiter is expected to produce moderate sonic booms on the surface until it reaches subsonic speeds just before landing.

Almost all of the currently scheduled Space Shuttle launches will use launch azimuths greater than 180° (an 180° launch azimuth is due south; larger azimuths are west of south). The sonic boom footprints resulting from launches at azimuths greater than 180° will occur over the open water of the Pacific Ocean. A maximum of seven launches over the 10-year period from 1985 to 1994, however, are scheduled at azimuths between 180° and

147.5°. Footprints from launches near the 150° azimuth are expected to impinge on the Northern Channel Islands with the following probabilities:

Location	Probability	Location	Probability
San Miguel	86%	Anacapa	98%
Santa Rosa	100%	All Islands Together	100%
Santa Cruz	100%		

The islands are expected to be within the focal region of these footprints (near 150°) with these probabilities:

Location	Probability	Location	Probability
San Miguel	81%	Anacapa	0%
Santa Rosa	15%	All Islands Together	96%
Santa Cruz	8%		

Expected sonic booms footprints for typical launch azimuths of 150°, 180° and 193° are contained in Attachment 3.

The area six nautical miles (11 km) surrounding San Miguel, Santa Rosa, Anacapa, Santa Cruz, and Santa Barbara Islands has been designated as a National Marine Sanctuary. These five islands form the Channel Islands National Park.

On each end-of-mission return to Vandenberg, the Orbiter is expected to produce moderate booms over San Miguel Island (1.0 - 1.5 psf) and Santa Rosa Island (0.5 - 1.0 psf), while Santa Cruz and Anacapa Islands should be unaffected.

San Miguel Island is the largest marine mammal and seabird rookery site on the west coast of the U.S. This island also contains a "forest" of caliche, a type of plant fossil also called rhizoconcretions. Anacapa Island is the site of the only sizable west coast nesting colony of the brown pelican, an endangered species.

All the Northern Channel Islands will experience a maximum of seven moderate sonic booms from Shuttle launches over a 10-year period. A maximum of seven high-magnitude, focused sonic booms will occur over San Miguel Island during this period, while only one or two are likely over Santa Rosa Island. Santa Cruz and especially Anacapa Islands should not experience focused booms. In addition, San Miguel and Santa Rosa will experience mild booms from Orbiter return approximately every four to five weeks for most years of the program, and less frequently from 1985 through 1987.

It is important to remember that this is a "worst-case" analysis of Shuttle-generated sonic booms. Because some of the seven launches will probably be at azimuths closer to 180° than to 150°, there may well be fewer focused sonic booms produced over the Northern Channel Islands than discussed above.

III. CONSISTENCY DETERMINATION

A. Statement of Determination

In accordance with the Federal Coastal Zone Management Act of 1972, as amended, the Air Force has determined that the Space Shuttle Program at Vandenberg Air Force Base is consistent to the maximum extent practicable with the California Coastal Act of 1976, as amended. Compliance of the project with specific applicable provisions of the Act is described below.

B. Compliance with Provisions of the California Coastal Act

1. Chapter 3. Coastal Resources Planning and Management Policies

Article 2. Public Access

Section 30210--Access; recreational opportunities; posting

"In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse. (Amended by Ch. 1075, Stats. 1978)."

Unlimited public beach access has, in the past, been provided on south Vandenberg AFB via Ocean Beach County Park south 3.5 miles (5.6 km). Public access to Ocean Beach County Park from Highway 246 is conspicuously posted at the junction with Cabrillo Highway (Figure 3). In response to Coastal Commission concerns for maintaining recreational access to beaches along Vandenbergs' coastline consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse, Vandenberg AFB has granted additional unlimited lateral beach access at two locations.

One area of additional lateral access extends north from Jalama Beach County Park to a natural rock outcropping barrier approximately one mile (1.6 km). Public access to Jalama Beach County Park from Jalama Road is conspicuously posted at the junction with Highway 1 (Figure 3). A portion of the second area includes a one-half mile (0.8 km) stretch of beach between Surf and the Santa Ynez River Mouth. The remainder of the second area extends from the Santa Ynez River Mouth to a natural rock outcropping barrier approximately one mile north (1.6 km). Public access to these areas is officially recognized in the latest revision of Vandenberg AFB Regulation 126.1. The additional two and one-half miles (4.0 km) of new access is granted to the beach area only. Upland access to the base is strictly prohibited for national and military security needs as discussed in Sections 30212 and 30214.

Restricted public access is also granted by VAFBR 126-1 on north Vandenberg AFB from Purisima Point south 3.5 miles (5.6 km) to approximately one mile north of the Santa Ynez River Mouth. Public beach access in this area is limited by reservations for weekends and holidays via the 13th Street Gate

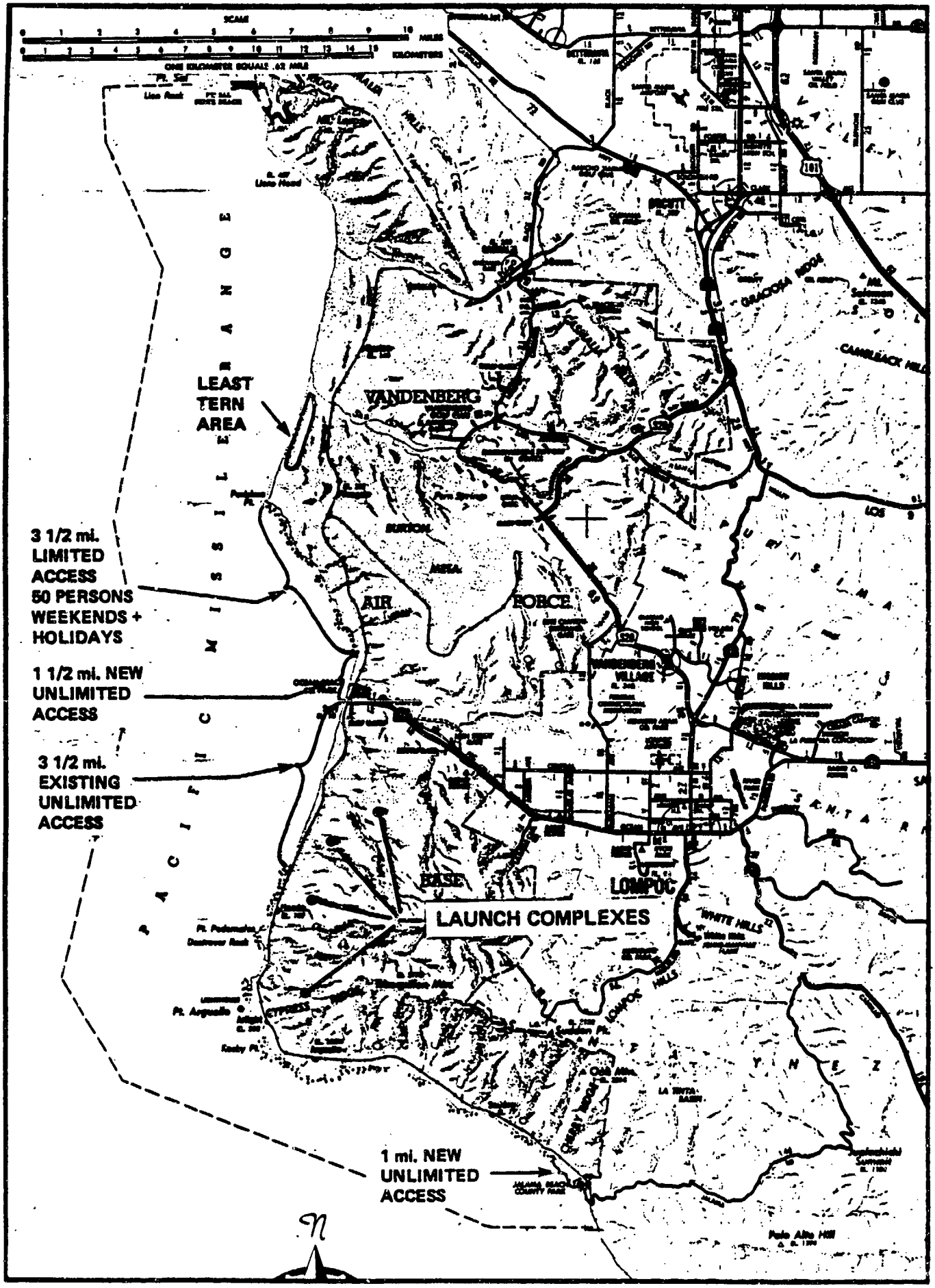


FIGURE 3 COASTAL ACCESS AT VANDENBERG AFB

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north of Highway 246. Fifty passes good for the entire weekend or holiday period are provided on a first come first served basis. Natural rock outcropping barriers and government property signs conspicuously delineate this restricted beach area.

The open and restricted areas of public beach access include a total of nine and one-half miles (15.3 km) of Vandenberg's shoreline that will routinely be open to the public (Figure 3). In addition, other areas on Vandenberg AFB, including sensitive habitats, are accessible upon request for scientific and eductional purposes. The increased access provided will reduce the demand impacts resulting from the Space Shuttle Program on public beaches in the local area. In addition, Vandenberg AFB does provide other outdoor recreation facilities and lands owned by the Air Force in order to satisfy a portion of the recreation needs of military personnel as discussed in Section 30252.

Section 30211--Development not to interfere with access.

"Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.

The Space Shuttle Program developments will not interfere with the public's right of access to the sea acquired by use or legislative authorization.

Section 30212--New development projects; provisions for access; exceptions.

"(a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where (1) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources, (2) adequate access exists nearby, or (3) agriculture would be adversely affected. Dedicated accessway shall not be required to be opened to public use until a public agency or private association agrees to accept responsibility for maintenance and liability of the accessway."

"(c) Nothing in this division shall restrict public access nor shall it excuse the performance of duties and responsibilities of public agencies which are required by Sections 66478.1 to 66478.14, inclusive, of the

Government Code and by Section 4 of Article X of the California Constitution."

Restricted public access is provided in accordance with Section 30212(1). Lateral access with respect to beach areas identified above is by foot only. Using these areas for entrance to upland or inland areas of the base is strictly prohibited for national and military security needs. The Atlas, Titan, and the Space Shuttle vehicles and related instruments located on Vandenberg are all vulnerable to a rifle shot. Military security experts have concluded that random public access to these areas is an open invitation to foreign agents and saboteurs. The security considerations are important because they constitute the only protection the United States has for its many unique resources located on Vandenberg AFB. Whenever possible, the base has taken every measure to facilitate public access to the beaches along Vandenberg's shoreline by providing public access to Ocean Beach and Jalama Beach County Parks, to Vandenberg's beaches through security police access points on a reservation basis, and by allowing the public in general to travel over base roads in one area of the base to reach the state beach at Point Sal (see Figure 3). Further access would the not allow Air Force to maintain minimal levels of security.

Lateral public access is also rigidly controlled for public safety. Credible missile-related risks exist in the beach area at various times between Ocean Beach and Jalama Beach County Parks including debris impacts as well as firebrand, acoustic, and toxic products. Public access, as indicated above, provides for positive control and evacuation means that include accountability of persons using these areas. Positive accountability and evacuation are necessary for public safety during certain launches. Because these areas dedicated to public access are defined by natural physical barriers, the Air Force can achieve more efficient evacuation prior to launches.

In addition, at various times scientific research and educational groups take advantage of the undisturbed nature and sensitive wildlife habitats preserved along Vandenberg's coastline (Figure 3) Any changes in beach access other than those described would significantly threaten endangered

species and sensitive habitats which have been preserved on Vandenberg's coastline in cooperation with the California Department of Fish and Game. The Air Force has taken these additional measures in order to maximize beach access while protecting military mission and natural resource protection programs. Due to location of shore access roads (Figure 3), any further additions to existing access policy would necessitate public access to large areas of the Base and impose an increased threat to habitats of endangered species.

Section 30212.5--Public facilities distribution.

"Wherever appropriate and feasible, public facilities, including parking areas or facilities, shall be distributed throughout an area so as to mitigate against the impacts, social and otherwise, of overcrowding or overuse by the public of any single area."

Public beach facilities adjacent to Vandenberg AFB include those at Ocean Beach and Jalama Beach County Parks. According to the 1981 California Coastal Access Guide, Ocean Beach County Park consists of a 28-acre (11.3 ha) unimproved park on a broad beach area. Facilities include parking, picnic tables, barbecue fire pits, and pit tolets. Jalama Beach County Park, according to the Commission's Coastal Access Guide, also consists of a 28-acre (11.3 ha) improved park on a broad beach area with coastal bluffs north of Point Conception. Facilities include parking, restrooms, 120 campsites, picnic tables, barbecue fire pits, hiking and equestrian trails, boating and fishing facilities, convenience store and snack stand, as well as facilities for the disabled. The provision of public facilities on south Vandenberg coastline are distributed in a manner to reduce potential impacts of overcrowding and over use by the public of any single area, as discussed in Section 30250.

Section 30213--Development of facilities; low cost housing; preferences.

"Lower cost visitor and recreational facilities shall be protected, encouraged, and where feasible, provided. Developments providing public recreational opportunities are preferred."

Vandenberg AFB, by allowing lateral access from local county parks, provides for additional low cost recreational opportunities. These areas are encouraged, provided and protected as noted in the Section 30210, 30211, 30212 and 30212.5 above. An entrance and parking fee is currently charged at Jalama Beach County with free access provided at Ocean Beach County Park.

Section 30214--Public access policies; implementation.

"(a) The public access policies of this article shall be implemented in a manner that takes into account the need to regulate the time, place, and manner of public access depending on the facts and circumstances in each case... (b) It is the intent of the Legislature that the public access policies of this article be carried out in a reasonable manner that considers the equities and that balances the rights of the individual property owner with the public's constitutional right of access, pursuant to Section 4 of Article X of the California Constitution. Nothing in this section or any amendment thereto shall be construed as a limitation on the rights guaranteed to the public under Section 4 of Article X of the California Constitution. (c) In carrying out the public access policies of this article, the commission, regional commissions, and any other responsible public agency shall consider and encourage the utilization of innovative access management techniques, including, but not limited to, agreements with private organizations which would minimize management costs and encourage the use of volunteer programs. (Amended by Ch. 919, Stats. 1979)."

Public access policy provisions in Article 2 of the California Coastal Act have been encouraged and implemented to the maximum extent possible. Vandenberg AFB Regulation 126-1 of 2 August 1982 and the amendment currently being prepared, establishes official policy, procedures, and responsibilities with respect to public access policies of this Article as discussed above.

Article 3. Recreation

Section 30220--Protection of certain water-oriented Activities.

"Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses."

Vandenberg AFB provides additional water-oriented recreational activity area. The additional public access and increased lateral beach use area ensures, encourages and protects unique coastal areas for both passive and active recreational activities including sightseeing, hiking, biking, fishing, and picnicking, as well as related scientific and educational activities. Due to the presence of strong rip tide currents and other dangerous conditions discussed in Section 30224, beaches along Vandenberg's coastline are considered unsafe for swimming and surfing. Accordingly, on beach areas to which Air Force allows access, swimming and surfing are prohibited. In the interest of public safety, beach activities on Vandenberg are monitored.

Section 30224--Recreational boating use; encouragement.

"Increased recreational boating use of coastal waters shall be encouraged, in accordance with this division, by developing dry storage areas, increasing public launching facilities, providing additional berthing space in existing harbors, limiting non-water-dependent land uses that congest access corridors and preclude boating support facilities, harbors of refuge, and by providing for new boating facilities in natural harbors, new protected water areas, and in areas dredged from dry land."

Although there is no marina development at Vandenberg, some private fishing and recreational boats from San Luis Obispo and Santa Barbara visit the area. Recreational boating use of coastal waters will not be impacted except during launches. Notice of a possible launch is posted in various ports and in the Notice to Mariners. On occasions that vessels are noted in the danger zone for a particular launch, the base will send helicopters to notify the boat by loudspeaker and will attempt to notify by ship to shore communications for dispersal from the area during a launch. The probability of damage to vessels is considered to be small, but the Air Force attempts to reduce this risk by excluding vessels from the area during times of launches.

The Boathouse ET Landing facility was designed for limited use and was not intended for use as a recreational boating area. The shallow draft barge requirements of the ET landing area, prevalent fogs, rough water conditions, and dangerous tidal rock outcroppings surrounding Point Arguello

preclude it from consideration for a safe harbor facility. In the past, the Point Arguello Boathouse has been considered as a harbor of refuge. Temporary tie up for mariner emergencies and severe storm weather conditions will continue to be permitted.

Article 4. Marine Environment

Section 30230--Marine resources; maintenance.

"Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and eductional purposes."

Section 30231--Biological productivity; wastewater.

"The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alternation of natural streams."

As a result of concern about the potential for Space Shuttle sonic booms to impact marine mammals and seabirds of the Northern Channel Islands, the Air Force contracted with the Center for Regional Environmental Studies, San Diego State University (SDSU) to conduct the necessary studies and assess the potential for impacts. The studies were conducted by scientists from SDSU, Hubbs/Sea World Research Institute, UCLA, and other institutions. These studies were reviewed by an independent committee of experts and are public documents (see Attachment 3).

The results of these studies indicated that the likelihood of Shuttle booms having adverse impacts on pinnipeds and seabird populations on the Northern Channel Islands was low. Available data and new field and laboratory studies indicated that Shuttle booms would add little to the level of disturbance on the islands and are unlikely to cause mortality of seabird eggs or

chicks, serious startling of seabirds, impacts on brown pelicans, physiological disruption in pinnipeds, or significant mortality in pinniped populations. For more detailed discussion of these studies and their findings, refer to Attachment 3.

In spite of the strong indications of no significant impact of sonic booms on Channel Island biological resources, the Air Force will sponsor a monitoring program to verify the predictions contained in the studies.

Concern has been expressed over the adequacy of sonic boom monitoring for San Miguel Island. The monitoring program now more fully addresses potential effects to pinniped and avian populations on the island.

At the present time the first scheduled launch that could potentially affect San Miguel does not occur during the most sensitive time period for pinniped and avian breeding activities, May through July. This will allow biological impacts to be monitored during a period when the potential for adverse impacts to these animals is low.

Sonic booms produced by the Orbiter on landing approach have been measured at Edwards AFB, and measurements have conformed closely to model predictions. Sonic boom ascent measurements have been made for Kennedy Space Center launch STS-5 and will be made for STS-6 to determine the characteristics of the focused sonic booms and to verify model predictions for launch booms. Even if measured sonic boom levels are similar to those predicted, biological impacts will still be verified by monitoring wildlife responses during the initial launches over the Channel Islands.

Further analysis has been made of proposed launch azimuths and the use of "Dog-Leg" trajectories. While each launch must be individually considered as to the mission's requirements, all reasonable attempts will be made to adjust the launch in order to avoid potential major disturbance to San Miguel Island.

In the unlikely event that the results of the initial launch monitoring indicate that the impacts to the Channel Islands are extremely adverse or could result in an unacceptable or catastrophic impact, the following restrictions will be implemented within mission constraints:

Current mission plans will be reviewed and scheduled launch dates, azimuths, and/or ascent trajectories may be modified. Mission requirements will dictate the degree of modification, if any, to be made. Future mission planning will use the rules described below before assigning specific launch dates to a particular mission.

During the months of May through July launch azimuths near 150° (or those affecting San Miguel) will not be planned for use by any DOD/NASA/Commercial STS mission launches from (Vandenberg Launch Site VLS). If the required orbital parameters are such that a prohibited launch azimuth would be necessary, the use of a "Dog Leg" maneuver will be considered to avoid impacting the Channel Islands in the area of the prohibited azimuths.

However, there are mission problems associated with using the Dog Leg. For example, to launch on a 180° azimuth (90° inclination that avoids overflying the islands) and then rotating to 150° azimuth (a 63.4° desired inclination requiring launching over the island directly) would result in a 20,000 pound payload restriction; this could mean a 2/3 loss for payload weight. For each degree change there is a loss of roughly 640 pounds of payload capability. Minor adjustments for inclinations and azimuths can be made with some losses in weight capability, but such flexibility may be limited with payloads that are performance critical.

Shuttle performance, and range safety concerns must all be weighed before accepting a Dog Leg maneuver to mitigate impacts to the Channel Islands. External tanks (ET) must be jettisoned into the ocean. With Dog Leg maneuvers there are potential problems with dropping these tanks in certain designated areas.

Some Shuttle Flights may necessitate Dog Leg maneuvers to satisfy mission requirements, and hence, any further maneuvering could degrade the Shuttle's ability to safely achieve orbit. Other range safety concerns that must be evaluated for all maneuvers are: debris footprints, SRB (Solid Rocket Boosters) impact areas, and ET impact areas.

If the mission is performance-critical such that a Dog Leg is not feasible, every other possible avenue of rescheduling the mission to a less critical seasonal window will be explored before accepting impacts to the Channel Islands. No mission which violates this ground rule will be scheduled without consultation on the impacts with the Environmental Planning Function at Space Division. The Space Division Environmental Planning Function will maintain close liaison with the Federal and State agencies as well as staying current on the Channel Island biological conditions to assure timely environmental information is used during mission planning.

Even in the unlikely event that a launch is necessary over the Northern Channel Islands during the sensitive period (May through July), field tests using simulated sonic booms indicated that Shuttle booms will not cause mother-pup separation, increase pup mortality, or result in pup trampling (see Attachment 3).

The procedures for monitoring the biological effects on the islands is being developed by San Diego State University and Hubbs/Sea World Research Institute. The proposed system is outlined below:

1981 to the Spring before first Channel Island launch

- Census pinniped populations
- Obtain measurements of focused sonic boom during launch at Kennedy Space Center
- Measure sonic boom levels on islands during first return to Vandenberg
- Observe behavior of birds and pinnipeds during return flights
- Census of birds not recommended

The Spring before first Channel Island launch:

- Survey for breeding peregrine falcons

2-4 weeks before first launch over Channel Islands

- Population census of pinnipeds
- Population estimates of birds
- Mortality data, for comparison with post-launch mortality

During first launch over Channel Islands:

- Measure sound on San Miguel and Anacapa Islands
- Determine location and extent of focusing track
- Observe behavior of birds and pinnipeds

Post-Launch:

- Population censuses
- Mortality surveys
- Repeat 3 weeks later
- Observe behavioral changes or disorientation
- Analyze data and verify assessment
- Evaluate need for mitigations

Federal and State regulatory agencies as well as selected elements of the scientific community (i.e., The Department of the Interior, National Marine Fisheries Service, Marine Mammal Commission, California Coastal Commission, California Fish and Game, the Santa Barbara Museum of Natural History and other advisors from the aerospace community) will be asked to review and comment on the plan. Overall monitoring will be accomplished by the San Diego State University and Hubbs/Sea World Research Institute. Scientists from Federal and State agencies may participate in the monitoring and observations to the extent allowable by safety and security requirements for the specific launch. Agencies involved in reviewing the plan will also be asked to review and comment on the results of the monitoring effort. Their recommendations will be considered in establishing future requirements to mitigate unacceptable impacts.

As outlined in 50 CFR 228.4(a)(3) & (4), the Marine Mammal Protection Act requires a permit be issued by the National Marine Fisheries Service for the incidental taking (including harrassment) of marine mammals. The Air Force is currently considering the appropriateness of this permit for the Space Shuttle Program and collecting the data needed for the permit. The plan developed for monitoring the effects of Shuttle sonic booms on pinnipeds will satisfy the requirements of the permit.

The Coastal Commission staff has expressed concern over the loss of intertidal habitat and the potential loss of a harbor seal hauling out area resulting from the dredging operation for the External Tank Landing facility at the Boathouse.

The 2.2 acres (0.9 ha) to be disturbed by the dredging operation and the 0.4 acres (0.2 ha) which will be disturbed by dock construction should be considered to be less valuable than adjacent areas by virtue of the previously disturbed condition of these two areas. Studies performed by Chambers Consultants and Planners indicate that the biota is richer, more varied, and less disturbed directly to the east of the proposed dredge site. Further, the proposed site optimizes the benefits of the existing breakwater and eliminates a necessity to build extensive new protection devices for the harbor, an action which would result in additional disturbance to the intertidal and nearshore environments. It is therefore felt that the least environmentally damaging location has been chosen. In addition, plans have been made to alleviate some of the potential adverse impacts by establishing a kelp forest within the harbor area (refer to Section 30233).

Areas to both the east and west of the existing breakwater may be used for hauling out by harbor seals. These areas have received only semi-regular use by six or more individuals, and are not considered to be critical use areas. Disturbance to animals utilizing areas adjacent to the boathouse will be limited to the construction period and to periods of human activity related to ET and SRB recovery. Harbor seals have shown resilience to human disturbances by adjusting their hauling out behavior to avoid periods of human activity and, in the case of more extreme disturbances, have moved

to areas further away. Suitable hauling out areas do exist in proximity to the boathouse. A major hauling out area utilized continually by about 150 individuals is present at Point Conception.

It is not anticipated that the ground water supply will be depleted by this project. Please refer to the discussion under Section 30250 regarding the use of water by the Shuttle program.

Domestic wastewaters will be discharged to an existing sanitary sewer or treatment facility. For a discussion of hazardous waste treatment plans refer to Section 30232 below.

Section 30232: Oil and hazardous substance spills

"Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that occur."

Protection from the accidental spillage of oil, gas, petroleum products or other hazardous substances is provided for in the Vandenberg AFB Spill Prevention Control and Countermeasures (SPCC) Plan, Vandenberg AFB Draft Toxic and Hazardous Waste Management Operations Plan, and in the Vandenberg Oil and Hazardous Substance Pollution Contingency Plan (OHSPC). (see Attachment 4.) Further protection is afforded by the requirement that construction constractors must have oil spill contingency plans in place prior to construction.

The contract to design the wastewater (deluge water) treatment system for the launch pad is presently out for bid. Design criteria for treatment methodology has been reviewed by the Regional Water Quality Control Board, the U.S. EPA, and the California Department of Health Services, and meets the standards established by these agencies. Other hazardous wastes generated by the Shuttle Program will be disposed of off base.

During Space Shuttle launches, the Vandenberg AFB Commander will advise the oil industry of the need to evacuate oil platforms considered to be at risk from the launch. According to oil industry representatives, prior to evaluation of a platform, the wellbore will be closed and capped, and the

There are numerous areas, various beaches and coastal related recreation facilities on Vandenberg AFB which the military has access to that reduce the pressure for off-base recreational facilities demand. The Space Shuttle Program accounts for only a relatively small portion of Vandenberg AFB's total recreational demand. To reduce the recreational needs and related access impacts from the Space Shuttle Program, the Air Force has enhanced public access to the coast by providing additional beach access and recreational opportunities as described in Sections 30210, 30211, 30212, 30212.5, 30213, 30214, 30220, 30221, and 30224 above.

Section 30253 (3) Consistency with Local and State Air Pollution Jurisdictions

"New development shall:...

(3) Be consistent with requirements imposed by an air pollution control district or the State Air Resources Control Board as to each particular development."

The Space Shuttle Project has been found to be consistent with requirements imposed by the Santa Barbara Air Pollution Control District, and the California Air Resources Board. Please refer to the discussion under Section 30414 for details of air monitoring programs.

Section 30254--Public works facilities

"New or expanded public works facilities shall be designed and limited to accommodate needs generated by development or uses permitted consistent with the provisions of this division; provided, however, that it is the intent of the Legislature that State Highway Route 1 in rural areas of the coastal zone remain a scenic two-land road. Special districts shall not be formed or expanded except where assessment for, and provision of, the service would not induce new development inconsistent with this division. Where existing or planned public works facilities can accommodate only a limited amount of new development, services to coastal dependent land use, essential public services and basic industries vital to the economic health of the region, state, or nation, public recreation, commercial recreeation, and visitor-serving land uses shall not be precluded by other development."

The cummulative effects of the Space Shuttle Program and other Vandenberg

AFB related projects will result in increased demands for various public services such as education, water, wastewater treatment, public health, and safety services. The Space Shuttle Program will not require direct expansion or preclude essential public works facilities. Existing educational facilities in the Vandenberg AFB region are currently operating below capacity. For additional discussion see sections on water, wastewater treatment, public access, recreation, and development.

2. Chapter 5, State Agencies

Article 2. State Agencies

Section 30414 State Air Resources Board and Local Air Pollution Control Districts.

"(a) The State Air Resources Board and local air pollution control districts established pursuant to state law and consistent with requirements of federal law are the principal public agencies responsible for the establishment of ambient air quality and emission standards and air pollution control programs. Neither the commission nor any regional commission shall modify any ambient air quality or emission standard established by the State Air Resources Board or any local air pollution control district in establishing ambient air quality or emission standards. (b) The State Air Resources Board and any local air pollution control district may recommend ways in which actions of the commission or any regional commission can complement or assist in the implementation of established air quality programs."

An air pollutant emissions inventory and an Air Quality Impact Analysis (AQIA) for the Space Shuttle Program have been completed and approved by the Santa Barbara County Air Pollution Control District (SBAPCD), the California Air Resources Board (CARB), and the EPA. These analyses included expected vehicle exhausts. An air quality monitoring program for criteria pollutants with two stations on VAFB and one in Lompoc is planned as part of the County's overall basin monitoring system. One of the stations on VAFB is already in operation. These Vandenberg Air Monitoring Stations (VAMS) are owned by the Air Force, and will be operated by the SBAPCD, with the data archived by the CARB. In addition, a launch-specific monitoring program is currently being developed to enable launch emissions

to be analyzed. Vandenberg's efforts to assure compliance with Air Pollution Directives were recently praised by Mr. John English, Director of the Santa Barbara County Air Pollution Control District (see Attachment 8).

3. Chapter 7. Development Controls

Article 1. General Provisions

Section 30607.1 Wetlands Dike and Fill Development; Mitigation Measures.

"Where any dike and fill development is permitted in wetlands in conformity with this division, mitigation measures shall include, at a minimum, either acquisition of equivalent areas of equal or greater biological productivity or opening up equivalent areas to tidal action; provided, however, that if no appropriate restoration site is available, an in-lieu fee sufficient to provide an area of equivalent productive value or surface areas shall be dedicated to an appropriate public agency, or such replacement site shall be purchased before the dike or fill development may proceed."

Mitigation measures proposed under the Section 30233 discussion do not specifically address the Section 30607.1 requirement to compensate the permanent habitat losses associated primarily with the dredging operation. However, the plans do include enhancement of the kelp habitat within the harbor. The suggestion of utilizing the dredge material to construct an artificial reef was discussed as a mitigation for permanent habitat loss. However, the Air Force, in consultation with the California Department of Fish and Game and the Army Corps of Engineers, has decided that there will be an insufficient quantity of suitable material to construct such a reef. Minutes of meetings where these topics were discussed may be found in Attachment 5.

There will be very little destruction of valuable wetland habitats as a result of the proposed action. Most of the construction activities associated with wetlands involve stabilization of drainage systems into the wetland (or canyon). In general, interference with natural drainage systems has been minimized through designs which utilize existing drainage patterns to the maximum extent and, where possible, avoidance of temporary

interference during construction. In most cases, the contractor has been required to maintain existing drainage patterns.

The wetlands potentially impacted by the Shuttle program were visited and examined by Mr. James Davis, a wetlands expert with the California Department of Fish and Game. The Department's analysis of the likely impacts to these areas and their recommended mitigations are contained in the letter in Attachment 9. The discussion below of measures for mitigating impacts to wetlands is based to a large extent on the Fish and Game Department's analysis.

There are three wetland crossings associated with the tow route: Oil Well Canyon, Honda Creek; and Santa Ynez River. Oil Well Canyon at the proposed crossing location is a minor drainage system which only has water during the rainy season and supports no wetland or riparian vegetation. Long-term grazing by cattle has degraded this canyon to the extent that it no longer provides wetland habitat. Impacts associated with the fill and culvert crossing will, therefore, be minimal. Side slopes will be revegetated with native and other erosion resistant species to enhance stability and decrease erosion potential.

The tow route spans Honda Creek at its mouth. Since the existing earthen bridge and culverts will be used, the crossing is expected to have minimal impacts. No material from the proposed cuts on either side of the bridge will be placed on the stream banks or allowed to enter the creek. Side slopes will be revegetated with native species.

At the 13th Street Bridge the Santa Ynez River is a low-flow perennial stream with a flat profile. During the rainy season, heavy runoff is channeled down river carrying all the debris and growth from upstream areas. This debris washes down to the 13th Street bridge, where it either passes under or piles up against the footing of one or more of the eight piers. In January of 19[illegible] this condition occurred and caused flooding and subsequent damage to the south abutment and approach to the bridge. For obvious reasons the Air Force is concerned about the structural integrity of the bridge during the flood season. Loss of the bridge during Shuttle operations could seriously endanger Air Force missions, since this bridge

is the only passage over the Santa Ynez River suitable for Orbiter transport. Plans have been made to strengthen the bridge and construct debris diverters at the base of the piers to protect the bridge during peak flows. The construction specifications are included in Attachment 2. These activities will not alter existing hydrologic features of the river, or result in the removal of any floodplain or wetland areas. There will be a temporary loss of riparian vegetation and a short-term increase in localized erosion and turbidity. Mitigation measures include scheduling the construction work in the floodplain during the dry season. This will reduce increased sediment loads downstream resulting from erosion adjacent to the construction area. Temporary water quality degradation will have insignificant effects on Santa Ynez River biology.

The following are some of the prescribed construction mitigation measures which have been taken or will be taken to avoid adverse impacts to wetlands, streams and groundwater basins. Mitigation measures are incorporated into contract specifications to which the contractor must adhere.

- Design and construction shall be planned and implemented for accident prevention and containment.
- All practical methods shall be used in design to prevent environmental pollution.
- The Construction Contractor shall not locate temporary facilities or perform construction operations, within areas designated as environmentally significant. (Such areas include wetlands.) Further, such facilities, installations and operations shall not be located or performed such that environmentally significant areas are degraded.
- The construction and operating contractors shall institute adequate measures for storage and disposal of debris and other waste products. Storage and disposal of debris shall be in accordance with applicable codes.
- Interference with natural drainage systems shall be minimized through design which utilizes existing drainage patterns to the maximum extent and, where possible, avoidance of temporary interference during construction.

- Upon completion of construction, the nonoperational site area shall be returned to its preconstruction state including:
  1) Preservation of natural drainage channel;
  2) Removal and/or replacement of excavated material;
  3) Resloping and grading, etc.;
  4) Revegetation with natural or non-competative species.

ATTACHMENTS

ATTACHMENT 1

CORPS OF ENGINEERS DREDGING PERMIT

(Refer to Appendix H, Permits and Entitlements)

ATTACHMENT 2

ENGINEERING DRAWINGS FOR IMPROVEMENTS
TO 13TH STREET BRIDGE

(Refer to Appendix H, Permits and Entitlements)

ATTACHMENT 3

SUMMARY ASSESSMENT OF SONIC BOOM IMPACT

(Refer to Appendix F)

ATTACHMENT 4

VANDENBERG AFB SPILL PREVENTION CONTROL
AND COUNTERMEASURES PLAN

VANDENBERG AFB TOXIC AND HAZARDOUS WASTE
MANAGEMENT OPERATIONS PLAN (DRAFT)

VANDENBERG AFB OIL AND HAZARDOUS
SUBSTANCE POLLUTION CONTINGENCY
PLAN (OHSPC)

(Available for public review at the 4392nd
Aerospace Group, Vandenberg AFB.)

ATTACHMENT 5

MINUTES OF MEETINGS CONCERNING IMPACTS
AND MITIGATIONS FOR DREDGING AT E.T. LANDING FACILITY

F/o [redacted]

1313-17-4-1-1

SPKED-M

LRT/mjh
11 March 1982

CONFERENCE MINUTES

SUBJECT: STS, V-33 Harbor and Towroute, Vandenberg AFB, CA.

1. A conference to discuss dredging operations and disposal of dredge material for subject project, was held on 8 March 1982, at the Los Angeles District Corps of Engineers Office. Inclosure 1 is a list of the personnel who attended.

2. Mr. Turnbeaugh began the conference by explaining that the intent of the meeting was to:

a. Determine a disposal site for the dredge material and to examine alternatives available.

b. Determine what permits are required and the process for acquiring these permits.

He continued by pointing out that the current design schedule indicates the project to be complete and "Ready to Advertise" by 14 May 1982.

3. A supplement to Foundation Report dated 17 December 1981, was distributed to the attendees which indicates "Monterey shale with chert stringers" was found in the three borings in the Harbor area. The project will consist of approximately 50,000 cys of material. The following discussion generated:

a. Artificial Reef Concept Using Dredge Material:

(1) The material indicated in the borings may not be suitable for an artificial reef. Mr. Wilson, California Fish & Game, stated that the material should be a minimum of 1 1/2 foot in diameter to attract marine life (not all material would have to be this large but at least more than half).

(2) The reef concept would need to be approved by EPA.

(3) It may be possible to obtain a dredge sample and simulate the disposal operations to determine how the material would form to construct a reef. The California Department of Fish and Game and the Environmental Branch of the Los Angeles Corps will coordinate the test. Mr. Turnbeaugh will coordinate with Bellmer (LA Corps) when they decide to proceed with the test for funding requirements.

b. Disposing Dredge Material at EPA Site:

(1) The closest EPA site is near Port Hueneme Mr. Bellmer thinks this site may be closed down. Two other sites may be available near Los Angeles Harbor.

(2) The Space Division wants to pursue obtaining permission from EPA for a one-time dump either near Port Hueneme or some other location closer than Los Angeles.

c. Disposing Dredge Material on Land:

(1) The dredge material would have to be compatible with the area its to be dumped.

(2) The material will have to be processed in drainage ponds near the project site, then hauled off to the disposal area. It is not clear at this time what area near the project site would be available for the drainage ponds. It is possible that once the ponds were not needed, mitigation in the form of re-vegetation would be required.

4. LTC. Wooton stated the EIS for the STS program includes the Harbor work but not disposal of the dredge material. His office will prepare the necessary supplemental documentation.

5. Mr. Mahoney (LA Construction) presented a basic explanation of the permit process and what would be required, as follows:

a. AF will provide to LA Corps (Construction Division) an application for the permit to include:

(1) Location of dredging area.

(2) Location of dolphins and bollards.

(3) Location of new dock and existing dock to be removed.

(4) Where dredge material will be dumped.

b. After permit application is complete, a Public Notice will be issued for 30 days to various environmental agencies (local, state, and Federal). During the 30 day period, review comments will be sent back to Los Angeles.

c. If there are objections by any of the reviewing agencies, they will be worked out between Los Angeles, the Air Force, and the commenting agency. If there are not objections, Los Angeles will take action to issue the permit.

d. During the 30 day review period, the AF will have to obtain a permit from the Water Quality Control Board. This could be done before the 30 day period if adequate information is known about the dredge material but must be done before Los Angeles can issue the construction permit.

6. The following are action items:

a. A-E to determine whether a site is available for a "one dump" operation that EPA will approve (No deadline required).

b. Los Angeles and Sacramento Corps (coordinating with CA Dept. of Fish and Game) will pursue a "clam shell" dredge test on the Harbor material. Mr. Turnbeaugh will provide core data on the material to Mr. Ballmer during the week of 15 March 1982, and will determine how soon the test can be done.

c. The AF will provide a land disposal site location to Mr. Turnbeaugh during the week of 15 March 1982. Mr. Turnbeaugh will provide a cost estimate for a land dump operation by 26 March 1982, to the AF.

F/L [illegible]

1313-17-4-1-1

SPKED-M

LRT/mjh
11 March 1982

CONFERENCE MINUTES

SUBJECT: STS, V-33 Harbor and Towroute, Vandenberg AFB, CA.

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c. The AF will provide a land disposal site location to Mr. Turnbeaugh during the week of 15 March 1982. Mr. Turnbeaugh will provide a cost estimate for a land dump operation by 26 March 1982, to the AF.

d. Los Angeles Corps will check on the availability of the EPA site near Port Hueneme and let the AF know the results.

7. It is not known at this time whether the dredging operation question will be resolved by the project RTA date of 14 May 1982. It may be necessary to begin all other work except the dredging for this project. Various alternatives such as advertising the work at different times, stipulating that work in the Harbor cannot begin until a designed time, etc. Mr. Turnbeaugh will work with Mr. Harbison as questions are resolved, to determine the eventual alternative to have the construction done. Any questions or comments may be directed to Les Turnbeaugh at (916) 440-2411.

Les R Turnbeaugh

1 Incl
as

LES R. TURNBEAUGH
Project Manager

DISTRIBUTION:
SD/DE, ATTN: Ltc. Wooten, PO Box 92960, Worldway Postal Center, L.A., CA 90009
SATAF/DE, ATTN: Lt. Harbison, VAFB.
LA Corps of Engineers, Environmental Res. Br. (Bellmer)
LA Corps of Engineers, Const. Divn (Mahoney)
LA Corps of Engineers, Const. Divn, Regulatory Br. (Zawadzki)
Mil Des Br, Special Proj Sec (Schildt)
Mil Des Br, Proj Mgr (Turnbeaugh)

CONFERENCE ATTENDANCE ROSTER

PROJECT: STS, V-33, HARBOR/TOWROUTE, VAFB CA.

LOCATION: LA DISTRICT OFFICE, CORPS OF ENGRS.

DATE & TYPE OF CONFERENCE: 8 MARCH 82/CRITERIA/REQUIREMENT CONF.

NAME	REPRESENTING	TELEPHONE NO. (Commercial or FTS)
Les R. Turnbeaugh	Corps Of Engrs., Sacramento District	Comm (916) 440-2411 FTS 448-2411
ANDREAS SCHMIDT	" "	(916) 440-2948
RUDY A. JARDINEL	" L.A. DISTRICT	(213) 688-5616
BECC MAHONEY	" " "	FTS 798-5600 (213) 688-5600
[illegible]	" " "	(213) 688-5606
ROMAN ZAWADZKI	" " REGULATORY	" "
Robert W. Wood	COE - LA Dist - Env. Res Br.	(FTS) 798-2934 (213) 688-2934
TED TURK	TETRA TECH	(213) 449-6400
ROSEMARIE CRISOLOGO	PARSONS	(213) 440-2000
RUSS BELLMER	COE - LA DISTRICT ERB	FTS 798-5421 (213) 688-5421
LT MARK D MILLER	SPACE DIVISION - DEE (LA)	(213) 643-0930
CT PAUL HARBISON	SATAF/DE Vandenberg AFB	(805) 865 3912
[illegible]	SPACE Vandenberg AFB	(213) 643-0934
Ken Wilson	Calif Dept Fish & Game LB	(213) 590-5101

INCLOSURE 1

THE RALPH M. PARSONS COMPANY

File 1347-C

INTEROFFICE CORRESPONDENCE

To Files

Date June 7, 1982

From D. C. Elias/D. D. Clark

Phone (805) 866-9868

Location VAFB

SUBJECT V33 Harbor & Towroute T.I.M., Tuesday, May 25, 1982

I. The purpose of the meeting was to review environmental issues at V33 Harbor & Towroute including dredge disposal, impacts to marine life, slope stabilization and wetlands. The strengthening of the 13th Steet Bridge was also discussed.

II. ATTENDEES

Name	Organization	Phone
Lt. Paul Harbison	SATAF/DE	(805) 865-3152
Ted Turk	Tetra Tech	(213) 449-6400
Donna Elias	RMP	(805) 866-9868
Don D. Clark	RMP	(805) 866-9868
Jim Johnston	4392 CES/DEV	(805) 866-9687
Jim Ryerson	Calif. Coastal Commission	(805) 963-6871
Rudy A. Jardinel	COE	(213) 688-5616
Richard Clark	COE	(213) 688-5606
Phillip Rieger	COE	(213) 688-5606
John Wolfe	U.S. Fish & Wildlife Service	(714) 831-4270
Robert Hoffman	Nat. Marine Fisheries Service	(213) 548-2518
Richard Nitsos	State of California, Dept. of Fish & Game	(213) 590-5174
Jay Shah	SD/DEC	(805) 866-5854
R. C. Wooten	SD/DEV	(213) 643-0933

III. DISCUSSION

1. At 10:15, Lt. Col. Wooten opened the meeting with a brief description of the issues to be discussed. After introduction of all participants, Mr. R. Clark of the Corps of Engineers (COE) explained his role in procuring the Dredge and Disposal Permit. Lt. Harbison supplied a handout which explained that dredging at V33 Harbor would occur to a depth of 9' below mean low low water, 40,000 cubic yards of Monterrey shale and sediment necessitated a disposal site, and that 6 dolphines would be installed at various locations in the harbor.

2. Lt. Col. Wooten referred to the results of the study by Tetra Tech Inc. entitled "Evaluation of Alternatives for Disposal of Material Dredged from the ET Landing Facility, VAFB, CA" which recommends disposal in Arguello Canyon, a submarine canyon, 8 miles off-shore. This disposal method was recommended because it is cheaper than land disposal, the nearest approved EPA dump site is in Port Hueneme,

100 miles away, only federal permits would be necessary to obtain, and the dredge material would not be suitable as fill material of an artificial reef. In addition, the State has permitted the removal of the boat house because two other structures of similar design and historical significance occur in Humboldt and Pt. Reyes. A historical report of the boat house has been developed.

3. Lt. Col. Wooten discussed reroutes of the towroute to avoid impacts to archaeological sites. Since the towroute cannot be rerouted around SBa 1542, recovery activities are planned for the site before construction.

4. The question of whether or not the proposed design of harbor facilities would withstand the extreme littoral conditions was resolved by relying upon Port Hueneme as a storage area in the event of inclement weather and by the infrequent use (4 times/year) of the harbor facilities.

5. Dr. Turk presented more information from the aforementioned disposal alternatives study including the details of the recommended dredging method (clamshell), composition of dredge spoil and the topographic conditions at Arguello Canyon (1150' deep and slopes favorable to disposal). Based upon the low number (40) of dredge barge trips with a load of 1,000 yd^3, the cost of this disposal method will be much less than land disposal.

6. Mr. Nitsos of the State Department of Fish and Game expressed concern over the potential problem of the shale tearing the nets of commercial trollers which operate at depths ranging between 100 to 200 fathoms. He agreed to check into this issue and report the results to Lt. Col. Wooten. Sport fishing will not be affected by the disposal activities because of the remoteness of the disposal site to use areas. The idea of disposing the dredged spoil on rocky outcrops is discouraged by concerned agencies. No large outcrops are known to exist in the area.

