

**Environmental Impact Assessment for
Facilities and Functions at the
NASA Industrial Plant
Downey, California,
In Support of the Space Shuttle Program**

Institutional Assessment



National Aeronautics and Space Administration
LYNDON B. JOHNSON SPACE CENTER
Houston, Texas

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FOREWORD

This report contains information pertaining to the control of potential sources of environmental contamination which issue from current and planned activities at the NASA industrial plant in Downey, California, in support of the Space Shuttle Program. Areas discussed are environmental setting, institutional considerations, facilities and operations, environmental control, and compliance with local, State, and Federal codes. Individual environmental impact assessments of the principal facilities and functions which will support the Shuttle program are also presented. These assessments of the planned functions and facilities of NASA's Downey plant indicate that Shuttle activities will not significantly affect the human environment. The assessments also indicate that all activities reviewed are in compliance with the rules and regulations of local, State, and Federal pollution control agencies.

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**I. BACKGROUND AND ENVIRONMENTAL FACTORS OF THE NASA INDUSTRIAL
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I. BACKGROUND AND ENVIRONMENTAL FACTORS OF THE NASA INDUSTRIAL PLANT IN DOWNEY, CALIFORNIA

A. BACKGROUND AND LOCATION OF FACILITIES

A brief historical review of the development of the NASA industrial plant at Downey reveals that the original buildings were constructed during the years 1929 through 1935. The plant underwent major expansion during the years 1939 through 1942. Approximately 700,000 square feet of manufacturing area were added to facilitate volume aircraft production for World War II. During this period, the Downey plant was under the cognizance of the USAF. After World War II from 1945 to 1948, the facility was relatively inactive. In 1948, North American Aviation, Inc., (now Rockwell International Corporation) occupied the plant for the first time for the purpose of research, development, and production of guided missiles.

The major portion of the plant was constructed and expanded to meet urgent wartime requirements. This produced an uncoordinated growth pattern and poor utilization of land. Wartime policies dictated the use of substandard materials and construction techniques, resulting in buildings which lacked permanency.

Following the selection of the Downey plant for Apollo spacecraft and Saturn S-II programs in late 1961, plant ownership (cognizance) was transferred from the USAF to NASA (1964). It became necessary for NASA and Rockwell International to change the capability of the facility to accommodate these significantly different Government programs.

In July 1972, NASA selected Rockwell International's Space Division to integrate, develop, and produce a Space Shuttle orbiter. The primary objective of this program is to provide an economic space transportation system that will support a wide spectrum of scientific and commercial applications in an earth orbit.

Five orbiters and supporting equipment are to be designed, developed, and fabricated. The Shuttle orbiter program management, engineering, and the manufacturing of the forward fuselage, crew module, and aft fuselage are centralized at the Downey industrial complex.

For maximum control over the commitment of resources to the program, the total effort has been divided into four increments: (1) completion of preliminary design, long lead time procurements, special tests, fabrication of tooling and special test articles, and the start of detail design; (2) continuation of the detail design and development, fabrication of two orbiter vehicles and support equipment, and horizontal and vertical test flight; (3) the production of three additional orbiter vehicles and the retrofit of the first two; and (4) the vehicle orbital operation phase.

The general functional facilities located at Downey are listed below.

- The general-purpose Shuttle manufacturing facilities have capabilities for machining parts, sheet metal detail fabrication, tube forming, processing, electrical and electronic component assembly, bonding, and tooling.
- The welding facilities, clean rooms, and conventional manufacturing areas provide assembly of frames, stringers, bulkheads, and skins, the orbiter crew module, and the orbiter forward and aft fuselage.
- The system installation and checkout clean room is used for equipment installation and checkout of the crew module and forward and aft fuselage.
- The test laboratories develop elements and components leading to design verification, evaluation of special materials and processes, and qualification of systems and subsystems. The facilities offer capabilities for environmental testing, climatic testing, dynamic testing, structural testing, thermal testing, cryogenic testing, pressure testing, and avionics testing.

Refer to Figure 1 for the location of these functions.

B. ENVIRONMENTAL SETTING

1. Location and Topography

The physical characteristics of a community have a significant effect upon its development and play a key part in community planning. Summarized here are some of the most prominent aspects of Downey's natural environment.

The city encompasses an area of approximately 12.7 square miles of relatively flat terrain. The land slopes to the southwest and varies from an elevation of 140 feet above sea level near Telegraph Road to approximately 90 feet above sea level near Gardendale Avenue (Figure 2).

The City of Downey adopted its Comprehensive General Plan in November 1963. This General Plan recognizes the central business district (CBD) as the commercial and governmental nucleus of the community. The CBD is an area of high land value which is characterized by concentrations of retail stores, offices, theaters, financial institutions, and governmental facilities. Under development is the Downey exchange center, including high-rise office buildings, a department store, and numerous shops. Future CBD plans also envision additional high-rise office buildings and banks, municipal parking lots with subterranean and/or deck parking, and other large developments.