7. Dr. Turk further explained that three current periods exist as follows:

   - o Upwelling from north to south during the months of February to September
   - o Oceanic/relaxation north to south during the months of September to November when upwelling decreases
   - o Davidson current from south to north during the months of November to February when counter currents and downwelling prevail.

Because dredging is likely to occur in October/November during the oceanic/Davidson period of decreasing upwelling, impacts to water quality (turbidity levels) may not be as great.

8. Impacts to cetaceans are not expected because whales do not usually migrate in such shallow depths and would avoid barge activities. Lt. Col. Wooten indicated that Parsons Environmental surveillants may be asked to monitor the behavior of marine mammal populations in the harbor area before and after dredging. Although the depositing of dredge spoil into the canyon will impact benthic communities, at this depth the populations are less dense and less diversified than those at shallower depths.

9. The potential conflict with off-shore drilling plans and the use of Arguello Canyon as a disposal site was disucssed and will be resolved as the permitting effort progresses. It is unlikely that maintenance dredging will occur making the use of Arguello Canyon a one-time activity.

10. Mr. Clark of Parsons presented details of the slope stabilization techniques to be implemented in the V33 excavation area. These techniques include the use of benches lined with air blown mortar along the sides of the cut, replacing the topsoil to a depth of 4" and revegetating with native species, if necessary. A floral recovery program may be conducted prior to construction in areas where known sensitive botanical species exist. In addition, an abalone recovery program may be initiated in order to preclude the potential loss of individuals due to increased turbidity levels and concussion.

11. At 11:45, the meeting broke for lunch, followed by a tour of the boathouse, harbor, and archaeological site SBa 1542.

12. At 2:10 the meeting resumed. It was mentioned that the pier and concrete blocks would be hauled to shore and disposed of on land. This activity is not part of the dredging contract. In addition, the blasting charge is not to exceed 50 lb. The use of a debris net will probably not be implemented because of the potential for trapping fish and other fauna.

13. Mr. Hoffman of the National Marine Fisheries Servic expressed concern about harbor seals returning to the construction area at night. He indicated that marine mammals biologist of his agency may elect to perform mark/recapture studies in the area. Mr. Rieger of the COE recommended that this plan be developed before the issuance of a Public Notice.

14. It was agreed that the removal of kelp beds could be partially mitigated by transplanting kelp to nearby suitable habitat. Moving rocks with kelp attached as opposed to removing kelp from substrate and reattaching at another location was discussed. Mr. Hoffman indicated that surf conditions may not be suitable to the reattachment of kelp after it has been disattached from the original substrate. The feasibility (from an engineering standpoint) of singling out rocks from dredge spoil and transferring such to a nearly location needs to be examined. It was agreed, however, that if this work was to be accomplished, a Facility Change Request would be required to effect the change.

15. Mr. Ryerson of the California Coastal Commission questioned the designation of a wetland area near V33. In his estimation, the area was not typically wetland, but he stated that under the California Coastal Act, designated wetland areas are to be protected and enhanced. He added that if the wetland area in question was to be impacted, a reasonable trade-off for loss of habitat would be to perform restoration work in another wetland area. In addition, restoration work can be done inexpensively. He commented that Mr. James Davis of the California Fish and Game would be notified and asked to prepare a report on the validity of designating the area as a wetland.

16. Mr. Clark displayed photos of various flood stages of the Santa Ynez River and described the pier nose pilings to be installed at the 13th Street Bridge. He commented that these pilings would prevent debris from blocking the river flow and thus prevent damages from scour and erosion.

17. Lt. Col. Wooten concluded the meeting at 3:30 by reviewing pertinent issues to be discussed at a meeting scheduled for June 9, 1982.

R. S. Crisologo for
D. C. Elias/D. D. Clark

DCE/DDC:tc

CC: K. E. Whitman
J. W. Chapman

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS SPACE DIVISION (AFSC)
LOS ANGELES AIR FORCE STATION, PO BOX 92960, WORLDWAY POSTAL CENTER
LOS ANGELES, CA 90009

01 SEP 1982

REPLY TO ATTN OF: DEV

SUBJECT: Minutes of Agency Coordination Meeting for the External Tank Landing Facility, Vandenberg AFB, California

TO: DISTRUBTION

1. PURPOSE: This meeting was conducted to review the results of a study conducted 25-27 August 1982 in the Marine environment at the Point Arguello Boathouse. The study was a follow-up to an agency review meeting on 25 May 1982 to review permit and mitigation requirements for dredging activities at the Point Arguello Boathouse, proposed disposal site and tow route construction crossing wetland areas. At that meeting it was of recommended that mitigation measures to offset the loss of 2.2 acres of intertidal habitat (kelp) loss be revised after biologist from California Fish and Game, National Marine Fisheries Service and the Corps of Engineers made dives in the project area. The mitigation measures in question were: 1) Establishing or enhancing habitat loss for kelp and 2) Abalone transplanting to mitigate the loss of Abalone populations in the area.

2. ATTENDEES:

NAME	ORGANIZATION	PHONE
LtCol R.C. Wooten	SD/DEV	(213) 643-0933
Lt Paul Harbison	SATAF/DE	(805) 865-3152
Jay Shah	SD/DEC	(805) 866-5854
Donna Elias	RMP	(805) 866-9868
Don D. Clark	RMP	(805) 866-9868
Richard Clark	COE	(213) 688-5606
Russel Bellmer	COE	(213) 688-5421
Robert Hoffman	Nat. Mar. Fish. Service	(213) 548-2518
Bud Lurrent	California Fish & Game	(805) 772-3011
Fred Wendell	California Fish & Game	(805) 772-3011

3. DISCUSSION AND CONCLUSIONS:

a. Results of the short study were reviewed at the proposed construction site. Proposed mitigation measures were discussed, including those on the Army Corps of Engineers Public Notice of Application for Permit.

b. It was recommended that habitat for kelp be enhanced by placing small clumps of rock from the dredging zone in an area between the dolphins and breakwater outside of the channel. Planting additional kelp in the area will be considered after completion of the project. Details for this habitat improvement (rock placement) will be developed by the Corps of Engineers, Los Angeles District, and given to the Air Force Project Officer.

c. The following recommendations were made in regard to mitigation measures listed in the Public Notice of Application of Permit.

1) Instead of transplanting abalone from the area to be affected by blasting and dredging to nearby undisturbed areas, the area would be reseeded with abalone after the project was completed. An appropriate plan will be developed by the Corps of Engineers and California Fish and Game. The Corps, California Fish and Game and the National Marine Fisheries Service will assist the Air Force in this effort.

2) The mitigation to install a silt screen during blasting and dredging to minimize the spread of debris and sediment should be removed from the list of required mitigations.

Rutherford C. Wooten

RUTHERFORD C. WOOTEN, LtCol, USAF, BSC
STS Environmental Program Manager
Environmental Planning Division
Directorate of Civil Engineering

1 Atch:
Permit Mitigation

Cy To:
Attendees
California Coastal Commission
SD/DEE
SATAF/DE

ATTACHMENT 6

SECTION 7 ENDANGERED SPECIES CONSULTATION
FROM THE NATIONAL MARINE FISHERIES SERVICE

SECTION 7 ENDANGERED SPECIES CONSULTATION
FROM THE U.S. FISH AND WILDLIFE SERVICE
(Refer to Appendix H, Permits and Entitlements)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
300 South Ferry Street
Terminal Island, California 90731

April 9, 1982

F/SWR31:DJS
F/NWC3:GA
F/SWR33:RSH

Lt. Col. R. C. Wooten, Jr.
Headquarters Space Division, SD/DEV
P.O. Box 92960
Worldway Postal Center
Los Angeles, CA 90009

Dear Colonel Wooten:

We have reviewed the Draft Supplement to the Final Environmental Impact Statement (DSFEIS) for the Space Shuttle Program at Vandenberg AFB, California and offer the following general comments for your consideration. These comments address issues relating to marine fisheries, endangered species, marine mammals, and their habitats for which the National Marine Fisheries Service (NMFS) is responsible.

Construction Activities at Point Arguello

The proposed construction activities at the Point Arguello boathouse area will have short and long-term adverse impacts to marine fishery resources of concern to our agency. The short term effects include the destruction of benthic organisms by dredging activities. These impacts are relatively minor since recolonization should occur rapidly. The long-term effects involve the permanent removal of an existing pier, submerged rocks, and a small kelp bed all of which serve to enhance fishery resources. In addition, construction of the proposed dock would eliminate approximately 0.4 acres of intertidal habitat.

The proposed mitigation is directed only to reducing impacts to intertidal and subtidal areas. The mitigation does not address the need to compensate the permanent habitat losses associated with this project. Although the document indicates that one potential option for the disposal of dredge material could be the creation of an artificial reef, which could have an enhancement value to fish resources, the suitability of dredge material for this type of project remains to be determined.

We feel the construction of an artificial reef would be an appropriate compensatory measure to offset the losses associated with this project since the reef would essentially replace in kind the habitat lost through construction activities. The final document should explore further the feasibility of this concept for habitat compensation.

Endangered Species

The final SFEIS should note that the NMFS is the federal agency responsible for administration of the Endangered Species Act of 1973 as amended (ESA) as it pertains to threatened and endangered marine species. Concerns pertaining to marine turtles are shared with the Department of Interior, Fish and Wildlife Service (FWS). Sea otters are also under the their jurisdiction.

The final SFEIS should note that species listed by the NMFS as endangered or threatened which are likely to occur within the area to be impacted by actions of this project include:

Gray whale	(Eschrictius robustus)
Blue whale	(Balaenoptera musculus)
Humpback whale	(Megaptera novaeangliae)
Right whale	(Eubalaena spp.)
Fin whale	(Balaenoptera physalus)
Sei whale	(B. borealis)
Sperm whale	(Physeter catodon)
Leatherback sea turtle	(Dermochelys coriacea)
Pacific hawksbill sea turtle	(Eretmochelys imbricata brissa)
Green sea turtle	(Chelonia mydas)

For the species listed above there has been no critical habitat proposed or designated in the southern California area.

The loggerhead sea turtle (Caretta caretta) and Pacific ridley sea turtle (Lepidochelys olivacea) are occasionally found in the area and are listed as threatened.

Section 7 of the ESA requires federal agencies to consider the impacts of a proposed action to listed species. We have treated your February 5, 1982, request for comments on the DSFEIS as a request for informal consultation pursuant to the ESA. We have reviewed the Final Environmental Impact Statement and DSFEIS and agree with the conclusions that the proposed action will not jeopardize the continued existance of any listed species for which the NMFS is responsible.

We concur with your recommended mitigation (#2, page 2-140) to limit blasting to periods when gray whales are absent from the immediate construction area. We further recommend that a reconnaissance of waters adjacent to the Boathouse cove be conducted during the gray whale migration period (December - March) to determine if gray whales are present in the immediate area.

These comments conclude our informal review under the ESA. In the event that any new evidence becomes available which indicates the project may have adverse impacts on listed species within the project area, we request that the

U.S. Air Force (USAF) initiate the formal consultation process. We futher recommend that formal consultation be initiated if another species in the project area is listed as threatened or endangered.

Marine Mammals

The DSFEIS predicts (summary, page ix and elsewhere) disturbance to pinnipeds on the northern Channel Islands due to Space Shuttle generated sonic booms. A 15 percent increase in pinniped mass movements from the shores of the islands to the water is predicted as a direct result of Space Shuttle generated sonic booms. Disturbance and/or displacement is predicted to occur to harbor seals at the Point Arguello Boathouse from proposed construction activities.

The Marine Mammal Protection Act of 1972, as amended (MMPA), places a moratorium on the taking of marine mammals. The definition (50 CFR 216.3, 216.11 et seq.) of take includes among other activities harassment, killing and "...the negligent or intentional operation of an aircraft or...any other negligent or intentional acts which result in disturbing or molesting of a marine mammals." Section 101 (a)3 of the MMPA as amended describes conditions by which the Secretary is authorized to waive the moratorium on taking provided specific conditions are met. Public law 97-58 amended the MMPA by adding, among other things, a new Section 101 (a)5 to allow individuals engaging in activities, other than commercial fishing, to take small numbers of marine mammals incidentally within a specified geographic region. The amendments and proposed general regulations (50 CFR 228 Subpart A) (enclosed) describe the process by which a formal written request must be submitted to receive consideration for a Letter of Authorization to allow activities which may result in the "take" of marine mammals. It is recommended that you contact our office so that we may assist you in exploring the potential for submission of a formal written request via these mechanisms of exemption.

We note that several statements which attempt to describe the effects of sonic booms to pinnipeds appear to inaccurately report the results of USAF contracted studies. Several references state that the present rate of disturbances to pinnipeds at San Miguel Island exceeds 30 major disturbances per year. It is unclear how this rate was obtained. It appears that Cooper and Jehl (1980) may have erred initially when they calculated this estimate by adding the estimated disturbance rates of otariids (given as 4 to 5 per month for California sea lions and northern fur seals) and harbor seals (2-3 per month-reported by Bowles and Stewart, 1980). For example, both otariids and harbor seals can be affected by the same loud sonic boom while in other instances a relatively quieter sonic boom may affect only a small group of geographically isolated harbor seals. Therefore, the disturbance rates for the two groups must be analyzed separately. Additionally, Bowles and Stewart (1980) use differing criteria for defining a "major event" for otariids and phocids. Neither of these definitions include the criterion "causing at least half the population to vacate the beach" (DSFEIS). It appears likely that estimates from separate analyses would result in lower rates of current annual disturbance and higher percentage increases in disturbance caused by shuttle-generated sonic booms.

The percent contribution of sonic booms and boat noises relative to total disturbance also should be presented in the Final SFEIS. Adopting these recommended changes in the Final SFEIS would result in a more accurate description of the complex interactions of pinnipeds and disturbing stimuli on San Miguel Island.

We are also concerned with the implication that the low abundance of harbor seals in the northern Channel Islands relative to the world population can be used as a rationale for not considering the species to be sensitive to disturbance during the pupping season (Page F-15, paragraph 4). Harbor seals on the northern Channel Islands are protected at all times under the MMPA and by being within the Channel Islands National Park and should not be overlooked when scheduling space shuttle activities which could adversely impact them. Bowles and Stewart (1980) state that for both harbor seals and otariids, the period of greatest potential impact occurs from March through July. They also note that "among the pinnipeds, harbor seals were most likely to startle." We concur with these statements. The mitigation measure offered in Section 2.7.2.3 (DSFEIS) should be improved to ensure that the flight director will avoid scheduling shuttle launches that will create large sonic-boom over-pressures at San Miguel Island during the breeding seasons (March-July), if a practical alternative exists.

Finally, there is a chance of significant impact of shuttle-generated booms on marine mammal hearing (Page 2-86, paragraph 1), and this points out the need for an experimental evaluation of this potential impact. We recognize the problems involved with studies designed to evaluate the effect of shuttle-generated booms on pinnipeds (Chappell, 1980). We suggest that the USAF can overcome the logistic and technical problems and that scientists would prefer to face the difficulties of interpretting the results of such an experiment rather than relying on extrapolations from experiments performed on other species. Therefore, we urge the USAF to consider supporting such research.

Sincerely yours,

Alan W. Ford

Alan W. Ford
Regional Director

Encl

Literature Cited

Bowles, A. E., and B. S. Stewart. 1980. Disturbances to pinnipeds and birds of San Miguel Island during 1979 and 1980, In Potential Effects of Space Shuttle Booms on the Biota and Geology of the California Channel Islands: Research reports USAF Technical Report #80-1, pages 99-137.

Chappell, M. A. 1980. Possible physiological effects of space shuttle sonic booms on marine mammals, In Potential Effects of Space Shuttle Sonic Booms on the Biota and Geology of the California Channel Islands: Research Reports, USAF Technical Report #80-1, pages 195-228.

Cooper, C. F., and J. R. Jehl. 1980. Potential effects of space shuttle sonic booms on the biota and geology of the California Channel Islands: Synthesis of research and recommendations, USAF Technical Report #80-2, 14 pages.

ATTACHMENT 7

AGREEMENTS CONCERNING ARCHAEOLOGICAL AND HISTORICAL RESOURCES

(Refer to Appendix E, Summary Assessment Point Arguello Boathouse)

ATTACHMENT 8

LETTER FROM THE SANTA BARBARA COUNTY
AIR POLLUTION CONTROL DISTRICT
CONCERNING THE JOINT AIR MONITORING PROJECT

COUNTY OF SANTA BARBARA • HEALTH CARE SERVICES
AIR POLLUTION CONTROL DISTRICT
315 CAMINO DEL REMEDIO, SANTA BARBARA, CALIFORNIA 93110 • PHONE (805) 964-8658

LAWRENCE HART, M.D., M.P.H.
DIRECTOR
HEALTH CARE SERVICES
AIR POLLUTION CONTROL OFFICER

JOHN B. ENGLISH
DIRECTOR, AIR POLLUTION CONTROL

August 26, 1982

Major General J. L. Watkins
USAF Commander
Vandenberg Air Force Base
First Strategic Aerospace Div.
Vandenberg, CA 93437

RE: Joint Air Monitoring Project in Lompoc

Dear General Watkins:

On behalf of the Santa Barbara County Air Pollution Control District, I wish to thank you for your letter of June 7, 1982. The initiative of your staff to resolve the emission inventory and the permitting review at the base has been excellent.

The District also appreciates the interest and support being given by Vandenberg Air Force Base (VAFB) to the air monitoring program and wishes to achknowledge the efforts of Captain Forbes towards completion of the three-station network. Your letter to Lompoc City Administrator, Mr. Waller, regarding the project was also most helpful.

It is understood that the second trailer is ready to be placed into operation and will have priority to be placed in Lompoc since we have finally been able to make progress on the location. The Lompoc site preparation is proceeding with the City of Lompoc with the Conditional Use Permit approval. Captain Forbes, and Don Jones of our office, met with city personnel to resolve some details with the Planning Department and our Counsel, Mr. Dana Smith, is preparing the contract amendment this week.

We also acknowledge receipt of the summary air monitoring data submitted with your June 7 letter. The data has been given a preliminary review and we have found nothing out of the ordinary at this time. Your future submittals should include the supporting strip chart information. I would also request that the formal stipulation of agreement to perform contractual site preparation, utility payments, other operating expenditures, and quality assurance review by the District be provided at our meeting with your staff on August 31.

The District also wishes to express appreciation for being invited to participate in the July 6 meeting with the Air Resources Board and Cal

Tech representatives regarding the tracer gas study. The District supports and recommends that the tracer study be performed as proposed by the ARB. Studies of this type have not previously been performed in the Lompoc area or other downwind areas. These data will be most veneficial to a better understanding of meteorological patterns in the area and the possible impact on inland valleys such as Lompoc and the Buellton/Santa Ynez area. I understand that the base will support a tracer release from Vandenberg AFB and/or offshore areas to provide needed information about possible transport to the south coast. This will be most helpful.

Your staff support is outstanding.

Very truly yours,

Lawrence Hart, M.D., M.P.H.
Air Pollution Control Officer

JBE:ls

John B. English, Director

ATTACHMENT 9

LETTER FROM THE CALIFORNIA DEPARTMENT
OF FISH AND GAME CONCERNING
IMPACTS AND MITIGATIONS FOR WETLANDS

DEPARTMENT OF FISH AND GAME
50 Golden Shore
Long Beach, California 90802
(213) 590-5113

August 5, 1982

Lt. Col. R. C. Wooten Jr.
Los Angeles Air Force Station
P.O. Box 92960
Worldway Postal Center
Los Angeles, California 90009

Dear Col. Wooten:

The Department of Fish and Game has completed a review of three wetland crossings associated with the space shuttle tow route on Vandenburg Air Force Base. We have the following concerns with these crossings.

1. The Oil Well Canyon crossing is a minor drainage system supporting no wetland or riparian vegetation. Impacts associated with the fill and culvert crossing will be minimal. All slopes associated with this segment of the route should be revegetated with a mix of grasses and forbs commonly found in the area.

2. The Honda Canyon crossing will have minimum impacts. No material from the proposed cuts on each side of the bridge should be placed on the stream banks or allowed into Honda Creek.

3. The proposed debris diverters to be constructed below the Santa Ynez bridge will result in a temporary loss of riparian vegetation. This impact can be largely mitigated if the willows and brush are stockpiled while work is being done and then spread over the base after completion. This will allow seeds and willow shoots to begin revegetation faster than if the ground were left bare. In addition, this work should be completed during the dry period so that sediment loads in the river will be minimized. A 1600 agreement with the Department will be required for any work within the high water mark of any stream.

If you have any questions regarding these comments, please contact Jim Davis at (805) 685-3902.

Sincerely,

Bruce E. Eliasson

Fred A. Worthley Jr.
Regional Manager
Region 5

cc: M. Mulligan
J. Davis
Wdn. Rawlinson

ATTACHMENT 10

SUPPLEMENT TO CONSISTENCY DETERMINATION

SUPPLEMENT TO CONSISTENCY STATEMENT

These stipulations are set forth to further narrow the uncertainty of Shuttle launch impacts on the Channel Islands. Extensive research by the Air Force indicates that the potential for adverse impact is remote and restricted to San Miguel. However, adverse impact cannot be totally ruled out until there is direct evidence from flights over the Island.

A comprehensive monitoring program has been implemented that will enable the Air Force, the scientific community and regulatory agencies to assess the impacts of the initial launches over the Islands and decide whether any launch restrictions are required.

a. Flights over the Channel Islands. Federal and state agencies will be allowed to review and comment on the monitoring plan and will be furnished the monitoring results from the first and all initial launches. Their review and recommendations will be used to determine if mitigation measures and overflight restrictions are required for subsequent flights. To enhance the review by state agencies, the Executive Director of the Coastal Commission will coordinate the comments of the reviewers. To assure permanent protection of the Channel Island habitat the conclusions and recommendations of the reviewing agencies will be considered in planning for subsequent space shuttle launches. These recommendations will be implemented unless operational mission constraints necessary to meet vital national security requirements preclude alternative dates or flight trajectories being used to prevent a focused sonic boom over San Miguel during the sensitive breeding period (May through July with special consideration for launch windows between peak breeding activities in March and April).

b. Definition of Sensitive Breeding Period. The Air Force agrees that in scheduling the first launch over San Miguel the sensitive breeding period (May through July with special consideration for launch windows between peak breeding activities in March and April) will be used as a planning factor, especially avoiding the peak periods for the marine mammal species. This restriction will be honored unless operational mission constraints necessary to meet vital national security requirements preclude using an alternative date or trajectory.

ATTACHMENT 11

STAFF REPORT AND RECOMMENDATION
ON CONSISTENCY DETERMINATION

CALIFORNIA COASTAL COMMISSION
631 Howard Street, San Francisco 94105 — (415) 543-8555

STAFF REPORT AND RECOMMENDATION

ON CONSISTENCY DETERMINATION

Consistency Determination
No. CD-21-82
(U.S. Air Force, Space Shuttle)
45th Day: 10/17/82
Extended to 12/1/82

FEDERAL AGENCY: U. S. Air Force

DEVELOPMENT LOCATION: Vandenberg Air Force Base, Santa Barbara County (Exhibits 1, 2)

DEVELOPMENT DESCRIPTION: Construction, activation, and operation of facilities for the Space Shuttle Program, including construction and expansion of facilities at the launch paid (SLC-6), construction and expansion of support, storage and processing facilities on several areas of the Base, landing strip extension, modification of on-Base transport roads and the 13th Street Bridge crossing, and Space Shuttle flight activities (Exhibits 3, 4, 5,6).

SUBSTANTIVE FILE DOCUMENTS:

1. Federal Agency's Consistency Determination.
2. Consistency Determination No. CD-2-80 (U.S. Air Force, Port Hueneme).
3. Consistency Determination No. CD-18-82 (U.S. Air Force, Vandenberg AFB).
4. Final Environmental Impact Statement for Space Shuttle Program (Jan. 1978).
5. Draft Supplement to Final Environmental Impact Statement for Space Shuttle Program (Feb. 1982).
6. Potential Effects of Space Shuttle Sonic Booms on the Biota and Geology of the California Channel Islands: Research Reports (Technical Report 80-1), and Synthesis of Research and Recommendations (Technical Report 80-2), Center for Marine Studies, San Diego State University (December 1980).
7. Potential Impact of Space Shuttle Sonic Booms on the Biota of the California Channel Islands: Literature Review and Problem Analysis, San Diego State University Center for Marine Studies and Hubbs/Sea World (April 1979).
8. Studies on the Pinnipeds of the Southern California Channel Islands, 1980-1981, Hubbs/Sea World, Technical Report No. 82-136 (January, 1982).

9. Preliminary Sonic Boom Correlation of Predicted and Measured Levels for STS-1 Entry, NASA Technical Memorandum 58242.
10. Draft Environmental Impact Statement on the Proposed Channel Islands Marine Sanctuary, National Oceanic and Atmospheric Administration.
11. Supplemental Water Study for Vandenberg AFB, Earth Sciences and PRC Toups (March 1982).
12. Staff Summary, Vandenberg Water, Edward W. Rogers, P.E. (December 1981).
13. Present and Future Water Needs of Santa Barbara County, Santa Barbara County Water Agency (October 31, 1977).
14. Housing Impacts and Mitigation Measures Associated With the Planned Expansion of Vandenberg Air Force Base, Santa Barbara County Resource Management Department (April 1982).
15. Cumulative Assessment of Employment and Housing Impacts of the Space Shuttle, MX, LNG, and OCS Projects, Santa Barbara County Cities Area Planning Council (February 1980).
16. Appraisal of Ground-Water Resources in the San Antonio Creek Valley, Santa Barbara County, California, USGS (August 1980).
17. Potential Effects of Increased Ground-Water Pumpage on Barka Slough, San Antonio Creek Valley, Santa Barbara County, California, USGS (December 1980).
18. Coastal Commission Staff Recommendation and Suggested Modifications for San Luis Obispo County Local Coastal Program Land Use Plan (July 28, 1982 and October 6, 1982).
19. Santa Barbara County Land Use Plan.
20. Vandenberg AFB Oil and Hazardous Materials Spill Prevention Control and Countermeasures Plan 234-81, Headquarters 4392 Aerospace Support Group, Vandenberg Air Force Base (July 1981).
21. Preliminary Draft, Operations Plan 236-31, Toxic and Hazardous Waste Management Plan, Headquarters 4392 Aerospace Support Group, Vandenberg Air Force Base (March 1982).

STAFF NOTE: The Commission has already concurred with consistency determinations for two portions of the Space Shuttle Program: the Port Hueneme facilities (concurred with in March, 1980) and the Point Arguello Boathouse modifications (concurred with September 24, 1982). The subject project consists of the remainder of the Space Shuttle Program, a complex, multi-billion dollar project with many diverse impacts to coastal zone resources. A memorandum recently sent to the Commission by its legal staff indicates the need for a more flexible approach to consistency review of federal projects within the framework of existing federal consistency regulations; this memo notes that the current procedures limited to simple concurrence or objection does not adequately accommodate the complexities, variations, and requirements of the federal projects reviewed by the Commission. The staff believes the Space Shuttle Program is one such complex project necessitating a more flexible approach.

The staff highly commends the Air Force for the efforts it has undertaken in providing mitigation for impacts in areas such as public access, habitat at the dredging location, archaeological and historic resources, hazardous substance management, and for the extensive research performed on a previously poorly understood subject: the impact of sonic booms on sensitive wildlife habitat.

Nevertheless the staff believes one major coastal issue remains unresolved: the issue of water use intensification.

The Space Shuttle Program would result in substantial intensification in water demand in an area where groundwater basins are currently in overdraft conditions, thereby increasing pressure for the State Water Project, which would significantly affect the coastal zone. Using Air Force data from its EIS Supplement and Supplemental Water Study, increased demand including on and off-base uses would approach 10,000 AFY. The staff's estimates, contained in this report, indicate that demand increases would be closer to 1,600-2,000 AFY. Regardless of this discrepancy, the Air Force proposes no mitigation to offset the increased water demand. The staff believes a more aggressive on-base water conservation program is necessary to offset this impact and reduce the need for water importation.

The staff had previously believed the sonic boom issue was not adequately addressed by the Air Force's consistency determination. However in response to concerns raised by the staff the Air Force recently amended its submittal to strengthen the Commission's role in monitoring and recommending future mitigation measures to assure protection of the sensitive habitat of the Channel Islands. The amended submittal also expanded the "sensitive breeding period" to include not only the months of May through July, but also the peak period for the harbor seal of roughly mid-March through mid-April. The staff believes the submittal adequately addresses the Commission's concerns over protection of the sensitive Channel Islands habitat.

Under the federal consistency regulations, even if only one aspect of a consistency determination is not found consistent to the maximum extent practicable with the coastal management program, the Commission must procedurally object to the entire consistency determination. The staff is therefore recommending that the Commission object to the Air Force's consistency determination, based on the concern over water use discussed above. Nevertheless, the staff also believes, relative to the scope of the entire Space Shuttle Program, that relatively minor modifications to the Space Shuttle Program would bring it into conformity, to the maximum extent practicable, with the California Coastal Management Program. The staff is therefore presenting this recommendation in the form of an objection followed by concurrence with one stipulation, which, if adopted by the Commission, would provide the Air Force with specific direction as to the modifications needed to bring the project into conformance, to the maximum extent practicable, with the California Coastal Management Program. This format has the additional advantage to the Air Force of avoiding the need for subsequent formal Commission review; Commission concurrence would become effective once the Executive Director acknowledges that the stipulation has been met. It should be noted that this stipulation is not binding on the Air Force; rather it indicates the nature of the Commission's concern, and, although an alternative approach would require resubmittal, the concern could be met in other ways. However, the staff believes both this format and the specific stipulation contained on page 6 provide the simplest mechanism to provide for consistency of the Space Shuttle Program to the maximum extent practicable with the California Coastal Management Program.

STAFF SUMMARY AND RECOMMENDATION

I. Staff Summary

1. Project Description. The U.S. Air Force proposes the construction and implementation of the Space Shuttle Program. The purpose of the program is to provide practical, long term use of space; the Space Shuttle vehicle is re-usable, designed to transport satellites to and from earth orbit and to serve as an orbiting laboratory for scientific research. The need for a Space Shuttle Program at Vandenberg Air Force Base arises from the need for polar orbiting capabilities, as opposed to the more equatorial orbits from Kennedy Space Center (Exhibit 2), and from the need to launch over the ocean to avoid populated areas. The Air Force states: "Satellites in polar orbit provide perpendicular cover of the entire planet, which is required for defense purposes, weather or earth resources surveillance, communications relay, navigational systems, and other scientific purposes."

The Air Force expects the first launch from Vandenberg to occur in late 1985, with two launches in 1986, increasing to 10 by 1988 and remaining at that level through 1994. A total of 80 launches are anticipated from Vandenberg. The Air Force states a maximum of 7 of these 80 launches will be of a flight path where the resultant focused sonic boom will occur on the Channel Islands.

Development of the Space Shuttle Program consists of the construction or modification of 27 facilities on Vandenberg Air Force Base and at port Hueneme Naval Battalion Center. The Commission has previously reviewed the Port Hueneme facilities (CD-2-80: the solid rocket booster recovery and washing facilities) and the Point Arguello Boathouse facilities (CD-18-82: dredging and harbor modification). The remainder of the Space Shuttle activities are included in the subject consistency determination and are best described in the format of the activity sequences of a Space Shuttle flight (See Exhibit 3 for facility locations):

a. Orbiter activities/facilities. The first sequence is the receipt of the orbiter, either by landing from the previous Space Shuttle launch at the Vandenberg runway or atop a 747 ferry aircraft from an alternative landing site or Kennedy Space Center. Development proposed to support this sequence consists of extension of the existing runway, and construction of: a Mate/Demate Facility (to disconnect the orbiter when transported atop a 747), a Safing and Deservicing Facility (to remove fuels and electronic data and to cool and vent the orbiter), and an Orbiter Maintenance and Checkout Facility (for payload removal, tests, inspections, maintenance, and servicing of hypergolic propellants). At the end of this sequence the orbiter will be towed to the launch pad area, which necessitates the modification of existing tow roads, construction of one new connecting road, and strengthening of the 13th Street bridge.

b. Solid Rocket Booster activities/facilities. The solid rocket boosters are the recoverable portion of the Space Shuttle's fuel supply. The boosters will parachute into the ocean, be towed to the Port Hueneme facilities previously reviewed by the Commission (CD-2-80), where they will be processed, separated into subcomponents, and shipped to the Refurbishment and Subassembly Facility at the launch pad area on Vandenberg.

c. External Tank activities/facilities. The external tank is the non-recoverable portion of the Shuttle's fuel supply. It will be jettisoned at an altitude 500,000 feet, will partially disintegrate during reentry, and will land at a remote ocean site; any remaining pieces will disintegrate on impact with the ocean. The external tanks will be delivered from Louisiana to the Point Arguello Boathouse facilities reviewed by the Commission last month (CD-18-82), towed to the proposed External Tank Storage and Checkout Facility (which will include inspection, pressure and humidity tests, and cleaning), and towed to the launch pad.

d. Launch Pad activities/facilities. The orbiter, solid rocket boosters and boosters and external tank will be combined (mated) at the launch pad area (SLC-6). Payload and propellant will be loaded, and the launch will occur. Prior to and during the launch, approximately 650,000 gallons of high pressure water will be sprayed onto launch pad and tower surfaces to minimize damage, fire, and launch induced noise; current plans are that this water will be treated and recycled. The launch pad area will then be washed and prepared for the next launch.

Exhibit 6 shows an artist's rendering of the proposed launch pad, which is an existing launch pad proposed to be modified for Space Shuttle purposes. The major modifications proposed are the conversion of an existing concrete underground rocket flame diverter to accommodate the Space Shuttle configuration, excavation to allow additional retracting capabilities of the Mobile Service Tower, addition of an underground payload preparation facility and a mobile Payload Changeout Room, and construction of cryogenic propellant storage tanks.

2. Federal Agency's Consistency Determination. The U.S. Air Force has found the Space Shuttle Program to be consistent to the maximum extent practicable with the California Coastal Management Program. The Air Force's consistency determination, which specifically discusses impacts to coastal resources and compliance with the relevant Coastal Act policies, was mailed to the Commission last month when it considered the consistency determination for the related Point Arguello Boathouse dredging and harbor modification activities (CD-18-82). Excerpts from the Air Force's consistency determination are provided in this report where appropriate.

II. Staff Recommendation

The staff recommends that the Commission adopt the following resolutions:

1. Objection

The Commission hereby objects to the consistency determination made by the U.S. Air Force for the remainder of the Space Shuttle Program as described in this report, finding that the Space Shuttle Program as submitted is not consistent to the maximum extent practicable with the policies and objectives of the California Coastal Management Program.

2. Concurrence with Stipulation

The Commission hereby finds that compliance with the stipulation noted below would bring the Air Force's consistency determination for the Space Shuttle Program into conformance, to the maximum extent practicable, with the California Coastal Management Program. The Commission finds that its concurrence will become effective upon certification by the Executive Director of compliance with this stipulation.

3. Stipulation

a. Water Conservation. The Air Force submits a water conservation program, subject to the review and recommendations of the Executive Director, designed to substantially increase existing water conservation efforts currently implemented on Vandenberg Air Force Base. The plan shall provide for metering of existing buildings, to the maximum extent practicable under existing Department of Defense regulations, and for monitoring of well and building meters, including annual reporting of monitoring efforts to the County Water Agency and the Coastal Commission. The plan shall include specific conservation measures, and a program for implementation of these measures, including a base leak detection program.

III. Findings and Declarations

The Commission finds and declares as follows:

1. Water

a. Coastal Act Policies. Section 30231 of the Coastal Act provides:

> The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, ...preventing depletion of ground water supplies and substantial interference with surface water flow...

Section 30250(a) provides:

> New residential, commercial, or industrial development... shall be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources.

Section 30241 provides:

> The maximum amount of prime agricultural land shall be maintained in agricultural production...and conflicts shall be minimized between agricultural and urban land uses through [among other means]...(e) by assuring that public service and facility expansions and nonagricultural development do not impair agricultural viability, either through increased assessment costs or degraded air and water quality.

b. Statement of Issue. One of the major issues raised by the Space Shuttle Program is the impact of a major expansion of facilities on Vandenberg Air Force Base, resulting in substantial increases in water demand, both on the base and in surrounding communities, in an area already experiencing groundwater

overdraft. This increased overdraft would exacerbate long term water shortage problems, resulting in increased pressure for the growth-inducing State Water Project, which would have numerous effects on coastal resources, among them increased pressure for conversion of prime agricultural lands to residential development. Aware of long term water shortage problems in north Santa Barbara County for many years, the Air Force has consistently stated its first choice for providing additional water supplies is the State Water Project, and a major water study prepared this year by consultants to the Air Force supports the State Water Project as the most cost effective means to supplement water supplies. Many long time observers of the local water supply situation believe the Air Force is the catalyst in the implementation of the State Water Project; the Commission is concerned over the role of the Space Shuttle Program in prematurely increasing this catalytic effect.

c. Existing Situation. Vandenberg Air Force Base currently obtains its water supply from wells in the San Antonio, Lompoc Plain, and Lompoc Terrace groundwater basins (Exhibit 10). Agriculture is the heaviest water user in the region (approximately 63%); Vandenberg use constitutes approximately 11% of regional consumption. On base water use in recent years has averaged 3,580 AFY (acre-feet/year); the Air Force also supplies the Federal Correction Institute (FCI) with 800 AFY. Pumpage from the Lompoc Terrace basin is minor (approximately 150 AFY), and pumpage from the Lompoc Plain basin has been reduced in recent years to that amount needed to supply the FCI. The San Antonio basin provides much higher quality water, and Air Force pumpage from this basin has increased to approximately 3,400 AFY since 1977.

Overdraft in the Lompoc Terrace Basin is approximately 100 AFY. Reduction in pumpage from the Lompoc Plain basin has reduced overdraft to approximately 400 AFY. Increased pumpage by Vandenberg, plus substantial increases in agricultural pumpage due to the development of new vineyards, have increased overdraft in the San Antonio basin to 14,600-18,400 AFY in the last few years. Continued overdrafting of the San Antonio basin threatens the integrity of the Barks Slough, a 500 acre pristine wetland (located well outside the coastal zone on the Base), and threatens an endangered species, the unarmored three-spine stickleback, with reductions in sufficient in stream flow in San Antonio Creek to ensure its survival. Total amounts of groundwater in storage are as follows: Lompoc Terrace-30,000 AF, Lompoc Plain-85,000 AF, San Antonio Basin-2,252,000 AF. Thus, in the absence of biological preservation issues, the current rate of overdraft does not imminently threaten these groundwater basins.

d. Air Force Water Study. Due in part to the increased competition for water in the San Antonio basin, the Air Force contracted with Earth Sciences Associates and PRC Toups for a comprehensive study entitled "Supplemental Water Study for Vandenberg Air Force Base" (March 1982). The study analyzed present and future water demands and constraints and recommended action to assure future water supplies for the Air Force Base. The study recommended that the Air Force could continue to rely on groundwater pumping until about 1990; after that time environmental constraints, such as the need to protect Barka Slough, and increased competion with agricultural interests, might result in limits on the Air Force's ability to continue to pump sufficient water to meet its needs. While pumping for on-base use has averaged 3,400 AFY in the last 5 years, the study projects that on-base demand would increase to 4,575 AFY in 1987 as a result of implementation of the Space Shuttle and MX programs, and that by the year 2000 on-base demand would increase to 6,405 AFY, based on an undisclosed "...new program of the size of the MX/STS program..." Including water supplied to FCI, the year 2000 demand would be 7,500 AFY, according to the study.

The study therefore recommended that the Air Force take the following action:

> The Air Force should take positive action towards implementation of the State Water Project (SWP) for provision of a long-term reliable water supply to Vandenberg AFB. The Air Force should obtain a maximum entitlement of 7,500 ac-ft/yr in the SWP and inform Santa Barbara County that it is willing, subject to negotiation of obligations and costs, to assume financing of its proportional share of SWP entitlement.
> This action will encourage other purveyors in Santa Barbara County desiring to participate in the SWP to do the same and thereby facilitate project implementation in a timely manner.
> If this action is taken within 1982, it is estimated that deliveries of State Project water will be available to Vandenberg AFB by about 1990.

The study notes that "Vandenberg AFB has a relatively large influence on the development of the [State Water Project] and, by taking positive action to implement the project, can greatly facilitate its development." The study also recommends:

(1) That the Air Force continue to pump 4,000 AFY from the San Antonio basin and additional water from the Lompoc basins until legal or environmental problems force restriction of pumping, at which time pumping should increase in the Lompoc Plain; that monitoring for environmental damage should continue and be expanded; that long term groundwater mining is not recommended; and that basin management and artificial recharge programs should be actively pursued.

(2) If agreements between the Air Force and other local purveyors and the County are not reached in 1983 to assure implementation of the State Water Project, and it is determined that the State Water Project will not proceed at that time, the Air Force should proceed to implement the "Salsipuedes Dam and Reservoir Project" alternative.

(3) If the Salsipuedes alternative is infeasible, desalination of seawater should be pursued as the last alternative; though expensive, it would provide a reliable and independent water source.

The study states that the cost for State Water Project water would range from $738/AF-$1203/AF, depending on how many other jurisdictions were involved in the Project. The cost for the Salsipuedes alternative would be $645-695/AF; however, it should be noted that this alternative is uncertain due to the limited knowledge about the ability of the groundwater basin to accept substantial additional water from the proposed spreading grounds, and, in addition, possible water quality limitations. The cost for desalination is estimated by the study to be $1,860/AF for seawater, and $470-670/AF for brackish groundwater (though use of brackish groundwater would not alleviate overdraft).

e. State Water Project The State Water Project referred to in this report in the Coastal Aqueduct branch of the State Water Project that would connect with the existing California Aqueduct, which currently brings northern California water through the San Joaquin Valley to Los Angeles and other southern California communities (Exhibit 11). The Coastal Aqueduct would serve Santa Barbara and San Luis Obispo Counties, which contracted with DWR (Department of Water Resources) in the early 1960's for participation in the State Water Project. The two counties pay annual entitlement fees for participation in the State Water Project; however the two counties have continually deferred implementation of the Project. The Coastal Aqueduct would bring water to the northern terminus of Santa Barbara County; the County would be required to fund the intra-county distribution system (ICDS). In March 1979, Santa Barbara County voters overwhelmingly rejected a bond authorization to construct the ICDS, and the County subsequently voted to defer implementation of the Coastal Aqueduct. The County again this year voted to defer for two years its decision on implementation of the Aqueduct. San Luis Obispo County generally follows Santa Barbara County votes on deferment, as the costs are significantly reduced if both counties are involved.

As currently conceived, the Coastal Aqueduct would supply San Luis Obispo County with 25,000 AFY and Santa Barbara County with 45,000 AFY. These amounts are based on estimates of projected needs and growth rates in the two counties; these numbers are flexible and subject to modification, for example, if alternative supplies become available for a particular community. Although assessment districts have not been formed, the Project is generally seen by County officials as a method to deliver water to urban users; agricultural demands are not figured into the demand projections, and agricultural users in most communities would continue to pump groundwater and not be subject to the greatly increased water costs. On the other hand, many agricultural users in the Carpinteria Valley use water district water; it is unclear how they would be protected from vastly increased assessments.

Aside from the question of effects on agricultural assessments, the State Water Project would, through its growth inducing nature, result in increased pressure for conversion of agricultural lands and adverse impacts to other coastal resources. The Air Force's water study states:

> Importation of State Project water would also be growth-inducing in various areas of the County, leading to increased growth rates by ending water supply moratoria, and increasing the population holding capacity of the County. Decreased air quality, decreased aesthetics and changes in land use, and other secondary impacts could result from growth, if not mitigated by growth management. However, it is anticipated that such impacts would not be as significant at Vandenberg AFB as at other areas of the County such as the South Coast.

Current growth controls in Santa Barbara County, in the form of urban-rural boundaries adopted through the County's LCP process, have been certified by the Commission as adequate protection to protect agricultural viability. However, many of these urban boundaries are based on limited availability of water supply, so that increased supplies would undoubtably create pressure for amendments to the LCP Land Use Plan to expand the urban rural boundaries into agricultural areas.

San Luis Obispo County's Land Use Plan has not yet been certified by the Commission. San Luis Obispo County's plan has delineated "Urban Reserve Lines" around each community, representing ultimate limits for community growth, and based in part on the availability of future public services such as the State Water Project or Nacimiento Project. The Urban Reserve Lines would allow the conversion of some prime and non-prime agricultural lands to urban uses. Thus, unless the County revises its Land Use Plan to conform to the Commission's expressed concerns, implementation of the State Water Project based on current planning efforts could result in conversion of prime agricultural lands in San Luis Obispo County.

In analyzing the feasibility of the State Water Project option, the Air Force's water study looked at different scenarios of participation by different entities and water purveyors. The lowest water cost for Vandenberg ($738/AF) would result from full participation by both counties (45,000 AFY by Santa Barbara and 25,000 AFY by San Luis Obispo). Higher rates ($757/AF) would result from participation by north Santa Barbara County at 27,000 AFY and all of San Luis Obispo County. Participation by Vandenberg as the only Santa Barbara County user and all of San Luis Obispo County would result in water costs to Vandenberg of $996/AF. If both counties drop out of the Project and Vandenberg is the sole participant, costs would be $1,203/AF. (All of the above scenarios assume Vandenberg demand will be 8,000 AFY; if demand is lower, per acrefoot costs will rise.) It appears unlikely, however, that both counties would drop out entirely from the Project. The water study states:

> Discussions with representatives of local purveyors in the Lompoc Valley and Santa Maria Valley regions during the course of this study indicate that those entities believe that the implementation of the SWP in Santa Barbara County is highly contingent upon the participation of Vandenberg AFB. This is due to its relatively significant participation in the project and because its financial resources are much greater than those of the local communities. In addition, the impacts on employment and population of the expanded mission of Vandenberg AFB will result in increased future water demands in the nearby communities. The local communities therefore believe that Vandenberg AFB should take positive action to relieve the future stresses placed on the water supplies of those communities. Generally, it is believed that once Vandenberg AFB finally decides to participate in the project and indicates to the County that it is willing to assume the financial burden of its participation from the County, the remaining communities will do likewise soon thereafter (in at least the North County and possibly elsewhere). It is also true that Vandenberg AFB can develop the facilities for delivery of State Project water without the participation of either San Luis Obispo or Santa Barbara counties, although at a significantly increased unit cost of water. Thus, it is apparent that Vandenberg AFB has the capability of ensuring the implementation of the project if it so desires.

f. Response to the Supplemental Water Study. On August 11, 1982 the State Resources Agency sent a letter to the Air Force in response to the Supplemental Water Study. In this letter (Exhibit 12), the Department of Fish and Game supported the State Water Project alternative from a fish and wildlife

standpoint, as it would help alleviate groundwater overdraft and in-stream flow reductions. The Department of Fish and Game also noted concerns over the State Water Project's growth inducing impact. The Department of Water Resources urged "...that more aggressive water conservation measures than those discussed in the report be implemented. Water conservation and the use of reclaimed water should be kept at the forefront of water planning for Vandenberg AFB, regardless of whether the imported water project plan is adopted." The Coastal Commission's comments questioned the study's failure to address water conservation as a potential source of additional supply, questioned the estimates of long term water demand provided by the study, and urged a more aggressive water conservation program on the base. The Air Force has not yet responded to the Resources Agency letter.

g. Impacts of the Space Shuttle Program. The documents submitted by the Air Force reviewing the impacts of the Space Shuttle Program appear to be internally inconsistent. On the one hand, the EIS Supplement states that the socioeconomic effects of the program would result in substantial increases in water demand. On the other hand, the consistency determination states that "Water use by the Space Shuttle program will have very little impact on water demand in Santa Barbara County in comparison to either the Base, total urban or agricultural demands."

The Air Force's EIS Supplement states that employment on Vandenberg AFB will increase from the current level of 10,631 employees (1980) to 15,500 employees in the peak year of 1985, levelling off to 14,700 in 1988. The Supplement states "This represents a 45% increase in direct employment in the peak year 1985 and a 38% increase by ...1988. The bulk of the increase is due principally from contractor employment associated with the Shuttle program." The Supplement notes that MX program would account for approximately 25% of the increase. The Supplement goes on to state that direct and indirect employment increases will amount to 9,585 jobs in the peak year 1985. that in-migration into north Santa Barbara County is projected at 24,000 persons in the peak year and 9,600 persons in the long term (1988); the Supplement attributes 80% of this increase to the Space Shuttle Program. The Supplement notes that growth rates in north County "...can be expected to increase further..." due to the Shuttle program and other non-Vandenberg related projects, and that "Subsequent increases in demand for residential and commercial land are also anticipated and will result in increased pressure for conversion of land currently in agricultural use to more urban uses."

In its section on the impact of the Space Shuttle program on infrastructure requirements, the EIS Supplement indicates that the Space Shuttle and MX programs will increase water demand in North County by approximately 12,000 AFY during the peak year and by approximately 9,400 AFY in the long term (1988), stating that "Both the quantity and quality of locally supplied water will be adversely affected unless non-local sources are made available." With the Shuttle program responsible for 80% of the increase, the long term demand attributable to the Shuttle program would then be approximately 7,500 AFY, using the data from the EIS Supplement. However, these demand projections are based on a per capita consumption rate of 0.98 AFY/person, which the Commission's staff believes are too high; the staff will provide what it believes to be a more realistic estimate in the following discussion.

In April 1982 Santa Barbara County's Resource Management Department released a study entitled "Housing Impacts and Mitigation Measures Associated With the Planned Expansion of Vandenberg Air Force Base." This report analyzed the number of new households that would be brought into the area as a result of increased employment, with its corresponding impact on local housing markets. The report took into account employment that would consist of local hires, and estimated that direct and indirect new household formation due to Vandenberg expansion would peak at 5,783 households in 1985 and level off to 4,516 in 1988. The Air Force is not proposing to increase housing on the base; the new households are expected to reside in Santa Maria (45%), Lompoc (45%) and the Santa Ynez Valley (10%). The new households would not compete for water directly with Vandenberg pumping from the San Antonio Basin, but the portions of north County from which they would obtain water are also experiencing groundwater overdraft already. As well as dealing with the housing impacts of Vandenberg expansion, one of the recommendations of this study is that water conservation should be required. The study states:

> Water Conservation Measures
>
> While this study proposes to mitigate the increased housing demand associated with VAFB and normal population growth in the North County by providing incentives for augmenting the housing stock, the area's limited water resources will act as a major deterrent to achieving this goal unless ways are found to conserve and thereby expand local water supplies. The County should begin work immediately with public and private water purveyors in the North County and VAFB to formulate a water conservation program. Included in such a program should be incentives for reducing water consumption in all new and existing development, e.g. a variable rate schedule for discouraging excessive use of water, installation of water-conserving devices, etc.

The report also looked at income levels, ability of new households to obtain housing, breakdowns of renters versus home purchasers and breakdowns of anticipated densities for new housing to serve the Vandenberg-related growth. The report indicates that 25% of the housing would be low density (1/3 acre per unit or greater), 25% would be medium density (around 6,000-8,000 square feet lots), and 50% would be high density (multi-unit development). Using overall County averages for water consumption of 1 AFY/unit for low density development, 0.4 AFY/unit for medium density development, and 0.15 AFY/unit for high density development, and multiplying these rates by the above density breakdowns of the County's estimated projections of household formation, the Commission's staff estimates that the off-base water demand generated by Vandenberg expansion activities would be 2,457 AFY in peak year 1985 and 1,920 AFY in the long term (1988). Since the Air Force's EIS Supplement attributes 80% of Vandenberg expansion to the Space Shuttle Program, then the off-Base increases in water demand as a result of the Space Shuttle Program would be 1,966 AFY in peak year 1985 and 1,536 AFY in the long term (1988).

Adding these figures to on-base projected increases would yield the total increased water demand resulting from the Space Shuttle Program. According to the Air Force's water study, expected water demand increases on the Base would increase by over 1,000 AFY due to Shuttle and MX related expansion, from 3,401

in 1978 to 4,575 AFY in 1987; however it is not clear to the Commission's staff how this figure was arrived at. Since no new on-base housing is being proposed, since the Air Force states that any new landscaping would be drought resistant, since launch related water use will be recycled,and since the Air Force states there are no classified military operations using substantial amounts of water, additional on-base requirements should be limited to that needed to serve the additional commuter employees. Using County averages for commercial/industrial workers of 3.08 per capita per day, with 248 work days per year, the approximately 5,000 additional commuter employees on the Base should increase demand by closer to 100 AFY, rather than the 1,000 AFY stated in the Air Force's water study. With 80% of that 100 AFY attributable to the Space Shuttle Program, then total water demand generated by the Space Shuttle Program is estimated by the Commission's staff to be approximately 2,046 AFY in peak year 1985 and 1,616 in the long term (1988).

h. Water Conservation. As mentioned above, several public agencies have urged water conservation as a means to minimize the effects of increased groundwater pumping due to Vandenberg expansion. The extent of current conservation is difficult to determine, since individual water users on the base are not billed or metered. In "Present and Future Water Needs of Santa Barbara County" (Oct. 1977) the County Water Agency conducted detailed analyses of the amount of water that could be saved through conservation in each jurisdiction. Potential savings through conservation generally ranged from 12-30%; however, Vandenberg AFB was excluded from the study due to the lack of existing metering and monitoring. The Supplemental Water Study prepared for the Air Force found the same problem, noting:

> The impact of ongoing and future water conservation measures as Vandenberg AFB is very difficult to monitor. This is due to a fluctuating population at the Base and to the limited extent of metering performed on the Base. The continuance of conservation practices at Vandenberg AFB should continue to minimize waste of water. Generally, the costs of such a program are difficult to develop at the current level of evaluation. The SBCWA [County Water Agency] has estimated that the costs of an ongoing conservation program (approximately $10/AF/yr.) would be minimal in comparison to other water supply alternatives. Because of this, a water conservation program should remain a basic part of Vandenberg AFB's water supply program.

The Supplemental Water Study did not recommend implementation of any specific additional water conservation measures.

The Air Force's consistency determination states: "...on base water consumption from the Space Shuttle Program is relatively low." The Commission believes this statement gives a limited picture of the total impact as it ignores off-base Space Shuttle induced water demand increases.

The consistency determination states: "Water use by the Space Shuttle Program will have very little impact on water demand in Santa Barbara County in comparison to either the Base, total urban or agricultural demands." The Commission believes comparing Shuttle induced growth to total County urban or agricultural demands is unreasonable. No individual project use would be substantial compared to total County demands. The Commission finds that the Shuttle generated increases determined above of 1,600 to 2,000 AFY in areas with already overdrafted groundwater basins remains a significant impact.

The consistency determination states: "Currently, the consumptive water use from the Lompoc Basin by Vandenberg AFB is net negative due to return of water to the Lompoc aquifer and, therefore has no direct adverse effect on the Coastal Zone." The Commission notes that the Lompoc Basin provides a very small portion of the bases' supply, and that the Air Force's Supplemental water study states:

> There are no landscape irrigation returns from the Base since all landscaping is done on portions of the Base underlain by impermeable rock. As a result out of the 4,800 AF pumped by Vandenberg AFB in 1980 for use on-Base and by the FCI, consumptive use was 4,500 AF; 300 AF returned via irrigation activities and wastewater effluent discharges at the FCI. Vandenberg AFB produces an average of 1,200 AFY of wastewater which are sent to the Lompoc Regional Wastewater Treatment Plant. Presumably, much of this effluent is returned to the Lompoc Plain groundwater basin since it is discharged into the Santa Ynez River to percolate in the channel. These returns, however, are credited to the City of Lompoc's consumptive use. The consistency determination states: "Because the Space Shuttle Program will require relatively small amounts of water, it can be implemented with or without the State Water Project. The Space Shuttle Program is therefore not dependent on the State Water Project."

The Commission nevertheless believes that, by exacerbating groundwater overdraft in north Santa Barbara County by at least 1,600-2,000 AFY, the Space Shuttle Program clearly results in increased pressure for implementation of the State Water Project.

The consistency determination states:

> Vandenberg AFB is fully committed to water conservation. Various programs have been implemented and are being planned by the [Utilities Conservation Committee] in an attempt to increase water conservation and minimize wastage on-base. Existing water conservation measures include lawn watering restrictions between 10 AM and 4 PM, landscape planning for use of drought-resistant vegetation, alteration of housing related water facilities to reduce flow rate, conducting periodic water conservation awareness campaigns, return of wastewater to the Lompoc aquifer, reduction in Space Shuttle program construction related on-base water requirements, as well as development of water supply alternative projects such as wastewater reclamation, dam and reservoir projects, conjunctive use, spreading grounds for recharge, and desalination...

The Commission does not disagree that the Air Force is committed to water conservation on the Base. Nevertheless the Commission believes the success of the existing water conservation program is limited, and that additional measures are feasible and practicable that would greatly enhance the base's water conservation program.

While the present lack of metering and monitoring makes accurate calculation of the potential savings through conservation difficult, using the County Water Agency estimates for potential savings through conservation for the surrounding County of 12%-30%, potential savings would range between 500 to 1,400 AFY and would minimize, though not entirely mitigate, the overall impacts of the Space Shuttle Program.

Furthermore, data just recently released by the Air Force indicates that water use on Base housing is more than 1 AF per unit for homes with lot sizes of approximately 10,000 square feet. Average water use for similar size lots in the surrounding County is approximately 0.5 AF/unit. This data also indicates that leaks in the Base's water system account for over 1,000 AFY, or over 20% of total water use. These two facts clearly indicate the potential for substantial water savings through conservation and monitoring. The Air Force indicates that one of the difficulties in pursuing conservation is the Defense Department's overall policy of not billing residents of military bases for utilities, including water. This policy would make it difficult to enact a billing structure as an incentive to induce savings. Nevertheless, there are numerous other mechanisms the Air Force could use to increase water conservation, for example retrofitting existing plumbing fixtures with flow reducing devices, and additional meters to help monitoring and detection of leaks in the water system.

i. Conclusion. The Air Force believes both that the Space Shuttle Program does not raise significant water intensification issues, and that the Base's current water conservation efforts are "...consistent with California conservation objectives...". The Air Force has agreed to include as part of its submittal the following statement: "The Coastal Commission will be kept informed of any new water conservation programs as they are implemented. Any recommendations from the Commission will be given serious consideration for implementation where feasible." The Commission believes this statement is clearly inadequate in addressing the issue of water intensification raised by the Space Shuttle Program. The Commission finds that the Space Shuttle Program would result in significantly increased water demand in areas already subject to groundwater overdraft. The consistency determination proposes no additional measures to mitigate this impact, and the future of the long term solutions mentioned in the Air Force's Supplemental Water study are all uncertain. The Commission finds that the Space Shuttle Program would not prevent the depletion of groundwater supplies, would not be located in an area with adequate public services, and, given the Air Force's above noted reliance on and influence over the State Water Project, would prematurely increase pressure for the State Water Project, which, in turn, would increase pressure for the conversion of agricultural lands to urban uses and adversely impact other coastal resources such as limited highway capacity and community character. The Commission therefore finds the Space Shuttle Program inconsistent with Sections 30231, 30250 and 30241 of the Coastal Act. The Commission cannot, therefore, find the proposed Space Shuttle Program consistent to the maximum extent practicable with the California Coastal Management Program and must object to the Air Force's consistency determination.

The Commission agrees with the Department of Water Resources that "...more aggressive water conservation measures than those discussed in the [Supplemental Water Study] be implemented...regardless of whether the imported water project

plan is adopted." The Commission also believes that implementation of reasonable water conservation measures on the Base would minimize the adverse impacts of the Space Shuttle Program on water intensification. Accordingly, the Commission has suggested modifications, contained in Stipulation (a), which, if enacted by the Air Force, should result in substantial water savings, allowing the Commission to find the Space Shuttle Program consistent to the maximum extent practicable with the relevant provisions of the California Coastal Management Program, and thereby allowing concurrence with the agency's consistency determination. The stipulation is intended to allow flexibility for the Air Force in meeting water conservation needs, as long as the intent is met, and to eliminate the need for formal resubmittal by the Air Force of its consistency determination by allowing administrative review of water conservation measures by the Executive Director of the Commission.

2. Sonic Boom Impacts.

a. Coastal Act Policies. Section 30230 of the Coastal Act provides:

> Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial recreational, scientific, and educational purposes.

Section 30240 provides:

(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on such resources shall be allowed within such areas.

(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade such areas, and shall be compatible with the continuance of such habitat areas.

b. Habitat Description. The northern Channel Islands (San Miguel, Santa Rosa, Santa Cruz and Anacapa Islands) were recently designated a National Marine Sanctuary due to their biological significance. The islands are located within an area known as the Southern California Bight, the confluence of two biogeographic coastal provinces resulting in unusual species diversity. The Islands represent the most significant pinniped habitat area in the western United States, and the highest number and concentration of species are located on San Miguel Island. Six species of seals and sea lions inhabit San Miguel Island; five of those, the northern fur seal, California sea lion, northern elephant seal, stellar sea lion, and harbor seal; breed there, thereby making it the world's most diverse pinniped breeding site. Approximately three fourths of the estimated 74,000 seals and sea lions which occur in the Southern

California Bight spend at least part of the year in the Northern Channel Islands, primarily at San Miguel Island. In addition, San Miguel Island is the principal seabird rookery of the Northern Channel Islands and the largest rookery in Southern California, containing the second largest world colony of the ashy storm petrel, along with nesting populations of the double-crested cormorant, Brandt's cormorant, pelagic cormorant, pigeon guillemot, and Cassin's auklet.

c. Sonic Boom Description. Great concern has been expressed over the potential of loud sonic booms resulting from Space Shuttle launches over San Miguel Island to adversely affect this significant habitat. The Space Shuttle launch trajectory begins vertically but soon curves towards the horizontal in order to bring the vehicle into proper altitude and orientation for orbital trajectory. This flight path will result in a focusing of the sonic boom energy into a narrow zone of particularly high sound pressure at the touch-down point of the shock wave. Focusing exacerbates the effects of the already intense Space Shuttle booms, the magnitude of which results not only from the very large size of the shuttle vehicle itself, but also from the size enhancement effect produced by the rocket's exhaust plume.

Even without the focusing effect a normal sonic boom from a Space Shuttle launch would create an overpressure of up to 6 psf (pounds per square foot), with a decibel (dB) equivalence of 143 dB, which is sufficient to cause damage to fixed structures (e.g., glass breakage, plaster damage). However, with the focusing effect, the sonic booms would create overpressures as much as five times greater, or up to 30 psf (157 dB). (Note: the dB scale is a logarithmic scale; an increase by 6 dB represents an approximate doubling of sound intensity.) The duration of the boom is predicted to be 2 to 5 seconds.

The focusing effect is expected to occur within a narrow zone approximately 1,000 feet wide, and extending laterally approximately 40 miles. The overpressures will be greatest at the focal point, and will begin to drop off to the south and laterally of the focal point; this is shown graphically in Exhibit 7(A), which shows the "footprint" of a sonic boom where the flight would pass over San Miguel Island. During flights of this azimuth (less than 180°) it is highly likely that the most intensely focused boom will occur directly on San Miguel Island. The number of flights affecting San Miguel Island is small; most of the flights will have a launch azimuth of greater than 180° and will result in a focused sonic boom over the open ocean (Exhibit 7(B)). Of the approximately 80 flights, the Air Force states a maximum of 7 will result in a focused boom on San Miguel Island. All of the return flights will fly over the islands; however they are expected to cause normal sonic booms in the range of 1.5 pfs (130 dB).

When the Air Force submitted its Environmental Impact Statement in 1978 noting the potential for focused sonic booms over the Channel Islands, great concerns were expressed by the Coastal Commission and other responsible public agencies, as well as the scientific community, of the need to assure protection of this significant habitat. At that time the Air Force's EIS recommended the following mitigation measures: (a) Restrict launches at or near the 70° inclination (150° azimuth), to times of the year when breeding and rearing activities are at a minimum; and (b) vary or alter the trajectory for those launches scheduled at or near the 70° inclination so as to move the sound focusing region seaward of the Island. The EIS also noted a need for more study of the effects of sonic booms on animal habitat and physiology.

d. Sonic Boom Studies. After the time of submittal of the original EIS, the Air Force contracted with Hubbs/Sea World Research Institute and the Center for Marine Studies at San Diego State University to compile existing literature, determine deficiencies in existing data, and conduct detailed new studies to more accurately predict the impact of sonic booms on sensitive habitat. The major concerns originally expressed were the potential for (a) disruption of social structure and interruption of reproductive behavior, due to stress associated with startle response to the boom; (b) physical damage to eggs, nests, and young of birds and mammals as a result of panic flushing or stampeding; (3) habitat destruction due to pressure induced collapse of fragile cliff areas used as roosting and nesting sites by marine birds, and collapse of burrows used by some birds, mammals and reptiles; and (c) endocrine system dysfunction due to increased stress, which could modify reproductive physiology of both birds and mammals. In December 1980 the results of the additional research were published, in a report entitled "Potential Effects of Space Shuttle Sonic Booms on the Biota and Geology of the California Channel Islands: Research Reports." Since that time the Air Force has also published its Supplemental EIS for the Space Shuttle Program, which addresses the sonic boom issues, and more recently, the subject consistency determination, which summarizes the sonic boom issues and the Air Force's response to the questions raised.

The Research Reports contain the following relevant information and conclusions:

1. "Historic and Current Disturbances to the Natural Resources of San Miguel Island" notes that San Miguel island was used by the Navy for intensive bombing target practice prior to 1963, and sporadically until the early 1970's, resulting in damage to habitat and geological features. Human activities are now strongly regulated, and the report notes that the major sources of current disturbance are military overflights, occasional sonic booms and illegal visitation of the island by boaters and fishermen. Flights below 1000 ft. over the island are prohibited by the State Fish and Game Code.

2. "Status of Peregrine Falcor in the Channel Islands, 1979-1980" reported that Peregrine Falcons, an endangered species, do not currently nest on the Northern Channel Islands. Recolonization remains likely, and the report recommended additional surveys for the Falcon prior to the first Space Shuttle launch from Vandenberg.

3. "Historical and Present Populations of Pinnipeds in the Channel Islands" indicates current pinniped populations. Pinnipeds populations have been increasing continually in recent years, and will continue to do so "...until density dependent factors begin to slow growth through increased pup mortality and/or decreased success." This report estimates that saturation may occur and growth increases slowed "...as early as 1985," possibly coinciding, then, with the first Space Shuttle launches from Vandenberg. This report also "...suggests the major ultimate cause of harbor seal pup mortality to be mother-pup separation during the first 2-3 weeks of life..."

4. "Disturbances to the Pinnipeds and Birds of San Miguel Island, 1979--1980" noted that harbor seals were most likely to startle, and elephant seals least likely. Major disturbances to harbor seals, defined when 50% of the animals moved or 20% entered the water, occur 4-5 times per month. This report investigated concerns over mother-pup separation, panic leaping from promontories, stress reactions and possible permanent leaving of the rookery. The report concluded:

> We do not regard [mother-pup] separation as a problem. ...sea lions are extremely cautious about jumping over the edges of cliffs. We do not have evidence of permanent abandonment of rookeries from any isolated stimuli, no matter how intense. Harbor seals will abandon the beach, possibly completely, in the event of a loud sonic boom. They will probably rehaul within a 1-2 hour period unless the boom occurs late in the day. Mother-pup separation is known to cause mortality in harbor seals, and there is no evidence that harbor seals are less reactive during pupping than at other times. ...we suspect that some pups may be deserted, resulting in some increase in mortality.
>
> Sonic booms from the Space Shuttle launches may increase the disturbance levels by 10-20%. ...Present levels of disturbance are not significantly harmful to the population. ...We doubt that this increment will have any measurable effect on current bird or pinniped populations, although it is conceivable that some mortality or injury would result. The most deleterious effects are likely to be experienced by harbor seals, and increase of one to two strong startles per month in March and April when small pups are unable to follow their mothers into the water may cause some mortality. In our experience, however, females return to their pups within an hour or so of an abandonment.
>
> We could not demonstrate on the basis of our data that loud sonic booms will have any deleterious effect on the pinnipeds of San Miguel. However, our data do not extend to the sound levels expected from 70° inclination launches, and we recommend caution during the period of greatest potential impact from March through July. Launches should be scheduled during other seasons whenever possible. ...Possible adverse impacts will be minimized if Space Shuttle activities, especially launches, are avoided during the pupping and nesting season from march through July.

5. "Effects of Impulse Noise on Seabirds of the Channel Islands" tested bird responses to shotgun and carbide cannon blasts (up to 140dB). This report investigated the possibility of egg cracking or predation by other birds due to panic reactions by nesting birds to loud impulse noises. This report noted:

> Little response occurred to the purely auditory stimuli of the two types we created, shotgun blasts and carbide cannon explosions. Generally only roosting birds actually fly in response to these stimuli, and those that left their roost generally returned immediately. The primary response to auditory stimuli that we recorded is a head-jerk with return to normal activities within one to three minutes. Birds are most susceptible to disturbance while they are roosting or courting and forming pair bonds. Once they have begun nest building, incubating and raising young, their tendency to remain at their nest is much stronger.

On the question of the impact of burrow collapse caused by the booms to burrow nesting birds such as Cassin's Auklet, the report concluded that burrow collapse already occurs under normal conditions and that the auklets are well adapted, and would re-excavate quickly. The report concluded that:

> We have no idea how a carbide explosion relates to a sonic boom noise. Yet, we believe that in comparison to a human walking into a bird colony a sonic boom will have minimal effect. In order to accurately determine the exact effects of a sonic boom on bird populations we must witness an actual boom.

6. "Sonic Booms and Reproductive Performance of Marine Birds: Studies on Domestic Fowl as Analogues" studied the effect of sound stress on the reproductive physiology of chickens. Chickens were chosen because much is already known about their reproductive physiology and because they are more adaptable to laboratory conditions. Actually egg cracking is not expected to occur until about 180 dB. The results on incubation were mixed: a simulated sonic boom applied after 1 day of incubation showed no effect, applied late in the incubation at day 19 "...caused a significant depression in growth on days 8, 9 nd 10 post hatch...", and applied at day 13 showed normal or even heavier chicks. The report concluded that sonic booms would not affect ovulation, shall thickness, percent of shell or laying time, and that a boom would only be likely to slow chick growth if the exposure occurs late in the incubation period. In transferring its findings to the more natural habitat on San Miguel Island, the report stated:

> These studies employed birds which had been genetically selected for persistence to lay; therefore, they might be less susceptible to stress than wild birds. On the other hand, the birds used in this study were housed under good conditions, ...buffering against environmental changes, compared to wild birds. Wild birds are subjected to many environmental factors...that makes them naturally selected for reproductive success in adverse conditions. Therefore, we are confident that these results are applicable to birds in natural settings. Our results do not indicate that further studies with wild birds would be productive.

7. "Possible Physiological Effects of Space Shuttle Sonic Booms on Marine Mammals" discussed in detail the nature of the sound expected from the sonic booms and the physiology of marine mammal hearing, including the effect of temporary and permanent auditory damage and its impact on such sound-related functions as territoriality, mating behavior, mother-pup recognition, and foraging. The report notes that vocal sounds are necessary for maintaining social order among pinnipeds, as well as necessary for mutual for recognition between mothers and their pups in many pinniped species; the report concluded that impacts would be minor if hearing losses were temporary. The report compared human and pinniped hearing physiology; the harbor seal, for example, is less sensitive than humans by about 20-30 dB in air, though it is more sensitive in water than in air. Both pinnipeds and humans are far less sensitive to low frequency noise than high frequency noise, and the Air Force has projected that the frequency range for the Space Shuttle booms will be limited to the low frequency range. The report states that auditory damage is a function of 3 factors: peak pressure levels, pulse duration and frequency spectrum. The report divides impulse noises into 2 main categories (Types A and B). Type A

noise lacks high frequency components; sonic booms are in this category. Type B noises arise quickly and are of short duration, containing significant energy in the high frequency ranges. Type A noise would not cause auditory damage unless the sound pressure exceeds 160-162 dB. The damage threshold may be as low as 140 dB for type B noise. The report therefore concludes that:

> [B]ased on the Air Force FEIS...auditory damage in humans is not expected, although some TTS [temporary threshold shift] is probable. Permanent auditory damage is probably even less likely for pinnipeds, because their in-air auditory sensitivity is lower than humans. Pinnipeds are likely to experience some degree of TTS, however. If the Space Shuttle boom should contain appreciable high-frequency components (which in fact might be expected because of the launch vehicle's irregular shape...), the PTS [permanent threshold shift] risk potential will increase greatly. Because of this uncertainty, it is important that early shuttle flights be monitored.

While submerged pinnipeds would be more sensitive, the report states the Shuttle impacts:

> ...do not appear likely to produce underwater boom intensities high enough to post significant risk of hearing loss (especially for the population as a whole). Again, the presence of high-frequency components in the shuttle boom's sonic spectrum will greatly increase the risk factor. Accordingly, underwater sound intensities should be carefully monitored along with airborne sounds during shuttle test launches.

This report anticipates no damage to cetaceans (whales, porpoises, and dolphins), stating that they produce sounds of up to 167 dB and have historically shown no adverse reactions to military aircraft. The report's overall conclusions are as follows:

> In summary, the Space Shuttle sonic boom is not expected to produce auditory or non-auditory effects in Channel Islands marine mammals of sufficient magnitude to measurably influence population levels. Some temporary hearing threshold shift is likely following the exceptionally loud focused boom created by those launches directly overflying the islands, but this threshold change should be of short duration (minutes to hours) and of minimal disruptive effect. Similarly, while the startle effect of the shuttle boom may cause some panic and concomitant physiological stress, the frequency of booms will be low compared to the frequency of naturally-induced startle-causing events. No significant increase in stress-related pathology is anticipated, and disruption of the reproductive cycle is also considered improbable.

> It should be recognized that these forecasts are based on a minimum of direct evidence, and depend primarily on extrapolations from experiments performed on other species (usually humans or common laboratory animals). Therefore, the predictions must be used with caution. Unfortunately, direct experimentation with marine mammals will be difficult, time-consuming and expensive. Furthermore, most of the feasible experimental designs suffer from interpretive difficulties, especially when attempting to formulate the eventual population consequences of any observed boom-induced physiological changes. Because of these shortcomings, and because of the low probability of any actual damage from Space Shuttle sonic booms, experimental investigation is not recommended at this time. Instead, the optimal approach would seem to be one based on careful observations of behavioral effects of Space Shuttle sonic booms on Channel Islands marine mammals, coupled with long-term population monitoring.

A separately published report entitled "Studies on the Pinnipeds of the Southern California Channel Islands, 1980-1981" by Brendt Stewart, for Hubbs/Sea World, examined the results of exposing breeding northern elephant seals and California sea lions on San Nicholas Island to a loud impulse noise caused by a carbide .. pest control cannon. This study reported that movement to the ocean in response to impulse noises decreased as the breeding season progressed, that no mother-pup separations were observed during the peak pupping period, and that no pups falling off cliffs or being trampled were observed. This study concluded that "Habitat use, population growth, and pup survival of both species appeared unaffected by periodic exposure to carbide cannon impulse noise during the 1981 breeding seasons."

In a "synthesis report", Hubbs/Sea World and the San Diego State Center for Marine Studies summarized all but the last above mentioned reports. The systhesis report states:

> Our field, laboratory and literature studies do not permit conclusive prediction of the effects of Space Shuttle activities on biological and geological resources. The focused sonic boom from Space Shuttle launches is an unprecedented event. Its consequences cannot be established through simple extrapolation of existing knowledge.
>
> Our studies, however, permit the establishment of hypotheses, some quite firm, about what to expect from Space Shuttle operations. These will require confirmation or modification as new information is received.

The hypotheses established are attached as Exhibit 8. The report's recommendations for future monitoring are summarized as follows: (a) obtain measurements of sound pressure levels, including the "focusing" effect, during early launches from Kennedy Space Center, during reentry flights over the Channel Islands and during early landings at Edwards Air Force Base; (b) continually survey pinniped populations on the Channel Islands up until the time of the first launch over the Islands; (c) observe animal behavior during early return flights over the islands; (d) survey the Channel Islands during the

first spring prior to the first scheduled launch over the Islands for peregrine falcons or other endangered species; (e) obtain population census of birds and pinnipeds 2 to 4 weeks prior to the first launch over the Islands; (f) measure sound pressure levels and observe animal behavior, in person if possible, or through time-lapse photography, during the first shuttle launch over the Islands; (g) obtain population censuses and mortality surveys during the first week after the launch, to be repeated 21 days later, including detailed behavioral observation and analysis of any population changes; (h) refine hypotheses after observation and analysis to design a new observational program for the subsequent launch, "...until it is evident that the effect of Space Shuttle sonic boom on the birds and mammals of the California Channel Islands is adequately understood."

e. Advisory Committee.. In addition to contracting for the above mentioned studies the Air Force set up and independent advisory committee of consisting of university professors in biological fields, to help in the initial formulation of the areas for research, and to comment and review during and after the research period. The advisory committee's final response (Exhibit 9) states:

> The scientific expertise of the group was of high caliber and conclusions made were based on hard facts and common sense. Predictions, in general, were that the Space Shuttle sonic boom effects would be minimal. We endorse the recommendation to validate the hypotheses and predictions as described in the Synthesis report.
>
> There still remains the tasks of obtaining pressure-time measurements of the sonic boom during the launch of the Space Shuttle, observing the response of selected animals and birds to the sonic boom during launch and recovery, and the taking of population censuses of certain species as the program proceeds.

f. EIS Supplement. In February, 1982 the Air Force submitted its Supplemental EIS for the Space Shuttle Program to update environmental information gathered since original EIS. The Supplement stated there would be a maximum of 7 launches over the Channel Islands (between 148° and 180° azimuth) in the 10 year life of the program, and concluded that:

> Sonic booms generated by the Space Shuttle are expected to have little impact on the biota of the Northern Channel Islands. Disturbances to pinnipeds resulting in mass movement from the shores of the islands to the water would be increased by no more than 15% (currently about 100 such events occur each year at San Miguel). There is little chance of pup-death (due to stampeding) or of significant effects on marine mammal hearing. Shuttle sonic booms are not expected to seriously startle nesting seabirds or cause egg or chick mortality. Consequences for seabird populations should be negligible.

The EIS Supplement proposed following the above mentioned monitoring recommendations of its technical consultants. However, in proposing mitigation the Supplement proposed less stringent mitigation than was proposed in the original EIS. The Supplement rejected the "Dog Leg" alternative of flying around the Islands as infeasible for two reasons: for most flights fuel would be insufficient to reach orbital trajectory in the desired flight path, and a dog leg trajectory could result in the external tanks being dropped in a populated part of the Pacific Ocean (the Marshall Islands). The mitigation proposed by the Supplement consisted of the following statement:

> Information on sensitive periods for Channel Island biota will be provided to mission designs, who will consider such information in program planning. If impact mitigation is deemed appropriate, the launch director may choose to avoid launching on certain azimuths during the most sensitive biological time, depending on mission requirements.

g. Responses to EIS Supplement. Several resource agencies wrote comments to the Air Force in response to the EIS Supplement. The National Park Service stated continued concern over the cumulative impacts of increases in sonic booms, and stated that "...arguments concerning [the] unfeasibility [of the dog leg alternative] are not convincing..." The U.S. Fish and Wildlife Service recommended that the first few launches over the island be limited to August 1 - December 31, to allow monitoring of sonic boom effects during a noncritical time. The National Marine Fisheries Service stated that "...harbor seals...should not be overlooked when scheduling space shuttle activities...", that the period of greatest potential impact occurs from March through July, and that the mitigation measures "...should be improved to ensure that the flight director will avoid scheduling...launches...[affecting] San Miguel Island during the breeding seasons (March-July), if a practical alternative exists. The Coastal Commission staff stated that given the uncertainties, a conservative approach is still warranted, and that flights over the islands from March through July should not be authorized at this time.

h. Air Force's Consistency Determination. The Air Force has responded to these concerns in the submittal of its consistency determination. The consistency determination states:

> In spite of the strong indications of no significant impact of sonic booms on Channel Island biological resources, the Air Force will sponsor a monitoring program to verify [its] predictions... The monitoring program now more fully addresses potential effects to marine mammal and avian populations on the island.
>
> At the present time the first scheduled launch that could potentially affect San Miguel does not occur during the most sensitive time period for marine mammal and avian breeding activities, May through July. This will allow biological impacts to be monitored during a period when the potential for adverse impacts to these animals is low.

> Sonic booms produced by the Orbiter on land approach have been measured at Edwards AFB, and measurements have conformed closely to model predictions. Sonic boom ascent measurements will be made for Kennedy Space Center launches STS-5 and STS-6 to determine the characteristics of the focused sonic booms and to verify model predictions for launch booms. Even if...similar to those predicted, biological impacts will still be verified by monitoring wildlife responses during the initial launches over the...Islands.
>
> Further analysis has been made of proposed launch azimuths and the use of 'Dog-Leg' trajectories. ...[A]ll reasonable attempts will be made to adjust the launch...to avoid major disturbance. In the unlikely event that the results of the initial launch monitoring indicate that...impacts...are extremely adverse or could result in an unacceptable or catastrophic impact, the following restrictions will be implemented within mission constraints. Current mission plans will be reviewed...Mission requirements will dictate the degree of modification, if any, to be made. During the months of May through July launch azimuths near 150° will not be planned...If the required orbital parameters are such that a prohibited launch azimuth would be necessary, the use of a 'Dog Leg' maneuver will be considered to avoid impacting the...Islands in the area of the prohibited azimuths. However, there are mission problems associated with using the Dog Leg. ...Shuttle performance, and range safety concerns must all be weighed before accepting a Dog Leg maneuver.
>
> If the mission is performance-critical such that a Dog Leg is not feasible, every other possible avenue of rescheduling the mission to a less critical seasonal window will be explored before accepting impacts to the Channel Islands. No mission which violates this ground rule will be scheduled without consultation on the impacts with the Environmental Planning Function at Space Division. The Space Division Environmental Planning Function will maintain close liaison with the Federal and State Agencies as well as staying current on the Channel Island biological conditions to assure timely environmental information is used during mission planning.

i. Conclusion. The Commission's staff previously indicated to the Air Force that the above mentioned mitigation left the Commission with two areas of continued concern. The first was that the Air Force excluded March and April from the "sensitive breeding period", whereas in the research reports and comments by public agencies these two months were considered to be important breeding months for the harbor seal, the pinniped most sensitive to disturbance, and several marine bird species. The second area of concern was that the language proposed by the Air Force only provided assurance that it would "consider" comments by concerned agencies. In response to these concerns the Air Force has recently amended its consistency determination to include: (1) that the sensitive breeding period will be defined as "May through July with special consideration for launch windows between peak breeding activities in March and April"; and (2) that the conclusions and recommendations of the reviewing agencies ".,..will be implemented unless operational mission constraints necessary to meet vital national security requirements preclude alternative dates or flight trajectories...".

The Commission finds that the first amended provision, the expansion of the sensitive breeding period, is adequate to assure protective of important marine populations from disturbance during peak breeding periods. While previous comments by concerned agencies indicated the sensitive breeding period to be March through July, agencies contacted by the Commission staff (including the State Department of Fish and Game and the National Marine Fisheries Service) accept the Air Force's contention that during March and April there are periods of relatively greater and lesser sensitivity, and that late March and early April represent the most important peak for the sensitive harbor seal. This acceptance is also based on the fact that sufficient harbor seal populations occur outside of San Miguel Island, as opposed to some of the other pinnipeds which concentrate principally on San Miguel Island, justifying a slightly less restrictive approach on the sonic boom issue during these two months.

The Commission finds that the second of the amended provisions adequately meets its concerns over assuring future flight restrictions over the Islands, if necessary, to protect sensitive habitat, and that such restrictions will only be overridden when necessary to protect vital national security interests. The Commission therefore finds the Air Force's consistency determination, as amended, consistent with Sections 30230 and 30241 of the Coastal Act, which provide special protection to areas and species of special biological significance and which provide protection of environmentally sensitive habitat areas against significant disruption. The Commission concludes that the project is consistent, to the maximum extent practicable, with the habitat provisions of the California Coastal Management Program.

3. Public Access. Section 30212 of the Coastal Act provides:

> (a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where (1) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources, (2) adequate access exists nearby, or (3) agriculture would be adversely affected.

Public access on Vandenberg Air Force Base is currently available along the 3½ miles south of Ocean Beach County Park, except during missile launches. The Air Force also currently allows restricted access along 3½ miles between Purisma Point and a point approximately one mile north of the Santa Ynez River mouth, limited to 50 persons and to weekends and holidays.

The Space Shuttle Program has both short term and long term effects on access. In the short term, the use of overnight facilities (hotels, motels, RV parks and campgrounds) by temporary construction workers would have the effect of precluding their use for general recreational purposes. Motels in the general north County area are experiencing 95% average annual occupancy, indicating a severe shortage of overnight facilities. In the long term, the socio-economic effects of the program noted in the previous section of bringing 4,500 additional households to north County, in an area where the predominance of the Air Force Base has resulted in very little shoreline access available to the public, would result in increased burdens on public access.

In response to Commission concerns expressed over the increased demands on public access generated by the Space Shuttle Program, the Air Force has agreed to formally open up two additional beach areas for public use on the base. One would be located along the beach for 1½ miles to the north of Ocean Beach County Park, and the other would be one mile of beach to the north of Jalama Beach County Park (Exhibit 13). The Air Force's consistency determination states:

> Public access to these areas is officially recognized in the latest revision of Vandenberg AFB Regulation 126.1. The additional 2½ miles of new access is granted to the beach area only. Upland access to the base is strictly prohibited for national and military security needs as discussed in Sections 30212 and 30214.
>
> The open and restricted areas of public beach access include a total of 9½ miles of Vandenberg's shoreline that will routinely be open to the public (Exhibit 13). In addition, other areas on Vandenberg AFB, including sensitive habitats, are accessible upon request for scientific and educational purposes. The increased access provided will reduce the demand impacts resulting from the Space Shuttle Program on public beaches in the local area.

In addition, the Air Force has surveyed campgrounds, RV parks and motels to attempt to quantify short term impacts. Much of the short term construction work has already occurred, and this survey indicates construction workers are only minimally using campgrounds and R.V. parks, using approximately 5% of hotel/motel rooms in Santa Maria, and that the predominance of overnight facilities used by construction workers are in Lompoc, with 20-25% of the rooms in Lompoc being used. The Commission agrees with the Air Force that Lompoc is probably not a primary visitor destination point, given the lack of coastal access, and would only be needed for recreational purposes if motels/hotels in surrounding communities are full.

The additional public access areas being provided by the Air Force consist of sandy beach areas that were not previously blocked from public access; however there has never been any formal recognition of their availability to the public. The Commission believes that the formal recognition of their availability to the public will serve to actually increase their use, and that the additional access will therefore provide public benefits, sufficient to outweight the adverse impacts of the Space Shuttle Program on public access. The Commission therefore concludes that the proposed Space Shuttle Program is consistent with the public access and recreation policies of the Coastal Act.

4. Archaeology. Section 30244 of the Coastal Act provides:

> Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be provided.

Of the approximately 80 archaeological sites located throughout the Base, three sites will be affected by the proposed modification of Coast Road along the orbiter tow route. The orbiter tow route has been rerouted in a number of

places to avoid four other archaeological sites, and data recovery operations have been developed to assure monitoring and protection of the sites that will be affected. In addition, the Air Force has instituted an overall archaeological protection program, which includes provisions for qualified archaeologists to be present during all construction activities, halting construction if potential archaeological resources are uncovered, and data recovery in consultation with the State Historic Preservation Office, the Advisory Council on Historic Preservation, local Native American Groups and the Interagency Archaeological Service. The Commission therefore finds the proposed project consistent with Section 30244 of the Coastal Act.

5. Landform Alteration. Section 30251 of the Coastal Act provides that permitted development shall be sited and designed to minimize the alteration of natural land forms. Concern has been expressed to the Air Force that focused sonic booms on San Miguel Island will collapse caliche plant fossils, a rare and important resource that was one of the reasons for establishment of the Channel Islands National Park. San Miguel Island is the only Channel Island to contain the caliche fossils, and it contains one of the largest caliche forests in the United States. The fossils range from a few inches to 8 feet in height and are very fragile. The Air Force notes that they are constantly being damaged by the harsh weathering processes on the Island, and states that their destruction by intense sonic booms would "...merely speed up by weeks, months, or at most a few years, an inevitable natural process..." and that "...new deposits are constantly being exposed by eroding dunes..." The National Park Service has requested that, along with monitoring of the impact of sonic booms on pinniped and seabird habitat, the Air Force also provide for the monitoring of the effect of the booms on the caliche fossils. The Air Force has included in its consistency determination a provision for the photographic monitoring of the impact on the caliche fossils during the first launch over San Miguel Island. The Commission finds the proposed project consistent with Section 30251 of the Coastal Act.

6. Hazardous Substance Contingency Plans. Section 30232 of the Coastal Act requires protection against the spillage of petroleum products and hazardous substances, and effective containment and cleanup facilities and procedures for accidental spills. The Air Force has submitted its plan for such protection, containment and cleanup in its "Spill Prevention Control and Countermeasures (SPCC) Plan" and "Toxic and Hazardous Waste Management Operations Plan", submitted as an appendix to its consistency determination. The plans provide for a rapid and organized response to spills of hazardous substances on the base, and provide for the Coast Guard to assume authority, using facilities available from the Clean Seas Cooperative, if spills occur offshore in coastal waters. The Air Force also requires construction contractors to provide spill contingency plans prior to construction for their operations.

In response to concerns expressed over the potential for oil platform evacuations during launches to increase the risk of spills, the Air Force's consistency determination states:

During Space Shuttle launches, the Vandenberg AFB Commander will advise the oil industry of the need to evacuate oil platforms considered to be at risk from the launch. According to oil industry representatives, prior to evacuation of a platform, the wellbore will be closed and capped, and the blow-out prevention equipment on the ocean floor and the platform activated, so that the well will be incapable of a spill. In addition, not all personnel would be evacuated from the platform. A skeleton crew trained in fire fighting, damage control, and spill response will remain on the platform. This crew will be in a shelter on the platform for only approximately twelve minutes at the time of launch.

Even in the very unlikely event that a spill should occur, industry representatives do not feel the response time to a spill would be affected by the evacuation of 80-90% of the crew. Personnel remaining on the rig could promptly respond to spills and fires utilizing onboard equipment and could request assistance from shore based support services without added delay.

The Commission's staff has contacted the State Lands Commission and the federal Minerals Management Service; both agencies agree that, given adequate notice to operators, a platform evacuation will not increase the likelihood of a spill. The Commission finds that the Air Force has provided for adequate protection against hazardous spills and for effective cleanup and containment procedures, and that the proposed project is therefore consistent with Section 30232 of the Coastal Act.

7. Air Quality. Section 30253 (3) provides that new development shall "...be consistent with the requirements by an air pollution control district or the State Air Resources Control Board..." The Air Force's consistency determination notes that an air pollution emissions inventory and an Air Quality Impact Analysis for the Space Shuttle Program have been completed and approved by the applicable air quality regulatory agencies, and that an air quality monitoring program, as well as a launch-specific monitoring program are being developed to enhance the County's monitoring capabilities. The Air Force states its efforts have been praised by the local air pollution control district, and the State Air Resources Board indicates it has no additional concerns. The Commission finds the proposed project consistent with Section 30253(3) of the Coastal Act.