DOWNEY COMPLEX

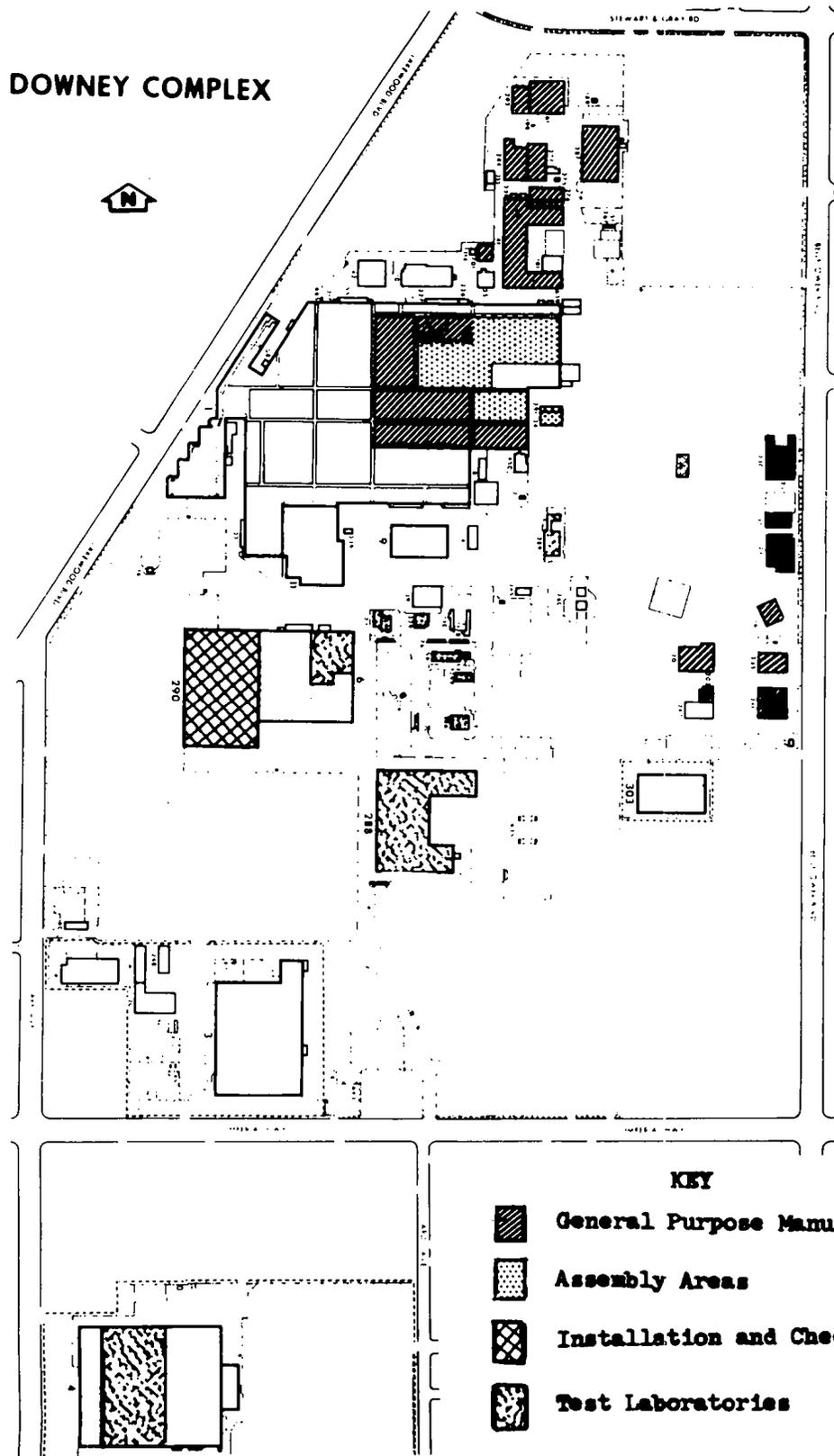


Figure 1. Location of Facilities

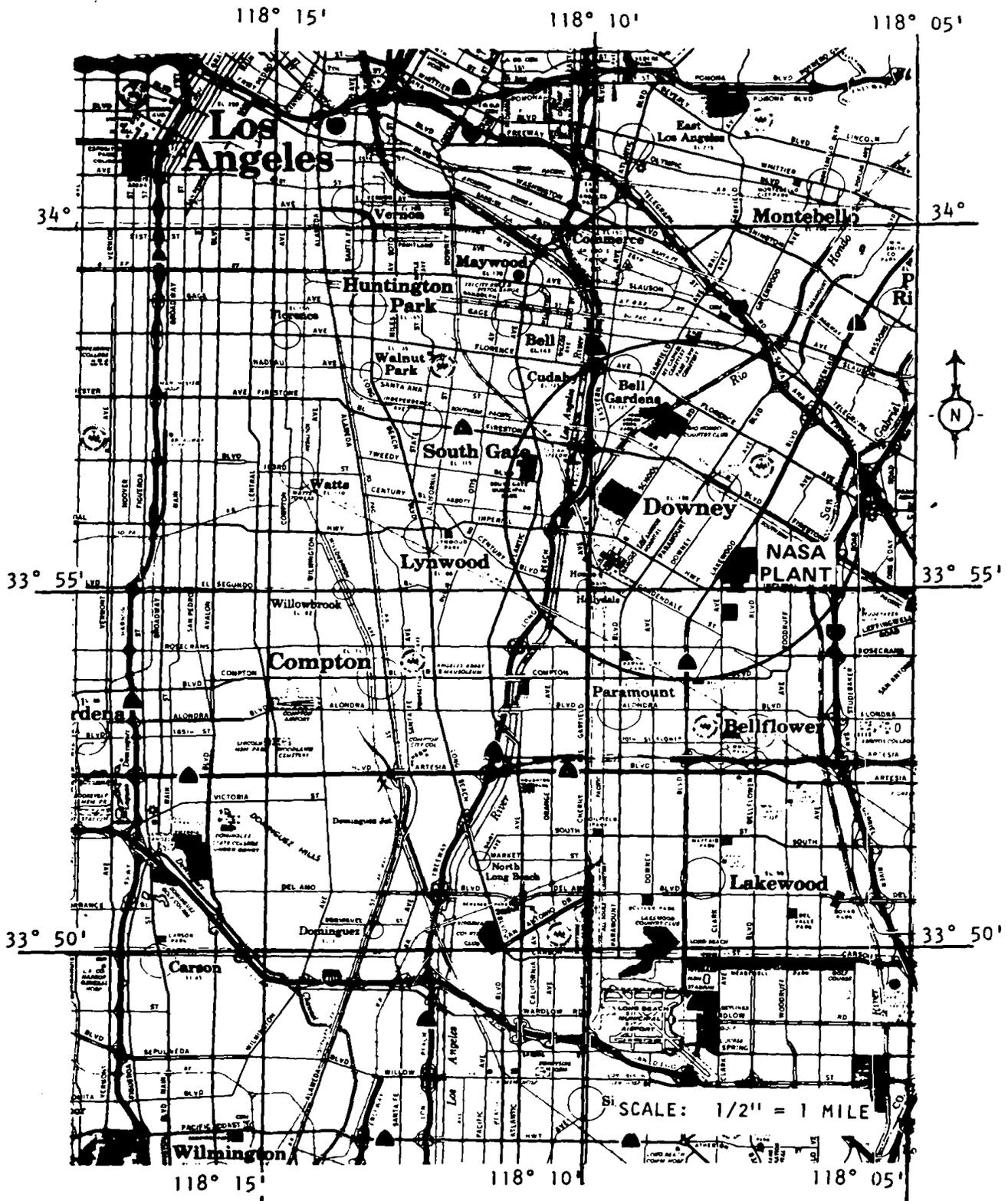


Figure 2. Downey and Vicinity

The plan for the revitalization of the CBD involves not only the future uses of the land, but also an architectural concept of the downtown area. Many of the recommendations of the plan are now in the developmental stage, and others are in the planning phases. The plan is used as a consistent guide to future action by downtown property owners, investors, and public officials.

A brief description of geographic characteristics is listed below:

Mean elevation:	103 ft above sea level
Latitude:	33° 55 min north
Longitude:	118° 07 min west
Terrain:	Relatively flat
Land slope:	10 ft per 1000 ft to the southwest

2. Hydrology

Major drainage occurs through the Rio Hondo Flood Control Channel on the west and the San Gabriel Flood Control Channel on the east. The proximity of these two natural rivers to the city has influenced the geology and soil composition of the community: approximately 9.5 percent of the city's soil is Tujunga sand; approximately 86.4 percent is Hanford sand (including Hanford sandy loam); and approximately 4.1 percent is Chino silt loam.

3. Climatology and Meteorology

Mean temperature:	Summer - 90° DB, 71° WB Winter - 35° DB
Mean annual rainfall:	10.5 in.
Mean barometric pressure:	29.9 mm of Hg
Mean humidity:	42 percent
Mean wind direction:	Northwest at 5 mph

4. Seismology, Subsidence, and Geology

Figure 3 depicts California's geological characteristics.

5. Bioenvironment

Table 1 lists land use, and Figure 4 is a projection of Downey's population growth.