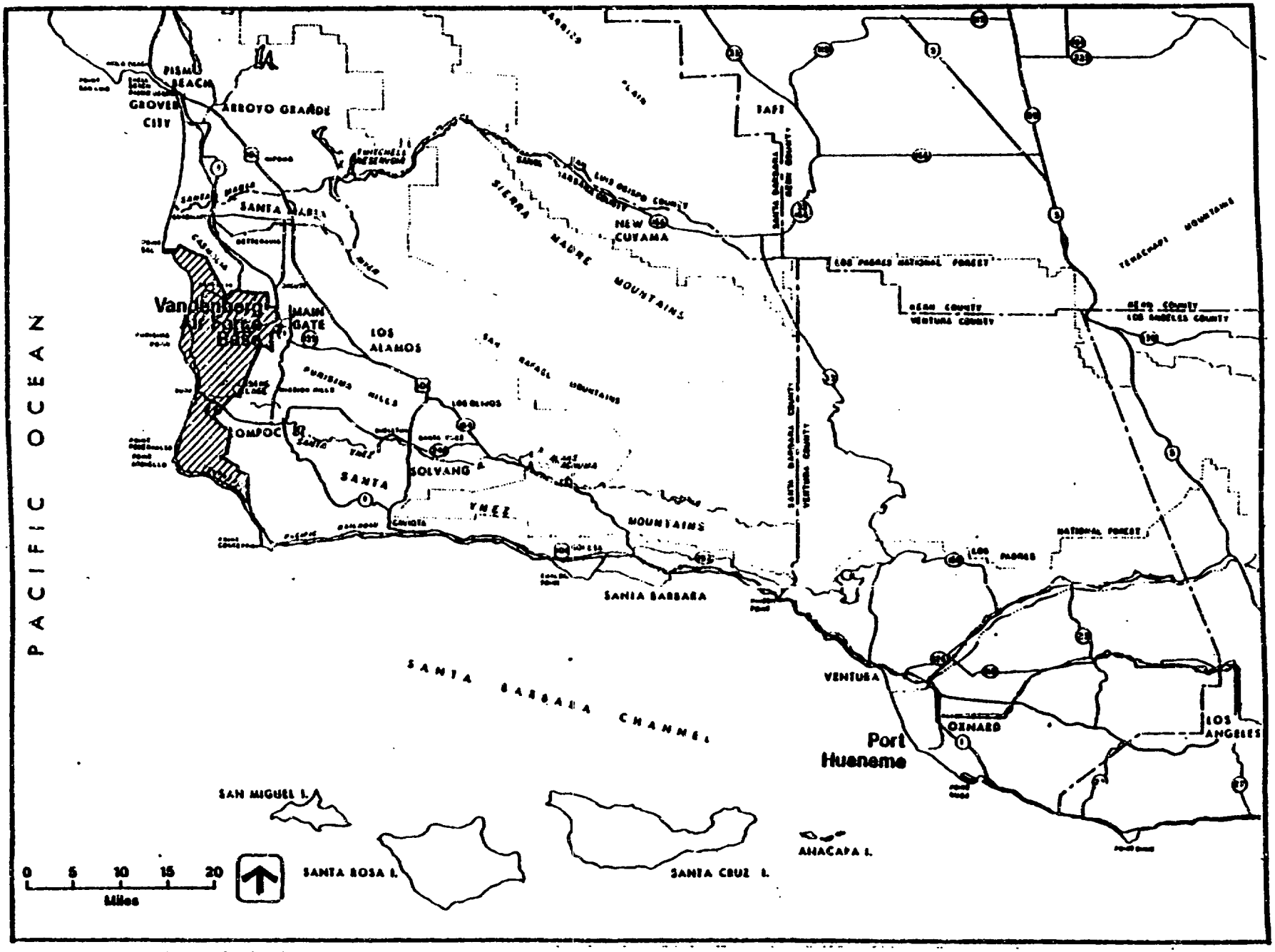


FIGURE 1 VANDENBERG AIR FORCE BASE AND VICINITY

EXHIBIT 1

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ATTACHMENT 12

FINDINGS OF CONSISTENCY

State of California, Edmund G. Brown Jr, Governor

California Coastal Commission
631 Howard Street, 4th floor
San Francisco, California 94105
(415) 543-8555

December 3, 198

Lt. Col. R. C. Wooton
Department of the Air Force, HQ Space Division
Los Angeles Air Force Station
P.O. Box 92960, Worldway Postal Center
Los Angeles, California 90009

Subject: Consistency Determination CD-18-82

Dear Colonel Wooton:

On September 23, 1982, by a vote of 11 in favor, 1 opposed, the California Coastal Commission concurred with your consistency determination for this portion** of the Space Shuttle Program. The State Commission found the project to be consistent to the maximum extent practicable with the policies and objectives of the California Coastal Zone Management Program.

Sincerely,

MICHAEL L. FISCHER
Executive Director

Mark Delaplaine

By: Mark Delaplaine
Permit Analyst

cc. South Central Coast District

MPD/lgu

**(Refers to construction of the External Tank Landing Facility)*

State of California, Edmund G. Brown Jr., *Governor*

California Coastal Commission
631 Howard Street, 4th floor
San Francisco, California 94105
(415) 543-8555

December 3, 1982

Lt. Col. R. C. Wooton
Department of the Air Force, HQ Space Division
Los Angeles Air Force Station
P.O. Box 92960, Worldway Postal Center
Los Angeles, California 90009

Subject: Consistency Determination CD-21-82

Dear Colonel Wooton:

On November 18, 1982, by a vote of 10 in favor, 0 opposed, the California Coastal Commission concurred with your consistency determination, as supplemented, for the Space Shuttle Program. The State Commission found the project to be consistent to the maximum extent practicable with the policies and objectives of the California Coastal Zone Management Program.

Sincerely,

MICHAEL L. FISCHER
Executive Director

Mark Delaplaine

By: Mark Delaplaine
Permit Analyst

cc: South Central Coast District

MPD/lgu

APPENDIX H

Permits and Entitlements

ADVISORY COUNCIL ON HISTORIC PRESERVATION

Memorandum of Agreement and No Adverse Effect Determination for the External Tank Tow Route

..ATE OF CALIFORNIA—THE RESOURCES AGENCY
OFFICE OF HISTORIC PRESERVATION
EPARTMENT OF PARKS AND RECREATION
POST OFFICE BOX 2390
SACRAMENTO, CALIFORNIA 95811

July 20, 1982

Mr. John D. Pearman
Dept. of the Air Force
P.O. Box 92960
Worldway Postal Center
Los Angeles, CA 90009

Date Rec'd: 6-6-82
Refer To: USAF 820706A

RE: External Tank Towroute Construction Project

Dear Mr. Pearman:

We are in receipt of the above referenced undertaking. Thank you for the opportunity to comment pursuant to 36CFR800.

Based on a review of the information provided by your agency I concur that the proposed undertaking should have no adverse effect on any properties included in or eligible for inclusion on the National Register of Historic Places if the following stipulations are met.

1. The final report should provide speicific information on how the various proposed analyses were actually conducted.
2. The various proposed analyses should be complete and fully reported in the final report for this excavation.
3. If all of the analyses are not completed or fully reported in the final report a clear and defensable explaination of each shortcoming should be detailed in the report.

It should be remembered that compliance with 36CFR800.7 is required if presently unknown cultural resources should be discovered during subsequent work.

If there are any questions please feel free to contact Michael Rondeau of my staff at (916) 445-6766.

Sincerely,

Marion Mitchell-Wilson

Dr. Knox Mellon
State Historic Preservation Officer
Office of Historic Preservation

cc: Garland Gordon, IAS
Lou Wall, ACOHP

DEPARTMENT OF THE AIR FORCE

HEADQUARTERS SPACE DIVISION (AFSC)
LOS ANGELES AIR FORCE STATION, PO BOX 92960, WORLDWAY POSTAL CENTER
LOS ANGELES, CA 90009

8 JUL 1982

Mr Louis S. Wall
Assistant Director
Office of Review and Compliance
Advisory Council on Historic Preservation
Lake Plaza-South, Suite 616
44 Union Blvd.
Lakewood, Colorado 80228

Dear Mr Wall

The Space Division, Los Angeles Air Force Station, requests a determination of no adverse effect, pursuant 59 36 CFR 800.4(c), relating to archeological resources to be affected by construction of the External Tank Towroute for the Space Shuttle Project at Vandenberg Air Force Base, Santa Barbara County, California. Please find enclosed documentation of the nature of the undertaking involved, Nation Register eligible sites to be affected, applicability of the criteria of effect (36 CFR 800.3), proposed data recovery and preservation measures, and an estimate of the cost of the undertaking.

We believe that the implementation of the attached plan will result in an amelioration of any adverse effects accrued by development of the External Tank Towroute. Concurrence by the California State Historic Preservation Office will be forwarded directly to you to expedite this process. We respectfully request your concurrence with this program in accordance with 36 CFR 800.4(c) and the ACHP procedures for "No Adverse Effect" statement. Please call LtCol R.C. Wooten at 213/643-0933 if we can answer additional questions.

Sincerely,

JOHN D. PEARMAN, Colonel, USAF
Director of Civil Engineering

RECEIVED
JUL 15 1982
ADVISORY COUNCIL ON HISTORIC PRESERVATION

12 Atch:
1. Documentation for "No Adverse Effect Determination"
2. Statement of Significant
3. Test Excavation Report
4. Archaeological Maps
5. Area Maps
6. Eligibility Request, IAS
7. Eligibility Determination, SHPO
8. Eligibility of District
9. Eligibility of Site for Register, SHPO
10. Eligibility Determination, Keeper of Register
11. Santa Ynez Coordination
12. Proposal

Cy To: W/O ATCH:
SD/DEC
4392 AeroSG/DEV
Advisory Council on Hist. Pres.
State Office of Hist. Pres.
IAS Division NPS

DOCUMENTATION FOR "NO ADVERSE EFFECT" DETERMINATION
EXTERNAL TANK TOWROUTE
SPACE SHUTTLE PROGRAM
VANDENBERG AIR FORCE BASE, CALIFORNIA
June 18,1982

Agency Involvement

The United States Air Force Systems Command (AFSC), Space Division (SD) is the lead Department of Defense (DOD) agency for Space Shuttle planning at Vandenberg Air Force Base (VAFB), California. Construction activities began for the system in January 1979.

Undertaking

In support of the Space Shuttle Program, the U.S. Air Force has developed plans to construct a 2.5 mile road connecting a ramp to be constructed at the former Coast Guard Lifeboat Rescue Station, with the Coast Road. The project location is approximately 1.8 miles east of Point Arguello and is located on the coastal terrace south of the Southern Pacific Railroad and Sudden Road (see Atch 1). The purpose of this development is to allow efficient and economical transport of the Space Shuttle's External Tanks to the launch complex (SLC-6).

A previous Case Study Report entitled, "Impact of Space Shuttle Activities on the Point Arguello Boathouse", prepared by Tetra Tech, Inc., was submitted to the Advisory Council of Historic Preservation and the California Office of Historic Preservation in 1980. In this report, submitted in fulfillment of 36 CFR 800.4, extensive discussion of alternative routes for the transport of the external tanks was presented. The result of analysis indicated that direct delivery to the Boathouse by shallow draft barges would be the safest and most economical method of transport. The presently proposed road construction is a direct concomitant of the use of the above plan.

National Register Properties or Eligible Properties to be Affected

Pursuant to the Reservoir Salvage Act of 1960 (P.L. 86-523; 74 Stat. 220) as amended by the Archeological and Historic Preservation Act of 1974 (P.L. 93-291; 88 Stat. 174; U.S.C. 469 et seq.), and Title 36 CFR 800, Space Division initiated a phased cultural resource survey and evaluation of the planned transport corridor (Atch 2). Investigations resulted in the recording of nine archeological sites including CA-SBa-635, 712, 1106, 1542, 1543, 1544, 1545, 1546, and 1547. A second phase of survey conducted to avoid archeological sites in the corridor of the towroute resulted in potential impact only to sites CA-SBa-712, 1117, 1542, 1544, and 1547 .

Following reconnaissance, a testing program was conducted on the five sites expected to sustain impact (Atch 3) in order to evaluate the nature of impact and the significance of the resources. Towroute redesign was determined to only impact site CA-SBa-1542 (original and subsequent design alternatives - Atch 4 and 5 respectively).

All five sites have been determined eligible for placement on the National Register of Historic Places under criterion d (Atch 6-10).

Applicability of Criteria of Effect (36 CFR 800.3)

Direct adverse impacts created by construction of the External Tank Towroute have been eliminated from sites CA-SBa-712, 1117, 1544, and 1547 by towroute redesign. The only expected impact of construction will consist of grading along a 50 meter by 10 meter swath through the southern portion of site CA-SBa-1542
With regard to the effect of project implementation on areas of potential concern to Native Americans, Interagency Archeological Services Division (IASD), Western Region, National Park Service, has formally consulted with Mrs. Rosa Pace of the Santa Ynez Band of Mission Indians Business Council. Her comments are attached (Atch 11)

The application of the criteria of effect demonstrates that although towroute construction will have no effect on those sites in the vicinity of Oil Well Canyon, there will be a direct and adverse effect from towroute construction through SBa-1542. The resources to be affected, however, are of an archeological nature, and it is felt that a professionally adequate program of data recovery will retrieve and protect sufficient information to result in an acceptable loss (no adverse effect) to the property's setting and integrity. Therefore, the criteria of adverse effect do not specifically apply in this situation.

In order to provide adequate documentation to substantiate a request for Determination of No Adverse Effect for this aspect of the Space Shuttle System, we offer the following enclosed document (Atch 12):

> "Archaeological Data Recovery Program at Site SBa-1542 to Mitigate the Impacts of External Tank Towroute Construction."

The IASD, NPS is managing the Space Division's cultural resource program at Vandenberg Air Force Base. They have retained the services of the Office of Public Archaeology, Social Process Research Institute, at the University of California, Santa Barbara, to perform the proposed data recovery plan. The program will be conducted under the supervision of Dr. Pandora E. Snethkamp, who meets the professional qualifications proposed at 36 CFR 66, Appendix C, and in accordance with the proposed Department of the Interior guidelines for "Recovery of Scientific, Prehistoric, Historic and Archeological Data: Methods. Standards, and Reporting Requirements" at 36 CFR 66. All specimens and data derived will be retained permanently at the University of California, Santa Barbara, and will be available to the legitimate archeological community and other interested scientists, Native Americans and public in such manner as to insure their integrity. The projected date for submission

of the data recovery final report to the Agency Official is March, 1983.

Upon completion of the data recovery program, documentation of the status of the property will be forwarded to the Agency Official and the SHPO to enable them to inform the National Register of Historic Places of any necessary boundary changes, or alterations in the property status pursuant to 36 CFR 60.16-17.

Should future evaluation, subsurface testing or exposure of archeological materials by construction activity result in the identification of additional cultural resources, heretofore unknown, the Space Division will consult with the SHPO and the Council pursuant to 36 CFR 800.7.

Cost of Undertaking

The present estimated cost of construction of the External Tank Towroute for the Space Shuttle System is approximately 3.8 million dollars.

ATCH 1



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1522 K Street N.W.
Washington, D.C. 20005

SAMTEC/XRXP 3312
10 November 1979

MEMORANDUM OF AGREEMENT

WHEREAS, the United States Air Force proposes to construct a Space Transportation System at Vandenberg Air Force Base, California; and,

WHEREAS, the United States Air Force, in consultation with the California State Historic Preservation Officer, has determined that this undertaking as proposed would have an adverse effect upon archeological sites numbered SBa-539, 670 and 931, properties determined on the authority of the Secretary of the Interior to be eligible for inclusion in the National Register of Historic Places; and,

WHEREAS, pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470f, as amended, 90 Stat. 1320) and Section 2(b) of Executive Order 11593, the United States Air Force has requested the comments of the Advisory Council on Historic Preservation; and,

WHEREAS, pursuant to the procedures of the Advisory Council on Historic Preservation (36 CFR Part 800), representatives of the Advisory Council on Historic Preservation, the United States Air Force, and the California State Historic Preservation Officer have consulted and reviewed the undertaking to consider feasible and prudent alternatives to avoid or satisfactorily mitigate the adverse effect; and,

WHEREAS, Interagency Archeological Services, Heritage Conservation and Recreation Service, will provide the technical assistance necessary to recover the important archeological material from the above-referenced archeological sites and was invited and participated in the consultation process; now,

THEREFORE:

It is mutually agreed that implementation of the undertaking, in accordance with the following stipulation and the attached letter of September 1, 1978, from Colonel William C. Martin, Director of Civil Engineering, Department of the Air Force, Space and Missile Systems Organization, will satisfactorily mitigate any adverse effect on the above-mentioned properties.

Stipulation

Should it subsequently be determined that, for financial reasons, it will not be possible to complete the specified data recovery program, the consulting parties will reconvene to decide an alternate course of action.

The Council is an independent unit of the Executive Branch of the Federal Government charged by the Act of October 15, 1966 to advise the President and Congress in the field of Historic Preservation.

At SAMTEC refer to:
SAMTEC/XRXP 3312
10 November ~~1979~~ 1978

Robert M. Utley 9/27/78 (date)
Robert M. Utley
Deputy Executive Director
Advisory Council on Historic Preservation

[signature]
JAMES H. MARSHALL, Brig Gen, USAF
Commander
Space and Missile Test Center
Vandenberg AFB, CA 93437

[signature] 17 Oct 78 (date)
Department of the Air Force
GERALD K. HENDRICKS, Maj Gen, USAF
Vice Commander, SAMSO

[signature]
ROBERT L. RUCK, Colonel, USAF
Commander
4392d Aerospace Support Group

[signature] Nov. 1, 1978 (date)
Interagency Archeological Services

[signature] 11/2/78 (date)
California State Historic
Preservation Officer

[signature] (date) 11/10/78
Advisory Council on Historic
Preservation

1 Atch
A. SAMSO/DE Ltr, 1 Sep 78 to ACHP

LOS ANGELES AIR FORCE STATION, PO BOX 92960, WORLDWAY POSTAL CENTER
LOS ANGELES, CALIFORNIA 90009

01 SEP 1978

ATTACHMENT A

At SAMTEC refer to:
SAMTEC/XRX 3312
10 November 1978

Executive Secretary
Advisory Council on Historic Preservation
1522 K Street, N.W.
Washington D.C. 20005

Gentlemen

The United States Air Force Systems Command (AFSC), Space and Missile Systems Organization (SAMSO) is the lead Department of Defense (DOD) agency for the Space Transportation System (STS) planning at Vandenberg Air Force Base (VAFB), California. Construction activities for the system will commence in January 1979 with the first Space Shuttle launch from Vandenberg AFB scheduled for June 1983. Environmental planning for the STS at Vandenberg AFB began in 1973. The Final Environmental Impact Statement (FEIS) for the Air Force Shuttle Program was filed with the Environmental Protection Agency (EPA) in February 1978.

The Strategic Air Command (SAC), host command for Vandenberg AFB, is responsible for management of cultural and natural resources on the installation. As the developer of the Space Shuttle at Vandenberg AFB, SAMSO is involved in preparing the environmental impact analysis and mitigative measures for construction and operation at Vandenberg AFB. This case study addresses measures required to mitigate the adverse impacts of STS construction activity on Vandenberg AFB archaeological resources. The land involved is federally owned.

In 1974 an archaeological survey and inventory was conducted within the project area to collect planning information for location of the STS facilities on South Vandenberg under a contract with the University of California at Santa Barbara, administered for the Air Force by Interagency Archaeological Services, National Park Service, Western Region (now Heritage Conservation and Recreation Service).

Archaeological investigations in the project area -- a 21 mile long, 3,000 foot wide coastal corridor extending from just north of the Santa Ynez River to a point south of Point Arguello -- were reported in January 1976 (Glassow, et al). The report gives a description of the environment, physical characteristics of the 80 identified archaeological resources, and provides an evaluation of the significance of all archaeological sites. Thirty-one (31) of these were tested in order to determine stratigraphic depth, chronology, areal extent of components and other data.

ATTACHMENT A

Careful construction planning with archaeological field assistance for STS facilities has resulted in avoiding direct impacts to all but three archaeological sites. These three sites occur along the Shuttle Orbiter tow route (Coast Road) and are designated in the countywide site inventory housed at UCSB as: SBa 539, 670 and 931. Mitigative measures to reduce the impact on archaeological sites along the tow route were considered in technical interchange meetings with the Corps of Engineers (tow route design agent), Air Force engineers, local Native Americans, Archaeologist from UC Santa Barbara and the National Park Services Interagency Archaeological Services group. A field inspection of each site was made to determine how the tow route could be realigned to eliminate or reduce the impacts for each site. The only feasible alternative was to shift the center line of the tow route to the side of least impact in order to avoid or minimize impacting the site. Not only was designing or constructing a new route cost prohibitive but would result in total destruction of several sites as well as impacts to many others because of the high density of sites in the area.

All three sites will be impacted during widening of existing road cuts along the Shuttle Orbiter tow route (Coast Road) to accommodate the wing span of the Space Shuttle vehicle as it is towed to the launch complex. The existing road cuts bisect the three archaeological sites; further widening will require removal of intact cultural resources. The existing cuts through these sites will be widened approximately one to 13 feet (0.3 to 4.0 meters). No other portions of the three sites will be affected by the construction activities. Construction along the tow route is scheduled to begin in January 1980.

Archaeological sites SBa 539, 670 and 931, along with 11 other sites, have been nominated through Air Force channels for inclusion in the National Register of Historic Places. These nominations have been reviewed by the State Historic Preservation Officer and were found to meet the first and second criteria for inclusion in the National Register (Atch 1). Copies of the nominations for the three potential impacted sites are attached (Atch 2). Should future evaluation, subsurface testing or unearthing of archaeological material by construction activity result in identification of additional cultural resource impacts, or revised significance, the Air Force will consult further with State Historic Preservation Officer, the Advisory Council on Historic Preservation, and local Chumash Native Americans. An emergency data recovery plan will be developed to protect archaeological resources that may be discovered during construction. Environmental protection plans have been developed and will be enforced to insure that all other archaeological sites outside of the impact corridor will be avoided during construction activities.

The Air Force proposes to contract through Interagency Archaeological Services, Heritage Conservation and Recreation Service, with the University of California at Santa Barbara for implementation of a data recovery and preservation program for the three sites to be impacted along the Orbiter tow route (Coast Road) at Vandenberg AFB. The principal investigator for this effort will be Dr. Michael Glassow. The results of the data recovery program will be detailed in a final report.

In consultation with the Heritage Conservation and Recreation Service, the Air Force proposes the following data recovery program:

a. Excavation and investigation of the impact areas of each site. ("Impact areas" are defined as the strips of land on either side of the Coast Road that will be removed in cut-widening.) It is proposed that 100 percent (to extent that can be professionally justified) of the impact areas on each site be excavated using modern fine-scale techniques of data recovery. In lieu of additional test excavations in non-impacted site areas we propose to complete the analysis of selected test data from the 1974 project. Field work is expected to begin in September 1978; and all data recovery is scheduled to be completed by 30 June 1979.

b. Materials obtained from the excavation except those described in paragraph e below will be processed initially in a field laboratory in the area and then transferred to UCSB for curation and further study at the termination of field work.

c. Preparation of preliminary descriptive report will be completed within six months after the end of the field work. The report will include descriptions of the field research procedures, classes of data collected, and the proposed specialized technical analysis to be conducted although these will not be completed by the time this report is submitted. The principle objective of this report is to verify that the field work has been accomplished and that particular kinds and quantities of data have been collected.

d. Once the analyses are completed, a detailed final technical report of all investigations will be prepared as well as a summary report for the general public. These reports (2) will be submitted 18 months after the descriptive report on the field work.

e. All data collected shall be permanently retained in a repository and shall be accessible to anthropologists, other scientists, Native Americans, and the public in such a manner as to assure their continued integrity and value for research. No deliberate burials of human remains are expected to be encountered within these sites, however, if human remains and mortuary offerings are uncovered, their final disposition will be determined by the Air Force in consultation with the Chief of the IAS, contractor archaeologist, the SHPO and with Native American representatives. If burial remains are uncovered, work shall cease in the immediate vicinity, until this determination is made. Treatment could include the following alternatives: (1) leave the burials in site if construction would not require removal; (2) excavation by archaeologist and physical anthropologist; (3) analysis of the remains at the site or in a laboratory; (4) reinter remains adjacent to the archaeological portion of the site; and (5) curation for long term reference.

Burials will be treated in accordance with the desires of the Chumash Native Americans. Such activities will be coordinated through the Santa Ynez Tribal Council who will consult with other Native Americans. The Air Force will provide reasonable assistance to Native Americans in accomplishing their

desires with respect to human remains and curation of archaeological materials for their use.

Further redesign of the project is not considered to be feasible. Native American Chumash will participate and/or observe the data recovery program to insure that their requirements regarding Chumash cultural remains are considered. The case study and mitigation plan have been reviewed with Native American representatives.

We believe that implementation of the Data Recovery Plan (Atch 3) prepared by Dr. Glassow (as modified above) will result in a completely satisfactory mitigation of effects of this undertaking. After completing your review, if you concur with our proposed procedure, prepare a "Memorandum of Agreement" pursuant to 36 CFR 800.

Sincerely

William C. Martin

WILLIAM C. MARTIN
Colonel, USAF
Director of Civil Engineering

3 Atch
1. SHPO Ltr, 3 Aug 78 -WITHDRAWN
2. Nomination Forms - 539, 670 and 931 -WITHDRAWN
3. Data Recovery Plan -WITHDRAWN

Copy to: 4392 ASG

U.S. ARMY CORPS OF ENGINEERS

Boathouse Dredging Permit
Dredged Material Disposal Permit

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2711
LOS ANGELES, CALIFORNIA 90053

IN REPLY REFER TO
SPLCO-R

22 SEP 1982

SUBJECT: Permit No. 82-100

United States Air Force
Headquarters, Space Division
Los Angeles, CA 90009

1. In response to your request of 7 April 1982 (82-100), there are inclosed two copies of a draft permit authorizing you to (1) Remove existing wood pier and boathouse 350 feet by 40 feet; (2) remove existing 36 inch dia. concrete filled steel support piles (approximately 25); (3) dredge 55,000 cubic yards of rock and sand to a depth of 12.4 feet below mean sea level (MSL) by a clamshell dredge; (4) excavate 5,000 cubic yards of bank material; (5) transport 55,000 cubic yards of dredged material to an ocean disposal site; (6) install six 3-pile dophins; (7) discharge 500 cubic yards of concrete and 250 cubic yards of backfill to construct an earth and concrete solid fill pier; and (8) place 250 cubic yards of rip-rap at the base of the proposed pier in the Santa Maria Basin, Pacific Ocean, at Point Arguello Coast Guard Rescue Station, Vandenberg Air Force Base, near the city of Lompoc, Santa Barbara County, California.

2. THIS PERMIT IS NOT VALID UNTIL SIGNED BY THE COMMANDER.

3. Your attention is particularly invited to the Special Conditions on pages 3 and 4.

4. Both copies shall be signed and dated by an owner or authorized responsible official. The signer's name and title, if any, must be typed or printed below the signature. Both copies should be returned to this office. The permit will then be validated and one copy will be returned to you. If the draft copies are not signed and returned within 30 days from the date of this letter, your request for the proposed work will be withdrawn.

Paul W. Taylor

1 Incl (dupe)
as

PAUL W. TAYLOR
COL, CE
Commanding

o. That if the activity authorized herein is not started on or before ////////////// day of ////////// ////// (one year from the date of issuance of this permit unless otherwise specified) and is not completed on or before ////////// day of ////////// 19////////// (three years from the date of issuance of this permit unless otherwise specified) this permit, if not previously revoked or specifically extended, shall automatically expire.

p. That this permit does not authorize or approve the construction of particular structures, the authorization or approval of which may require authorization by the Congress or other agencies of the Federal Government.

q. That if and when the permittee desires to abandon the activity authorized herein, unless such abandonment is part of a transfer procedure by which the permittee is transferring his interests herein to a third party pursuant to General Condition t hereof, he must restore the area to a condition satisfactory to the District Engine

r. That if the recording of this permit is possible under applicable State or local law, the permittee shall take such action as may be necessary to record this permit with the Register of Deeds or other appropriate official charged with the responsibility for maintaining records of title to and interests in real property.

s. That there shall be no unreasonable interference with navigation by the existence or use of the activity authorized herein.

t. That this permit may not be transferred to a third party without prior written notice to the District Engineer, either by the transferee's written agreement to comply with all terms and conditions of this permit or by the transferee subscribing to this permit in the space provided below and thereby agreeing to comply with all terms and conditions of this permit. In addition, if the permittee transfers the interests authorized herein by conveyance of realty, the deed shall reference this permit and the terms and conditions specified herein and this permit shall be recorded along with the deed with the Register of Deeds or other appropriate official.

II. Special Conditions: (Here list conditions relating specifically to the proposed structure or work authorized by this permit):

SEE ATTACHED SHEET

The following Special Conditions will be applicable when appropriate:

STRUCTURES IN OR AFFECTING NAVIGABLE WATERS OF THE UNITED STATES:

a. That this permit does not authorize the interference with any existing or proposed Federal project and that the permittee shall not be entitled to compensation for damage or injury to the structures or work authorized herein which may be caused by or result from existing or future operations undertaken by the United States in the public interest.

b. That no attempt shall be made by the permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized by this permit.

c. That if the display of lights and signals on any structure or work authorized herein is not otherwise provided for by law, such lights and signals as may be prescribed by the United States Coast Guard shall be installed and maintained by and at the expense of the permittee.

d. That the permittee, upon receipt of a notice of revocation of this permit or upon its expiration before completion of the authorized structure or work, shall, without expense to the United States and in such time and manner as the Secretary of the Army or his authorized representative may direct, restore the waterway to its former conditions. If the permittee fails to comply with the direction of the Secretary of the Army or his authorized representative, the Secretary or his designee may restore the waterway to its former condition, by contract or otherwise, and recover the cost thereof from the permittee.

e. Structures for Small Boats: That permittee hereby recognizes the possibility that the structure permitted herein may be subject to damage by wave wash from passing vessels. The issuance of this permit does not relieve the permittee from taking all proper steps to insure the integrity of the structure permitted herein and the safety of boats moored thereto from damage by wave wash and the permittee shall not hold the United States liable for any such damage.

MAINTENANCE DREDGING:

a. That when the work authorized herein includes periodic maintenance dredging, it may be performed under this permit for _____ years from the date of issuance of this permit (ten years unless otherwise indicated);

b. That the permittee will advise the District Engineer in writing at least two weeks before he intends to undertake any maintenance dredging.

DISCHARGES OF DREDGED OR FILL MATERIAL INTO WATERS OF THE UNITED STATES:

a. That the discharge will be carried out in conformity with the goals and objectives of the EPA Guidelines established pursuant to Section 404(b) of the FWPCA and published in 40 CFR 230;

b. That the discharge will consist of suitable material free from toxic pollutants in other than trace quantities;

c. That the fill created by the discharge will be properly maintained to prevent erosion and other non-point sources of pollution; and

d. That the discharge will not occur in a component of the National Wild and Scenic River System or in a component of a State wild and scenic river system.

DUMPING OF DREDGED MATERIAL INTO OCEAN WATERS:

a. That the dumping will be carried out in conformity with the goals, objectives, and requirements of the EPA criteria established pursuant to Section 102 of the Marine Protection, Research and Sanctuaries Act of 1972, published in 40 CFR 220-228.

b. That the permittee shall place a copy of this permit in a conspicuous place in the vessel to be used for the transportation and/or dumping of the dredged material as authorized herein.

This permit shall become effective on the date of the District Engineer's signature.

Permittee hereby accepts and agrees to comply with the terms and conditions of this permit.

John D. Pearman, Col USAF — 27 Sep 82

PERMITTEE — DATE

JOHN D. PEARMAN, Colonel, USAF
Director of Civil Engineering

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

Paul W. Taylor — 12 October 1982

PAUL W. TAYLOR
COL, CE, CE — DATE

DISTRICT ENGINEER,
U.S. ARMY, CORPS OF ENGINEERS

Transferee hereby agrees to comply with the terms and conditions of this permit.

TRANSFEREE — DATE

☆ U. S. GOVERNMENT PRINTING OFFICE: 1980—624-404 3-1

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2711
LOS ANGELES, CALIFORNIA 90053

IN REPLY REFER TO
SPLCO-R

12 October 1982

SUBJECT: Permit No. 82-100

United States Air Force
Headquarters, Space Division
Los Angeles, CA 90009

Your Permit No. 82-100 has been validated and is inclosed. Also inclosed are Work Status Post Card (dupe) and Notice of Authorization.

PAUL W. TAYLOR
COL, CE
Commanding

3 Incl
1. Permit
2. Work Status Post Card (dupe)
3. Notice of Authorization

SPECIAL CONDITION (82-100-RC)

1. That items of potential archeological, scientific, prehistoric or historic value which are discovered in the course of construction activities be carefully preserved in situ pending a determination by the Corps of Engineers of their significance and appropriate disposition.

2. That the permittee shall notify the Commander (oan) 11th Coast Guard District, Union Bank Building, 400 Oceangate, Long Beach, CA 90822, (213) 590-2222 at least 2 weeks prior to start of the activity and 30 days if buoys are to be placed.

3. That the permittee shall keep human interference with the natural environment to a minimum by declaring all areas adjacent to construction sites "off limits".

4. That a qualified biologist provided by the permittee shall be onsite to assure that minimum amount of physical impacts occur during construction. The number and species of mammals and birds within a 1/4 mile of the boathouse area during the construction shall be recorded daily and transmitted to the District Engineer weekly.

5. That no blasting shall be done when marine mammals and birds are in the blast area. Immediately after the blasting, the biologist shall record numbers, size and species destroyed and distance from charges, along with size and kind of explosives. A report will be submitted to the District Engineer when the blasting is completed.

6. That the permittee shall use slow burning explosives.

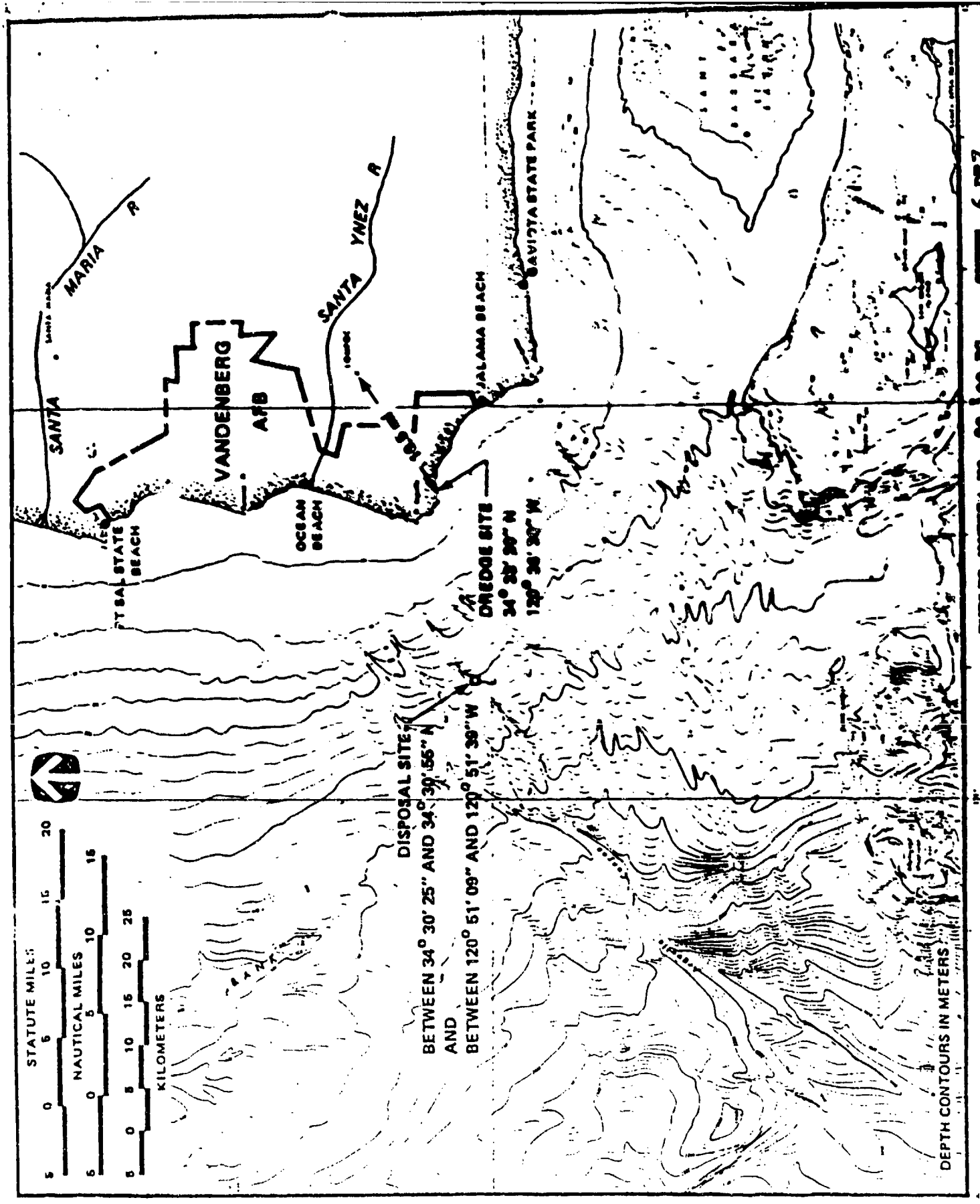
7. That the permittee shall notify U. S. Fish and Wildlife Service, National Marine Fisheries Service and the California Fish and Game Department two (2) weeks prior to the start and end of marine construction.

8. That the permittee shall construct three (3) rock piles out of clean rock at least 2.5 ft. in diameter. The piles shall be 40 ft. by 25 ft. by 3 ft. high and there shall be 15 ft. between them as shown on the attached drawings.

9. That the permittee shall plant 6,000 red abalone (Habiotis rufescens) size of 1.25 inches or larger. They shall be placed in rocky habitat adjacent to the boathouse area, within 18 months after the completion of the construction. This shall be undertaken with direction from the District Engineer in consultation with the wildlife agencies.

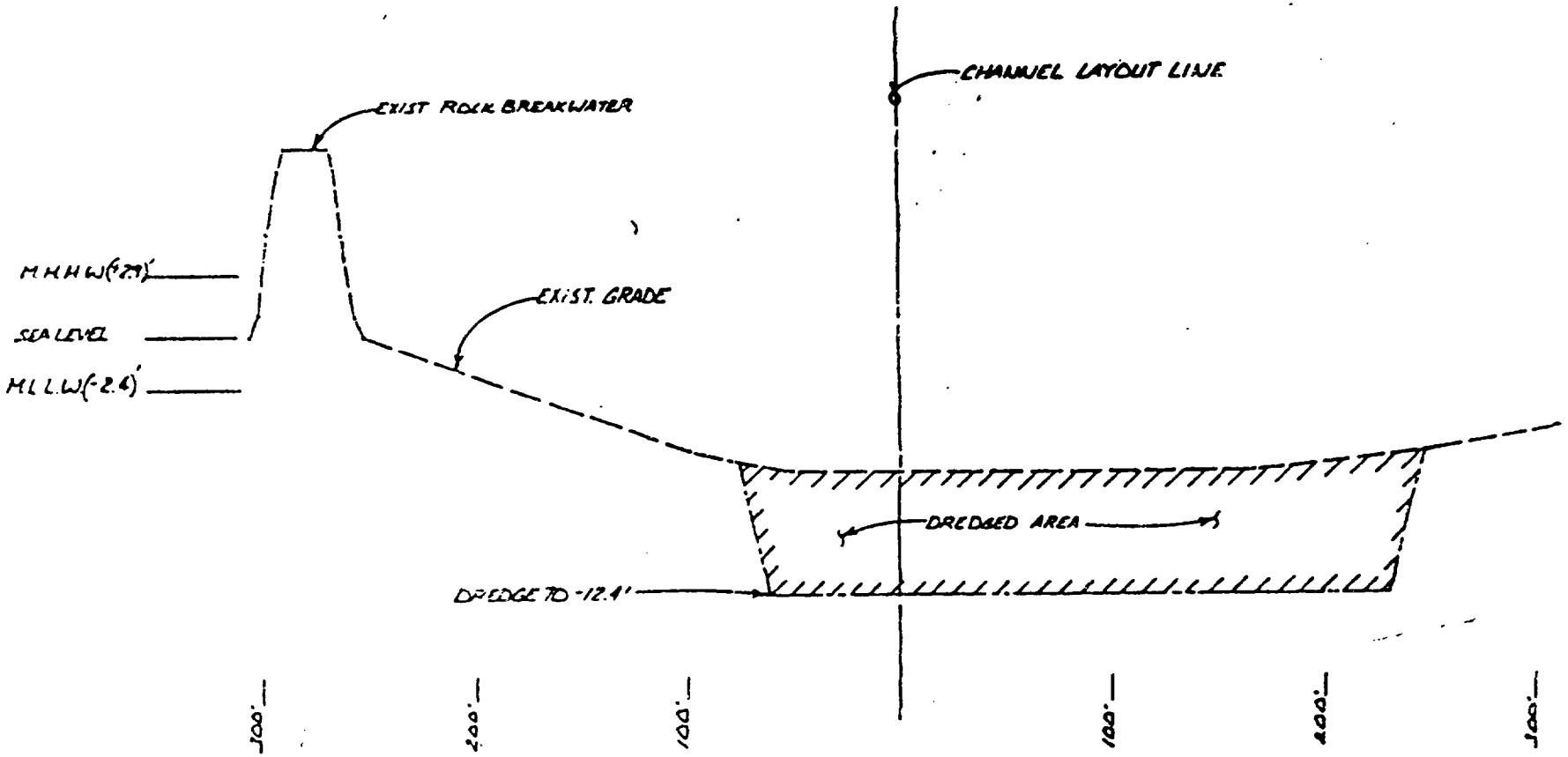
10. That the permittee after construction is complete shall resurvey six (6) of the downcoast rocky inter- and subtidal stations and six (6) of the sandy stations for one sampling period, to determine if changes have resulted from construction. This program shall be comparable with the existing baseline study. This shall be undertaken with direction from the District Engineer in consultation with the wildlife agencies.

11. That the permittee shall notify U. S. Coast Guard, Santa Barbara Marine Safety Detachment, 24 hours prior to dumping of dredged material at disposal site, at (805) 962-7430. ///



(SOURCE: NOAA, NATIONAL OCEAN SURVEY BATHYMETRIC MAP NOS 1306 N–20)

FIGURE 1 LOCATION OF THE PROPOSED DREDGING AND DISPOSAL SITES IN RELATION TO FEATURES OF THE SURROUNDING AREA



H-26

NOTE:

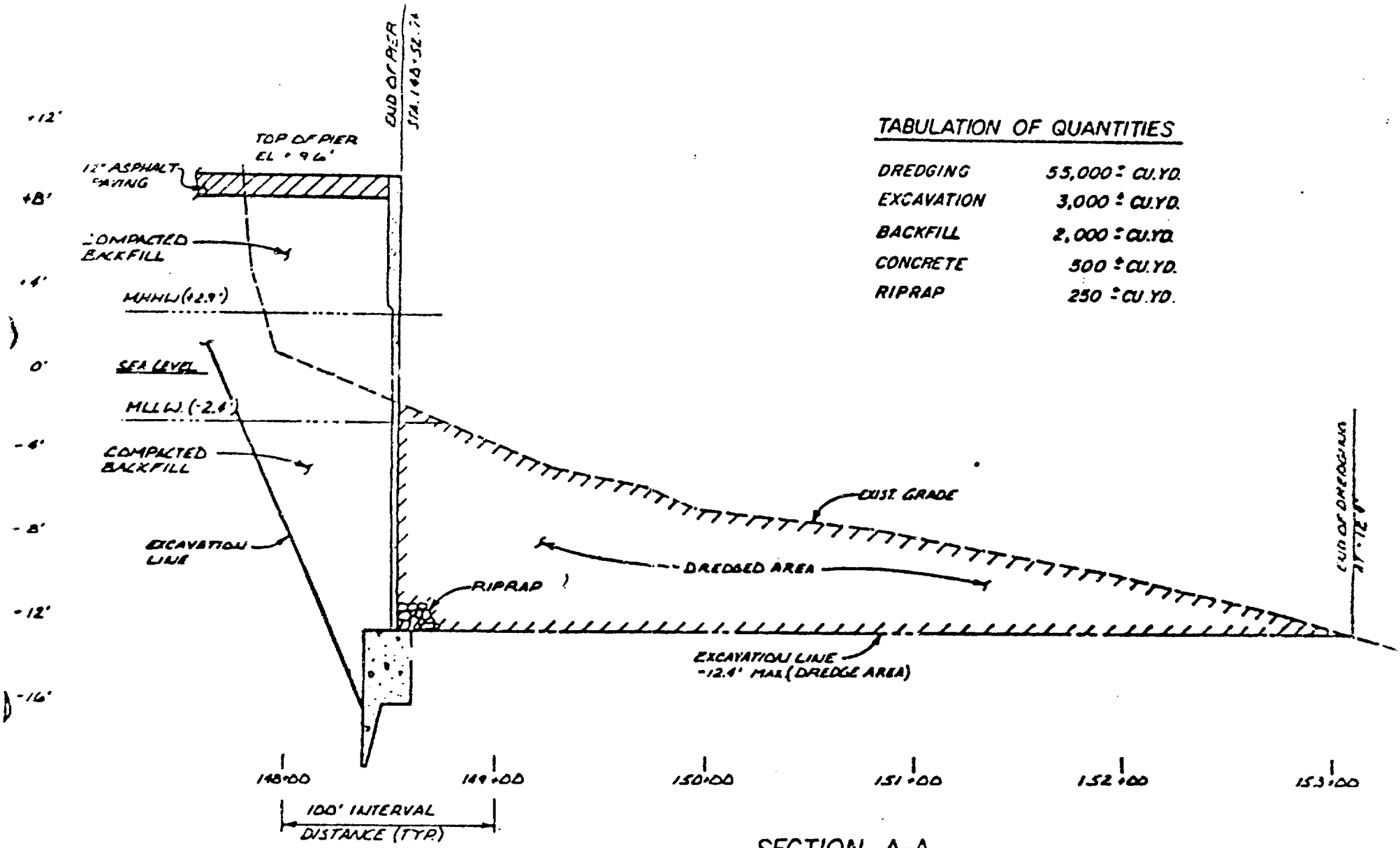
1. M.H.H.W. IS +2.9' ABOVE NATIONAL GEODETIC DATUM OF 1929.
2. M.L.L.W. IS -2.4' BELOW NATIONAL GEODETIC DATUM OF 1929.

SECTION B-B

SCALE: HORIZ. 5/8"=50'
VERT. 5/8"=5'

PROPOSED DREDGING SITE
V-33 HARBOR
VANDENBERG A.F.B. CA.
SHEET 5 OF 7

PUBLIC NOTICE NO. 82-100-RC



TABULATION OF QUANTITIES

DREDGING	55,000 ± CU.YD.
EXCAVATION	3,000 ± CU.YD.
BACKFILL	2,000 ± CU.YD.
CONCRETE	500 ± CU.YD.
RIPRAP	250 ± CU.YD.