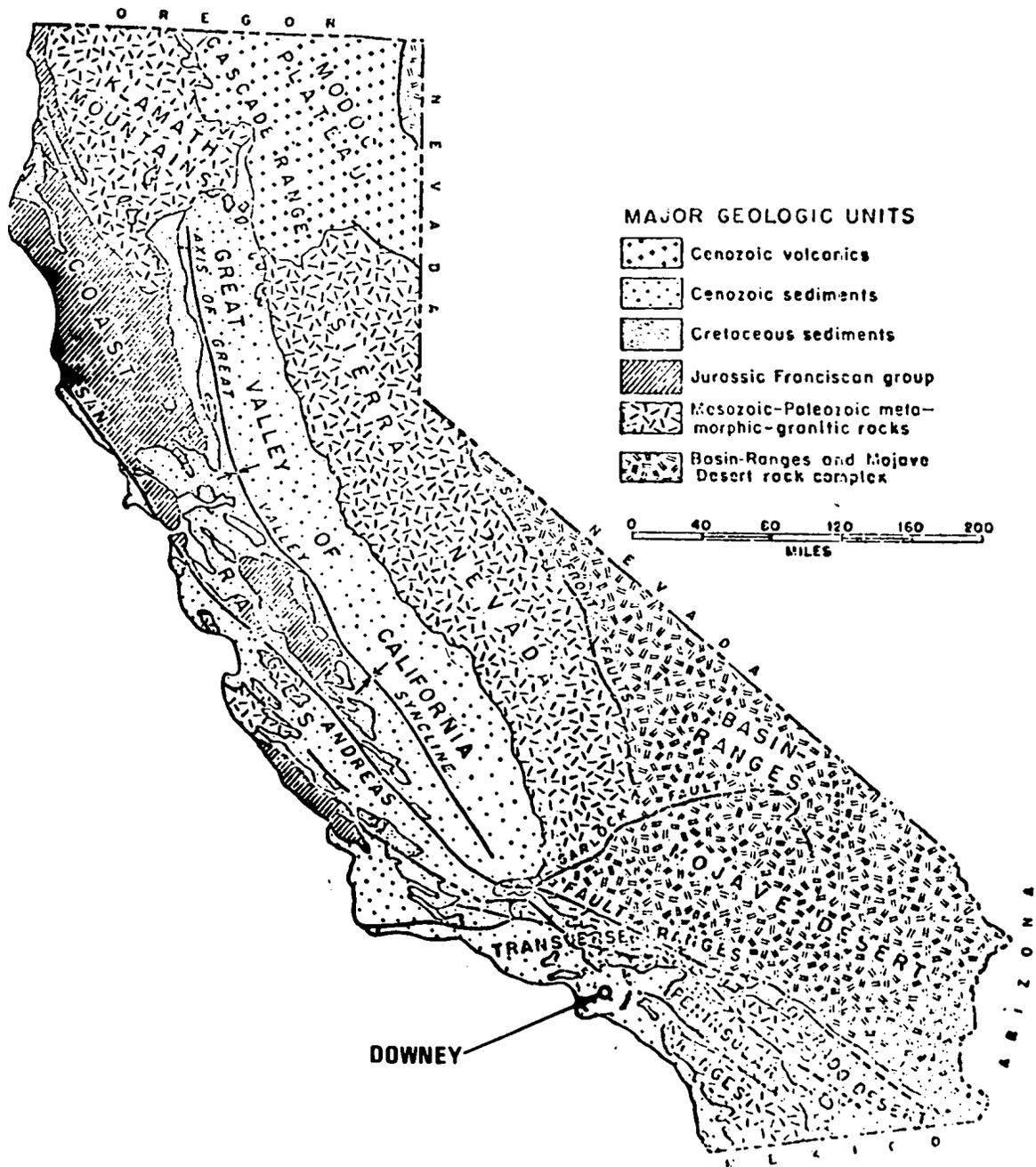


Figure 3. Map of California Showing Natural Provinces

Table 1. Land Use Inventory for Downey, California, 1968

LAND USE CATEGORY	AREA IN ACRES	% OF NET TOTAL	BUILDING AREA (SQ FT)
RESIDENTIAL	3737.5	61.1	(30282) ¹
<i>SINGLE FAMILY</i>	3411.8	55.8	(20580) ¹
<i>TWO FAMILY</i>	82.2	1.3	(1082) ¹
<i>MULTIPLE FAMILY</i>	243.6	4.0	(8620) ¹
COMMERCIAL	424.6	7.9	4,839,379
OFFICE	32.7	0.5	546,230
MEDICAL	31.5	0.5	452,753
GENERAL COMMERCIAL	420.6	6.9	3,840,396
INDUSTRIAL	498.6	8.2	5,349,600
UTILITIES	35.9	0.6	119,540
VACANT LAND	326.3	5.3	0
VACANT BUILDINGS	21.9	0.4	419,183
AGRICULTURAL	20.5	0.4	75,200
PUBLIC QUASI-PUBLIC	986.4	16.1	2,422,453
NET TOTAL	6112.0	100.0	13,224,355
RIGHTS-OF-WAY	2056.2		
THOROUGHFARES	1718.2		
RAILROAD	41.0		
OTHER ²	299.0		
TOTAL CITY	8170.2		

¹Building area for dwelling units is not computed. The figure entered is the total number of dwelling units within each category.

²Consists of flood control channels and land occupied by electric transmission lines.