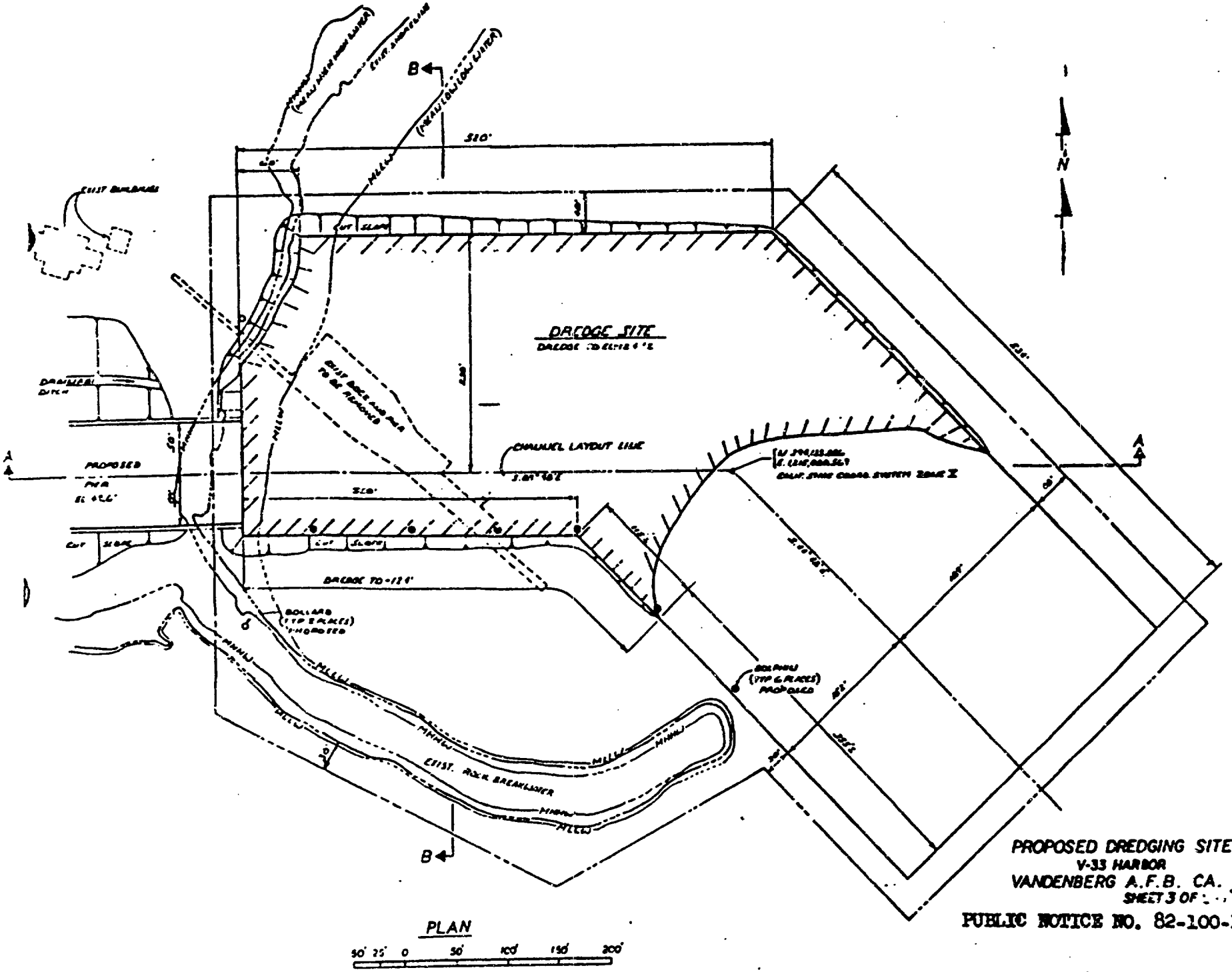
SECTION A-A

SCALE: HORIZ. 1"=100'
VERT. 5/8" = 4'

NOTE:
1. M.H.H.W. IS +2.9' ABOVE NATIONAL GEODETIC DATUM OF 1929.
2. M.L.L.W. IS -2.6 BELOW NATIONAL GEODETIC DATUM OF 1929.

PUBLIC NOTICE NO. 82-100-RC

PROPOSED DREDGING SITE
V-33 HARBOR
VANDENBERG A.F.B. CA.
SHEET 4 OF 7

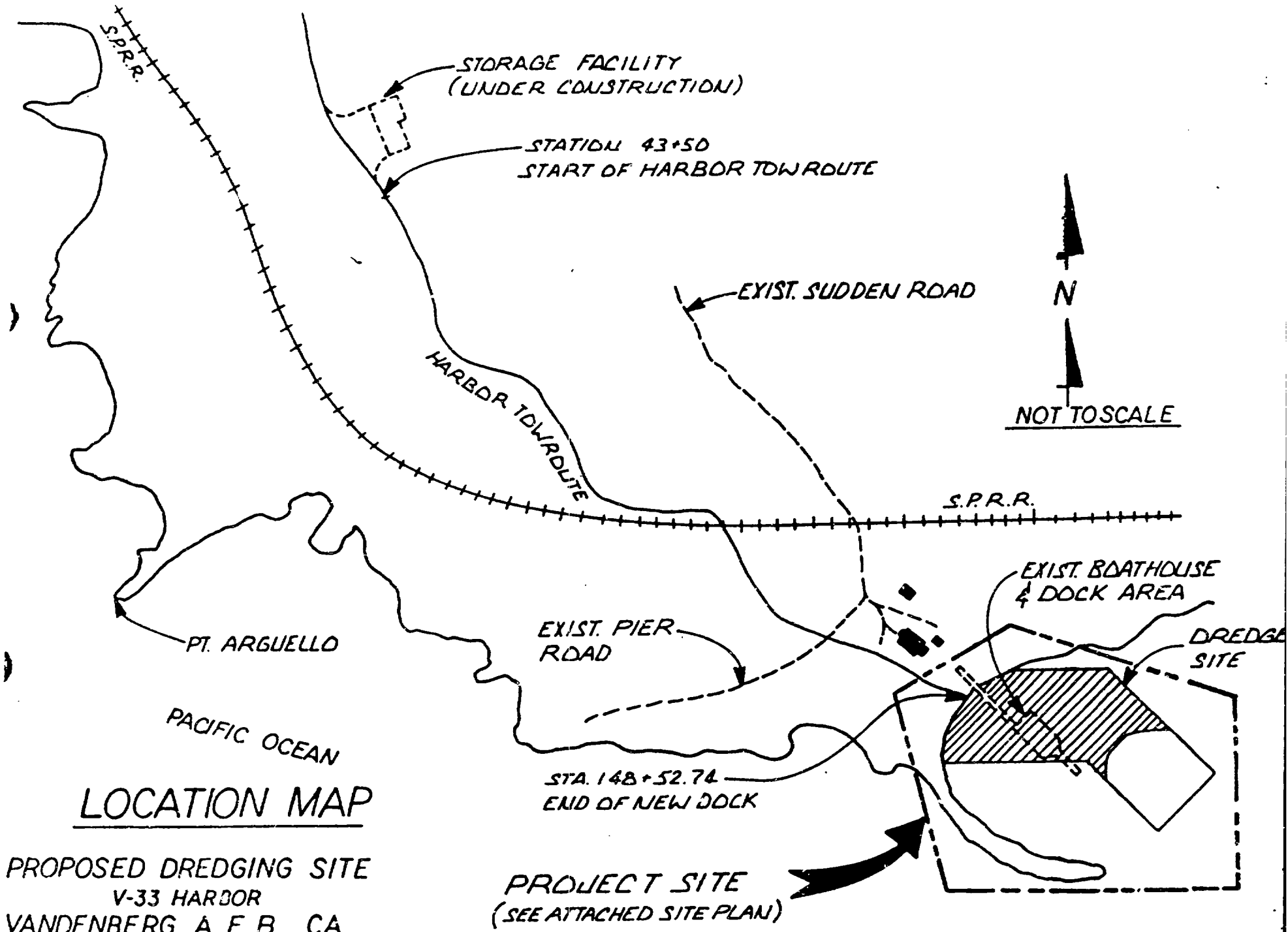


PLAN

50' 25' 0 50' 100' 150' 200'

PROPOSED DREDGING SITE
V-33 HARBOR
VANDENBERG A.F.B. CA.
SHEET 3 OF 7

PUBLIC NOTICE NO. 82-100-RC

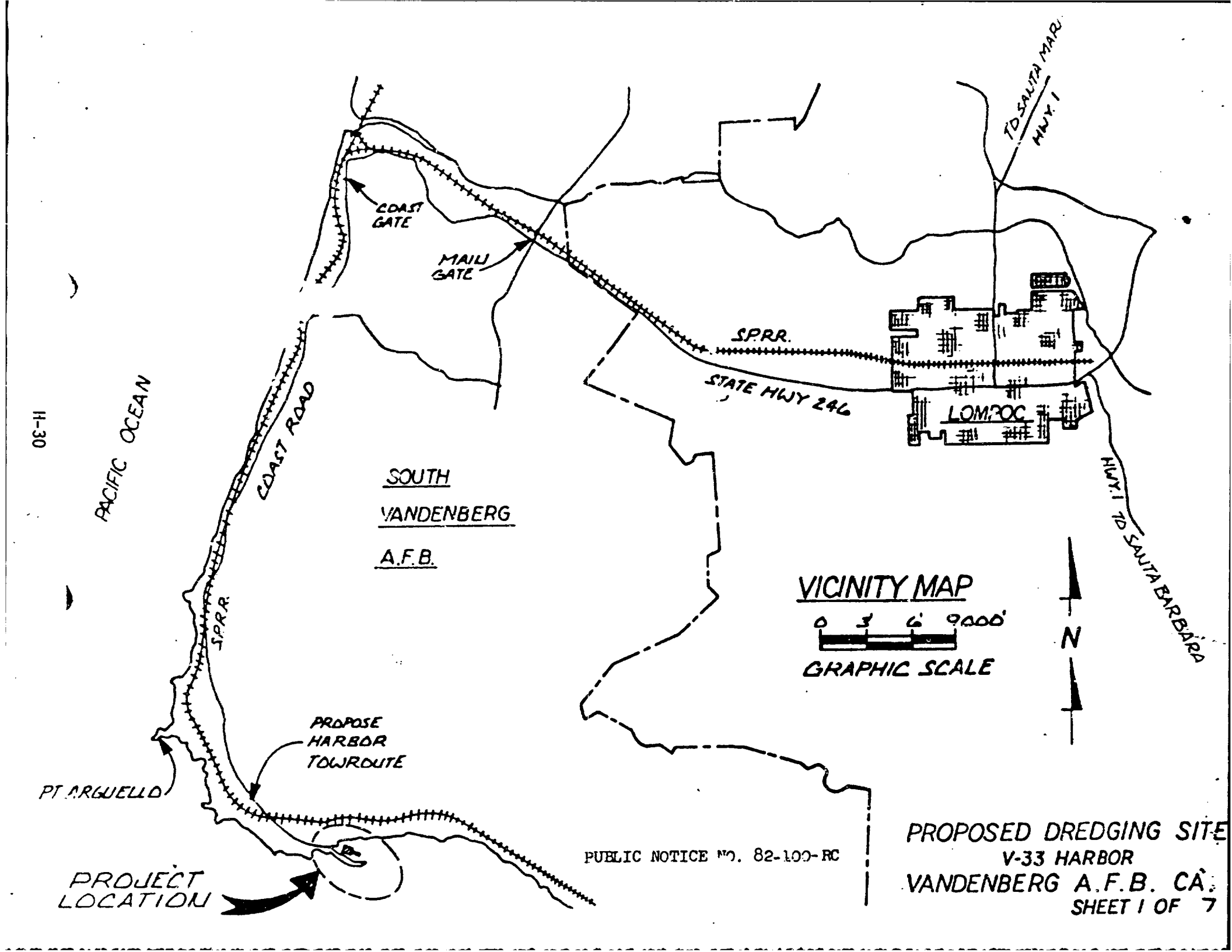


H-29

LOCATION MAP

PROPOSED DREDGING SITE
V-33 HARBOR
VANDENBERG A.F.B. CA.
SHEET 2 OF 7

UBLIC NOTICE NO. 82-100 · RC


TO SALITA MAR
HWY. 1
COAST GATE
MAIN GATE
SPRR.
STATE HWY 246
LOMPOC
PACIFIC OCEAN
COAST ROAD
SPRR
SOUTH
VANDENBERG
A.F.B.
HWY 1 TO SANTA BARBARA
VICINITY MAP
0 3 6 9000'
GRAPHIC SCALE
N
PROPOSE
HARBOR
TOWROUTE
PT ARGUELLO
PROJECT
LOCATION
PUBLIC NOTICE NO. 82-100-RC
PROPOSED DREDGING SITE
V-33 HARBOR
VANDENBERG A.F.B. CA.
SHEET 1 OF 7
H-30

Application No. 82-100

Name of Applicant UNITED STATES AIR FORCE

Effective Date 12 October 1982

Expiration Date (If applicable) 12 October 1985

DEPARTMENT OF THE ARMY
PERMIT

Referring to written request dated 7 April 1982 for a permit to.

(X) Perform work in or affecting navigable waters of the United States, upon the recommendation of the Chief of Engineers, pursuant to Section 10 of the Rivers and Harbors Act of March 3, 1899 (33 U.S.C. 403);

(X) Discharge dredged or fill material into waters of the United States upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 404 of the Federal Water Pollution Control Act (86 Stat. 816, P.L. 92-500);

(X) Transport dredged material for the purpose of dumping it into ocean waters upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (86 Stat. 1052; P.L. 92-532);

United States Air Force
Headquarters, Space Division
Los Angeles, CA 90009 ///

is hereby authorized by the Secretary of the Army:

to (1) Remove existing wood pier and boathouse 350 feet by 40 feet; (2) remove existing 36 inch dia. concrete filled steel support piles (approximately 25); (3) dredge 55,000 cubic yards of rock and sand to a depth of 12.4 feet below mean sea level (MSL) by a clamshell dredge; (4) excavate 5,000 cubic yards of bank material; (5) transport 55,000 cubic yards of dredged material to an ocean disposal site; (6) install six 3-pile dophins; (7) discharge 500 cubic yards of concrete and 250 cubic yards of backfill to construct an earth and concrete solid fill pier; and (8) place 250 cubic yards of rip-rap at the base of the proposed pier in Santa
XX Maria Basin, Pacific Ocean, at Point Arguello Coast Guard Rescue Station, Vandenberg Air Force Base, near the city of Lompoc, Santa Barbara County, California ///

XX

in accordance with the plans and drawings attached hereto which are incorporated in and made a part of this permit (on drawings: give file number or other definite identification marks.)

"PUBLIC NOTICE NO. 82-100
(SHEETS 1 THROUGH 7) ///

subject to the following conditions:

1. General Conditions:

a. That all activities identified and authorized herein shall be consistent with the terms and conditions of this permit; and that any activities not specifically identified and authorized herein shall constitute a violation of the terms and conditions of this permit which may result in the modification, suspension or revocation of this permit in whole or in part, as set forth more specifically in General Conditions j or k hereto, and in the institution of such legal proceedings as the United States Government may consider appropriate, whether or not this permit has been previously modified, suspended or revoked in whole or in part.

ENG FORM 1 JUL 77 1721 EDITION OF 1 APR 74 IS OBSOLETE. (ER 1145-2-303)

Sheet 1

b. That all activities authorized herein shall, if they involve, during their construction or operation, any discharge of pollutants into waters of the United States or ocean waters, be at all times consistent with applicable water quality standards, effluent limitations and standards of performance, prohibitions, pretreatment standards and management practices established pursuant to the Federal Water Pollution Control Act of 1972 (P.L. 92-500; 86 Stat. 816), the Marine Protection, Research and Sanctuaries Act of 1972 (P.L. 92-532, 86 Stat. 1052), or pursuant to applicable State and local law.

c. That when the activity authorized herein involves a discharge during its construction or operation, of any pollutant (including dredged or fill material), into waters of the United States, the authorized activity shall, if applicable water quality standards are revised or modified during the term of this permit, be modified, if necessary, to conform with such revised or modified water quality standards within 6 months of the effective date of any revision or modification of water quality standards, or as directed by an implementation plan contained in such revised or modified standards, or within such longer period of time as the District Engineer, in consultation with the Regional Administrator of the Environmental Protection Agency, may determine to be reasonable under the circumstances.

d. That the discharge will not destroy a threatened or endangered species as identified under the Endangered Species Act, or endanger the critical habitat of such species.

e. That the permittee agrees to make every reasonable effort to prosecute the construction or operation of the work authorized herein in a manner so as to minimize any adverse impact on fish, wildlife, and natural environmental values.

f. That the permittee agrees that he will prosecute the construction or work authorized herein in a manner so as to minimize any degradation of water quality.

g. That the permittee shall permit the District Engineer or his authorized representative(s) or designee(s) to make periodic inspections at any time deemed necessary in order to assure that the activity being performed under authority of this permit is in accordance with the terms and conditions prescribed herein.

h. That the permittee shall maintain the structure or work authorized herein in good condition and in accordance with the plans and drawings attached hereto.

i. That this permit does not convey any property rights, either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to property or invasion of rights or any infringement of Federal, State, or local laws or regulations nor does it obviate the requirement to obtain State or local assent required by law for the activity authorized herein.

j. That this permit may be summarily suspended, in whole or in part, upon a finding by the District Engineer that immediate suspension of the activity authorized herein would be in the general public interest. Such suspension shall be effective upon receipt by the permittee of a written notice thereof which shall indicate (1) the extent of the suspension, (2) the reasons for this action, and (3) any corrective or preventative measures to be taken by the permittee which are deemed necessary by the District Engineer to abate imminent hazards to the general public interest. The permittee shall take immediate action to comply with the provisions of this notice. Within ten days following receipt of this notice of suspension, the permittee may request a hearing in order to present information relevant to a decision as to whether his permit should be reinstated, modified or revoked. If a hearing is requested, it shall be conducted pursuant to procedures prescribed by the Chief of Engineers. After completion of the hearing, or within a reasonable time after issuance of the suspension notice to the permittee if no hearing is requested, the permit will either be reinstated, modified or revoked.

k. That this permit may be either modified, suspended or revoked in whole or in part if the Secretary of the Army or his authorized representative determines that there has been a violation of any of the terms or conditions of this permit or that such action would otherwise be in the public interest. Any such modification, suspension, or revocation shall become effective 30 days after receipt by the permittee of written notice of such action which shall specify the facts or conduct warranting same unless (1) within the 30-day period the permittee is able to satisfactorily demonstrate that (a) the alleged violation of the terms and the conditions of this permit did not, in fact, occur or (b) the alleged violation was accidental, and the permittee has been operating in compliance with the terms and conditions of the permit and is able to provide satisfactory assurances that future operations shall be in full compliance with the terms and conditions of this permit, or (2) within the aforesaid 30-day period, the permittee requests that a public hearing be held to present oral and written evidence concerning the proposed modification, suspension or revocation. The conduct of this hearing and the procedures for making a final decision either to modify, suspend or revoke this permit in whole or in part shall be pursuant to procedures prescribed by the Chief of Engineers.

l. That in issuing this permit, the Government has relied on the information and data which the permittee has provided in connection with his permit application. If, subsequent to the issuance of this permit, such information and data prove to be false, incomplete or inaccurate, this permit may be modified, suspended or revoked, in whole or in part, and/or the Government may, in addition, institute appropriate legal proceedings.

m. That any modification, suspension, or revocation of this permit shall not be the basis for any claim for damages against the United States.

n. That the permittee shall notify the District Engineer at what time the activity authorized herein will be commenced, as far in advance of the time of commencement as the District Engineer may specify, and of any suspension of work, if for a period of more than one week, resumption of work and its completion.



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS

NOTICE OF AUTHORIZATION

12 October 1982

A PERMIT TO (1) Remove existing wood pier and boathouse 350 ft. by 40 ft.; (2) remove existing of 36 in. dia. concrete filled steel support piles (approxi. 25); (3) dredge 55,000 c. y. of rock and sand to a depth of 12.4 below mean sea level by a clamshell dredge; etc. All work will be done in Santa Maria Basin, Pacific Ocean, at Point Arguello Coast Guard Rescue Station, Vandenberg Air Force Base, near the city of Lompoc, Santa Barbara County, California

AT

HAS BEEN ISSUED TO United States Air Force **ON** 12 October 1982

ADDRESS OF PERMITTEE Headquarters, Space Division
Los Angeles, CA 90009

PERMIT NUMBER 82-100

PAUL W. TAYLOR
COL, CE
District Engineer

EMC Form 4336
Jul 70

THIS NOTICE MUST BE CONSPICUOUSLY DISPLAYED AT THE SITE OF WORK.

* GPO: 1977 232-984

CALIFORNIA DEPARTMENT OF FISH AND GAME

Boathouse Use of Explosives Permit

ATTACHMENT 1 of 3

ATE OF CALIFORNIA RESOURCES AGENCY
EDMUND G. BROWN JR., Governor

DEPARTMENT OF FISH AND GAME
1416 NINTH STREET
MENTO, CALIFORNIA 95814
T6) 445-3531

September 3, 1982

Explosives Permit
No. B-11-82

To whom it may concern:

In accordance with approval granted by the Fish and Game Commission on August 27, 1982, and as far as the Department of Fish and Game is concerned, permission is hereby granted to:

Colonel John D. Pearman, USAF
Director of Civil Engineering
Department of the Air Force
Headquarters Space Division (AFSC)
P. O. Box 96960, Worldway Postal Center
Los Angeles, CA. 90009

to use explosives in waters of the Pacific Ocean at the Point Arguello Coast Guard Rescue Station, Vandenberg AFB, California, in conjunction with excavation of the harbor bottom.

The USAF Headquarters Space Division (AFSC), hereinafter referred to as the permittee, may use explosives only in accordance with the following conditions and requirements:

1. The permittee may detonate explosives only if a Department of Fish and Game representative is present to observe the effects of the explosives upon fish and other aquatic life.

2. The permittee shall, at the request of the observer, collect any fish which may be killed or injured by the explosives, and shall dispose of such fish as requested by the observer.

3. The permittee shall provide the use of a suitable and acceptable boat, with operator, for use by the observer for the purpose of inspecting the shot point immediately following the detonation of explosives. The permittee shall afford the observer full use of the boat to inspect for a sufficient period of time for dead or injured fish in the vicinity of the shot point, or any area where such fish may drift. The suitability of the boat for the necessary observation work shall be determined by the observer.

4. The permittee shall give at least 72 hours notice of the proposed use of explosives to Patrol Inspector Russell Goodrich, Department of Fish and Game, 350 Golden Shore, Long Beach, California 90802, telephone (415) 590-5115, so that a Department of Fish and Game representative may be assigned to observe the effects of the explosives.

5. The permittee shall only detonate the minimum explosives necessary to accomplish the purpose of this permit.

6. This permit does not authorize the permittee to possess or use explosives in a manner contrary to any other state law or regulation, or in violation of any rule, regulation, ordinance or condition imposed by any local agency, or in violation of any Federal law or regulation.

7. If the permittee contracts the blasting work to a private firm, the permittee shall reimburse the Department for observer costs at the rate of $170.00 for each eight-hour day or portion thereof, and $21.25 per hour for any time in excess of eight hours in any one day that a Department observer is required to travel, standby, or be present to observe the effects of the explosives upon fish and other aquatic life. If the permittee actually does the work, the aforementioned fees may be waived.

8. The permittee shall not detonate explosives whenever it appears that an appreciable number of fish will be killed or injured by the explosives.

9. Each underwater shot shall be limited to a maximum of 50 pounds of explosives.

10. Permittee shall make all shots at slack high tide unless permission to do otherwise is granted by the Department observer at the scene.

This permit shall expire on January 31, 1983, except that it may be cancelled by the Department of Fish and Game if the permittee fails to comply with the foregoing conditions and requirements.

FOR Director

CALIFORNIA STATE LANDS COMMISSION

Boathouse Dredging Permit

STATE OF CALIFORNIA — EDMUND G. BROWN JR., Governor

STATE LANDS COMMISSION

KENNETH CORY, *Controller*
MIKE CURB, *Lieutenant Governor*
MARY ANN GRAVES, *Director of Finance*

EXECUTIVE OFFICE
1807 · 13th Street
Sacramento, California 95814

CLAIRE T. DEDRICK
Executive Officer

October 21, 1982

File Ref.: W 23052

Headquarters Space Division
S.P./D.E.
P. O. Box 92960
Worldway Postal Center
Los Angeles AFS
Los Angeles, California 90009
Attention: Lt. Col. Wooten

Gentlemen:

Pursuant to your application dated August 17, 1982, you are hereby granted permission to dredge a maximum of 55,000 cubic yards of sand, silt, clay and gravel, excluding all other minerals, including but not limited to oil, gas and geothermal from an area of submerged lands in Point Arguello, Coast Guard Station, Santa Barbara County, as described and designated respectively in Exhibits "A" and "B" attached hereto, which are by this reference expressly made a part hereof. Said permission includes the right to deposit said material at the EPA approved disposal site 34°30'40"N, 120°5'24"W in the Pacific Ocean.

No royalty will be assessed for material removed from State-owned land and placed at the EPA disposal site; and a royalty of $0.25 per cubic yard shall be paid for material placed on private property or used for any private or commercial benefit. Said permission is given on the condition that all dredging and spoils deposition shall be done in accordance with all applicable Federal, State and local government laws, rules and regulations. Said permission shall be effective from November 1, 1982 until October 31, 1983.

The permission to dredge the above-described lands is based upon information presently available to the State Lands Commission, and is given without survey or title determination. Such permission shall not be construed as fixing State land boundaries nor as necessarily establishing the extent of the State's claim to property in the area. The State warrants neither the title to the demised premises nor any right you may have to possession or quiet enjoyment of the same.

It is hereby agreed that the operations authorized under this permit shall be performed with diligence, in a good and workmanlike manner, and with the use of due care and safety precautions.

It is further agreed that you shall submit reports substantiating the volume of materials dredged and any royalties due to the Commission on a quarterly basis, on forms supplied by the Commission (Form 30.9 NC). It is agreed that you shall submit said forms on or before the twenty-fifth (25th) day of the month following the end of each permit quarter, together with payment for the royalty due on the volume removed during that quarter.

It is hereby agreed that, pursuant to Public Resources Code Section 6224, any installments of royalty accruing under the provisions of this permit that are not paid when due shall be subject to a five percent (5%) penalty and shall bear interest at the rate of one percent (1%) per month from the date when the same was payable by the terms hereof.

It is agreed that you shall furnish the Commission with copies of final surveys or copies of any other computations used as a basis to verify dredge volumes within twenty-five (25) days of completion of the activity authorized hereunder.

It is agreed that you shall indemnify, save harmless and, at the option of the State of California, defend said State, its officers, agents and employees, against any and all claims, demands, causes of action, or liability of any kind which may be asserted against or imposed upon the State of California or any of its officers, agents or employees by any third person or entity, arising out of or connected with the issuance of this permit, operations hereunder, or the use by you or your agents, employees or contractors, of the above described lands.

Without limiting the generality of the foregoing, such indemnification shall include any claim, demand, cause of action or liability of any kind asserted against or impounded upon the State of California or any of its officers, agents or employees arising out of or connected with any alleged or actual violation by you, your agents, employees or contractors of the property or contractual rights of any third person or entity. It is agreed that you shall at the option of the Commission procure and maintain liability insurance for the benefit of the State in an amount satisfactory to the Commission.

You agree to comply with the terms and conditions hereof, and you further agree that any violation thereof shall constitute grounds for termination of this permit and shall allow the Commission to pursue any other remedy available to it under the law. It is further agreed that this permit may be suspended, modified or terminated whenever the State Lands Commission deems such action to be in the best interests of the State, and that no such action by the Commission shall be deemed to be a basis for any claim or cause of action for damages against the State or any officer, employee or agency thereof.

STATE OF CALIFORNIA
STATE LANDS COMMISSION

W. M. Thompson

W. M. THOMPSON, Chief
Extractive Development Program

DATE

ACCEPTED:

BY John Pearman, Col. USAF

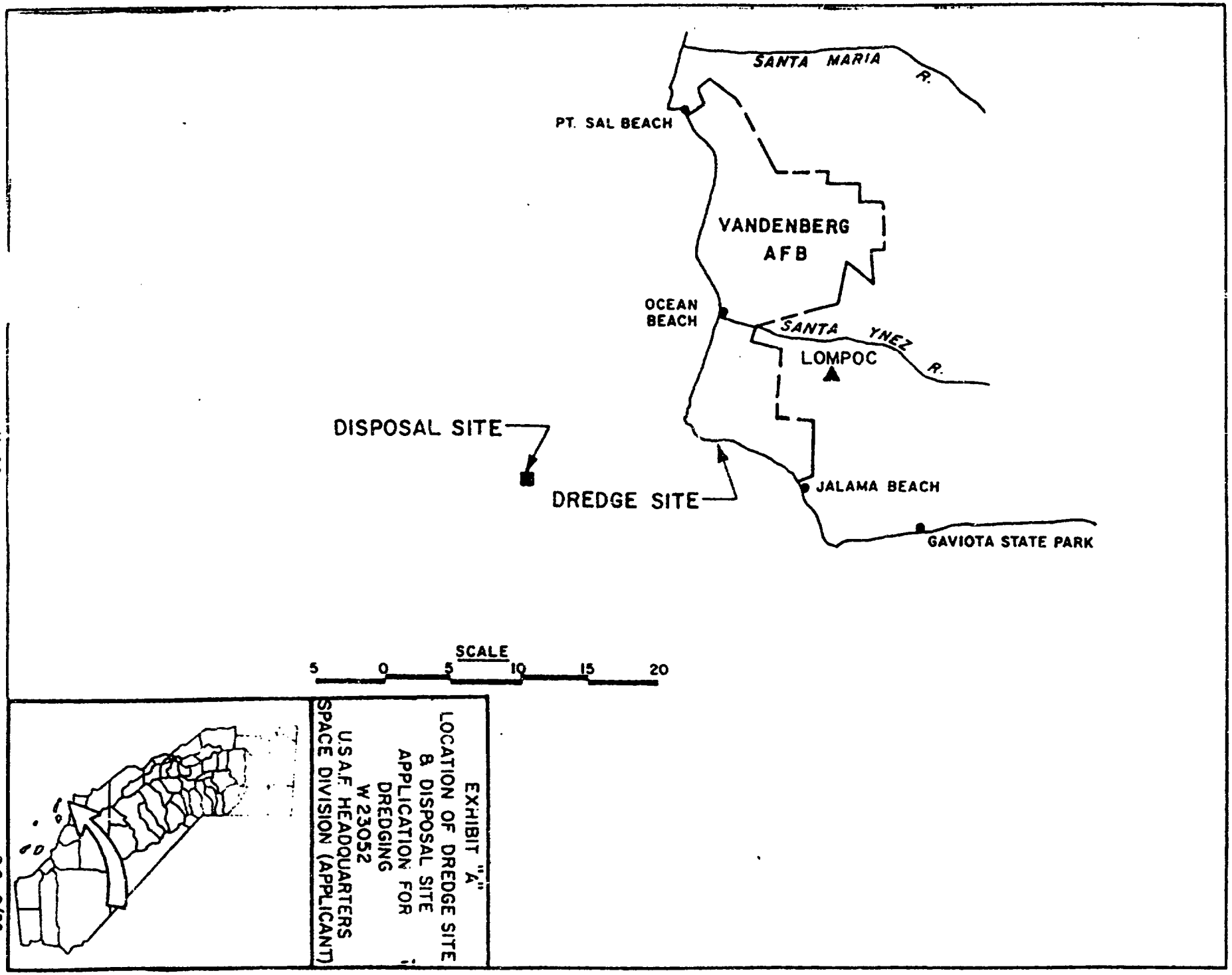
TITLE Director of Civil Engineering

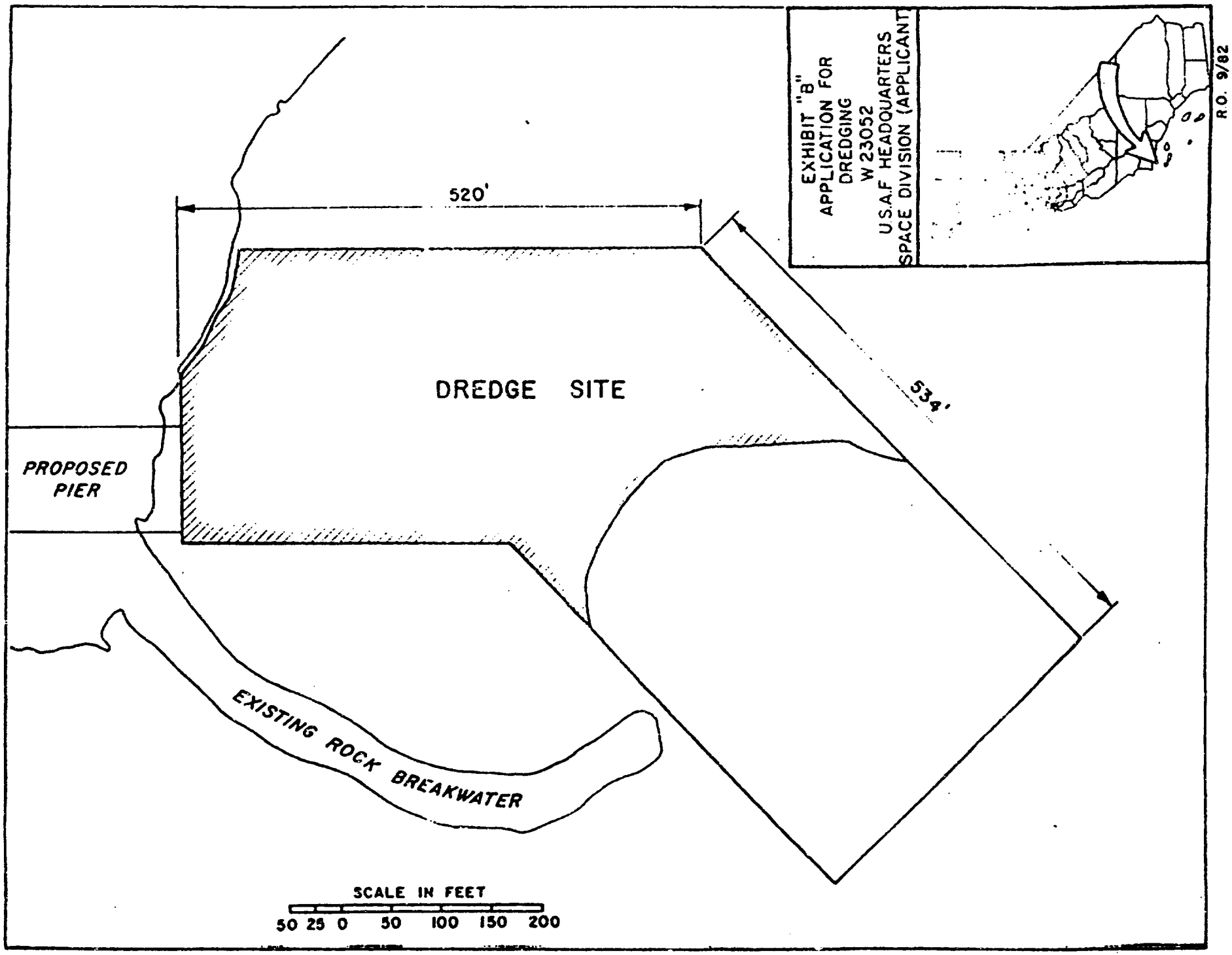
DATE 4 Nov 82

Mailed in Triplicate

Enclosures: EXHIBITS "A" and "B"

30.9 Forms


SANTA MARIA R.
PT. SAL BEACH
VANDENBERG AFB
OCEAN BEACH
SANTA YNEZ R.
LOMPOC
DISPOSAL SITE
DREDGE SITE
JALAMA BEACH
GAVIOTA STATE PARK
N
SCALE
5 0 5 10 15 20
EXHIBIT "A"
LOCATION OF DREDGE SITE & DISPOSAL SITE
APPLICATION FOR DREDGING
W 23052
U.S.A.F. HEADQUARTERS SPACE DIVISION (APPLICANT)
RO 9/82


EXHIBIT "B"
APPLICATION FOR
DREDGING
W 23052
U.S.A.F HEADQUARTERS
SPACE DIVISION (APPLICANT
R.O. 9/82
520'
534'
DREDGE SITE
PROPOSED
PIER
EXISTING ROCK BREAKWATER
SCALE IN FEET
50 25 0 50 100 150 200
N
H-45

PRC No. _____

Permittee's Quarterly Report of Operations—Non-Commercial

Instructions: Complete and submit the white copy BEFORE the 25th of the month following the end of the Permit Quarter with Check (when appropriate) to: STATE LANDS COMMISSION/1807 13th Street/Sacramento, California/95814 Attention: Accounting Unit The yellow copy is for your records.

Permittee _____ Address _____ Permit Qtr. Ending _____ 19 _____

Total Extractions For Period Above

Dates	Dredging/Excavation Site - Specific	Operator	Disposal Site	Type Of Material	Tons/Cubic Yards
				Total	

Royalty Calculation

Calculation by Permittee:

_____ tons or cubic yards times
(quantity extracted)

_____ ¢ per ton or cubic yard equals
(royalty rate)

$_____, due and paid herewith.
(royalty)

Verification by State:

_____ tons/c.y. times

_____ ¢ equals $_____

Difference:

$_____

Additional royalty due (overpaid)

Summary

Month	Tons/Cubic Yards Extracted
Totals	

Brief Description of Work Done During The Quarter

Tools, Machinery And Other Equipment In Serviceable Condition And On The Area Described In The Permit

Item	Days

Certification

I certify (or declare) under penalty of perjury that the foregoing is true and correct and that it is complete to the best of my knowledge and belief.

_____
(Signature of Permittee or Agent)

Title: _____

Dated: _____

At: _____
(City and State)

Do Not Write Below This Line

Received by _____

for Mineral Leasing Unit on _____

_____

Calculations verified by _____

_____

on _____

Amount Received	Date Received	C/R Reference

SLC Routing:

1. ☐ Accounting - Sacramento
2. ☐ Dredging Coordinator
3. ☐ Mineral Extraction Unit, Long Beach
4. ☐ File

Form 30.9 NC (3-80)

U.S. ARMY CORPS OF ENGINEERS

Permit to Place Large Stones Around Piers
of 13th Street Bridge

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2711
LOS ANGELES, CALIFORNIA 90053

IN REPLY REFER TO

2 DEC 1982

SPLCO-R

SUBJECT: Placement of Large Stone Around the Piers of 13th Street Bridge

U.S. Air Force
Headquarters, Space Division
Los Angeles, CA 90009

1. In response to your request of 23 September 1982 (82-196-RC), there are inclosed two copies of a draft permit authorizing you to place large stone around the piers of 13th Street Bridge, for protection during large flow periods of the Santa Ynez River in S nta Ynez River at the 13th Street Bridge, near the city of Lompoc, Santa Barbara County, California.

2. THIS PERMIT IS NOT VALID UNTIL SIGNED BY THE DISTRICT ENGINEER.

3. Your attention is particularly invited to the Special Conditions on pages 3 and 4.

4. All copies shall be signed and dated by an owner or authorized responsible official. The signer's name and title, if any, must be typed or printed below the signature. All copies should be returned to this office. The permit will then be validated and one copy will be returned to you. If the draft copies are not signed and returned within 30 days from the date of this letter, your request for the proposed work will be withdrawn.

Paul W. Taylor

PAUL W. TAYLOR
COL, CE
Commanding

1 Incl (two copies)
as

E30

Application No. 82-196-HC

Name of Applicant U.S. Air Force

Effective Date

Expiration Date (If applicable)

DEPARTMENT OF THE ARMY
PERMIT

Referring to written request dated 23 September 1982 for a permit to:

( ) Perform work in or affecting navigable waters of the United States, upon the recommendation of the Chief of Engineers, pursuant to Section 10 of the Rivers and Harbors Act of March 3, 1899 (33 U.S.C. 403);

(X) Discharge dredged or fill material into waters of the United States upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 404 of the Federal Water Pollution Control Act (86 Stat. 816, P.L. 92-500);

( ) Transport dredged material for the purpose of dumping it into ocean waters upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (86 Stat. 1052; P.L. 92-532);

U.S. Air Force
Headquarters, Space Division
Los Angeles, CA 90009

is hereby authorized by the Secretary of the Army:

to (1) place 5,600 cu. yards of quarry rock around eight (8) support piers to prevent scouring; and (2) place two temporary diversion groins upstream of 13th Street Bridge--one groin will be approximately 800 ft long, 10 ft high, and 20 ft wide at the base, the other will be 500 ft long, 10 ft high, and 20 ft wide at the base. The groins will be constructed from sand within the river bottom///

in Santa Ynez River///

at the 13th Street Bridge, near the city of Lompoc, Santa Barbara County, California///

in accordance with the plans and drawings attached hereto which are incorporated in and made a part of this permit (on drawings: give file number or other definite identification marks.)

"PUBLIC NOTICE NO. 82-196-HC"
(SHEETS 1 ,2 ,3, and 4)

///

subject to the following conditions:

I. General Conditions:

a. That all activities identified and authorized herein shall be consistent with the terms and conditions of this permit; and that any activities not specifically identified and authorized herein shall constitute a violation of the terms and conditions of this permit which may result in the modification, suspension or revocation of this permit, in whole or in part, as set forth more specifically in General Conditions j or k hereto, and in the institution of such legal proceedings as the United States Government may consider appropriate, whether or not this permit has been previously modified, suspended or revoked in whole or in part.

b. That all activities authorized herein shall, if they involve, during their construction or operation, any discharge of pollutants into waters of the United States or ocean waters, be at all times consistent with applicable water quality standards, effluent limitations and standards of performance, prohibitions, pretreatment standards and management practices established pursuant to the Federal Water Pollution Control Act of 1972 (P.L. 92-500; 86 Stat. 816), the Marine Protection, Research and Sanctuaries Act of 1972 (P.L. 92-532, 86 Stat. 1052), or pursuant to applicable State and local law.

c. That when the activity authorized herein involves a discharge during its construction or operation, of any pollutant (including dredged or fill material), into waters of the United States, the authorized activity shall, if applicable water quality standards are revised or modified during the term of this permit, be modified, if necessary, to conform with such revised or modified water quality standards within 6 months of the effective date of any revision or modification of water quality standards, or as directed by an implementation plan contained in such revised or modified standards, or within such longer period of time as the District Engineer, in consultation with the Regional Administrator of the Environmental Protection Agency, may determine to be reasonable under the circumstances.

d. That the discharge will not destroy a threatened or endangered species as identified under the Endangered Species Act, or endanger the critical habitat of such species.

e. That the permittee agrees to make every reasonable effort to prosecute the construction or operation of the work authorized herein in a manner so as to minimize any adverse impact on fish, wildlife, and natural environmental values.

f. That the permittee agrees that he will prosecute the construction or work authorized herein in a manner so as to minimize any degradation of water quality.

g. That the permittee shall permit the District Engineer or his authorized representative(s) or designee(s) to make periodic inspections at any time deemed necessary in order to assure that the activity being performed under authority of this permit is in accordance with the terms and conditions prescribed herein.

h. That the permittee shall maintain the structure or work authorized herein in good condition and in accordance with the plans and drawings attached hereto.

i. That this permit does not convey any property rights, either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to property or invasion of rights or any infringement of Federal, State, or local laws or regulations nor does it obviate the requirement to obtain State or local assent required by law for the activity authorized herein.

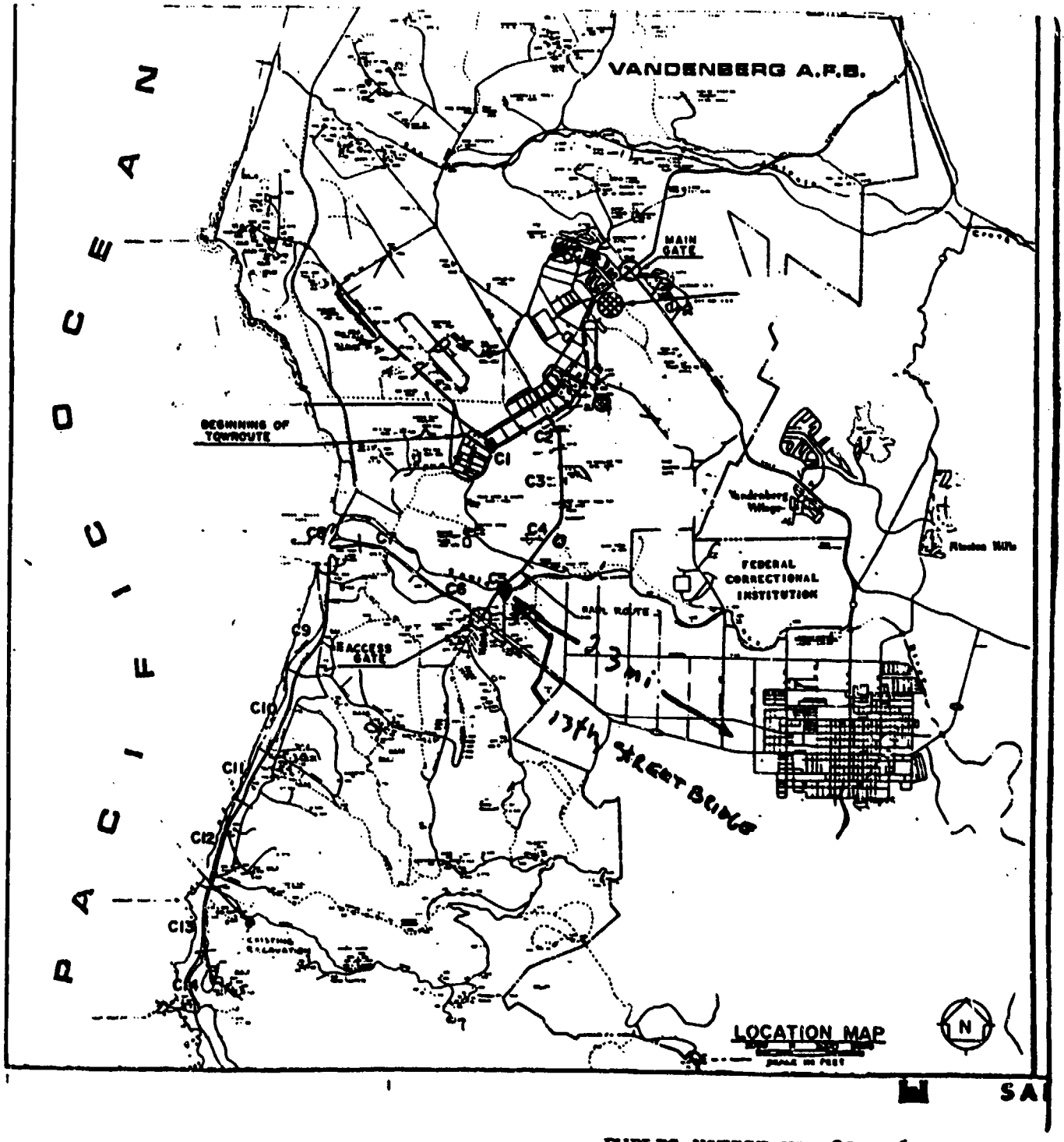
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k. That this permit may be either modified, suspended or revoked in whole or in part if the Secretary of the Army or his authorized representative determines that there has been a violation of any of the terms or conditions of this permit or that such action would otherwise be in the public interest. Any such modification, suspension, or revocation shall become effective 30 days after receipt by the permittee of written notice of such action which shall specify the facts or conduct warranting same unless (1) within the 30-day period the permittee is able to satisfactorily demonstrate that (a) the alleged violation of the terms and the conditions of this permit did not, in fact, occur or (b) the alleged violation was accidental, and the permittee has been operating in compliance with the terms and conditions of the permit and is able to provide satisfactory assurances that future operations shall be in full compliance with the terms and conditions of this permit; or (2) within the aforesaid 30-day period, the permittee requests that a public hearing be held to present oral and written evidence concerning the proposed modification, suspension or revocation. The conduct of this hearing and the procedures for making a final decision either to modify, suspend or revoke this permit in whole or in part shall be pursuant to procedures prescribed by the Chief of Engineers.

l. That in issuing this permit, the Government has relied on the information and data which the permittee has provided in connection with his permit application. If, subsequent to the issuance of this permit, such information and data prove to be false, incomplete or inaccurate, this permit may be modified, suspended or revoked, in whole or in part, and/or the Government may, in addition, institute appropriate legal proceedings.

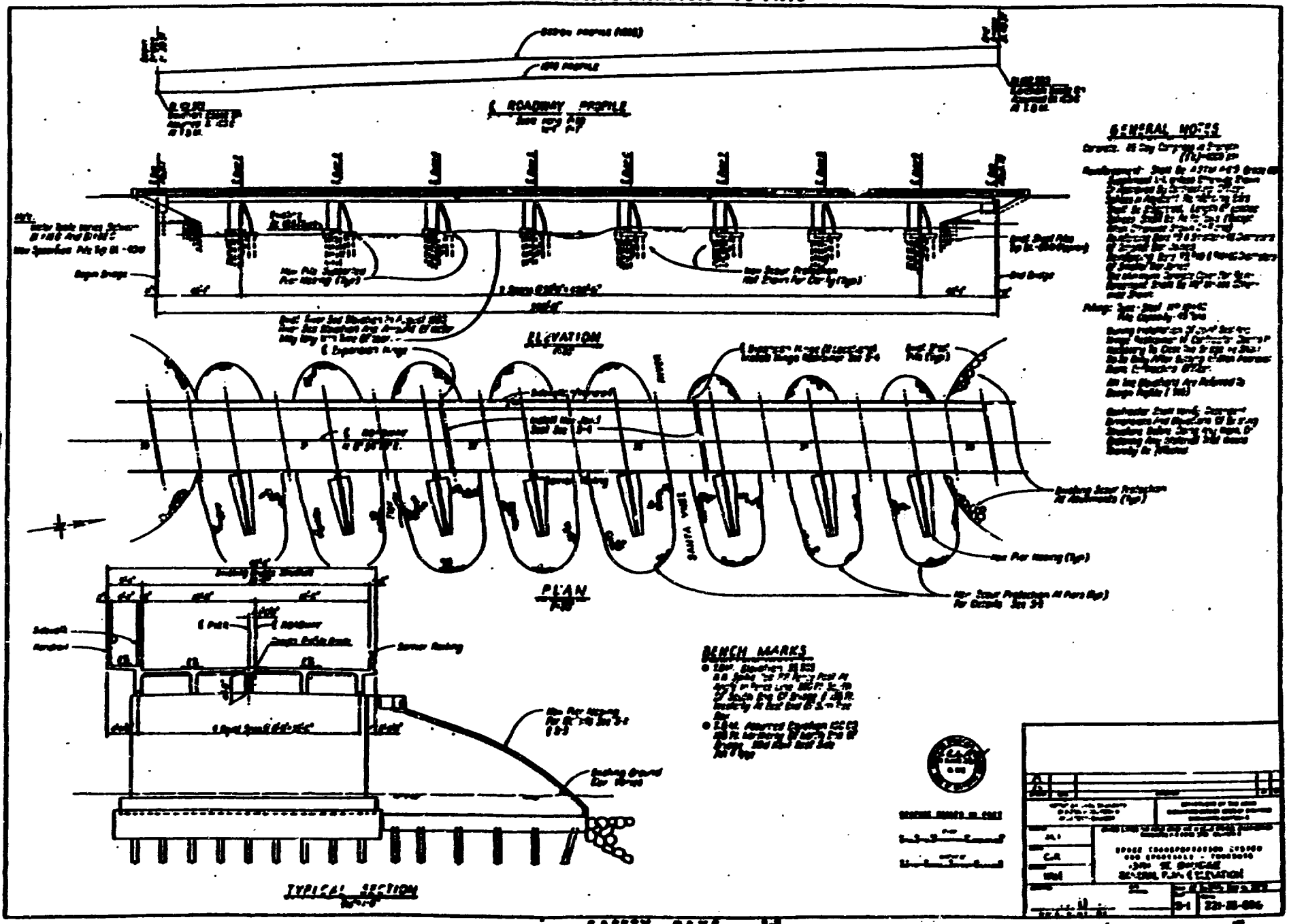
m. That any modification, suspension, or revocation of this permit shall not be the basis for any claim for damages against the United States.

n. That the permittee shall notify the District Engineer at what time the activity authorized herein will be commenced, as far in advance of the time of commencement as the District Engineer may specify, and of any suspension of work, if for a period of more than one week, resumption of work and its completion.

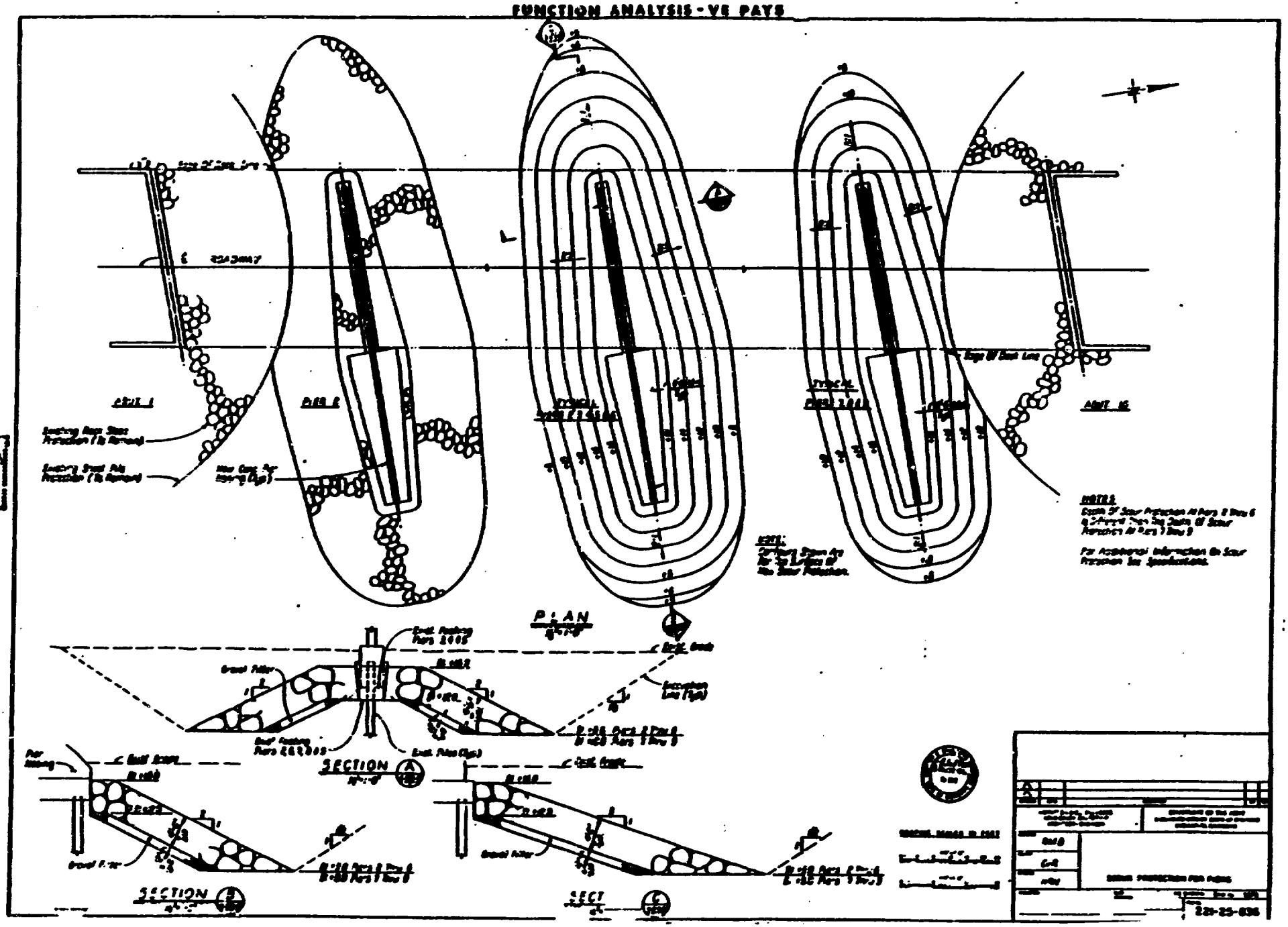


PUBLIC NOTICE NO. 82-196-RC
SHEET 1 OF 4

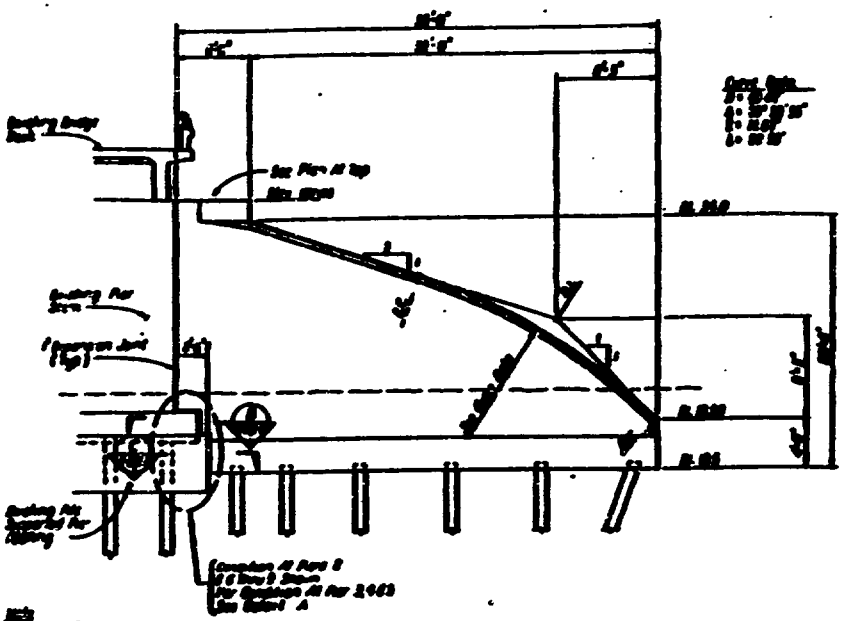
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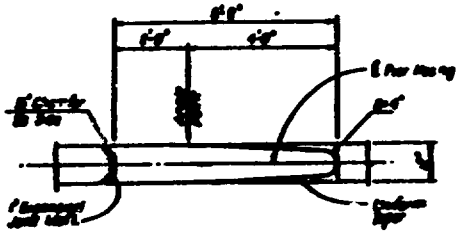
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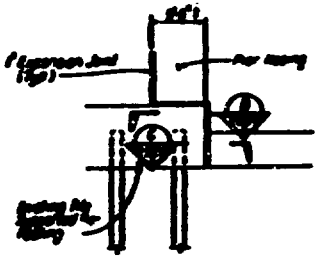
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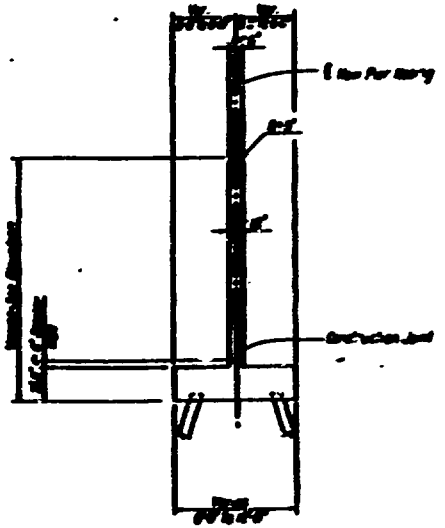
PIER NOSING ELEVATION



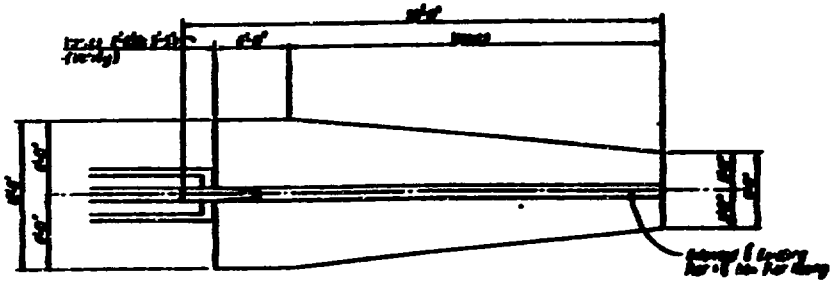
PLAN AT TOP



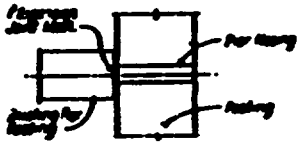
DETAIL A



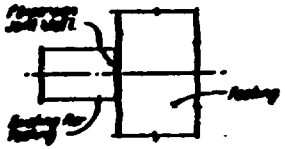
TYPICAL SECTION



FOUNDATION PLAN



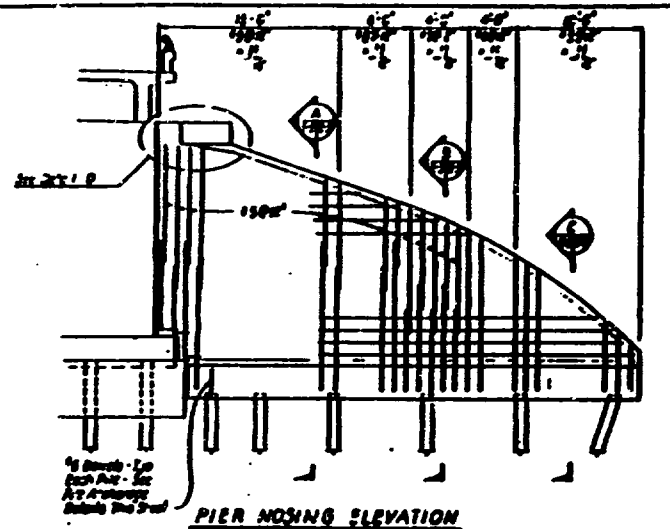
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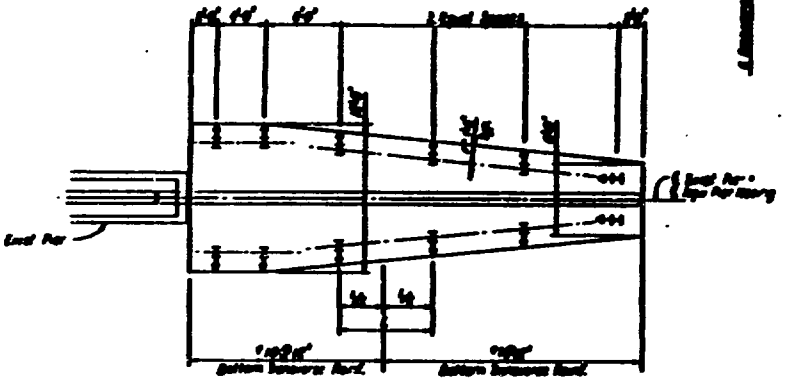
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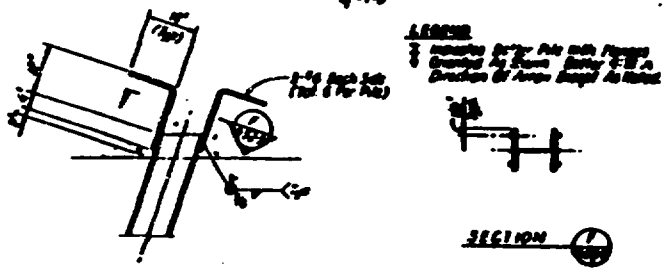
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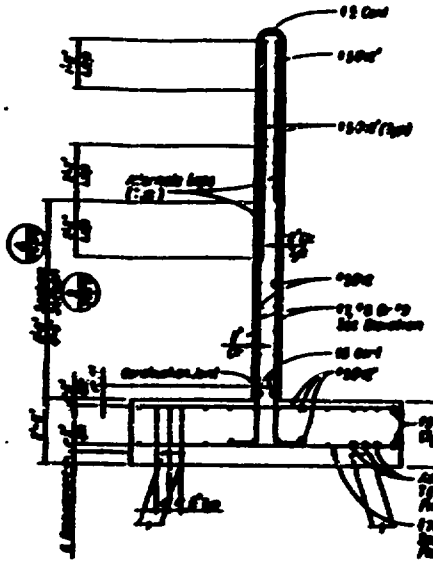
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FOUNDATION PLAN

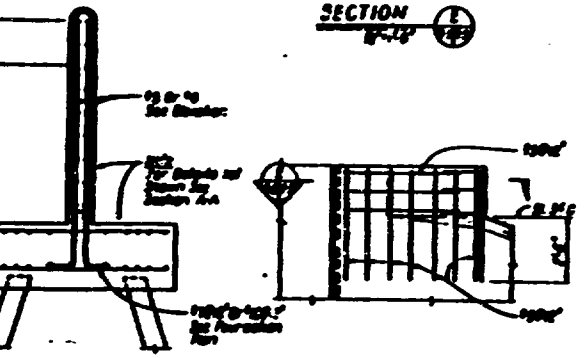


PILE ANCHORAGE DETAILS



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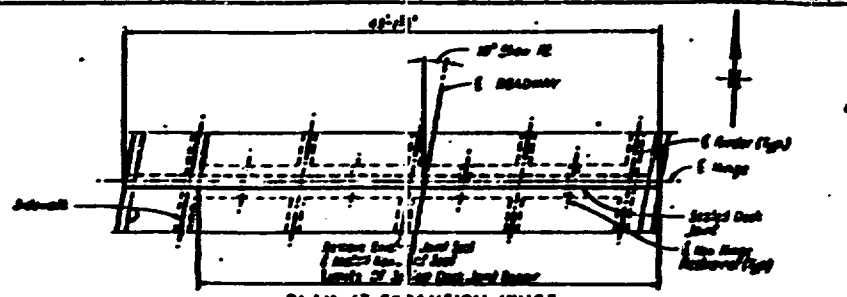
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DETAIL D

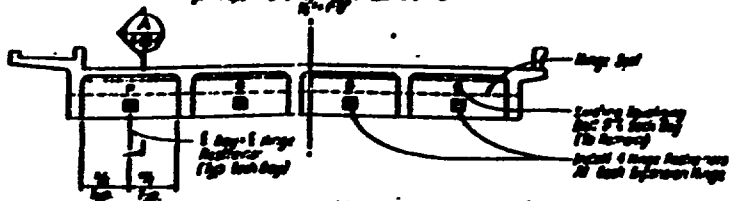
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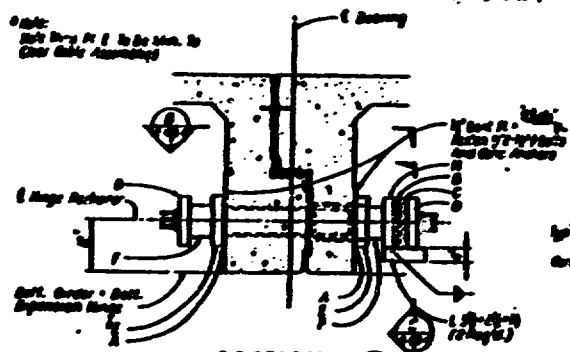
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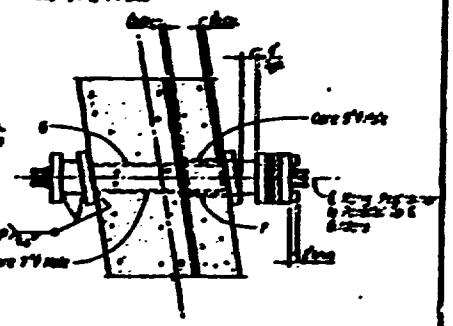
PLAN AT EXPANSION HINGE



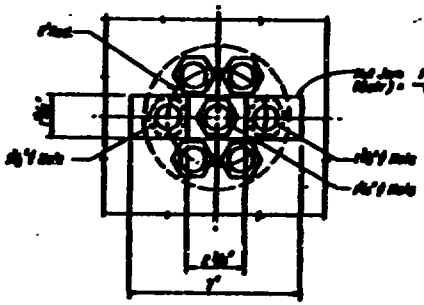
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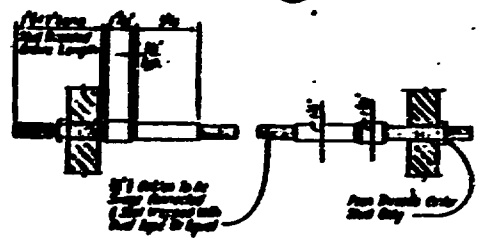
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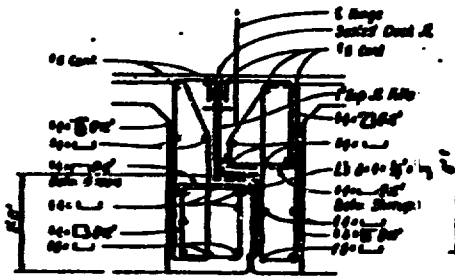


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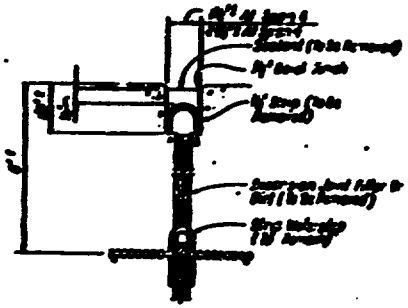


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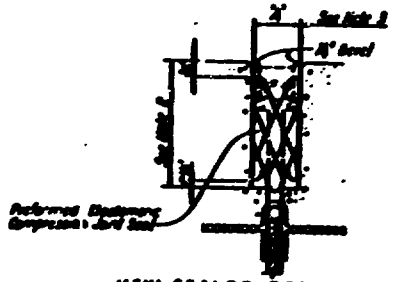
HINGE RESTRAINER DETAILS



EXPANSION HINGE SECTION (EXIST)

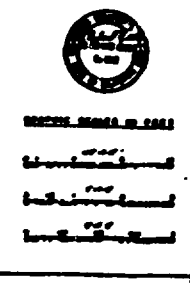


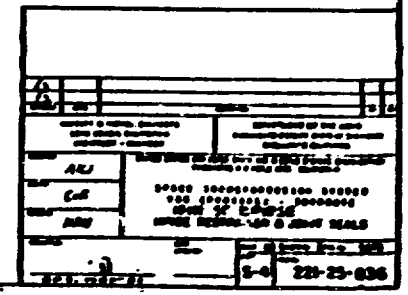
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NEW SEALED DECK JOINT DETAIL

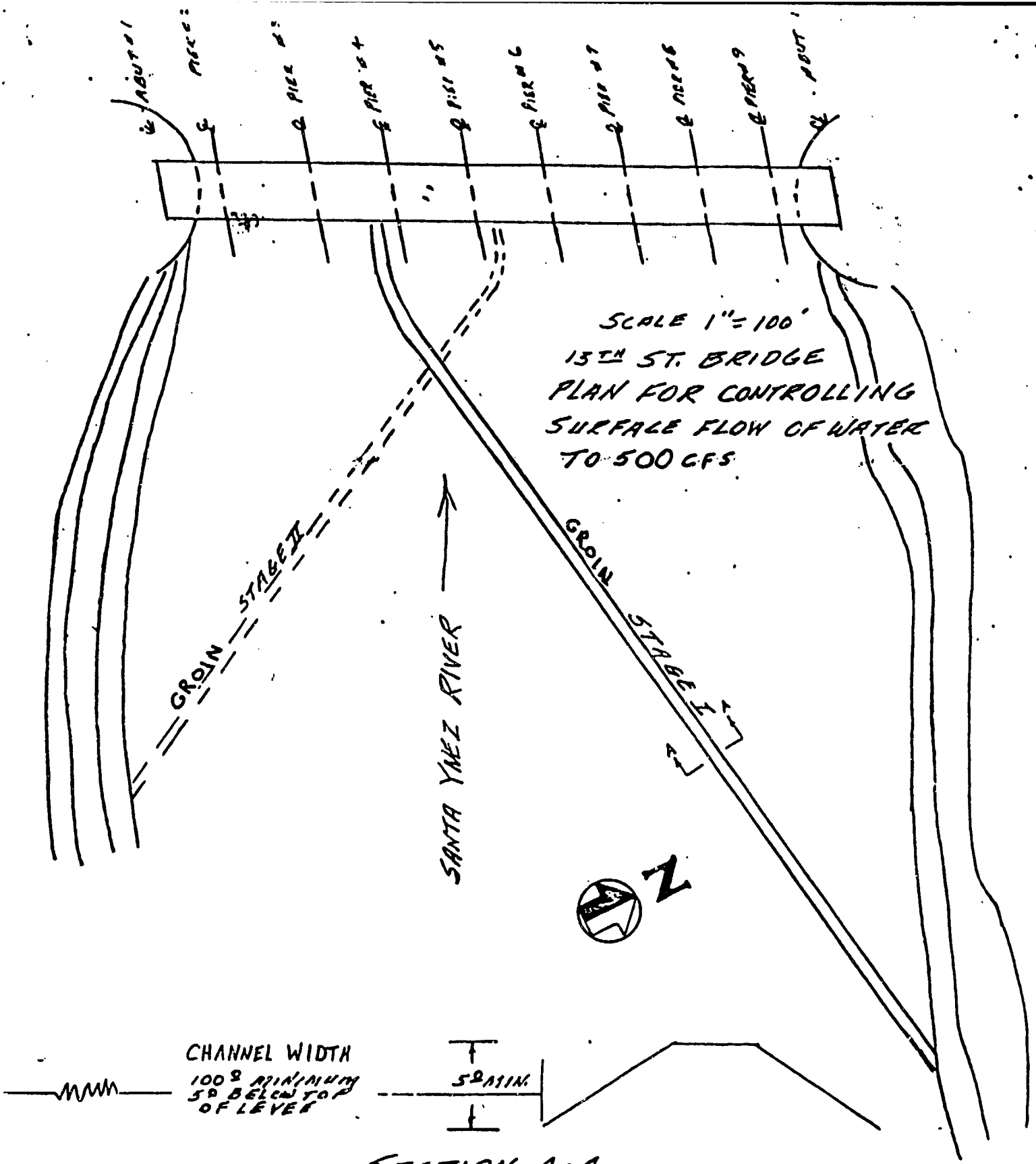
NOTES





SAFETY PAYS

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION



SECTION A-A
Not to Scale

PUBLIC NOTICE NO.
82-196-RC
SHEET 4 OF 4

o. That if the activity authorized herein is not started on or before ////////// day of ////// ////, (one year from the date of issuance of this permit unless otherwise specified) and is not completed on or before ////////// day of ////// ////, (three years from the date of issuance of this permit unless otherwise specified) this permit, if not previously revoked or specifically extended, shall automatically expire

p. That this permit does not authorize or approve the construction of particular structures, the authorization or approval of which may require authorization by the Congress or other agencies of the Federal Government.

q. That if and when the permittee desires to abandon the activity authorized herein, unless such abandonment is part of a transfer procedure by which the permittee is transferring his interests herein to a third party pursuant to General Condition t hereof, he must restore the area to a condition satisfactory to the District Engineer.

r. That if the recording of this permit is possible under applicable State or local law, the permittee shall take such action as may be necessary to record this permit with the Register of Deeds or other appropriate official charged with the responsibility for maintaining records of title to and interests in real property

s. That there shall be no unreasonable interference with navigation by the existence or use of the activity authorized herein.

t. That this permit may not be transferred to a third party without prior written notice to the District Engineer, either by the transferee's written agreement to comply with all terms and conditions of this permit or by the transferee subscribing to this permit in the space provided below and thereby agreeing to comply with all terms and conditions of this permit. In addition, if the permittee transfers the interests authorized herein by conveyance of realty, the deed shall reference this permit and the terms and conditions specified herein and this permit shall be recorded along with the deed with the Register of Deeds or other appropriate official.

II. Special Conditions: (Here list conditions relating specifically to the proposed structure or work authorized by this permit):

1. **That the permittee shall stockpile outside of the riverbed all the willows and brush that is removed during the construction activities. That within six (6) months after the completion of construction activities, this stockpiled vegetation shall be spread evenly over the disturbed areas, except directly under the 13th Street bridge.**

2. That if the permittee during prosecution of the work authorized herein, encounters a previously unidentified archeological or other cultural resource that might be eligible for listing in the National Register of Historic Places, he shall immediately notify the District Engineer. ///

The following Special Conditions will be applicable when appropriate:

STRUCTURES IN OR AFFECTING NAVIGABLE WATERS OF THE UNITED STATES:

a. That this permit does not authorize the interference with any existing or proposed Federal project and that the permittee shall not be entitled to compensation for damage or injury to the structures or work authorized herein which may be caused by or result from existing or future operations undertaken by the United States in the public interest.

b. That no attempt shall be made by the permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized by this permit.

c. That if the display of lights and signals on any structure or work authorized herein is not otherwise provided for by law, such lights and signals as may be prescribed by the United States Coast Guard shall be installed and maintained by and at the expense of the permittee.

d. That the permittee, upon receipt of a notice of revocation of this permit or upon its expiration before completion of the authorized structure or work, shall, without expense to the United States and in such time and manner as the Secretary of the Army or his authorized representative may direct, restore the waterway to its former conditions. If the permittee fails to comply with the direction of the Secretary of the Army or his authorized representative, the Secretary or his designee may restore the waterway to its former condition, by contract or otherwise, and recover the cost thereof from the permittee.

e. Structures for Small Boats: That permittee hereby recognizes the possibility that the structure permitted herein may be subject to damage by wave wash from passing vessels. The issuance of this permit does not relieve the permittee from taking all proper steps to insure the integrity of the structure permitted herein and the safety of boats moored thereto from damage by wave wash and the permittee shall not hold the United States liable for any such damage.

MAINTENANCE DREDGING:

a. That when the work authorized herein includes periodic maintenance dredging, it may be performed under this permit for None years from the date of issuance of this permit (ten years unless otherwise indicated);

b. That the permittee will advise the District Engineer in writing at least two weeks before he intends to undertake any maintenance dredging.

DISCHARGES OF DREDGED OR FILL MATERIAL INTO WATERS OF THE UNITED STATES:

a. That the discharge will be carried out in conformity with the goals and objectives of the EPA Guidelines established pursuant to Section 404(b) of the FWPCA and published in 40 CFR 230;

b. That the discharge will consist of suitable material free from toxic pollutants in other than trace quantities;

c. That the fill created by the discharge will be properly maintained to prevent erosion and other non-point sources of pollution; and

d. That the discharge will not occur in a component of the National Wild and Scenic River System or in a component of a State wild and scenic river system.

DUMPING OF DREDGED MATERIAL INTO OCEAN WATERS:

a. That the dumping will be carried out in conformity with the goals, objectives, and requirements of the EPA criteria established pursuant to Section 102 of the Marine Protection, Research and Sanctuaries Act of 1972, published in 40 CFR 220-228.

b. That the permittee shall place a copy of this permit in a conspicuous place in the vessel to be used for the transportation and/or dumping of the dredged material as authorized herein.

This permit shall become effective on the date of the District Engineer's signature.

Permittee hereby accepts and agrees to comply with the terms and conditions of this permit.

John D Pearman — 3 Dec 82

PERMITTEE — DATE

JOHN D. PEARMAN, Colonel, USAF

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

DATE

PAUL W. TAYLOR
COO, CE

DISTRICT ENGINEER,
U.S. ARMY, CORPS OF ENGINEERS

Transferee hereby agrees to comply with the terms and conditions of this permit.

TRANSFEREE — DATE

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U.S. GOVERNMENT PRINTING OFFICE : 1982 O - 368-964

U.S. FISH AND WILDLIFE SERVICE

Endangered Species Act Consultation

United States Department of the Interior

FISH AND WILDLIFE SERVICE

AREA OFFICE
2800 Cottage Way, Room E-1803
Sacramento, California 95825

APR 20 1982

In reply refer to:
1-1-77-F-05

John D. Pearlman, Colonel
Director of Civil Engineering
Department of the Air Force
Headquarters Space Division (AFSC)
Los Angeles Air Force Station
P.O. Box 92960
Worldway Postal Center
Los Angeles, California 90009

Subject: Endangered Species Act Consultation on the Space Shuttle Program at Vandenberg AFB

Dear Colonel Pearlman:

This responds to your February 22, 1982, letter which requested that we resume the consultation process on the Space Shuttle Program at Vandenberg Air Force Base (VAFB). This Biological Opinion is prepared pursuant to Section 7(a) of the Endangered Species Act of 1973, as amended, on the possible impacts of the project to endangered species. It refers only to actions affecting endangered species and not to the overall environmental acceptability of the proposed action.

Your office initiated formal consultation by letter of May 11, 1977, with our Portland Regional Office. We responded by letter of June 17, 1977, expressing concern that sonic booms from the Space Shuttle launches over the Channel Islands may jeopardize the continued existence of the endangered American peregrine falcon (Falco peregrinus anatum) and the endangered California brown pelican (Pelecanus occidentalis californicus). Our follow-up letter of September 12, 1977, recommended six studies to help evaluate possible impacts from the Space Shuttle launches on these two endangered species. These included:

1. Laboratory studies to determine the effect of sonic booms of the expected intensity over Anacapa Island on brown pelican eggs relative to possible shell breakage and damage to embryos at various stages of development.

2. Monitoring of the present noise disturbance on Anacapa to help us judge how much the shuttle would add to existing disturbances.

3. Survey to determine the presence of active peregrine falcon eyries in the areas of concern.

4. Studies that would assist in judging the impact of sonic booms on peregrine falcon reproduction.

5. Any studies that might be helpful in evaluating the effect of sonic booms on brown pelican behavior.

6. Monitoring of brown pelican behavior at Anacapa (and any peregrine falcons) during space vehicle launches, assuming project moves as planned.

In response to these and many environmental concerns, the Air Force implemented a research program in an attempt to assess impacts from Space Shuttle sonic booms on the Channel Islands biota. The research program was split into two phases: Phase I evaluated current literature and Phase II involved field and laboratory studies identified by Phase I as needed to provide additional information. The report Potential Impact of Space Shuttle Sonic Booms on the Biota of the California Channel Island: Literature Review and Problem Analysis resulted from the Phase I evaluation. Two reports Potential Effects of Space Shuttle Sonic Booms on the Biota and Geology of the California Channel Islands: Research Reports and Potential Effects of the Space Shuttle Sonic Booms on the Biota and Geology of the California Channel Islands: Synthesis of Research and Recommendations resulted from the Phase II studies. The Air Force incorporated information from these reports into the Draft Supplement to the Final Environmental Impact Statement, Space Shuttle Program, Vandenberg AFB, California dated February 1982. These documents, the Final Environmental Impact Statement, Space Shuttle Program, Vandenberg AFB, California (FES), information provided by the Air Force and their consultants during this consultation period, and other literature from our files, provide the basis of this Biological Opinion.

As noted in the draft Supplement to the FES, several endangered species occur on VAFB or may be impacted by the Space Shuttle program. The federally endangered California least tern (Sterna albifrons browni) nests on VAFB near Purisima Point. The endangered unarmored three-spine stickleback (Gasterosteus aculeatus williamsoni) inhabits portions of the San Antonio Creek. We concur with the decision that these species should not be significantly impacted by the Space Shuttle program. The endangered bald eagle now resides on Santa Catalina Island because of a reintroduction project. This species also will not be impacted by the shuttle program. We will, therefore, not discuss these species further in this Opinion.

Considerable research and debate have centered on the possible impacts of the Space Shuttle program and associated sonic booms to the endangered California brown pelican (Pelecanus occidentalis californicus) and the endangered American peregrine falcon (Falco peregrinus anatum). Based on the studies performed by your consultants and other available information, the Air Force has concluded in the draft supplement that the Space Shuttle Program at VAFB is not likely to jeopardize the continued existence of these species. This Biological Opinion will consider the possible impacts of this project to these two species.

The endangered gray whale (Eschrichtius robustus) also seasonally occurs in the waters off the coast of VAFB. We will not address any issues regarding this species since it falls under the purview of the National Marine Fisheries Service. You should consult with NMFS on matters related to the gray whale.

Biological Opinion

Based on the analysis which follows, it is our Biological Opinion that the Space Shuttle Program at Vandenberg Air Force Base is not likely to jeopardize the continued existence of the American peregrine falcon or California brown pelican. This Opinion is based on the low number of launches expected over the Channel Islands and evidence that strongly suggests little or no impact to these endangered species from the anticipated sonic booms. Construction of new facilities on Vandenberg to support the Space Shuttle program also were considered to have no significant impacts.

Project Description

The following is a brief summary of the Space Shuttle program, taken from information found in the FES and the draft supplement to the FES.

VAFB was selected as a launching and landing location for the Space Shuttle since its location allows the Space Shuttle to be launched at azimuths between 158 to 201 degrees.

The purpose of the VAFB Shuttle Program is to launch the shuttle into a polar orbit for placement of satellites for defense, communication, navigation and scientific research. The project will involve construction on VAFB of a landing strip extension, Orbitor processing facilities, a tow rounded partially using existing roads, a facility at the Port Arguello boathouse to receive Shuttle external tanks, and other facility modifications.

Space Shuttle launches from VAFB are scheduled to begin in late 1985. The Air Force expects the number of launches to increase gradually to a maximum of 10 launches per year by 1988, and continue at that level through 1994. Most of these launches will occur at azimuths greater than 180°, placing them and resulting sonic booms over the open ocean. A maximum of seven launches will occur at azimuths between 147.5° and 180°. Launches near 150° azimuth will pass over the northern Channel Islands. Sonic booms from these launches may result in overpressures as high as 30 pounds per square foot (psf) in the focusing zone, dropping off rapidly away from this zone (Attachment 1). All return flights of the Shuttle will pass over the northern Channel Islands and create sonic boom overpressures comparable to normal high altitude supersonic booms (see Attachment 2).

Species Accounts

American peregrine falcon

The American peregrine falcon historically nested throughout most of North America, south of the boreal forest, wherever suitable nesting habitat and prey species occurred together. In the first half of this century, the peregrine population in the western United States was declining due to direct and indirect impacts, most notably habitat loss and shooting by an increasing human population (Bond 1946). Herman, Kirven, and Risebrough (1970) estimated the breeding population in California to be about 100 pairs prior to 1947. A rapid decline in peregrine populations occurred throughout most of Europe and North America during the years following World War II due to widespread use of chlorinated hydrocarbon pesticides (Hickey and Anderson 1969). By 1970 the California peregrine population was estimated to be less than 10 reproductive pairs (Herman, Kirven and Risebrough 1970). By this time, the peregrine was extirpated as a breeding species in Canada south of the boreal forest and in the United States east of the Rockies. In 1978, 23 nesting pairs of peregrines in California fledged an average of 1.38 young, with the North Coast Range population fledging an average of 1.82 young (Harlow 1978). In 1979, 31 California pairs fledged and average of 1.37 young per pair (Harlow et al. 1979). A total of 39 pairs were reported in 1980 which fledged an average of 1.69 young per pair (Boyce 1981). Thirty-nine pairs fledged an average of 1.6 young per active pair in 1981 (Monk 1981). This increase in the number of pairs can be attributed to both increased survey effort and to a limited recovery of the population.

Peregrine falcons historically nested at locations on or near VAFB. Reported historical nesting locations in this vicinity include Point Sal, Point Conception and south of Point Arguello (Walton pers. comm.). Peregrines also nested on all the Channel Islands (Kiff 1980).

Wintering peregrines are regularly seen at San Miguel Island (Jehl 1980). A pair of peregrines attempted to nest but failed a few years ago near Jalama Beach and a pair was seen near Point Arguello during September 1981 (Walton pers. comm.). There has been a recent increase in breeding peregrine falcons along the California central coast area, and they appear to be moving south at a fairly rapid rate. There is, hence, a good chance of peregrines nesting again in the VAFB and northern Channel Islands areas, perhaps even before the first Vandenberg Space Shuttle launches occur.

Although peregrine falcons tend to be fairly tolerant of human activities, prolonged disturbances near nest sites during the critical nesting period from about February 1 through August 1 may lead to a loss of productivity and/or site abandonment. Photographers, rock climbers, construction and timber harvest, are examples of disturbances that if in close proximity to a nest site can lead to interference with incubation or parental care. Short-term disturbances also may lead to a loss of productivity. Cade (1960) observed several instances where incubating peregrines were startled and bolted off the nest, kicking eggs out of the scrape in the process. Detailed studies of responses of raptors to

jet overflights and sonic booms by Ellis (1981), however, observed no significant adverse behavioral responses from peregrine and prairie falcons. Harmata et al. (1978) observed no significant reactions by prairie falcons during repeated disturbances by low flying aircraft and their sonic booms.

Other peregrine mortality factors include shooting, poisoning, transmission line collisions and predation of nestlings (USFWS, 1981).

California brown pelican

The brown pelican was listed as an Endangered Species on 13 October 1970 (35 FR 16047). Eggshell thinning caused by DDT and its derivatives (Hickey and Anderson 1968) led to catastrophic reproductive failures throughout the United States, including the Anacapa Island nesting colony (Risebrough et al. 1971) and colonies off Baja California (Jehl 1973). Although environmental DDT levels have abated and pelican reproduction has improved in recent years, eggshell thinning remains a chronic problem. Offshore oil development, possibly declining northern anchovy (Engraulis mordax) populations, and human disturbance at nesting colonies potentially threaten the Southern California Bight (SCB) brown pelican population (Gress and Anderson 1981).

Brown pelicans are colonial nesters, using offshore islands for colony sites. Anacapa Island supports the only consistently active pelican nesting colony in California, and recently it has been the largest colony in the entire SCB pelican population. In 1980, over 2,200 pairs nested here, far more than the only other current nesting colony--758 pairs at Los Coronados Islands. Other colony sites in the Channel Islands have been used only sporadically. They include Santa Barbara Island, Santa Cruz Island and a small islet off San Miguel Island.

The earliest recorded breeding on the Anacapa Island is January, with May being the latest date for initiation of nesting. The nesting effort may be synchronous or may consist of several cohorts breeding asynchronously over a period of months (Gress and Anderson 1981). Onset and duration of breeding is in large part related to forage availability. Being almost totally dependent on northern anchovy for food, the timing of nesting and numbers of young produced are related to anchovy population fluctuations and seasonal distribution.

Brown pelicans are vulnerable to disturbance during the nesting season. Historically, many islands off the west coast of Baja California were used as rookeries (Jehl 1973). All except Los Coronados have been abandoned as active nesting colonies, largely because of various types of human disturbance (Anderson and Gress, unpubl. data). When disruption is of a less severe nature, disturbance-induced reductions in productivity result in (1) death of nestlings from hyper- or hypothermia and injury, (2) nest desertion by uneasy adults (this occurs more readily early in the nesting season), and (3) egg losses to over-heating and to predation by gulls (Anderson et al. 1976). The greatest potential for major disturbance occurs early in the nesting cycle, when pelicans are most prone to abandon nests. Even a one-time disturbance, if at a critical time in the breeding cycle, can cause abandonment of a colony or cohort within a colony (Gress and Anderson 1981).

Analysis of Potential Impacts

If peregrine falcons reestablish a nest or nests on any of the northern Channel Islands prior to or during the operation of Space Shuttle launches and returns at VAFB, there is a likelihood that sonic booms may occur during the critical nesting period. Based on the results of studies by Ellis (1981) and others, we believe that adverse impacts for the most part are unlikely. The only possibility of an adverse impact is perhaps if a focused boom occurred on San Miguel Island while peregrines were incubating eggs. The worst case scenario could be that a startled incubating peregrine could crack or break thin-shelled eggs. The likelihood of this occurring is, in our opinion, remote and does not pose a threat to the survival of the species. Since the Air Force plans to monitor for impacts from the focused boom to verify conclusions of no significant impact, substantiation of this opinion can be done at that time.

If peregrines were to reestablish a nest site at the historical nesting location near the Point Arguello Boathouse, construction of the external tank landing facility could disturb nesting peregrines. As of this date, however, no such nest reestablishment has occurred, and the Air Force plans construction of the facility commencing after August 1, 1982. So we see no adverse impact from this phase of the Space Shuttle program to peregrine falcons.

The probability of breeding brown pelicans at Anacapa Island being impacted by sonic booms during 150° azimuth launches is only 0.26 (Cooper and Jehl 1980). These booms will not be focused. Studies on surrogate seabird species by Schrieber and Schrieber (1980) indicate a low probability of adverse response to sonic booms. These considerations combined with the low probability that launches might occur during the nesting season lead us to believe that there will be no threat to the survival of the species.