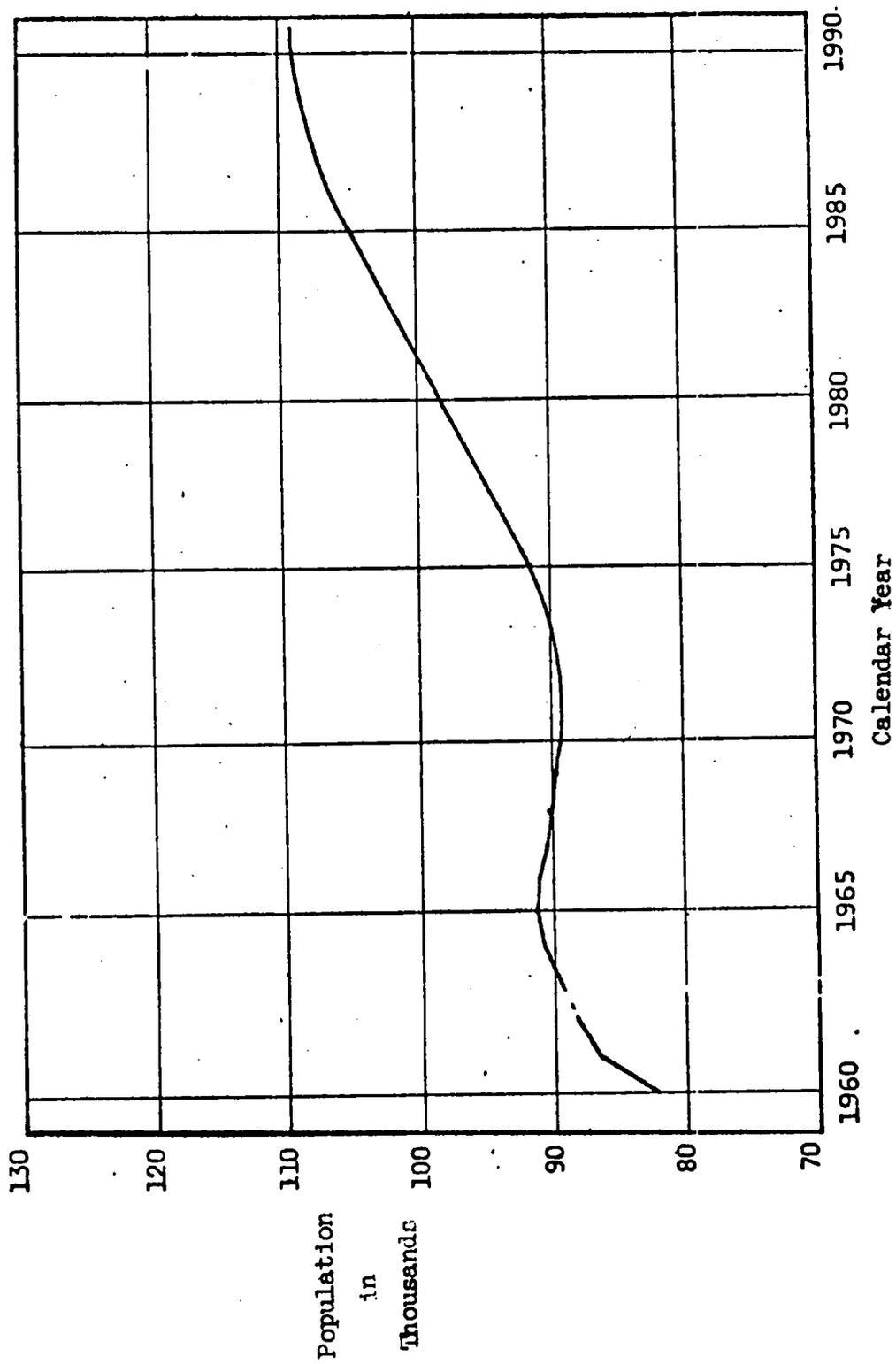


Figure 4. Population Projection to 1990 for Downey, California

6. Surrounding Land Use

In 1972, Downey's Planning Department conducted a detailed land use survey within the immediate area of the NASA industrial plant. The study area is bounded by Firestone Boulevard on the north, Imperial Highway and the Downey city limits on the south, the San Gabriel River on the east, and Downey Avenue on the west.

Field surveys and aerial photographs identified the residential, commercial, industrial, vacant, and related community land uses as they influence the operational expansion and appearance of NASA's industrial plant.

The residential areas west of the NASA industrial plant are composed of medium- to medium-low value houses with pockets of blighted properties between Lakewood Boulevard and Downey Avenue. The properties facing Lakewood on the east side and going south from Firestone are of mixed commercial, industrial, and residential uses, including groupings of attractive apartment buildings at Stewart and Gray Road. On the west side of Lakewood facing the NASA plant are a series of blighted commercial buildings and semivacant areas used for commercial employee parking.

Continuing south between Lakewood and Clark are residential properties of medium value, which are generally well maintained. Vacant land to the west and to the south of the NASA plant lies in small parcels along main highways and in large residential areas.

On the west, between Lakewood and Brookshire and south of the Southern Pacific Railroad, are large vacant parcels belonging to several old semivacant industrial plants. These properties have access to Firestone and Lakewood Boulevards and are serviced by a rail spur. Adjacent residential properties are old and blighted.

North of the NASA site, across Stewart and Gray, is a small mixture of new and old apartments and residential structures.

East of the NASA plant, beginning north of the Southern Pacific Railroad and running diagonally south between Bellflower and Woodruff, are belts of new and old residential structures. Farther east, across these residential strips and past Woodruff to the San Gabriel River between the Southern Pacific Railroad and Imperial Highway, is a large area of industrial land, both used and vacant, and a small blighted residential pocket. This area shows signs of industrial reconstruction.

7. Population

Approximately 10,000 people are employed at the Downey site. Downey's population of 88,442 inhabitants is located within the Los Angeles Metropolitan area. (See Figures 2 and 4.)

8. Transportation

Air

Greater Los Angeles is served by 21 scheduled air carriers offering domestic and international passenger and cargo service. One helicopter line operates scheduled passenger and air express services to 19 suburban areas.

Four major airports—Los Angeles International, Lockheed Air Terminal, Long Beach Municipal, and Ontario International—are served by the scheduled airlines, while these and other smaller airports handle private and other noncommercial flights.

Freeways adjacent to or near all major airports ensure rapid delivery of cargo and transportation of passengers to the area's business and population centers.

Over 30 domestic and international air freight forwarders in the Los Angeles area provide complete service.

Highways and Freeways

The trucking industry offers complete transportation service, carrying everything from the smallest shipments to truck-load quantities across the vast network of Southern California highways. They provide business and industry with transportation equipment designed to move goods rapidly and safely.

There are more miles of completed freeways in the metropolitan area than in any corresponding area in the world, and the ratio of miles of freeway per million population is rapidly increasing.

The freeway master plan for 1980 is now about one-third completed in the metropolitan portion of the five-county region. A total of 3100 miles of freeways will serve this five-county region by the target date. California's 1980 master plan calls for 12,400 miles of freeway, 2177 miles of which are included in the Interstate System completed in 1972. Both the region and the state exceed all others in freeway construction.

The Federal Highway Act of 1962 requires continuous, comprehensive transportation planning studies in metropolitan areas. The Los Angeles Regional Transportation Study (LARTS) has been under way since 1960 and is a sophisticated planning tool for the future development not only of the freeway system but also of other transportation modes. Maps are available which show the progressive development of the freeway system since 1953 and denote the future program through 1980.

Every industrial area will be within a mile or two of a segment of the freeway grid; and airports, rail terminals, and harbors are all adjacent to existing or proposed parts of the freeway system. In addition, labor mobility will be greatly enhanced because workers may choose homes anywhere within a vast area and still be within reasonable commuting distance of their jobs.

Rail

The Los Angeles five-county area, as well as much of the area adjacent to these counties, is served by three major transcontinental railroads: Santa Fe, Southern Pacific (including Pacific Electric Railway), and Union Pacific. Portions of the area are served by two local primarily switching carriers: the Los Angeles Junction Railway and the Harbor Belt Line, serving the Los Angeles Harbor and Wilmington area. The Long Beach Harbor is served by the three major transcontinental lines.

These railroads provide fast dependable service to and from all major transcontinental points and offer overnight service to major West Coast areas, such as San Francisco, Oakland, Phoenix, Tucson, San Diego, Las Vegas, and intermediate points. Second-day delivery is provided to areas in the Pacific Northwest. Large switching yards provide quick switching and delivery to industrial areas, and new trailer-on-flat-car (piggyback) facilities serve those who require this rapidly growing type of rail transportation.

The three major railroads and their subsidiaries own considerable parcels of industrial property, properly zoned with streets and utilities in place, which they will sell or lease to industries which ship sufficient volumes of rail freight to qualify.

Water

Southern California has unexcelled water transportation—coastwise, intercoastal, and foreign. The two adjoining ports of Los Angeles and Long Beach have the finest and most modern facilities for handling any type of world commerce. Over 5000 vessels call annually at these ports, offering regular and dependable service to all international markets, particularly Hawaii, the Orient, South America, and Australia. Modern and efficient terminals ensure fast loading and discharge of cargoes, affording the merchant economical handling and prompt dispatch. In addition to the regular cargo terminals, the ports have many specialized facilities, including two of the finest passenger terminals in the world, two super-tanker terminals, a modern efficient bulk loader capable of handling 3000 tons of iron ore or bulk chemicals per hour, a modern grain terminal with an elevator capacity of 2,000,000 bushels, and equipment for handling such items as bananas, molasses, containerized cargo, bulk liquids, and many other products.

Public

Mass transportation services in Southern California are provided almost entirely by motor coach. Local lines operate in the urban areas, and the communities in the region are linked together by an extensive network of interurban lines. A large number of suburban and intercity routes employ the freeway system to afford rapid service for commuter, business, and recreational travel.

Publicly owned and operated mass transportation systems predominate in Southern California. The largest system is the Southern California Rapid Transit District, which operates more than 2200 miles of local and interurban routes. The District is based in Los Angeles County and serves more than 160 cities and communities, with lines extending into Orange, Riverside, and San Bernardino Counties.

Private companies operate local bus lines in a number of the smaller communities and also provide public transportation services to the mountain and desert recreation areas.

The transportation systems in the Southern California area are ideally suited and quite adequate to support the existing and projected business activities of the NASA industrial plant at Downey, California. No additional transportation systems are required or planned to support the Space Shuttle effort; therefore, no additional environmental impact will result.

9. Water Supply and Water Pollution Control Factors

Pollution control regulations for industrial wastes are imposed by the Sanitation Districts of Los Angeles County. Pertinent excerpts from these regulations follow.

General Limitations

No person shall discharge or cause to be discharged to a public sewer, which directly or indirectly connects to the Los Angeles County Sanitation Districts' sewerage systems, the following wastes:

- a. Any gasoline, benzene, naphtha, solvent, fuel oil, or any liquid, solid, or gas that would cause or tend to cause flammable or explosive conditions to result in the sewerage system
- b. Any waste containing toxic or poisonous solids, liquids, or gases in such quantities that, alone or in combination with other waste substances, may create a hazard for humans, animals, or the local environment, interfere detrimentally with waste-water treatment processes, cause a public nuisance, or cause any hazardous condition to occur in the sewerage system

- c. Any waste having a pH lower than 6.0 or having any corrosive or detrimental characteristic that may cause injury to waste-water treatment or maintenance personnel or may cause damage to structures, equipment, or other physical facilities of the sewerage system
- d. Any solids or viscous substances of such size or in such quantity that they may cause obstruction to flow in the sewer or be detrimental to proper waste-water treatment plant operations: these objectionable substances include, but are not limited to, asphalt, dead animals, offal, ashes, sand, mud, straw, industrial process shavings, metal, glass, rags, feathers, tar, plastics, wood, whole blood, paunch manure, bones, hair and fleshings, entrails, paper dishes, paper cups, milk containers, or other similar paper products, either whole or ground
- e. Any rainwater, storm water, ground water, street drainage, subsurface drainage, roof drainage, yard drainage, water from yard fountains, ponds or lawn sprays or any other uncontaminated water
- f. Any water added for the purpose of diluting wastes which would otherwise exceed applicable maximum concentration limitations
- g. Any nonbiodegradable cutting oils, commonly called soluble oil, which form persistent water emulsions
- h. Any excessive concentrations of nonbiodegradable oil, petroleum oil, or refined petroleum products
- i. Any dispersed biodegradable oils and fats, such as lard, tallow, or vegetable oil in excessive concentrations that would tend to cause adverse effects on the sewerage system
- j. Any waste with an excessively high concentration of cyanide
- k. Any unreasonably large amounts of undissolved or dissolved solids
- l. Any wastes with excessively high biochemical oxygen demand (BOD), chemical oxygen demand (COD), or decomposable organic content
- m. Any strongly odorous waste or waste tending to create odors
- n. Any wastes containing over 0.1 milligram per liter of dissolved sulfides
- o. Any wastes with a pH high enough to cause alkaline incrustations on sewer walls

- p. Any substance promoting or causing the promotion of toxic gases
- q. Any waste having a temperature of 120 degrees F or higher
- r. Any wastes requiring an excessive quantity of chlorine or other chemical compound used for disinfection purposes
- s. Any excessive amounts of chlorinated hydrocarbon or organic phosphorus-type compounds
- t. Any excessive amounts of deionized water, steam condensate, or distilled water
- u. Any waste containing substances that may precipitate, solidify, or become viscous at temperatures between 50 degrees F and 100 degrees F
- v. Any waste producing excessive discoloration of waste water or treatment plant effluent
- w. Any garbage or waste that is not ground sufficiently to pass through a 3/8-inch screen
- x. Any wastes containing excessive quantities of iron, boron, chromium, phenols, plastic resins, copper, nickel, zinc, lead, mercury, cadmium, selenium, arsenic, or any other objectionable materials toxic to humans, animals, the local environment or to biological or other waste-water treatment processes
- y. Any blowdown or bleed water from cooling towers or other evaporative coolers exceeding one-third of the makeup water
- z. Any single-pass cooling water
- aa. Any excessive quantities of radioactive material wastes
- bb. Recognizable portions of the human anatomy

No person shall discharge or cause to be discharged to any public sewer which directly or indirectly connects to the Districts' sewerage system any wastes, if in the opinion of the chief engineer, such wastes may have an adverse or harmful effect on sewers, maintenance personnel, waste-water treatment, plant personnel or equipment, treatment plant effluent quality, public or private property, or may otherwise endanger the public, the local government, or create a public nuisance. The chief engineer, in determining the acceptability of specific wastes, shall consider the nature of the waste and the adequacy and nature of the collection, treatment, and disposal system available to accept the waste.

The Districts' chief engineer shall from time to time prepare a list of the maximum permissible quantities or concentrations of certain constituents in industrial waste-water flows and otherwise issue detailed directions for meeting the requirements of this section.

The NASA industrial plant at Downey, California, currently meets and will continue to meet the requirements of the Los Angeles Sanitation District.

Storm Drainage

The general flow of storm water overland is in a south-westerly direction. The City of Downey has recently completed a major underground storm sewer program to accommodate this flow. Those improvements which affect the NASA site are as follows:

- a. An 84-inch, reinforced-concrete pipe in Bellflower Boulevard running north from the storm drain at the intersection of Bellflower Boulevard and Imperial Highway is a trunk sewer that serves the easterly side of the site.
- b. A 96-inch, reinforced-concrete pipe in Ardis Avenue running north to Imperial Highway, then west beneath Imperial Highway to Clark Avenue, serves the west and south sides of the site.
- c. An 81-inch pipe in Clark Avenue from Imperial Highway north to Lakewood Boulevard and a 69-inch pipe north in Lakewood Boulevard to Alameda Street also serve the south and west sides of the site.