Biological Opinion

Based on our review of the above information and information in our files it is our Biological Opinion that the Space Shuttle Program at Vandenberg Air Force Base is not likely to jeopardize the continued existence of the American peregrine falcon or the California brown pelican. This Opinion is based on the low number of launches expected over the Channel Islands and evidence that strongly suggests little or no impact to these endangered species from the anticipated sonic booms. Construction of new facilities on Vandenberg to support the Space Shuttle program also were considered in this Opinion to have no significant impacts.

In furtherance of the purposes of the Endangered Species Act [Sections 2(c) and 7(a)(1)] which mandates Federal agencies to utilize their authorities to carry out programs for the conservation of listed species, we recommend that the Air Force schedule the first few 150° azimuth Space Shuttle launches from VAFB between August 1 and December 31. The intensity of the resulting sonic booms and effects on avian behavior can therefore be monitored during a noncritical time.

We wish to take this opportunity to express our appreciation to the Air Force for their cooperation and concern for endangered and candidate species. We look forward to continued cooperation throughout the Space Shuttle program.

This concludes formal consultation on this project. If the proposal is significantly modified in a manner not discussed above or if new information becomes available on listed species, reinitiation of formal consultation with this Service should be considered.

If you have any questions, please call Mr. Gail Kobetich or Mr. Dave Harlow at 916-440-2791 (FTS 448-2791).

Sincerely,

William E. Sweeney

Area Manager

Attachments

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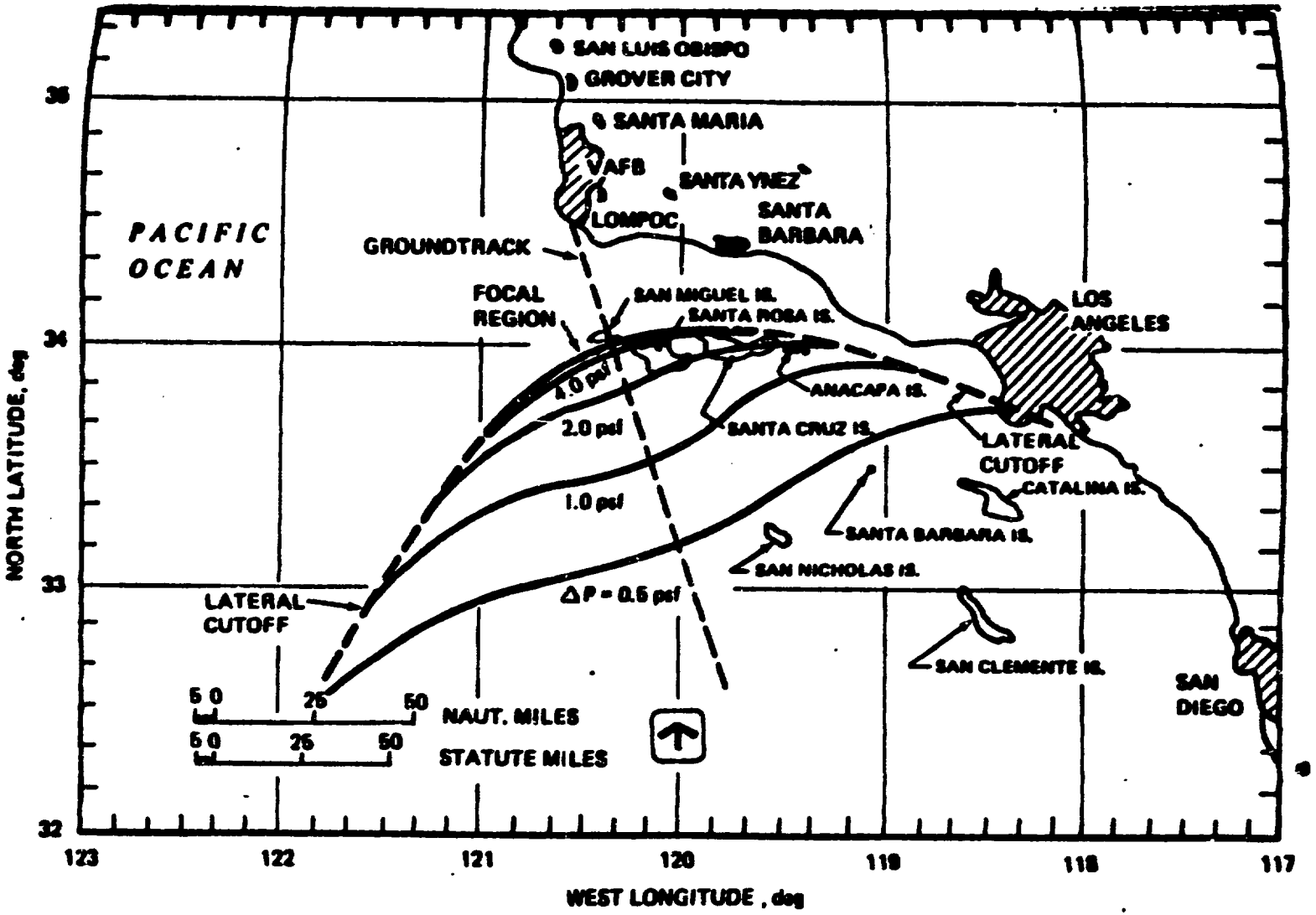
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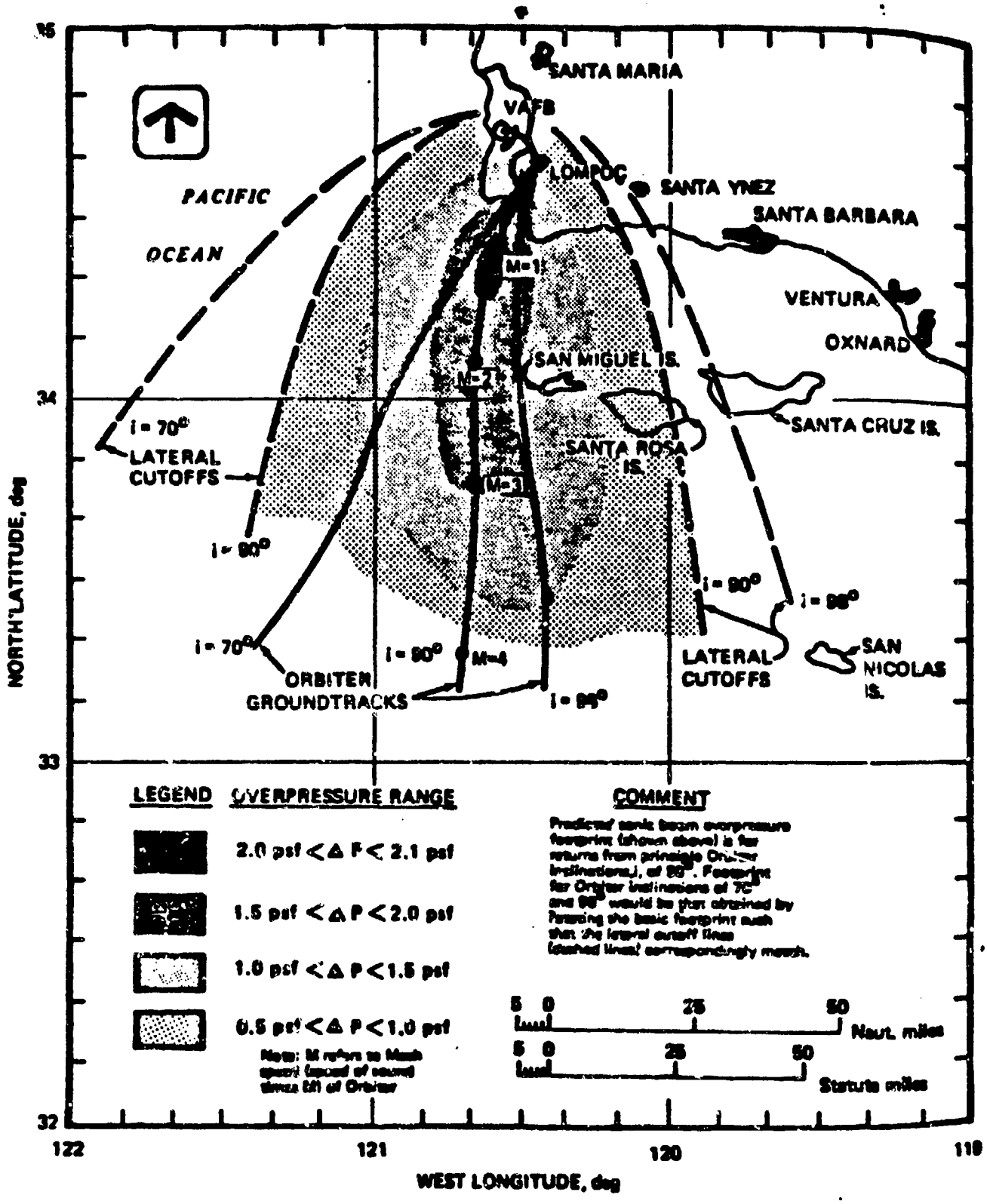
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Predicted sea level footprint of sonic boom overpressures resulting from VAFB Shuttle launches from SLC-6 into an orbit of 70° inclination.

from Final Environmental Impact Statement, Space Shuttle Program, Vandenberg AFB, California

Attachment 2



Predicted footprint of sonic boom overpressures resulting from normal end-of-mission return of Orbiter to Vandenberg Air Force Base.

from Final Environmental Impact Statement, Space Shuttle Program, Vandenberg AFB, California

Letter A

Comments From
U.S. Department of the Interior
Office of the Secretary
Including Comments from the
U.S. Fish and Wildlife Service and the
U.S. National Park Service

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
PACIFIC SOUTHWEST REGION
BOX 36098 • 450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102
(415) 556-8200

ER 82/242

March 15, 1982

Headquarters Space Division/DEV
P.O. Box 92960
Worldwide Postal Center
Los Angeles, California 90009

Dear Sir:

This responds to your notice of February 5, 1982 requesting the views of the Department of the Interior on the Draft Supplement to the Final Environmental Impact Statement for the Space Shuttle Program at Vandenberg Air Force Base, California.

Fish and Wildlife Service Comments

The document covered most of the concerns for fish and wildlife resources and their habitats with some exceptions. They are: 1) proposed new road construction and widening of existing roadways; 2) construction practices in and near wetlands; and 3) proposed construction of the External Tank Landing Facility at Point Arguello Boathouse. Regarding the first two items, it appears (based on staff telephone conversations with Lt. Col. Wooten) that the Air Force has set specific contract specifications which should avoid most adverse impacts to fish and wildlife resources. On the third item, we understand that the Air Force has acknowledged
A.1 the need to obtain the necessary California Coastal Commission and Corps of Engineers permits. As expressed in previous comments on the DEIS, the Fish and Wildlife Service "...will critically review any subsequent applications for permits under Section 10 of the River and Harbor Act of 1899 or Section 404 of the Federal Water Pollution Control Act (Clean Water Act)." Since no public notice has been issued nor construction specifications for the facilities have been set, according to Air Force personnel, we cannot make comments on this aspect of the Space Shuttle Program at this time. The Fish and Wildlife Service's Laguna Niguel Field Office will review any permit applications and provide response at the appropriate time.

National Park Service Comments

Page IV, 2-34, F-33: Santa Barbara Island also occasionally hosts nesting brown
A.2 pelicans (1981). Anacapa Island is, however, the only consistent nesting site on the West Coast.

A.3 Page 2-64, G-2: Should discuss the Channel Island National Marine Sanctuary.

Page 2-86: Some of the references cited during the discussions of pinniped and
A.4 marine bird disturbance are in draft form and have not come under the scrutiny of peer review. It is difficult to know how much weight to attach to such statements.

Page 2-86: The reference made during the discussion of caliche and the slight potential of adverse effects to it by a sonic boom is a preliminary report concerning needed research, clearly not a valid reference for this discussion in
A.5 which conclusions are drawn concerning potential harm to a very slowly-renewing resource.

Page 2-140, F-38: The possible mitigating measure of using a dog leg trajectory to take launches around the Channel Islands is first mentioned on page F-38, though it should have been discussed on page 2-140 as well. When it is finally discussed, arguments concerning its unfeasibility are not convincing: it requires
A.6 extra money and personnel and the discovery of a method to safely dispose of the booster, but considering the potential impacts of what the agency is proposing, and the already existing budget of the Space Shuttle, there could well be some mitigation in the choice of the trajectory route.

Page 2-152: Discussion should take place on the need to obtain a marine mammal
A.7 permit as well.

F-2: The list of reference studies is misleading since so many are in draft form
A.8 and therefore of unknown value.

F-13: The statement that landslides and other mass soil and rock movements are frequent needs to be referenced, since it implies that any such actions as a result
A.9 of sonic booms will be relatively unimportant.

F-30: The discussion on pinniped behavioral response does not address cumulative effects which might come into effect with an additional 15% increase in the number of expected sonic booms. Particularly with harbor seals, continued disturbance
A.10 can cause abandonment of a haul-out area.

F-33: The statement that cormorants usually nest on stable cliffs is a bit contradictory of the statement on page F-13 concerning the frequency of landslides and geological movements on San Miguel Island. The size of that island indicates
A.11 that either it is prone to landslides and rock movements or there are stable cliffs for cormorants to nest--not both.

A.12 F-39: The caliche plant fossils should be monitored also.

Cultural Resources

Page iii: Notes various new facilities proposed, but does not clearly state within the text that these new construction activities will be subject to the same
A.13 identification, evaluation, consultation, and monitoring procedures as those used for other cultural resources on the base.

Page vii: Line 2-3 should be corrected to read "in coordination with the National
A.14 Park Service....".

NOTE: All other references within the text to the former Heritage Conservation and Recreation Service should be changed to National Park Service.

A.15 Line 3: "advisory council" should be capitalized.

Page 2-9, Paragraph 3: Archeological site SBa 539 contains cultural material from the Middle Period of California Prehistory (ca. 3900 to 500 years ago); thus care should be taken in stating it may have been occupied by local Chumash people.
A.16 While the site does also have a Late Period component, and we know the Chumash were occupying the VAFB area at first Spanish contact, we have no proof that they were the ethnic group living there 2,000 or 3,000 years before. Considerable population movement probably did occur prior to late prehistoric times.

Page 2-38, Paragraph 4: This one-sentence statement regarding the importance of
A.17 SBa 670 is misleading. Like SBa 539, it too contains a very old component (Middle Period) as well as a Late Period component.

Paragraph 5: SBa 931 has several occupations, the oldest of which may date as
A.18 early as 6000 BC.

Page 2-75, Paragraph 1: States "no special features have been observed at the archeological site (SBa 1542)." This is incorrect. Chert outcrops occur there,
A.19 which in combination with the type of stone tools and chert flakes present, suggests it is a highly specialized type of site, a quarry for the production of stone tools.

Page 2-75: This section on Impact to Archeological Resources should be updated
A.20 to reflect results of emergency data recovery by UCSB in the vicinity of the V-33 External Tank Checkout Facility in April 1981.

Page D-3, Paragraph 2, final sentence: Should read "Participants in the survey included divers from Channel Islands National Monument (NPS), the NPS Inundation Studies Team (Santa Fe, New Mexico), and the U.S. Army Corps of Engineers, as well
A.21 as representatives of Interagency Archeological Services Division (NPS) and the U.S. Air Force." (It was, in fact, the first inter-agency cocperative underwater archeological survey conducted along the California coast).

Page D-6, Paragraph 1, final sentence: While some data will be irretrievably lost, despite approved data recovery, a considerable portion of sites SBa 539, 670, and
A.22 931 remain for future investigation when archeological techniques are even further refined than at present.

Channel Islands Marine Sanctuary

The EIS should state that in September 1980, the Channel Islands Marine Sanctuary was established. This sanctuary consists of the waters within six nautical miles of the five islands forming Channel Islands National Park. This marine sanctuary, which is administered by the Marine Sanctuaries Office of the National Oceanic and Atmospheric Administration (NOAA) was designated because of the unique
A.23 biological values of the Channel Islands region. The regulations for the Sanctuary rely upon existing federal and state laws and agencies for resources management. Other regulations refer to development or intrusion near the islands, including restrictions concerning construction on the seabed, aircraft overflights, vessel traffic, dumping of waste, and development of new oil and gas leases.

Thank you for the opportunity of commenting on this document.

Sincerely,

Patricia Sanderson Port
Regional Environmental Officer

Director, OEPR (w/copy of incoming)
Director, National Park Service
Director, Fish and Wildlife Service
Director, Geologic Survey
Director, Bureau of Land Management
Commissioner, Bureau of Reclamation
Director, Bureau of Mines
Regional Directors

Responses to Comments from U.S. Department of the Interior Office of the Secretary

A.1 The Air Force has set certain standards and developed mitigation measures for proposed road construction and/or widening as well as for construction practices in and near wetlands. These techniques are described in Sections 2.7.2 and 2.7.3.

Construction of the External Tank Landing Facility has been found consistent with the California Coastal Act by the Coastal Commission, and the Corps of Engineers has issued permits under Section 10 of the Rivers and Harbors Act, Section 404 of the Clean Water Act, and Section 102 of the Marine Protection, Research and Sanctuaries Act.

A.2 This information has been added to the text in Section 2.3.1.3 and F.3.2.1.4.

A.3 This information has been added to the text in Section 2.4.2.5 and in Appendix G, Section II.B.4.

A.4 All of these reference documents cited in the Draft Supplement are now in Final form. Copies of these final reports have been distributed to all interested agencies.

A.5 See above response A.4.

A.6 Section 2.7.2.3 has been revised. In addition, the discussion of mitigations in Section F.5.1 has been expanded.

A.7 A discussion has been added as Section 2.7.4.6, Marine Mammal Permit.

A.8 See above response A.4.

A.9 The appropriate reference has been added to Section F.2.2.4.

A.10 Implicit in the final paragraph of Section F.3.2.1.2.3 is the analysis of cummulative impacts. The text has been modified to specifically include the word cumulative.

A.11 The referenced statements are not necessarily contradictory. Certain areas of San Miguel Island are composed of stable rock cliffs while other areas are composed of unstable landslide-prone sedimentary materials.

A.12 Monitoring of the caliche forest is planned in addition to biological monitoring. A discussion has been included in Section F.5.2.

A.13 An initial archaeological resource study, preliminary site investigations, and numerous potential site were tests under direction of a qualified archaeologist were conducted along South Vandenberg to identify potential archaeological resources which could be impacted from proposed construction activities. Initial investigations were conducted to aid in determining preliminary construction site locations. Archaeological sites affected by newly proposed STS related construction projects at Vandenberg AFB are summarized in Section 2.5.1.1. A detailed assessment of construction project related archaeological impacts is presented in Appendix D. An emergency response plan including provisions for archaeological surveillance, monitoring, and consultation is also presented in Appendix D. All construction sites, including any proposed new activities, are subject to archaeological emergency response planning criteria involving surveillance, monitoring, and data recovery to minimize potential impacts on archaeological resources.

A.14 Comment noted and text amended.

A.15 Comment noted and text amended.

A.16 Archaeological site SBa 539, as noted in Appendix D, is a heavily disturbed site which perhaps served as a seasonal base camp for various indigenous populations. The fact of considerable population movements occurring prior to late prehistoric times suggests the possibility of recurrent site occupation by various prehistoric [illegible] including the Chumash and their direct anscestors. Positive evidence of Chumash occupation must rest on additional site including further excavation work and artifact material dating analysis.

A.17 Note text change. The relative importance of site SBa 670 is due to its position relative to other sites of importance with the archaeological district including SBa 539 and SBa 931.

A.18 Note text change.

A.19 Note text change.

A.20 Refer to revised Section 2.5.1.1.

A.21 Comment noted and text amended.

A.22 Comment noted and text amended.

A.23. See above response A.3.

Letter B
National Oceanographic Aeronautics Administration
National Marine Fisheries Service

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
300 South Ferry Street
Terminal Island, California 90731

April 9, 1982 F/SWR31:DJS
F/NWC3:GA
F/SWR33:RSH

Lt. Col. R. C. Wooten, Jr.
Headquarters Space Division, SD/DEV
P.O. Box 92960
Worldway Postal Center
Los Angeles, CA 90009

Dear Colonel Wooten:

We have reviewed the Draft Supplement to the Final Environmental Impact Statement (DSFEIS) for the Space Shuttle Program at Vandenberg AFB, California and offer the following general comments for your consideration. These comments address issues relating to marine fisheries, endangered species, marine mammals, and their habitats for which the National Marine Fisheries Service (NMFS) is responsible.

Construction Activities at Point Arguello

The proposed construction activities at the Point Arguello boathouse area will have short and long-term adverse impacts to marine fishery resources of concern to our agency. The short term effects include the destruction of benthic organisms by dredging activities. These impacts are relatively minor since recolonization should occur rapidly. The long-term effects involve the permanent removal of an existing pier, submerged rocks, and a small kelp bed all of which serve to enhance fishery resources. In addition, construction of the proposed dock would eliminate approximately 0.4 acres of intertidal habitat.

The proposed mitigation is directed only to reducing impacts to intertidal and subtidal areas. The mitigation does not address the need to compensate the permanent habitat losses associated with this project. Although the document indicates that one potential option for the disposal of dredge material could be the creation of an artificial reef, which could have an enhancement value to fish resources, the suitability of dredge material for this type of project remains to be determined.

B.1

We feel the construction of an artificial reef would be an appropriate compensatory measure to offset the losses associated with this project since the reef would essentially replace in kind the habitat lost through construction activities. The final document should explore further the feasibility of this concept for habitat compensation.

Endangered Species

The final SFEIS should note that the NMFS is the federal agency responsible for administration of the Endangered Species Act of 1973 as amended (ESA) as it pertains to threatened and endangered marine species. Concerns pertaining to marine turtles are shared with the Department of Interior, Fish and Wildlife Service (FWS). Sea otters are also under the their jurisdiction.

The final SFEIS should note that species listed by the NMFS as endangered or threatened which are likely to occur within the area to be impacted by actions of this project include:

Gray whale	(Eschrictius robustus)
Blue whale	(Balaenoptera musculus)
Humpback whale	(Megaptera novaeangliae)
B.2 Right whale	(Eubalaena spp.)
Fin whale	(Balaenoptera physalus)
Sei whale	(B. borealis)
Sperm whale	(Physeter catodon)
Leatherback sea turtle	(Dermochelys coriacea)
Pacific hawksbill sea turtle	(Eretmochelys imbricata brissa)
Green sea turtle	(Chelonia mydas)

For the species listed above there has been no critical habitat proposed or designated in the southern California area.

The loggerhead sea turtle (Caretta caretta) and Pacific ridley sea turtle (Lepidochelys olivacea) are occasionally found in the area and are listed as threatened.

Section 7 of the ESA requires federal agencies to consider the impacts of a proposed action to listed species. We have treated your February 5, 1982, request for comments on the DSFEIS as a request for informal consultation
B.3 pursuant to the ESA. We have reviewed the Final Environmental Impact Statement and DSFEIS and agree with the conclusions that the proposed action will not jeopardize the continued existance of any listed species for which the NMFS is responsible.

We concur with your recommended mitigation (#2, page 2-140) to limit blasting to periods when gray whales are absent from the immediate construction
B.4 area. We further recommend that a reconnaissance of waters adjacent to the Boathouse cove be conducted during the gray whale migration period (December - March) to determine if gray whales are present in the immediate area.

These comments conclude our informal review under the ESA. In the event that any new evidence becomes available which indicates the project may have adverse impacts on listed species within the project area, we request that the

U.S. Air Force (USAF) initiate the formal consultation process. We futher recommend that formal consultation be initiated if another species in the project area is listed as threatened or endangered.

Marine Mammals

The DSFEIS predicts (summary, page ix and elsewhere) disturbance to pinnipeds on the northern Channel Islands due to Space Shuttle generated sonic booms. A 15 percent increase in pinniped mass movements from the shores of the islands to the water is predicted as a direct result of Space Shuttle generated sonic booms. Disturbance and/or displacement is predicted to occur to harbor seals at the Point Arguello Boathouse from proposed construction activities.

B.5 The Marine Mammal Protection Act of 1972, as amended (MMPA), places a moratorium on the taking of marine mammals. The definition (50 CFR 216.3, 216.11 et seq.) of take includes among other activities harassment, killing and "...the negligent or intentional operation of an aircraft or...any other negligent or intentional acts which result in disturbing or molesting of a marine mammals." Section 101 (a)3 of the MMPA as amended describes conditions by which the Secretary is authorized to waive the moratorium on taking provided specific conditions are met. Public law 97-58 amended the MMPA by adding, among other things, a new Section 101 (a)5 to allow individuals engaging in activities, other than commercial fishing, to take small numbers of marine mammals incidentally within a specified geographic region. The amendments and proposed general regulations (50 CFR 228 Subpart A) (enclosed) describe the process by which a formal written request must be submitted to receive consideration for a Letter of Authorization to allow activities which may result in the "take" of marine mammals. It is recommended that you contact our office so that we may assist you in exploring the potential for submission of a formal written request via these mechanisms of exemption.

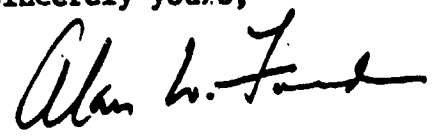
B.6 We note that several statements which attempt to describe the effects of sonic booms to pinnipeds appear to inaccurately report the results of USAF contracted studies. Several references state that the present rate of disturbances to pinnipeds at San Miguel Island exceeds 100 major disturbances per year. It is unclear how this rate was obtained. It appears that Cooper and Jehl (1980) may have erred initially when they calculated this estimate by adding the estimated disturbance rates of otariids (given as 4 to 5 per month for California sea lions and northern fur seals) and harbor seals (2-3 per month-reported by Bowles and Stewart, 1980). For example, both otariids and harbor seals can be affected by the same loud sonic boom while in other instances a relatively quieter sonic boom may affect only a small group of geographically isolated harbor seals. Therefore, the disturbance rates for the two groups must be analyzed separately. Additionally, Bowles and Stewart (1980) use differing criteria for defining a "major event" for otariids and phocids. Neither of these definitions include the criterion "causing at least half the population to vacate the beach" (DSFEIS). It appears likely that estimates from separate analyses would result in lower rates of current annual disturbance and higher percentage increases in disturbance caused by shuttle-generated sonic booms.

The percent contribution of sonic booms and boat noises relative to total disturbance also should be presented in the Final SFEIS. Adopting these recommended changes in the Final SFEIS would result in a more accurate
B.7 description of the complex interactions of pinnipeds and disturbing stimuli on San Miguel Island.

We are also concerned with the implication that the low abundance of harbor seals in the northern Channel Islands relative to the world population
B.8 can be used as a rationale for not considering the species to be sensitive to disturbance during the pupping season (Page F-15, paragraph 4). Harbor seals on the northern Channel Islands are protected at all times under the MMPA and by being within the Channel Islands National Park and should not be overlooked when scheduling space shuttle activities which could adversely impact them. Bowles and Stewart (1980) state that for both harbor seals and otariids, the period of greatest potential impact occurs from March through July. They also note that "among the pinnipeds, harbor seals were most likely to startle." We concur with these statements. The mitigation measure offered in Section 2.7.2.3 (DSFEIS) should be improved to ensure that the flight director will
B.9 avoid scheduling shuttle launches that will create large sonic-boom over-pressures at San Miguel Island during the breeding seasons (March-July), if a practical alternative exists.

Finally, there is a chance of significant impact of shuttle-generated booms on marine mammal hearing (Page 2-86, paragraph 1), and this points out the need for an experimental evaluation of this potential impact. We recognize the problems involved with studies designed to evaluate the effect of shuttle-
B.10 generated booms on pinnipeds (Chappell, 1980). We suggest that the USAF can overcome the logistic and technical problems and that scientists would prefer to face the difficulties of interpretting the results of such an experiment rather than relying on extrapolations from experiments performed on other species. Therefore, we urge the USAF to consider supporting such research.

Sincerely yours,



Alan W. Ford
Regional Director

Encl

Literature Cited

Bowles, A. E., and B. S. Stewart. 1980. Disturbances to pinnipeds and birds of San Miguel Island during 1979 and 1980, In Potential Effects of Space Shuttle Booms on the Biota and Geology of the California Channel Islands: Research reports USAF Technical Report #80-1, pages 99-137.

Chappall, M. A. 1980. Possible physiological effects of space shuttle sonic booms on marine mammals, In Potential Effects of Space Shuttle Sonic Booms on the Biota and Geology of the California Channel Islands: Research Reports, USAF Technical Report #80-1, pages 195-228.

Cooper, C. F., and J. R. Jehl. 1980. Potential effects of space shuttle sonic booms on the biota and geology of the California Channel Islands: Synthesis of research and recommendations, USAF Technical Report #80-2, 14 pages.

Response to Comments From
National Oceanographic Aeronautics Administration
National Marine Fishery Service

B.1 The possibility of constructing an artificial reef, as well as mitigating measures for the potential short- and long-term impacts caused by dredging, are discussed in Appendix G, Sections 30231, 30233, and 30607.1.

B.2 Information on rare, endangered or threatened wildlife appears on page 3-74 of the FEIS. In addition, the information provided by this letter has been included in Section 2.3.1.3.

B.3 Comment acknowledged.

B.4 Blasting is not scheduled to occur during the gray whale migration period, and a reconnaissance will not be necessary.

B.5 A formal written request for a letter of Authorization has been prepared, pursuant to the Marine Mammal Protection Act of 1972, as amended, and has been submitted to NMFS.

B.6 Statements regarding the anticipated effects of Shuttle sonic booms on pinnipeds have been revised in Sections 2.3.1.2, 2.3.1.3 and 2.5.1.2, as well as in the Summary. These revisions are based on Bowles and Stewart's 1980 Report (Refer to Letter N).

The criterion "causing at least half the population to vacate the beach" is from Cooper and Jehl (1980), reference 38. This is a good compromise for the various criteria for the various terms concerning "events" and "disturbances" used by Bowles and Stewart (1980), reference 14.

B.7 See response C.6, and Section 2.3.1.2 of the FSFEIS.

B.8 Section F.2.2.1.1 has been revised to reflect more clearly the intended meaning.

B.9 Section 2.7.2.3 has been revised and is included in the FSFEIS.

B.10 Careful study of the analysis performed by Chappell (1980) indicates that the probability of long-term auditory damage to pinnipeds from Shuttle sonic booms is unlikely. Experimental approaches to verify this hypothesis cannot be justified, primarily because they would not be sufficiently productive to warrant the sacrifice of pinnipeds required. Experiments not requiring the sacrifice of pinnipeds involve prohibitive time investments and would generally provide results of limited value. None of the experiments would yield direct, reliable predictions of eventual population consequences. Testing would be neither justifiable nor productive, and is therefore not being pursued.

Letter C

Comments From
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Survey

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

MAR 5 1982

Lt. Col. R. C. Wooten, Jr.
HQ Space Division/DEV
Post Office Box 92960
Worldway Postal Center
Los Angeles, California 90009

Dear Lieutenant Colonel Wooten:

The Draft Supplement to the Final Environmental Impact Statement Space Shuttle Program, Vandenberg AFB, California, has been received and reviewed within the areas of the National Ocean Survey's (NOS) responsibility and expertise, and in terms of the impact of the proposed action on NOS activities and projects.

The National Ocean Survey reminds you that geodetic control survey monuments may be located in the proposed project area. If there is any planned activity which will disturb or destroy these monuments, NOS requires
C.1 not less than 90 days' notification in advance of such activity in order to plan for their relocation. NOS recommends that funding for this project includes the cost of any relocation required for NOS monuments. For further information about these monuments, please contact Mr. John Spencer, Director, National Geodetic Information Center (OA/C18), or Mr. Charles Novak, Chief, Network Maintenance Branch (OA/C172), at 6001 Executive Boulevard, Rockville, Maryland 20852.

Sincerely,

Robert B. Rollins for

H. R. Lippold, Jr.
Rear Admiral, NOAA
Director
National Ocean Survey

10TH ANNIVERSARY 1970-1980
National Oceanic and Atmospheric Administration
A young agency with a historic
tradition of service to the Nation

Response to Comment Form
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Survey

C.1 Geodetic control survey monuments are indicated on site plans for construction areas. The Corps of Engineers has procedures that are followed for timely notification to NOS if these monuments need to be removed.

Letter D

Comments From
U.S. Department of the Army Corps of Engineers
Los Angeles District

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2711
LOS ANGELES, CALIFORNIA 90053

SPLPD-E

18 APR 1982

SUBJECT: Review of Draft Supplement (DS) to the Final Environmental Impact Statement (EIS) for the Space Shuttle Program at Vandenberg AFB, California

Hq Space Division/Dev
Post Office Box 92960
Worldway Postal Center
Los Angeles, CA 90009

Our comments which pertain to cultural resources, are as follows:

Generally, the cultural resources seem to be thoroughly covered, but there are several specific points which might be addressed in more detail and which would serve to give the reader a better basis upon which to evaluate mitigation efforts.

D.1 (1) What about indirect impacts to sites? How have these impacts been handled during construction? Will road cuts result in further site erosion? The DS should include a discussion of such impacts.

D.2 (2) What percentages of affected sites have been or will be excavated? This should be indicated by percentage of area to be affected, and total size of site.

D.3 (3) In Section D. 3. 3. 1. it is stated (last sentence) that "some site information will be lost——." However, there is no way of evaluating the mitigation effort unless there is some indication of the site area destroyed versus area excavated and total site size.

D.4 (4) In Section D. 3. 3. 1. burial sites should be mentioned only when absolutely necessary, especially in a public document which has maps showing environmental "off limits" areas which are obviously archeological sites. Even though VAFB is not open to the public, such publication of what amounts to site location is unwise.

FOR THE COMMANDER:

CARL F. ENSON
Acting Chief, Planning Division

Response to Comments From
U.S. Department of the Army Corps of Engineers
Los Angeles District

D.1 Although indirect impacts to these sites are possible, they were not considered in detail due to the low probability of occurrence and the extensive mitigation and compliance monitoring plans developed. Construction plans were submitted to and approved by the Sacramento District Corps of Engineers. These included specific construction zone and construction free maps, site identification, data recovery and compliance monitoring plans, monitoring process for unknown sites, as well as specific methods for erosion control and abatement. Compliance with the procedures approved by the Sacramento District COE will minimize indirect construction related impacts on cultural resources.

D.2 & D.3 A data recovery plan for identified archaeological sites have been developed and approved by the Interagency Archaeological Services, the California State Historic Preservation Officer and the National Advisory Council on Historic Preservation. All data recovery efforts will be in compliance with this approved plan. Only a relatively small percentage of the affected sites will be impacted by construction of the proposed project. Further, the affected sites represents only an extremely small portion of an unique archaeological region which stretches along the Coast of South Vandenberg.

D.4 Generalized off limit maps for environmental resources were included in the FEIS for impact mitigation purposes. These environmental resource areas include wetlands, locations of rare species, and other sensitive habitats, as well as historical and cultural resources. In addition, the locations of burial sites are not described in sufficient detail to permit location of them by outside parties.

Letter E

Comments From
U.S. Environmental Protection Agency
Region IX

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

James F. Boatright
HQ Space Division/DEV
Post Office Box 92960
Worldway Postal Center
Los Angeles, CA 90009

MAR 26 1982

Dear Mr. Boatright:

The Environmental Protection Agency (EPA) has received and reviewed the Draft Supplement (DS) to the Final Environmental Impact Statement titled SPACE SHUTTLE PROGRAM, VANDENBERG AIR FORCE BASE, CALIFORNIA. Our specific comments are attached.

The EPA's comments on the DEIS have been classified as Category LO-1. Definitions of the categories are provided by the enclosure. The classification and the date of the EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and the adequacy of the environmental statement.

The EPA appreciates the opportunity to comment on this DS and requests five copies of the Final Supplement when available.

If you have any questions regarding our comments, please contact Loretta Kahn Barsamian, Chief, EIS Review Unit, at (415) 974-8137 or FTS 454-8137.

Sincerely yours,

William Anneng

for John Wise, Acting Director
Office of Policy and Resources Management

Enclosures (2)

404 Comments

E.1 Dredged material from Point Arguello, consisting of fractured shale, may be unsuitable for beach nourishment due to particle size incompatibility. The Los Angeles District of the Army Corps of Engineers has requirements for sampling, testing, and data analysis which should be applied to this dredged material to determine suitability for beach nourishment. In addition, EPA would review a 404 fill permit application for compliance with Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR 230).

EIS CATEGORY CODES

Environmental Impact of the Action

LO—Lack of Objections

EPA has no objection to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER—Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to reassess these aspects.

EU—Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1—Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2—Insufficient Information

EPA believes that the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3—Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft impact statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

Response to Comment From
U.S. Environmental Protection Agency
Region IX

E.1 A decision has been made to not use the dredged material for beach nourishment or artificial reef construction due to its unsuitability for either purpose. The Air Force proposes to dispose of material via ocean dumping in an approved location, has prepared and submitted the necessary documentation in compliance with 33CFR 228 of the Federal Ocean Dumping Regulations, and has received the required permits from the Corps of Engineers (Appendix H). Please refer to Appendix G, Section 30233, for description of the proposed action.

Letter F.

Comments From
Marine Mammal Commission

MARINE MAMMAL COMMISSION
1625 EYE STREET, N. W.
WASHINGTON, DC 20006

2 March 1982

Lieutenant Colonel R. C. Wooten
HQ Space Division/DEV
P.O. Box 92960
Worldway Postal Center
Los Angeles, California 90009

Dear Colonel Wooten:

The Commission recently received, and the staff has conducted a preliminary review of, the Draft Supplement to the Final Environmental Impact Statement of the Space Shuttle Program, Vandenberg AFB, California. The draft Supplement indicates that sonic booms from launches and returns of the space shuttle at Vandenberg Air Force Base are not likely to have significant adverse effects on marine mammals, but that pinniped populations, as well as other populations, on the Channel Islands will be monitored during the first two or three launches and returns to assure that the effect of Shuttle sonic booms on the birds and mammals of the Channel Islands is adequately understood. The draft Supplement also indicates (page F-40) that, in addition to biological monitoring, the sound levels produced on the Channel Islands by the first few Shuttle sonic booms will be measured in order to validate the over pressure predictions.

The conclusion that pinniped populations on the Channel Islands will not be affected adversely by Shuttle sonic booms is based, at least in part, upon information contained in draft technical reports which apparently have not yet
F.1 been published or distributed. It is difficult to assess the validity of the conclusions without reviewing the data and reports upon which they are based and, to assist us in reviewing the draft Supplement, I would be grateful if you would send us copies of the draft technical reports listed in the attachment to this letter.

On a related subject, it was my understanding, when we last met, that the Air Force and/or the National Aeronautics and Space Administration were considering monitoring sonic
F.2 booms produced during launches from Kennedy Space Center, Cape Canaveral to determine if the magnitude of those booms substantially exceeds expectations. I would be grateful, therefore, if you would let me know whether there are plans to monitor one or more of the launches from the Kennedy Space Center and, if not, why it was decided not to do so.

Finally, I note that the draft Supplement indicates (page F-36) that Shuttle-produced booms are expected to add little to the current level of disturbance of Northern Channel Islands pinnipeds. The draft does not discuss
F.3 possible cumulative effects and I would be grateful if you would let me know whether possible cumulative effects have been considered and, if so, whether you feel that currently available information on the size and productivity of the various populations is sufficient to serve as a baseline for detecting possible long-term, cumulative effects.

With best regards.

Sincerely,

R. J. Hofman, Ph.D.
Scientific Program Director

Enclosure

Draft Technical Reports Cited in the Draft Supplement to the Final Environmental Impact Statement of the Space Shuttle Program, Vandenberg AFC, California

Bowles, A.E., and B.S. Stewart. Disturbances to the Pinnipeds and Birds of San Miguel Island during 1979 and 1980. Draft Technical Report, Center for Marine Studies, San Diego State University. September 1980.

Chappell, M. Possible Effects of Space Shuttle Sonic Boom on the Physiology of Channel Islands Marine Mammals. Draft Technical Report, Center for Marine Studies, San Diego State University. September 1980.

Stewart, B.S. Seasonal Abundance and Distribution of Pinnipeds on San Miguel Island, California, 1978-1980. Draft Technical Report, Center for Marine Studies, San Diego State University. September 1980.

Responses to Comments From Marine Mammal Commission

F.1 Refer to Response A.4 of Letter A, from U.S. Department of Interior, Office of the Secretary.

F.2 Sonic boom ascent measurements have been made for Kennedy Space Center launches STS-5 and will be made for STS-7. In addition, the sonic booms produced by the Orbiter on landing approach have been measured at Edwards AFB, and will be monitored during the first return flight to Vandenberg AFB.

F.3 See response A.10 of Letter A. New information contained in recent reports by HSWRI and SDSU (Refs. 37 and 152). contain substantial baseline information on the Northern Channel Islands pinnipeds.

Letter G

Comments From
The California Coastal Commission

State of California, Edmund G. Brown Jr., *Governor*

California Coastal Commission
631 Howard Street, 4th floor
San Francisco, California 94105
(415) 543-8555

April 22, 1982

Lt. Col. R.C. Wooton
Headquarters Space Division, SD/DEV
P.O. Box 92960
Worldway Postal Center
Los Angeles, CA 90009

RE: Space Shuttle Program, EIS Supplement

Dear Colonel Wooton:

Thank you for the opportunity to comment on the draft Supplement to the Final EIS for the Space Shuttle Program at Vandenberg Air Force Base. We appreciate your flexibility in granting us a time extension to allow for a thorough review of the Supplement. In return we intend, through this letter, to attempt to expedite the Consistency Determination review process by alerting you as early as possible as to the nature of our staff's concerns and the as yet unresolved issues relating to the California Coastal Management Program.

Biological Issues

1. Sonic Booms. The Air Force has extensively addressed this issue in terms of conducting studies and research on a relatively little-known subject - the effects of sonic booms on sensitive wildlife habitat. Nevertheless, we believe the mitigation proposed in the Supplement is incomplete and inadequate. Given the uncertainties acknowledged in the supporting research documents, the potential damage of intense sonic booms and the absence of verification of the estimated frequency, rise time,
G.1 and pressure level of Space Shuttle sonic booms, a conservative approach is warranted. We do not believe flights with launch azimuths of less than 180 degrees between March 1 and August 1 should be authorized at this time. The proposed mitigation that flight planners will "consider" sensitive breeding periods is, therefore, inadequate. We believe the suggested monitoring program needs to be specified in further detail, discussing specif[illegible] responsibility for observations and measurements taken, analysis, determination as to the level of adverse environmental effects, and the consequences and mitigation measures to be undertaken if significant adverse effects are determined. We have been informed that the Marine Mammal Act requires authorization by the National Marine Fisheries Service for the incidental taking (which includes harassment) of marine mammals; perhaps then, such a monitoring program could be developed to respond to both the Marine Mammal Act and the California

Coastal Management Program. Other agencies such as the National Park Service may have similiar concerns and responsibilities; we would therefore recommend a multi-agency effort in developing and evaluating the monitoring program, including at a minimum the following agencies: the Coastal Commission, U.S. Air Force, the California Department of Fish and Game, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the Marine Mammal Commission, Hubbs/Sea World Research Institute, San Diego State University Center for Marine Studies, the Santa Barbara Museum of Natural History, and the Santa Barbara County Department of Resource Management.

3.1 We do not believe that any flights affecting the Channel Islands should be authorized until the sonic boom model is verified through testing of Space Shuttle flights out of Kennedy Space Center. As the Supplement also notes that Space Shuttle landings at Edwards AFB are being monitored for sonic boom levels, we would appreciate submittal of any such information when it has been collected. We have been unable to analyze environmentally less damaging alternatives to flights over San Miguel Island, since the Air Force states the need for such flights is classified information and since the Air Force has not provided any information that would allow consideration of flights around the island (the "dog-leg" alternative).

One final concern on the sonic boom issue is that Appendix F states on page F-5 that the breeding period for the Northern elephant seal is among the "most sensitive", whereas page F-35 states that designating the elephant seal's breeding period "...as 3.2 sensitive does not seem warranted". Given that this species is the only major species with a winter breeding period, clarification of this discrepancy is essential in the determination of preferable flight times.

2. Dredging at Arguello Boathouse. We are concerned that no mitigation is proposed for the loss of 2.2. acres of valuable marine intertidal habitat from 3.3 dredging and blasting operations, the loss of 0.4 acres of intertidal habitat from dock construction, and the potential loss of a harbor seal haulout area to the west of the existing breakwater. While the Supplement states that rapid recolonization of the intertidal habitat will occur, it will be permanently lost if continued maintenance dredging occurs. The Supplement estimates maintenance dredging once in the 10-year life of the program; such maintenance may well be necessary more often, given the extent of sand movement in the area and the proposed bluff cut which would 3.4 undoubtably direct additional runoff to the dredged location. We would appreciate submittal of the underlying analysis supporting this estimate. The location and impacts resulting from the disposal of dredge material cannot be analyzed at this time as the Supplement states it is still an unresolved issue. This issue, too, involves multi-agency concerns, depending on the disposal location, and we would appreciate being kept closely informed as to the progress of this issue.

3. Air Quality. Again, it is difficult to realistically analyze the effects because of incomplete monitoring programs and statements that flight planners will 3.5 "consider" guidelines to minimize any adverse effects, such as the creation of acid rain. Also, we would appreciate clarification as to whether the launch emissions themselves will comply with all local, State and Federal air quality requirements. We will work further with the APCD, ARB and EPA in addressing air quality concerns.

4. Water Quality/Wetlands Protection. Several water quality questions are raised by the impacts of the Space Shuttle program on wetlands, streams, groundwater 3.6 basins and coastal waters. For most of these concerns the Supplement states that contingency plans are being prepared. Thus specific mitigation has not been proposed in the Supplement and again,the adverse impacts and sufficiency of mitigation cannot

be determined. We would like to review the "Oil and Hazardous Substance Pollution
G.6 Contingency Plan" and "Spill Prevention and Countermeasure Plan". We would also like to know what measures will be taken to prevent wetlands, streams and groundwater basins from receiving toxic substances, as well as increased runoff from erosion from construction activities and increased impervious surfaces, and what measures will be taken to protect and restore these habitats if adversely affected. The method for wastewater treatment and disposal has not yet been resolved and cannot, therefore, be
G.7 adequately reviewed at this time; again, this is a multi-agency concern and we would appreciate being kept informed of progress on this issue. Site restoration included in mitigation of construction impacts (page 2-147, Terrestrial Habitat Impact) should
G.8 include revegetation with endemic drought resistant species. We would like to review designs and plans for drainage systems and catchment basins to assure adequate protection of streams and wetlands. We would like to review design plans for stream crossings, especially the proposed strengthening of the 13th Street Bridge crossing,
G.9 to assure protection of streams and wetlands; since the plans have not been provided in the Supplement we cannot at this time determine whether the least environmentally damaging design will be utilized. Finally, we would appreciate an analysis of whether the evacuation of any further off-shore oil rigs during Space Shuttle
G.10 launches has the potential to increase the risks of oil spills or delay the response time to any possible spills.