On the NASA industrial plant site, the surface run-off is intercepted by area inlets and carried to the above lines which empty into the San Gabriel River. The existing storm drain system is entirely adequate.

Sanitary Sewers

On-site sanitary sewer capacity is adequate. Off-site sanitary sewer capacity is adequate for existing facilities. The facilities are serviced by a 21-inch trunk sewer in Lakewood Boulevard and Clark Avenue, which has been relieved by the Woodruff Avenue relief trunk sewer and a 10-inch trunk sewer in Bellflower Boulevard. Hydrographs of the 21-inch sewer adjacent to the site show flow at 45 percent of its capacity; the flow in the 10-inch sanitary sewer is 50 percent of its capacity.

Water

Presently, water is purchased from the City of Downey and the Park Water Company. Wells are the primary water source for the City of Downey, while the Colorado River augments the supply. The Park Water Company is an independent concern whose numerous wells provide domestic

water throughout the local area. Eventually, all water will be supplied by the 79-inch Metropolitan Water Department trunk, which runs adjacent to the northerly side of the NASA site through the City of Downey distribution system.

Fire Protection Water

The existing fire protection system is a loop system. On-site storage capacity of the NASA industrial plant is 650,000 gallons, with an additional 300,000 gallons available off-site from the Park Water Company. The quality of the water meets State specifications for civil defense purposes.

All buildings on the site are equipped with sprinklers. Wet systems are used throughout, installed in accordance with the Factory Insurance Association (FIA) code requirements. The entire sprinkler system is supervised by an alarm system connected to a master panel located in the central control room of the Building 14 fire station.

10. Ambient Air Quality and Air Pollution Control Factors

The general limitations for air pollution are established in the Rules and Regulations of the County of Los Angeles Air Pollution Control District (APCD). Excerpts from pertinent rules follow.

Rule 50. Ringelmann Chart

(Effective 6 January 1972 for any source not completed and put into service. Effective for all sources on 1 January 1973.)

A person shall not discharge into the atmosphere from any single source of emission whatsoever any air contaminant for a period or periods aggregating more than three minutes in any one hour which is:

- a. As dark or darker in shade as that designated No. 1 on the Ringelmann Chart, as published by the United States Bureau of Mines, or
- b. Of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in subsection a of this rule.

This amendment shall be effective on the date of its adoption for any source of emission not then completed and put into service. As to all other sources of emission, this amendment shall be effective on 1 January 1973. Sources completed prior to 1 January 1973 shall comply with paragraph a, but refer to the shade designated No. 2 on the Ringelmann Chart.

Rule 51. Nuisance

A person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such persons or the public or which cause or have a natural tendency to cause injury or damage to business or property.

Rule 54. Solid Particulate Matter - Weight

(Effective 6 January 1972 for any equipment not completed and put into service. Effective for all equipment on 1 January 1973.)

A person shall not discharge into the atmosphere from any source solid particulate matter, including lead and lead compounds, in excess of the rate shown in the appropriate table contained in the APCD rule book.

Rule 58. Disposal of Solid and Liquid Wastes

a. A person shall not burn any combustible refuse in any incinerator except in a multiple-chamber incinerator as described in Rule 2p, or in equipment found by the Air Pollution Control officer in advance of such use to be equally effective for the purpose of air pollution control as an approved multiple-chamber incinerator. Rule 58a shall be effective in the Los Angeles Basin on the date of its adoption, and in the Upper Santa Clara River Valley Basin on 1 January 1972. In all other areas of Los Angeles County, this Rule shall be effective on 1 January 1973.

b. A person shall not discharge into the atmosphere from any incinerator or other equipment used to dispose of combustible refuse by burning, having design burning rates greater than 100 pounds per hour, except as provided in subsection d of this rule, particulate matter in excess of 0.1 grain per cubic foot of gas calculated to 12 percent of carbon dioxide (CO₂) at standard conditions. Any carbon dioxide produced by combustion of any liquid or gaseous fuels shall be excluded from the calculation to 12 percent of carbon dioxide.

Rule 66. Organic Solvents

a. A person shall not discharge into the atmosphere more than 15 pounds of organic materials in any one day, nor more than 3 pounds in any one hour, from any article, machine, equipment, or other contrivance, in which any organic solvent or any material containing organic solvent comes into contact with flame or is baked, heat-cured or heat-polymerized, in the presence of oxygen, unless said discharge has been reduced

by at least 85 percent. Those portions of any series of articles, machines, equipment, or other contrivances designed for processing a continuous web, strip, or wire which emit organic materials and using operations described in this section shall be collectively subject to compliance with this section.

b. A person shall not discharge into the atmosphere more than 40 pounds of organic materials in any one day, nor more than 8 pounds in any one hour, from any article, machine, equipment, or other contrivance used under conditions other than described in section a for employing or applying any photochemically reactive solvent, as defined in section k, or material containing such photochemically reactive solvent, unless said discharge has been reduced by at least 85 percent. Emissions of organic materials into the atmosphere resulting from air or heated drying of products for the first 12 hours after their removal from any article, machine, equipment, or other contrivance described in this section shall be included in determining compliance with this section. Emissions resulting from baking, heat-curing, or heat-polymerizing as described in section a shall be excluded from determination of compliance with this section. Those portions of any series of articles, machines, equipment or other contrivances designed for processing a continuous web, strip, or wire which emit organic materials and using operations described in this section shall be collectively subject to compliance with this section.

c. A person shall not, after 31 August 1974, discharge into the atmosphere more than 3,000 pounds of organic materials in any one day, nor more than 450 pounds in any one hour, from any article, machine, equipment, or other contrivance in which any non-photochemically reactive organic solvent or any material containing such solvent is employed or applied, unless said discharge has been reduced by at least 85 percent. Emissions of organic materials into the atmosphere resulting from air or heated drying of products for the first 12 hours after their removal from any article, machine, equipment, or other contrivance described in this section shall be included in determining compliance with this section. Emissions resulting from baking, heat-curing, or heat-polymerizing as described in section a shall be excluded from determination of compliance with this section. Those portions of any series of articles, machines, equipment, or other contrivances designed for processing a continuous web, strip, or wire which emit organic materials and using operations described in this section shall be collectively subject to compliance with this section.

d. Emissions of organic materials to the atmosphere from the cleanup with photochemically reactive solvent, as defined in section k, of any article, machine, equipment, or other contrivance described in sections a, b, or c, shall be included with the other emissions of organic materials from that article, machine, equipment, or other contrivance for determining compliance with this rule.

f. Emissions of organic materials into the atmosphere required to be controlled by sections a, b, or c, shall be reduced by (1) incineration, provided that 90 percent or more of the carbon in the organic material being incinerated is oxidized to carbon dioxide, or (2) adsorption, or (3) processing in a manner determined by the Air Pollution Control officer to be not less effective than (1) or (2).

g. A person incinerating, adsorbing, or otherwise processing organic materials pursuant to this rule shall provide, properly install, and maintain in calibration, in good working order, and in operation, devices as specified in the authority to construct or the permit to operate, or as specified by the Air Pollution Control officer, for indicating temperatures, pressures, rates of flow, or other operating conditions necessary to determine the degree and effectiveness of air pollution control.

h. Any person using organic solvents or any materials containing organic solvents shall supply the Air Pollution Control officer, upon request and in the manner and form prescribed by him, written evidence of the chemical composition, physical properties, and amount consumed for each organic solvent used.

i. The provisions of this rule shall not apply to:

- The manufacture of organic solvents, or the transport or storage of organic solvents or materials containing organic solvents
- The use of equipment for which other requirements are specified by Rules 56, 59, 61, or 65 or which are exempt from air pollution control requirements by said rules
- The spraying or other employment of insecticides, pesticides, or herbicides
- The employment, application, evaporation, or drying of saturated halogenated hydrocarbons or perchloroethylene
- The use of any material, in any article, machine, equipment or other contrivance described in sections a, b, c, or d, if (1) the volatile content of such material consists only of water and organic solvents, and (2) the organic solvents comprise not more than 20 percent of said volatile content, and (3) the volatile content is not photochemically reactive as defined in section k

j. For the purposes of this rule, organic solvents include diluents and thinners and are defined as organic materials which are liquids at standard conditions and which are used as solvers, viscosity reducers or cleaning agents, except that such materials which exhibit a boiling

point higher than 200 degrees F at 0.5-millimeter mercury absolute pressure or having an equivalent vapor pressure shall not be considered to be solvents unless exposed to temperatures exceeding 220 degrees F.

k. For the purposes of this rule, a photochemically reactive solvent is any solvent with an aggregate of more than 20 percent of its total volume composed of the chemical compounds classified below or which exceeds any of the following individual percentage composition limitations, referred to the total volume of solvent: (1) a combination of hydrocabrons, alcohols, aldehydes, esters, ethers, or ketones having an olefinic or cyclo-olefinic type of unsaturation—5 percent; (2) a combination of aromatic compounds with eight or more carbon atoms to the molecule except ethylbenzene—8 percent; (3) a combination of ethylbenzene, ketones having branched hydrocarbon structures, trichloroethylene, or toluene—20 percent.

Whenever any organic solvent or any constituent of an organic solvent may be classified from its chemical structure into more than one of the above groups of organic compounds, it shall be considered as a member of the most reactive chemical group, that is, that group having the least allowable percent of the total volume of solvents.

l. For the purposes of this rule, organic materials are defined as chemical compounds of carbon excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides, metallic carbonates, and ammonium carbonate.

Rule 66.2 Disposal and Evaporation of Solvents

A person shall not during any one day dispose of a total of more than 1-1/2 gallons of any photochemically reactive solvent, as defined in Rule 66k, or of any material containing more than 1-1/2 gallons of any such photochemically reactive solvent by any means which will permit the evaporation of such solvent into the atmosphere.

Rule 67. Fuel Burning Equipment

A person shall not build, erect, install, or expand any nonmobile fuel burning equipment unit unless the discharge into the atmosphere of contaminants will not and does not exceed any one or more of the following rates: (1) 200 pounds per hour of sulfur compounds, calculated as sulfur dioxide (SO₂); (2) 140 pounds per hour of nitrogen oxides, calculated as nitrogen dioxide (NO₂); (3) 10 pounds per hour of combustion contaminants as defined in Rule 2m and derived from the fuel.

For the purpose of this rule, a fuel burning equipment unit shall be comprised of the minimum number of boilers, furnaces, jet engines, or other fuel burning equipment, the simultaneous operations of which are required for the production of useful heat or power.

Fuel burning equipment serving primarily as air pollution control equipment by using a combustion process to destroy air contaminants shall be exempt from the provisions of this rule.

Nothing in this rule shall be construed as preventing the maintenance or preventing the alteration or modification of an existing fuel burning equipment unit which will reduce its mass rate of air contaminant emissions.

Rule 69. Vacuum Producing Devices or Systems

A person shall not discharge into the atmosphere more than 3 pounds of organic materials in any one hour from any vacuum producing devices or systems including hot wells and accumulators, unless said discharge has been reduced by at least 90 percent.

This rule shall be effective at the date of its adoption for any equipment not then completed and put into service. As to all other equipment this rule shall be effective on 1 July 1972.

The NASA industrial plant at Downey, California, currently meets and will continue to meet the requirements set forth in the Rules and Regulations of the County of Los Angeles Air Pollution Control District.

11. Other Codes and Regulations

The following list of codes and regulations also governs construction and/or operations at the NASA industrial plant in Downey, California.

- Uniform Building Code
- ACI Building Code Requirements
- AISC Specification for Structural Steel for Buildings
- National Electric Code
- Western Plumbing Officials' Uniform Plumbing Code
- ASHRAE
- National Association of Fan Manufacturers
- National Boards of Fire Underwriters
- Local city and/or county ordinances
- ASA Code for Pressure Piping, B31-1
- ASME Boiler Code
- ASME Unfired Pressure Vessel Code
- Factory Insurance Association
- Industrial Safety Orders, State of California
- Construction Safety Orders, State of California
- Federal Register, 18 October 1972, Vol. 37, No. 202,
Part II, Department of Labor Occupational Safety and
Health Administration
- Environmental Protection Agency
- U.S. Department of Health, Education and Welfare (Water
Supply and Plumbing Cross-Connections)
- State of California Air Resources Board

C. INSTITUTIONAL ENVIRONMENTAL CONSIDERATIONS

1. Land Use

The existing NASA industrial plant, located on 164 acres of land confined by Imperial Highway, Bellflower Boulevard, Stewart and Gray Road, Lakewood Boulevard, and Clark Avenue in Downey, California, is used by Rockwell International's Space Division for the production of flight and ground hardware associated with the Shuttle program.

2. Waste Management

Air Pollution Control

The Downey facility operates under the jurisdiction of the Los Angeles County APCD. All equipment used at the facility for controlling emissions or gaseous pollutants which vent into the atmosphere is designed and installed in accordance with APCD stipulations.

Water Pollution Control

The cognizant water pollution control agency for the facility is in the State of California Department of Water Resources, Office of the 4th Regional Water Control Board. All industrial processes using potable water supplies are equipped with backflow prevention devices in accordance with the rules and regulations of the Los Angeles County Sanitation District. The facility does not contribute to water pollution.

Generally, the sanitary and the nontoxic industrial wastes are discharged to the Los Angeles County Sanitation District trunk line, which is operated by the Sanitation District under the Sanitation Districts of Los Angeles County. Toxic wastes and heavy acids are hauled to an approved disposal site by a licensed hauler, and reports of each haul are filed with the county engineer. Hence, neither toxic industrial wastes nor other industrial wastes are discharged on the ground or to storm drains. Compliance action with all requirements of the State Water Pollution Control Board Code and the Los Angeles County Sanitation District requirements has been implemented and is in operation as standard operating procedure.