Visual and Cultural Issues

1. Landform Alteration. The Space Shuttle will result in significant alteration of natural landforms in two ways: the 50-200 ft. wide bluff cut for the External Tank two route, and potential destruction of rare caliche plant fossils on San Miguel
G.11 Island resulting from sonic booms. We would like to review the specific grading, landscaping, and drainage plans for this activity, which should provide for runoff and erosion controls, should prohibit grading during the rainy season, and provide for timely revegetation of the graded slopes with drought and erosion resistant endemic vegetation. We are concerned that no mitigation or monitoring is proposed to address the potential destruction of the caliche fossils, significant and rare land
G.12 forms which were one of the reasons for establishment of the Channel Islands National Park.

2. Archaeology. The archaeological impacts appear to have been addressed quite thoroughly by the Air Force. We would like to review the Memoranda of Agreement
G.13 between the Air Force, the Advisory Council on Historic Preservation, and the State Historic Preservation Officer regarding: (a) sites SBa 539, 670 and 931; (b) site SBa 1542; and (3) the removal of the boathouse and pier at the External Tank landing facility.

Socioeconomic/Growth Inducing Issues

1. Water Supply. Limited water supply is the major constraint to growth in Santa Barbara County. The Commission's joint planning efforts with local governments in the County have consistently limited additional development to that which can be
G.14 served by existing water supplies; these policies also serve to protect sensitive habitat areas from over-development and to protect agriculture by limiting conversions to urban uses and reducing pressure for imported State Water Project water. The Supplement acknowledges the growth-inducing nature of the Space Shuttle program but provides no mitigation for the adverse impacts that would result. The

Supplement estimates a need for up to 18,000 AFY as a result of Vandenberg and LNG facilities. Elsewhere the Air Force has stated a need for 6,000 to 8,000 AFY for Space Shuttle and MX programs. The supplement states that "Both the quantity and quality of locally supplied water will be adversely affected unless non-local sources are made available".

We believe that any Consistency Determination for the Space Shuttle program must include a comprehensive water management and conservation plan that will minimize water consumption on the base to the maximum extent practicable while still allowing vital national defense programs to adequately function. Our preliminary suggestions for such a water conservation plan would be that it include: metering and monitoring of Air Force wells as well as individual uses and buildings, incentives for water conservation, provision for a water audit by the Department of Water Resources and
G.15 provisions for replacing water intensive landscaping with drought resistant vegetation. We also believe that a Consistency Determination should provide in far greater detail analysis of existing and potential enhancement of the Air Force Base's water supply. Such analysis should include: sources of and uses of current water supplies, current levels of overdraft and total amount of groundwater in storage in the San Antonio and Santa Ynez basins, the effect on these basins of increased water demand resulting from the Space Shuttle program (including both peak construction and long term impacts), and alternatives for potential additional water supplies. We would like to review your report entitled "Staff Summary Vandenberg Water Supply" (by Ed Rogers, December 1980). In addition, we have been informed by your staff that a major water study on the Vandenburg Air Force Base conducted by Earth Sciences Associates of Palo Alto will be released shortly (in mid-May). We have been led to believe this study may provide important information concerning water supply issues, and we would strongly urge the Air Force to await submittal of its formal Consistency Determination until this study can be included.

Finally, we would like to be made aware of the extent of the Air Force's reliance on the State Water Project as a potential future water supply, because the State Water Project would have significant effects on coastal resources and because federal participation in the State Water Project may trigger additional Consistency requirements.

2. Public Access and Recreation. Impacts of the Space Shuttle program on public access and recreation are twofold: (a) long term growth inducing impacts of the program will significantly increase demands for access in an area where the predominance of the Air Force Base has resulted in a paucity of public access points; and (b) use of motels and recreational vehicle spaces by temporary construction workers will preclude their use for for general recreational purposes. On the first
G.16 point, the Land Use Plan for Santa Barbara contemplates the possibility of increased lateral shoreline access between Jalama Beach County Park and Point Arguello. The Air Force currently allows lateral access along several miles of the base's shoreline just south of Ocean Beach County Park at times when missile launches are not scheduled. Nevertheless the Supplement does not address the issue of the increased need for lateral public access but rather relies on unsupported statements that increased access would be inconsistent with public safety, military security needs and habitat protection (Appendix G, p. G-8). Lateral access is a major goal of the Coastal Act and a guarantee of California's State constitution; we believe this issue must be addressed in greater detail and that the Air Force needs to provide further evidence that additional shoreline access would threaten military security. On the second issue of temporary construction workers, the Supplement notes that

additional transient quarters will be needed for the program (p. 2-119) and notes a recommendation for "Provision of leased land by Vandenberg AFB for mobile home sites for temporary workers" (p. 2-142). Nevertheless the Supplement does not include any proposals for on base or off base transient housing. Given that motels in the area are currently experiencing 95% average annual occupancy, potential temporary but significant adverse impacts on public recreation appear to remain unmitigated. We would like to continue to work with the Air Force in addressing the issues of public access and recreation.

Conclusion

The Space Shuttle Program is a major project on the California coast, bringing certain social benefits but which also has the potential to result in significant adverse impacts on numerous coastal resources. The Air Force's Final EIS and draft Supplement notes where additional planning, mitigation and monitoring efforts are continuing to be developed. Because we are aware that the Air Force intends to submit a Consistency Determination in the near future, we have attempted to note where and how the Supplement has provided insufficient or inadequate information to thoroughly address issues raised under California's Coastal Management Program. If any of the additional information we have requested is or will shortly be available, we would recommend you include such information prior to or concurrently with submittal of your Consistency Determination. We intend to work closely with you in coming up with any additional information we have requested and in resolving any remaining conflicts. We appreciate your cooperative spirit and this opportunity to comment at such a late date.

Very truly yours,

Mark P. Delaplaine

MARK P. DELAPLAINE
Coastal Planner

MPD:rp

cc: Don Kellogg

Robert Cameron
U.S. Dept. of Interior
U.S. Fish & Wildlife Service
Environmental Protection Agency
National Park Service
National Marine Fisheries Service
Dept. of Fish & Game - Region V
Dept. of Water Resources
Air Resources Board
State Lands Commission
Hazardous Materials Management Section
County Resource Management
County Flood Control and Water Agency
County Environmental Health Dept.
County APCD
Santa Barbara Museum of Natural History
Coastal Commission - South Central District
Marine Mammal Commission

Responses to Comments From
The California Coastal Commission

G.1 The revised Section 2.7.2.3 address the majority of the points raised. The estimated frequency of launches will at no time exceed 10 per year. The rise time and pressure level of Shuttle sonic booms will be verified through monitoring planned for Kennedy Space Center launches STS-5 and STS-6. In addition to monitoring of the Orbiter landing approach for Edwards AFB, the first Vandenberg AFB return will also be monitored to verify model predictions. A formal written request for a Letter of Authorization has been prepared, pursuant to the Marine Mammal Protection Act of 1972, as amended, and has been submitted to NMFS.

G.2 Refer to Response C.8 of Letter C, from the National Marine Fisheries Service.

G.3 Refer to Appendix G of this document, Sections 30231 and 30233.

G.4 Refer to Appendix G of this document, Sections 30233 and 30253(2).

G.5 Section 2.7.2.1 (Air Quality Impact Mitigation) has been revised. Refer also to Appendix G of this document, Section 30414.

G.6 Refer to Appendix G of this document, Sections 30232 and 30607.1. The "Spill Prevention Control and Countermeasure Plan" and the "Toxic and Hazardous Waste Management Operations Plan" have both been submitted to your office.

G.7 Refer to Appendix G of this document, Section 30232.

G.8 Drought resistant native and noncompeting non-native plant species will be used in revegetation treatments as well as species which aid slope stability and/or retard erosion. Refer to Appendix G, Section 30253(2) for some of the plant species planned for use.

G.9 The engineering drawings for the proposed 13th Street Bridge improvements have been submitted to your office as Attachment 2 of the Coastal Act Consistency Determination prepared by the Air Force (Appendix G).

G.10 Refer to Appendix G of this document, Section 30232.

G.11 Refer to Section F.5.2 and Appendix G, Section 30253(2).
& 12.

G.13 Refer to Appendix G Section 30244.

G.14 Refer to Appendix G, Sections 30250 and 30241.

G.15 Refer to Appendix G, Section 30250.

G.16 Refer to Appendix G, Sections 30210, 30211, 30212, 30212.5, 30213, 30214, 30220, 30224, 30250, and 30252.

Letter H

Comments From
California Department of Fish and Game

STATE OF CALIFORNIA--RESOURCES AGENCY EDMUND G. BROWN JR., Governor

DEPARTMENT OF FISH AND GAME

Marine Resources Region
350 Golden Shore
Long Beach, California
(213) 590-5117

March 25, 1982

H. Q. Space Division/DEV
Post Office Box 92960
Worldway Postal Center
Los Angeles, California 90009

Draft Supplement, FEIS, Space Shuttle Program,
Vandenberg AFB, Santa Barbara County

Gentlemen:

We have reviewed the subject document which presents additional updated information regarding potential effects from proposed program changes.

Of those changes made in the proposed program, the External Tank (ET) Landing Facility and Tow Route appear to have the greatest potential for significantly impacting fish and wildlife resources and their habitats. The document also lists several unresolved issues which are to receive further investigation especially during initial launch and landing operations.

With regard to marine biological impacts that would result from the ET landing facility construction at the Boathouse, the document and supporting biological study identified the loss of about 0.4 acres of intertidal habitat that would result from dock construction. In addition, dredging activities would result in the loss of a small kelp bed and temporarily disrupt up to 2.2 acres of hard and soft bottom habitat and associated benthic organisms. Impacts to biological resources would also occur from underwater blasting to break up hard benthic (rock) substrate. In addition, the proposed project may impact the endangered California sea otter which has been observed in the area just west
H.1 of the Boathouse breakwater. This species is not listed in the subject document, and should be considered relative to the overall project.

In addition to the above impacts, there is the still unresolved issue concerning the disposal of dredged material. While the document does consider, in a very general sense, some of the impacts of the various alternatives, no
H.2 preferred alternative is specified. Several of the alternatives have possible merit from our perspective and we would like to discuss these further with appropriate Air Force and/or consultant staff.

The construction of the respective tow routes for the ET and shuttle to the
H.3 proposed launch area will also adversely impact, to various degrees, wetlands and riparian habitats in areas of canyon and river crossings.

Although the subject document identifies a majority of the impacts detailed above, there are no measures proposed for mitigating or significantly reducing
H.4 those impacts. Loss of the existing small kelp bed, and the intertidal habitat will be permanent and it is the permanency of this loss as well as the types of habitat involved which we consider significant.

Section 2.7.1 of the subject document lists unavoidable adverse impacts of the project as proposed. Those impacts listed are primarily concerned with the ET landing facility and tow route and are essentially those previously outlined.
H.4 Section 2.7.2 lists some limited mitigation measures designed to reduce impacts during the construction phase, but leaves unanswered the more important question of mitigation for habitat losses. We believe there are some techniques or actions which can further mitigate for those impacts. The best way to consider those measures would be to concurrently meet with our staff and those of the U. S. Fish and Wildlife Service and National Marine Fisheries Service. We believe such a meeting would be beneficial to all parties involved and would facilitate the future processing of both State and Federal Permits necessary for project implementation.

Should you have any questions or desire to arrange for the recommended meeting, please contact Mr. R. E. Mall, Environmental Services Supervisor at the letterhead address, phone (213) 590-5155.

Sincerely,

R E Mall for

John L. Baxter
Regional Manager
Marine Resources Region

cc: U.S. Fish and Wildlife Service, Laguna Niguel
National Marine Fisheries Service, Terminal Island
California Coastal Commission
State Clearinghouse
Resources Agency, J. Burns

Responses To Comments From
California Department of Fish and Game

H.1 Section 2.3.1.3 has been revised to include a list of endangered or threatened marine species which may occur in the Southern California Bight. Although the Southern Sea Otter (Enhydra lutris nereis) appears on this list, the Southern Califonria Bight is beyond the southern extent of their range. The generally accepted range for this otter is from Point Ano Nuevo (about 20 miles northwest of the City of Santa Cruz) south to Point Sal (about 23 miles north of the Boathouse). Individuals have been sighted as far south as Northern Baja California, Mexico, but these are considered to be transient animals.

It is unlikely that the overall project would have an adverse impact on the Southern Sea Otter.

H.2 Refer to Section 2.5.1.1, Appendix 6, Section 30233.

H.3 Refer to Section 2.7.3.2 and to Appendix G, Section 30607.1.

H.4 Refer to revised Section 2.7.2.3 and to Appendix G, Sections 30231 and 30233.

Letter I

Comments From

Native American Heritage Commission

State of California
Governor's Office
Native American Heritage Commission

March 1, 1982

Commissioners
Ed Castillo
Cahuilla
Patricia E. Duro
Luiseno
William J. Franklin
Me-Wuk
Jay J. Johnson
Miwok-Paiute
Milton M. Marks
Yurok
Mabel McKay
Pomo
Noddeen Naylor
Paiute
Jane K. Penn
Wanakik-Cahuilla
Talbert M. Wilson
Pit River

HQ Space Division/DEV
P.O. Box 92960
Worldway Postal Center
Los Angeles, California 90009

RE: Draft Supplement to the Final EIS for the Space Shuttle Program at Vandenberg AFB, California

Dear Sir:

I am enclosing a copy of a letter I have written concerning the treatment of cultural resources on Vandenberg Air Force Base. Please consider these comments in relation to the EIS Draft Supplement.

I.1 With a responsible approach that recognizes the importance of involving the Indian community in matters of their cultural heritage, mitigation measures can be employed that do not cause an undue burden to construction activities.

Native American cultural resource preservation is a priority of the Native American Heritage Commission. These resources represent an indispensible cultural resource to California Indians and their destruction is viewed as a direct loss of their heritage. Many of the resources are nonrenewable and fast action is needed for their preservation.

Please ensure that agencies and individuals are apprised of their legal responsib lities in this sensitive area.

Sincerely,

William J. Pink
Executive Secretary

WJP:BD:js

Enclosures: Letter to Col. Farney
PL 95-341/PL 96-95/AB-4239
Cultural Resources Handbook
Observers/Monitors

cc: Edward Olivas, Chairman
Santa Ynez Indian Reservation
P.O. Box 517
Santa Ynez, California 93460

1400 Tenth Street, Sacramento 95814 (916) 322-7791

Response to Comments From
Native American Heritage Commission

I.1 Native American cultural resource preservation is a major concern of Vandenberg AFB. Numerous source studies, site testing and evacations, and various construction monitoring activities indicate that effective mitigations can be employed which do not cause an undue burden to construction activities. Recent Air Force regulations have required the identification of a Historic Preservation Officer for all military installations. The Historic Preservation Officer for Vandenberg is Mr. Larry Beil, and the alternate is Mr. Jim Johnston. The goal of these assignments is to consolidate all cultural resource management under one office, and to provide leadership from long-term career professionals, avoiding the transitory nature of military assignments. The Historic Preservation Office is a single point of reference for cultural resources, with stability and continuity assured for the future.

A Memorandum of Agreement between the Air Force and the California Office of Historic Preservation, the National Advisory Council on Historic Preservation and the Interagency Archaeological Services, National Park Service agencies indicate specific legal and stipulated responsibilities, as well as professional conduct in dealing with impacted archaeological resources. The Memorandum of Agreement is presented in Appendix E.

Letter J

Comments From
Santa Barbara County - Cities Area Planning Council



Santa Barbara County - Cities Area Planning Council

922 Laguna Street
Santa Barbara, Ca. 93101
(805) 963-7194

March 26, 1982

City of Carpinteria

City of Guadalupe

City of Lompoc

City of Santa Barbara

City of Santa Maria

Lt. Col. R. C. Wooten, Jr.
HQ. Space Division
P.O. Box 92960
Worldway Postal Center
Los Angeles, CA 90009

Dear Sir:

We find the update to the FEIS of the Space Shuttle program to be a much improved version of the original report with reference to the socioeconomic impacts section. However, the section on housing mitigation measures remain defficient. The questions below outline my concern.

J.1 1. What programs does VAFB have to house anticipated increase in military personnel on base?

J.2 2. What programs have been budgeted to house anticipated increase in military personnel on base?

J.3 3. What is the current on base housing situation, e.g., number of units, vacancies in existing available units, trailer space vacancies, plans for additional trailers-mobile homes, etc.?

J.4 4. Personnel at VAFB have indicated to me that the housing situation in local communities for new military (low wage grade) personnel is desperate. This is due to low vacancy rates and cost above that affordable by entry level married airmen who have families. Since significant new housing demands are well documented in the update, it is likely that the lower income groups will suffer the greatest (this includes airmen) when demand outstrips supply. Mitigation measures must be developed to meet this problem.

J.5 5. General attention given to mitigation of anticipated housing impacts are inadequate. What if contractors cannot hire people due to unavailability, on high cost, of housing. What will likely happen to the STS schedule?

Thank you for your consideration.

Sincerely,

Michael G. Powers
Area Planner

MGP:cf
cc: County, Department Resource Management
Santa Maria Community Development Dept.
Lompoc Community Development Dept.
VAFB, Larry Bell

Response to Comments From
Santa Barbara County - Cities Area Planning Council

J.1 & 2 In FY-83, the base has programmed one dormitory for unaccompanied enlisted personnel. Rooms will be provided for 240 personnel in 2-person rooms. In FY-85, an additional dormitory for unaccompanied enlisted personnel is being programmed to house 316 personnel. However, this project may not remain in the FY-85 MCP. No additional Military Family Housing units have been programmed or budgeted.

J.3 The base has 2080 family housing units with a 98.65% occupancy rate. This includes eligible and ineligible personnel. This equates to an average of 32 houses being constantly vacated and assigned. Vandenberg AFB mobile home parks are currently all occupied and the base has no immediate plans for additional spaces.

J.4 The average waiting list over the last six months has had from more houses available from time to time than applicants to accept housing in the Junior Non-commissioned Officer category. When this occurs, the Base puts ineligibles inactive units under rehabilitation project. Sixty-four of these units are 95% complete. Once completed, all of those units will be assigned to lower ranking and ineligible airmen. The remaining 56 units will be completed in FY-83. In reviewing the projected manning through 1985 and taking into consideration the percentage of married personnel that will be assigned to Vandenberg, it appears that the Base will be able to house the majority of lower ranking airmen including ineligible personnel.

J.5 The peak construction period for the Space Shuttle program at Vandenberg has past, and no housing-related difficulties in hiring of construction workers has occurred. In addition, have there been no hiring difficulties reported by contractors responsible for Shuttle Program operation, and the hiring of operational personnel is on schedule. With continued high levels of unemployment in all sectors of the economy and relative high levels of mobility associated with high technology and professional activities, hiring difficulties related to housing are not anticipated. A related impact on the Shuttle Program schedule is therefore not expected.

Letter K

Comments From
City of Lompoc

CITY OF LOMPOC
VALLEY OF FLOWERS

MAYOR
Tom Green

COUNCILMEMBERS
Charlotte Benton, Andrew Salazar,
E.C. Stevens, Joe H. Valencia

CITY ADMINISTRATOR
Gene L. Wahlers

March 18, 1982

Lt. Col. R. C. Wooten, Jr.
HQ Space Division, SD/DEV
P.O. Box 92960
World Way Postal Center
Los Angeles, CA 90009

Dear Lt. Col. Wooten:

The City of Lompoc has performed a comprehensive review of the Space Shuttle Program Draft Supplement to the Final Environmental Impact Statement. We would like to compliment the Air Force on its thorough and detailed analysis of project impacts. Additionally, we would like to note that we recognize the importance of Vandenberg Air Force Base to our National defense and space programs and our comments should not be interpreted as representing opposition to the programs assigned to the base. Our comments are intended to identify problems we foresee in adequately serving as a primary place of residence for base employees. Further, we have suggested a solution to these problems. Our comments focus on two areas: 1) mitigation of socioeconomic impacts and 2) transportation of hazardous materials.

Mitigation of Socioeconomic Impacts

The EIS Supplement finds that the projected population growth will result in "significant" socioeconomic impacts. Specifically, the report states:

> "The level of population in-migration in the communities of the North County will put a strain on the public and private sectors abilities to provide the goods and services demanded by the in-migrating population. Of particular concern is the private sectors' ability to provide housing and the public sectors' ability to provide for the health and safety concerns of both the existing and projected population in the communities".

To mitigate these impacts the report lists existing Federal programs through which communities may seek financial assistance. The City of Lompoc has aggressively sought financial assistance to mitigate impacts over the past two years and to date has received no such assistance. Thus, we assert that
K.1 the report has in fact identified no measures for mitigating the very significant impacts that will be felt by our community. In this regard, we find the EIS inadequate because it fails to comply with the provisions of the National Environmental Protection Act which require that the United States Air Force identify and pursue realistic measures for mitigating significant impacts.

CITY OF LOMPOC, CITY HALL, 100 CIVIC CENTER PLAZA, LOMPOC, CALIFORNIA 93438 (805) 736-1261

To mitigate these impacts we have, and continue to, suggest that funds be appropriated by the Federal government to assist in the construction of capital facilities such as storm drains, interceptor sewers, roads, public buildings, etc. that will be required to serve the in-migrating population.

The EIS identifies water supply as an unresolved issue. In-migration is occurring, water demand is increasing and the issue remains unresolved. The report should state that increased water demand within North County communities
K.2 will result from in-migration of population due to increased employment at Vandenberg Air Force Base and, therefore, the Air Force should participate in the cost of meeting community water supply requirements.

Hazardous Material Routes

The City Council requests that the Air Force reduce the probability of hazardous materials being transported through City business and residential
K.3 areas To this end we would suggest the two following routes listed in order of preference.

1. State Route 246 to Lompoc-Casmalia Road, to County Road S-20, to Santa Lucia Canyon Road, and entering the base by the Pine Canyon Gate.

2. State Route 246 to Lompoc-Casmalia Road, to Highway 1 south to Central, west to Floradale, south to 246, and west to the base entrance.

A third alternative of transporting materials through Lompoc on Highway 246 would unnecessarily expose our citizens to potential hazards.

Summary

The City of Lompoc enjoys a positive relationship with adjacent Vandenberg Air Force Base and we wish to continue to work with Air Force officials to solve problems of mutual concern. However, the rapid increase in employment at the base will significantly impact our ability to maintain acceptable service levels for our current and future citizens. The City of Lompoc requires financial assistance to meet the capital improvement needs resulting from a rapidly increasing population. Further, we request that the Air Force take all reasonable steps to ensure that hazardous materials are not transported through the City's commercial and residential sections.

Sincerely,

Tom Green, Mayor
City of Lompoc

cc: Congressman Lagomarsino
Senator Hayakawa
Senator Cranston
Assemblyman Hart
Assemblywoman Wright
Senator Rains
Carla Bard
Major General Jack L. Watkins

Response to Comments From
City of Lompoc

K.1 Environmental consequences and appropriate socioeconomic mitigations within the scope of CEQ regulations are discussed and presented in Section 2.7.2.5 in the FSFEIS. The Air Force has identified numerous measures for mitigating impacts, some beyond the scope of Air Force responsibility as outlined by NEPA regulations (40 CFR 1500-1508), and has referred the list of proposed mitigative actions to other appropriate agencies, including the Department of Defense Office of Installations and Economic Adjustment (I&EA). The Air Force does not have congressional authorization or appropriation to fund any capital improvement requirements which result directly or indirectly from the STS Program. Local communities should work closely with the I&EA which has responsibility for assisting local communities impacted by major Federal actions.

K.2 Estimates of increased water demand have been made and are presented in Section 2.5.2.3. Increased urban water demand due to the expansion of VAFB programs is estimated at an increase of 3,143 acre-feet per year in the peak year 1985. The Air Force has contracted for and received a detailed study of supplemental water alternatives in the reaction and the results of that study can be found in the Supplemental Water Study for Vandenberg AFB, March 1982 prepared by Earth Sciences Associates and PRC Toups (Ref. 46).

The Base has historically supported the local communities in all attempts to obtain supplemental water since 1960 and continues to do so. For additional discussion refer to Section 30250 in Appendix G.

K.3 Transportation routes for explosive and hazardous materials are estimated by the California Highway Patrol (CHP), who has final authority for designation and approval in establishing safe transportation routes. Resolution of local routing issues is properly between interested citizens, communities and the CHP. The Air Force will use officially designated routes for transporting exotic materials

through the county, but the public has the responsibility for participating with the CHP in approval of desired routes.

Letter L
City of Port Hueneme

CIVIC CENTER

City of Port Hueneme

250 North Ventura Road • Port Hueneme, California 93041 • Phone (805) 488-3625

February 10, 1982

Lt. Col. R.C. Wooten, Jr.
HQ Space Division, SD/Dev
P.O. Box 92960, Worldway Postal Center
Los Angeles, California 90009

RE: SPACE SHUTTLE EIS

After reviewing the Draft Supplement to Final EIS, Space Shuttle Program, I am interested in receiving more information regarding the possible impacts
L.1 of chemical spills in the Port Hueneme Solid Rocket Booster Recovery and Wash Facilities. Please send any special studies which were conducted in regard to this matter as well as a chemical spill contingency plan for the Port Hueneme Harbor.

I am also interested in the noise levels that may be experienced during
L.2 normal operation of the Wash Facility by Port Hueneme's nearby residential neighborhoods.

Any assistance in this matter will be greatly appreciated.

Kurt Yeiter

KURT YEITER
Assistant Planner
Department of Community Development

KY/bjn

Responses to Comments From The City of Port Hueneme

L.1 The Navy has developed a Spill Prevention Control and Countermeasure Plan (SPCC) for their Port Hueneme facility. Worst-case scenarios for Space Shuttle facilities at Port Hueneme have been incorporated into this plan.

L.2 The SRB wash operations will be approximately as noisy as a commercial carwash (100 dBa). This operation will occur inside a building, and the resulting outside noise should not exceed 70 dBa. Considering the distance from this building to residential areas, the SRB wash operations noise would not be noticeably audible on its own, and it will not be audible at all amongst the various other traffic/industrial noise sources already existing in the area.

Letter M

Hubbs-Sea World Research Institute

1700 South Shores Road, Mission Bay, San Diego, California 92109 (714) 223-2693

March 30, 1982

James F. Boatright
Deputy Assistant Secretary of the Air Force
HQ Space division/DEV
Post Office Box 92960
Worldway Postal Center
Los Angeles, CA 90009

Dear Sir:

We believe several corrections to the text of the draft EIS for the Space Shuttle Program at Vandenberg AFB, California are in order. Several statements as they now stand are either oversimplified and misleading or incorrect. The corrections or modifications we suggest are itemized below.

"They are derived from Bowles and Stewart's (1981) Report in SDSU Center for Marine Studies Tech. Rep. 80-1."

M.1 1) p ix. Paragraph #2. Should read:

Disturbances to pinnipeds resulting in mass movement from the shores of the islands should increase by less than 15% for otariids and about 20% for harbor seals. Currently 24-36 such events occur per year for otariids and 48-60 per year for harbor seals at the sites examined (whole-island rates could not be calculated). Of the sonic booms which presently occur, about 25% cause major disturnances to sea lions while about 50% cause major disturbances to harbor seals.

M.2 2) p 2-30. Paragraph #2, lines 8-10. Should read:

Major disturbances to pinnipeds occur abut 24-36 times per year for otariids and about 48-60 times per year for harbor seals and appear to he primarily from combined visual and acoustic stimuli, such as the presence of humans or low-flying aircraft. Sonic booms and boat noises sometimes cause such disturnances; approximately 25% of incident sonic booms cause major disturbances to otariids and 50% cause major disturbances to harbor seals.

M.3 3) p 2-86. Paragraphs 3, lines 3-4. Should read:

These events have been noted to occur at frequences of 24-36 per year for otariids and 48 to 60 per year for harbor seals.

If we can be of further assistance please do not hesitate to contact us.

Sincerely,

Joseph R. Jehl, Jr.
Assistant Director,
Hubbs-Sea World Research Institute

Charles F. Cooper
Professor of Biology
San Diego State University

cc: Dr. Ted Turk
Lt. Col. R. C. Wooten

Responses to Comments From
Hubbs-Sea World Research Institute

M.1 The referenced paragraph has been revised to include the information given in this comment.

M.2 Refer to above response M.1.

M.3 Refer to above response M.1

Letter N

Comments From
Mr. H. E. Christensen

1313 East Locust Ave,
Lompoc CA 93436
March 20, 1982

HQ Space Division/DEV
Post Office Box 92960
Worldway Postal Center
Los Angeles CA 90009

In accordance with the instructions of the Dept. of the Air Force letter dated Feb. 5 '82, I would like to make the following comments regarding the Draft Supplement to the Final Environmental Impact Statement of the Space Shuttle program at Vandenberg AFB, dated Feb. 82.

First let me comment on the personnel figures used in 2.5.2.2., Operational Phase Economic Impact. The figures used to indicate a 46% increase of personnel in 1985 and reduction to 38% in 1988 are quite misleading in mid-1982 due to using the 1980 reference line. In this context the numbers required for construction phase are overlooked and as these for the most part are transient workers, they will depart the scene. Thus the terrific influx identified by the 46% figure will in the most part be negated due to the fact that
N.1 most of the new operational personnel will be one-for-one replacements of construction types. The indirect portion of the buildup will not be affected by a change of personnel by type, so the infrastructure is in place. Let me point out that there is probably little reason for a continuing over-priced home-building program in the area as the increase from mid-1982 to '83 becomes a relatively mild buildup. Other items not considered in the document relating to the total personnel force is the fact of the questionable nature of the MX program - with MX going into Minuteman holes, there is little reason for a great increase in workforce. The acceptance of the LNG plant as a factor for consideration is surely open to question.

Secondly, I would like to speak of my high regard for the Space program as our hope of the future and the concern I have for the public's acceptance of the program if there should be an accident of catastrophic proportions - where many died or even if only a large section of Los Angeles, say, had to be evacuated. If one recalls the backlash following the incident when Grissom and his crew lost their lives, possibly one might start to conceive of the public outcry in the event of a major accident causing civilian damage and death. It seems that this thought must be ever present in the minds of the planners and later the operators, and that public safety is paramount to program continuation.

In that regard let me inquire as to the amount of consideration that has been given to moving the hypergolic propellants out of the Louisiana/Mississippi area by barge in the same manner as the move-
N.2 ment of the external tank. If barges are unsatisfactory, what consideration has been given to ships, with a system of offshore discharge similar to the one envisaged by the LNG association or of docking at Port San Lucas in San Luis Obispo County and carrying out the trucking from there. Considering the current plan of a large storage capability on South Vandenberg it seems that the barge/ship approach is most practicable.

Relative to the routings by truck indicated on page 2-77, there is no question of the higher degree of California safety offered by the northern route with the Highway 135 option. The northern route passes only two sizeable cities in California (San Bernardino and Santa Maria,
N.3 combined pop. 125,000 approx.) while only that portion of the southern route from Ventura to destination has nearly 170,000 people including only the Ventura, Santa Barbara and Lompoc populations. The population possibly placed at hazard from Ventura back to the California/Arizona border on Highway 10 would exceed the Ventura/destination figures by a large multiple.

My third subject of comment relates to the disposal of the generated hazardous wastes, and I'd like to point out that this is a new item in the Shuttle EIS and so one not previously discussed in open
N.4 meeting. It would seem that all waste generated at Vandenberg whether raw or initially processed would most probably be disposed of at Casmalia site. If initial processing could possibly clear the cooling water sufficiently, it would be in the best interests of the base and surrounding area to reinject this into the ground. Certainly, whatever the procedure initially, the residual material should leave the base at either the San Antonio or Titan gate and be transported north on the Lompoc-Casmalia road for the very short distance involved. It
N.5 would be totally impractcal to move such material through Lompoc on Highway 246 to Buellton, then to Los Alamos via Highway 101 and so follow Highway 135/Highway 1/Black Road to the dump site.

Finally but hardly of least importance is the hazard consideration of an LNG plant at Point Conception and the so-called Hold-Harmless Agreement. In all reported discussions to date the Air Force has contended and continues to contend that a definite hazard will exist if the plant is constructed. Your compromise provides for shelters, andthe Hold-Harmless Agreement. The plant itself apparently would be under the missile pattern only on certain flight paths, but
N.6 my understanding is that from three (3) to seven (7) LNG vessels may be lying off the port waiting to off-load. What responsibility does Western LNG assume regarding damage to one or more ships? If a ship incurred missile damage and exploded, how far out from the main plant would it have to be to not adversely damage that installation? Is there a probability that at some time foreign-registry vessels might become involved so that damage would create an international incident? If there were international complieations, do you suppose Western LNG would still bear the brunt? If there was such an accident resulting in a wild brushfire stretching possibly into the urban area of Goleta, do you think the public would hold the Air Force harmless?

The most vexing problem of such a situation is in the consideration of what action Western LNG Associates would take to recoup their losses if the entire brunt of a monetary loss fell on them. This consideration is quite timely because the operating head of Western has
N.7 just stated that his company intends to request rate increaes to cover the study and construction costs to date even if the plant is never finished. In the same vein an executive of PGE is quoted in the press lately as saying that if the determination is finally made to scrap the Diablo nuclear plant, the company will expect a rate increase so the

customers would reimburse the corporation for their executives' mistakes. I fear that what Western in reality is saying is "No Sweat. If the plant blows we'll have our customers pay the damages." The Air Force has a responsibility to bend every effort to stop any further construction even more so than your work on Bixby.

H.E. Christensen
CWO4, USAF (Ret.)

N.1 Revised operation phase personnel requirements indicate an increase over 1980 baseline levels of 52.6 percent in the peak year 1985 and a 43.8 percent increase in the long-term (1988). Inclusion of construction workers (craft labor and SIOH) levels in the calculation of percent increases (381 workers in 1980, 260 in 1985, and 10 in 1988) reduces the percentage increases to 44.7 percent in 1985 and 39.0 percent in 1988.

Vacancy rate figures from the 1980 census indicate approximately 1600 year-round vacant housing units were available for rent or for sale in the North County. 1981 housing demand for units other than transient demands due to VAFB activities was about 1,660 units (Table 2.5.2-18). This demand as well as estimated future demand indicate that housing supply still remains a critical issue in the North County in light of the proposed expansion of VAFB activities.

Increased operation work force estimates for the MX program at VAFB do not rely on basing mode decisions. However, if a basing mode is chosen that would require construction of additional test shelter facilities, some increase in construction activities in the 1982-84 period would result.

Analysis of the effects of LNG construction and operation activities have been dropped from the analysis. Refer also to revised Section 2.5.2.2.

N.2 In the early planning stages of the Space Shuttle Program, a number of alternatives, including barge and ship transport, were considered for transporting hypergolics to Vandenberg. This analysis concluded that transport by truck would be the safest and most practicable method. This is a standard, commonly used means of transporting hypergolics and other propellants. Carefully designed trucks and ancillary equipment, handling and transporting procedures, and transportation routes have been developed and used to minimize the risk entailed in the transportation of these materials. Propellants

transported for use in the Space Shuttle will add little to the total amount of propellants transported in the U.S. for use by other Air Force programs, other DoD agencies, and other organizations.

N.3 Transportation routes for explosive and hazardous materials are established by the California Highway Patrol (CHP), who has final authority for designation and approval in establishing safe transportation routes. Resolution of local routing issues is between citizens, communities and the CHP. The Air Force will use officially designated routes for transporting exotic materials through the county, but the public has the responsibility for participating with the CHP in approval of desired routes.

N.4 Please refer to revised Section 2.2.5.

N.5 The routes referred to in the comment are those designated for transport of explosive materials, not all hazardous materials. Non-explosive materials taken to the Casmalia site will be transported on the Lompoc-Casmalia Road.

N.6 Western LNG has advised us their plans call for one LNG carrier to arrive at the facility every two days. Off-load of the LNG carrier requires less than 24 hours. During routine operations at the facility the off-loaded ship would be gone for about one day before the next LNG carrier arrived for off-loading. At no time would there be from three to seven LNG ships waiting to unload their cargo. Western LNG will have total control over the shipping operation, and with advance notice of missile operations from the Air Force, Western LNG would not permit a vessel to be anywhere near designated impact areas during launches.

According to the Air Force and Western LNG Hold Harmless Agreement "Western assumes all risks to damage or injury to persons or property which occurs at or near the Little Cojo Point Conception LNG terminal site to any person or persons who are agents, employees, or invitees of Western performed by Western at the above-mentioned LNG terminal site..." The LNG carriers are chartered or owned by and "doing busi-

ness with" the permittee and are therefore the responsibility of Western LNG. Since all LNG ships are owned or chartered by Western LNG, there is no question of an "international incident." Western LNG is required by their contract to carry insurance equal to the market value of each vessel.

A detailed safety study performed for the Air Force by Science Applications, Inc., states "LNG in itself is not explosive, and penetration of LNG containers does not itself lead to an explosion..." The greatest hazard of LNG is the potential release of a large low-lying flammable cloud. LNG must be enclosed prior to ignition. Located at Point Conception this condition should not occur. Western LNG has advised us the question of a ship "explosion" becomes moot given the fact that LNG cannot explode. Under the worst conditions for the largest credible LNG spill, it is inconceivable that a cloud of revaporizing LNG could travel more than a mile or two before dissipating beyond its limits of flammability and rise harmlessly into the air.

Western LNG has advised us that all LNG carriers will be of new construction, owned by Western LNG, and will carry United States registry. If foreign registry vessels do carry LNG to the facility at some future date, those vessels will be under charter to Western LNG, so there is no question of an "international incident." Their status would therefore be the same as US registry vessels when in the vicinity of the LNG facility.

The potential for a wild brush fire at the Point Conception LNG facility reaching the urban area of Goleta is so remote it has not been considered in safety studies. Western LNG advises the Little Cojo Bay facility will employ advanced fire control and suppression technology designed, in part, to assure that any fire will be contained entirely with the site's perimeter.

N.7 Western LNG has advised us their facilities will be fully insured. Western LNG will look to their insurance policy, not utility customers, for recovery of losses in the highly unlikely event any damage

occurs as a result of a Vandenberg launch. It is important to maintain a sense of perspective with all these issues. The LNG terminal at Little Cojo Bay will provide California with a strategic link to long-term sources of natural gas supply that will help meet the state's energy needs into the next century. We consider the missions of the Air Force and Western LNG to be compatible.

Letter O

Comments From
Mr. Garrett Connelly

TO: HQ Space Division/DEV
Post Office Box 92960
Worldway Postal Center
Los Angeles, California 90009

FROM: Garrett Connelly
300 West Mountain Drive
Santa Barbara, California 93103

DATE: March 26, 1982

RE: DRAFT SUPPLEMENT TO THE FINAL ENVIRONMENTAL IMPACT STATEMENT (EIS) - SPACE SHUTTLE (VAFB)

I have four main concerns regarding the space shuttle and its impact upon California, the Tri-Counties, and Santa Barbara. I have studied the Draft EIS and its amendments and find it wanting according to this list of points:

0.1 1) National Geographic Magazine, October, 1981, mentions that the shuttle program will deplete the ozone layer by five percent per year. Since that time, further research has proven that figure too high; yet there is indication in the literature that five percent may be a realistic maximum within the launch corridor itself.

The Draft EIS supplement does not address the stratospheric affects of NO_x or HCl. These compounds are catalytic ozone inhibiters; they are also a major portion of the solid-fuel booster exhaust.

The Final EIS involving California and Santa Barbara should include stratospheric impacts.

0.2 2) The Draft EIS contains several disjointed statements which indicate that water supplied may become a problem.

If the Air Force desires to override the will of local voters in an attempt to import northern water for reasons of national security, then that impact--the social impact becomes environmental in this case--must also be examined within the completed EIS.

0.3 3) The Preliminary Social Impact Statement on use of the Space Shuttle to establish a large orbiting power station referred to an anticipated fear of developing within the American citizenry. The fear that no one is secure from focused beams is projected by that report to become acute around the year 2000.

A social impact of such magnitude should be included in a properly finished EIS. Secret cargoes have already gone up on the Shuttle out of Florida. Is the good name of Santa Barbara about to become associated with the ultimate in terrorist weapons?

0.4 4) The Draft EIS refers to several required dumping permits which have not as yet been obtained. One of these permits is for extremely hazardous materials; it must come from the State directly. The others come from various California regulatory agencies.

Is it fair to begin constructions that cannot be used without the aforementioned permits? What if one of the wastes is not permissible in California? Doesn't this put an unfair burden on a State agency?

0.5 The Draft EIS fails to list all the wastes and the final one should. Also, great care should be taken that units of measurement, base years, and base percents remain comparable throughout the Final Statement.

If these concerns are not squarely addressed within the EIS, then the positive benefits which the Air Force can bring to California will be too heavily outweighed by possibly detrimental unknowns.

The entire world is watching our great democratic republic build a space exploration program for the 21st century. The admiration given to America because of the Shuttle will turn to cynical scorn and pity if she loses democracy and good health in order to gain the freedom of deep space. This is too heavy a price to pay if all that is required to avoid mistakes is a little more time and patience.

Sincerely,

Garrett Connelly

GC:pw

cc: Major General Jack L. Watkins
Commander, Vandenburg AFB

Response To Comments From
Mr. Garrett Connelly

0.1 The DSEIS does not address the effects of NO_x and HCl on the stratosphere because this issue was discussed in detail in the 1977 NASA EIS for the overall Space Shuttle Program. Even though that analysis incorporated a much higher flight frequency in model predections (60 flights/year), the net impacts were still determined to be insignificant. Refer to Section 4.2.2.1 of the reference document, which describes climatic and biological effects of ozone depletion and the likelihood of such effects. Baseline data and studies done to arrive at the conclusion of no significant impact are also presented.

0.2 The Air Force has no desire to go against the will of the voters on the water issue. In fact, the Air Force has made it clear that it is willing to follow the will of the voters and cooperate with local authorities on this matter. Refer to Appendix G, Section 30250.

0.3 The Preliminary Social Impact Statement referred to concerns a conceptual design for a large orbiting power station. The Solar Power Satellite (SPS) Concept Development and Evaluation Program System Definition Technical Assessment Report (Dec 1980) states that the SPS system will require the extra energy provided by an eastward launch and probably a Shuttle derivative vehicle. The Program Assessment Report Statement of Findings - Solar Power Satellite Concept Development and Evaluation Program mentions that a heavy lift launch vehicle will be required to orbit the SPS equipment. Both the eastward launch and the heavy lift vehicle negate the use of VAFB as the launch site.

As to concern about the SPS being a "terrorist weapon," current studies and designs indicate that the SPS will have a maximum intensity at the center of a receiver of one-fourth the solar microwave radiation intensity at noon at the same location. It will not be a threat to life or properlty. It should be noted that before the SPS receives final approval, an Environmental Impact Statement will be prepared by the agency responsible for its development.

0.4 The Space Shuttle Program fully intents to comply with all standards required for all relevant and necessary hazardous materials permits. Refer to revised Section 2.7.4.3.

0.5 Refer to revised Section 2.2.5.

Letter P

Comments From
Mr. Bryon J. Willner

To: JAMES F. BOATRIGHT
DEPUTY ASSISTANT SECRETARY
OF THE AIR FORCE (INSTALLATION)
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23 FEBRUARY 1982

FROM: BYRON V. WILLNER
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SUBJECT: ENVIRONMENTAL IMPACT ANALYSIS PROCESS - SPACE SHUTTLE PROGRAM, VANDENBERG AFB, CALIFORNIA.

P.1 AFTER A PRELIMINARY REVIEW OF THE DRAFT SUPPLEMENT TO THE FINAL ENVIRONMENTAL IMPACT STATEMENT, DATED FEBRUARY 1982, I FEEL A STUDY AND REPORT SHOULD BE MADE REGARDING THE EXTERNAL TANK, ITS FALLBACK, RETURN INTO ATMOSPHERE, AND DISINTEGRATION, IF IN FACT IT DOES IN TOTALITY, INTO INTERNATIONAL WATERS. IT WOULD SEEM THE INTERNATIONAL IMPACT WOULD NOT ONLY BE MATERIALLY BUT POLITICAL IN NATURE. THIS MAY RAISE A QUESTION OF RESTITUTION AT A COST TO THE TAX PAYERS.

P.2 PERHAPS AN INTERNATIONAL AGREEMENT IN SIMPLE FORM COULD BE MADE TO COVER THE PROBLEMS OR AN ALTERNATE METHOD OF RETAINING CONTROL OF THE EXTERNAL TANK SUCH AS ORBITING IT FOR FUTURE SPACE USE.

P.3 I WOULD ALSO ADVISE WATER AVAILABILITY IN THE ORCUTT AREA IS A SOCIOECONOMIC ENVIRONMENT IMPACT.

I WOULD APPRECIATE A COPY OF THE FINAL ENVIRONMENTAL IMPACT STATEMENT, WHEN AVAILABLE, AND A COPY OF THE DRAFT SUPPLEMENT AS THE REVIEWED COPY WAS A ON-SPECIAL-LOAN. THANK YOU.

SINCERELY

Byron V. Willner

Response to Comments From
Mr. Bryon J. Willner

P.1 The possibility of environment impact from External Tank fallback has been analyzed in the NASA Final Environmental Statement for the Space Shuttle Program (July, 1972) Section C.6. The major potential impact is from possible physical impact of rentry debris fragments. The heating and deceleration forces typically caused the tank to disintegrate into peices of varying size, which will not ordinarly result in complete "burn-up." Although the risks are expected to be small, reentry will be controlled to a planned impact zone in an announced, preselected remote ocean site. These same planning and control procedures are currently used for expendable launch vehicles to reduce the likelihood of injury, damage, or intentional incidents to extremely low levels. The extent of this hazard as well as that of uncontrolled reentry is very small based on world-wide experience to date.

P.2 Because External Tank fallback will be controlled in the same manner as fallback of expendable vehicles is currently controlled, and because the likelihood of damage or injury is very low, an international agreement is not warranted.

P.3 Please refer to Appendix G, Section 30250.

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