Radioactive Materials

Numerous small radioactive sources are stored and/or used at the Downey site. Sources are used for such diverse purposes as thickness gauging, radiographic inspection, cabin environment chromatography, astronaut grab ring and docking ring studies, studies of photon effects on spacecraft skin, various calibration requirements, gamma high-flux radiator for life science studies, tracers for study of biological effects, viscosity measurement, and studies of radiation effects on infrared detectors.

The storage and use of all radioactive sources are carefully controlled in accordance with California Administrative Code, Title 17. Mandatory precautions for the use of radioactive sources include the employment of collimating devices, lead shielding, special tooling, warning lights and warning signs, personnel barricades, and area surveillance by qualified radiographic personnel. In addition, each exposure is carefully monitored. The only materials used are those permitted by the above code, California radioactive material licenses, and Rockwell policies and procedures.

3. Emissions From Heating Fuels

Emissions from heating fuels are minimized by burning natural gas. During rare periods of peak demand when gas is unavailable, fuel oil is burned. The burning of fuel oil is under the control of the Los Angeles County APCD. The amount burned at the facility is controlled so that the general atmosphere is not affected to an unacceptable degree.

4. Noise Control

None of the activities conducted at the site produces noise of significant levels. When there is a noise problem, it is controlled by sound-proofing the area in which the noise is produced.

5. Radio Frequency Interference

All power installations at the Downey site are appropriately filtered to prohibit the transmission of radio frequency signals which could interfere with military or commercial installations. It is possible, on 24-hour notice, to obtain FCC permission for short-duration use of such frequencies. No proposed Shuttle frequencies employed at the Downey site will interfere with military or commercial frequencies. All equipment used is of the accepted FCC type.

6. Environmental Monitoring and Control

Environmental Health Program Requirements

The site operates in compliance with the following federal requirements:

- Walsh Healey Public Contracts Act
- Atomic Energy Act
- Public Law 91-596—Occupational Health and Safety Act
(signed into law in January 1971)
- Laboratory Manual of the U.S. Department of Health,
Education and Welfare Public Health Service
(methods for evaluating and controlling
the environment)

The following codes of the State of California, the County of Los Angeles, and the City of Downey govern Space Division activities:

Title 8, Chapter 4, of the California Administrative Code, Industrial Safety Orders of State, including, but not limited to:

Article 102, Standards for Protection
Against Radiation
Article 105, Standards for Noise Control
Article 107, Dusts, Fumes, Mists, Vapors,
and Gases

Title 17, Public Health (applicable sections)
Title 19, Public Safety (applicable sections)
Los Angeles County APCD Rules and Regulations
Special County and City codes for building and
safety, sanitation, fire, and transportation

In addition to the above mandatory requirements, the following sources are guides in the resolution of problems or issues:

American National Standards Institute
State Department of Public Health Standards
American Society of Mechanical Engineers' Standards
Department of Defense Publications
NASA Publications
Underwriters Laboratory Standards
National Fire Protection Association Standards
Manufacturing Chemists' Association Standards
American Conference of Governmental Industrial
Hygienics
National Safety Council Data Sheets

Other Programs

Packaging and transportation of hazardous and/or otherwise toxic materials to and from plants are carried out in accordance with applicable Department of Transportation (DOT) regulations.

The NASA industrial plant at Downey has adopted in its general plan a policy to maintain a good community image. The community is protected by a protective barrier (buffer strip, normally consisting of a parking lot and landscaped areas, plus a street) which physically separates Company activities from the nearest inhabitant.

Through stringent adherence to all applicable safety codes, standards, and ordinances within the plant, the general ecology of the surrounding community is preserved.

A reciprocal agreement exists between Rockwell and Downey's Fire Department for emergency action to protect inhabitants of the plant's periphery. Firemen are on call for in-plant protection as well.

Salvageable solid waste materials are segregated, deposited into appropriate containers, released to salvage sales, and sold. Other solid waste materials are picked up on a regular basis by a contracted licensed hauler and taken to a Los Angeles Sanitation District land fill dump.

II. ASSESSMENTS OF ENVIRONMENTAL IMPACT FOR INDIVIDUAL
FACILITIES AND FUNCTIONS

(Assessments 1 through 24)

II. ASSESSMENTS OF ENVIRONMENTAL IMPACT FOR INDIVIDUAL FACILITIES AND FUNCTIONS

Environmental impact assessments have been prepared for each facility and function which will be involved in the development of the Space Shuttle Program at the NASA industrial plant in Downey, California. This section contains a brief review--proposed action, potential for environmental effect, and conclusions regarding environmental impact--for each assessment as well as a map showing the location of the function or facility.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 1

TITLE: CHEMICAL PROCESSING OF METALS

A. CHEMICAL PROCESSING FACILITIES

Description of Proposed Action

Chemical processing functions are located in Buildings 061/292, 244/277, and 287 (Figure 5). The functions of Buildings 244/277 and 287 include passivating, cadmium plating, nickel plating, tin plating, anodizing, and metallic dye processes of Shuttle/orbiter detailed parts. These facilities have rinse tanks, chemical solution tanks, and vapor degreasers. Building 061/292 has special purpose capabilities for ultrasonic cleaning, passivating, etching, salt brazing, and plating for aluminum and stainless steel detailed tubing processes. The facility has cleaning tanks, a freon flushing system, a final cleaning system, a dry oven, a salt bath, rinse, passivation, and flux removal tanks.

Rinse water and certain chemicals that are spent and released for disposal are drained or pumped through plumbing from these buildings to a liquid waste treatment station for neutralization. The neutralization process of a spent liquid is to maintain the pH factor at a level between the established minimum pH of 6.0 and maximum pH of 9.0. This requirement is met by adding a base when the reading is pH 6.0 or less, and adding an acid when the reading is pH 9.0 or higher. When the effluent meets this requirement of the Sanitation District of Los Angeles County, it is released to the public sewer. Tanks containing concentrated chemicals, such as chromates and nitric acids, receive special handling. When these solutions are spent, they are released into receiving sumps. The solutions are hauled away for disposal by a State of California licensed hauler to a legally approved dump site. These spent solutions are disposed of at this site by injecting them into an approved and licensed deep well. A legally approved dump site for waste in the County of Los Angeles is a site that conforms geologically, hydrologically, and topographically to the State of California and Los Angeles County regulations. Other solutions, such as cyanides, are released to a neutralizing processing plant operated by the Los Angeles County Sanitation District.

The toxic fumes and steam emitted from various tanks are collected in a hood and duct system through an approved fume scrubber. Two approved types of scrubbers are common at the Downey complex: the water spray and the dry filter. The water spray scrubber collects the organic particles as the fumes and/or steam passes through the spray. The effluent from the scrubber is drained to the applicable sump and pumped with the other wastes to the liquid waste treatment station. The dry filter scrubber removes organic particles as the fumes pass through a filtering element. This element is changed periodically and discarded as normal disposable refuse. The vapors emitted from the scrubber into the atmosphere are within the limitations of the Los Angeles County APCD.

**DOWNEY COMPLEX
ASSESSMENT NUMBER 1**

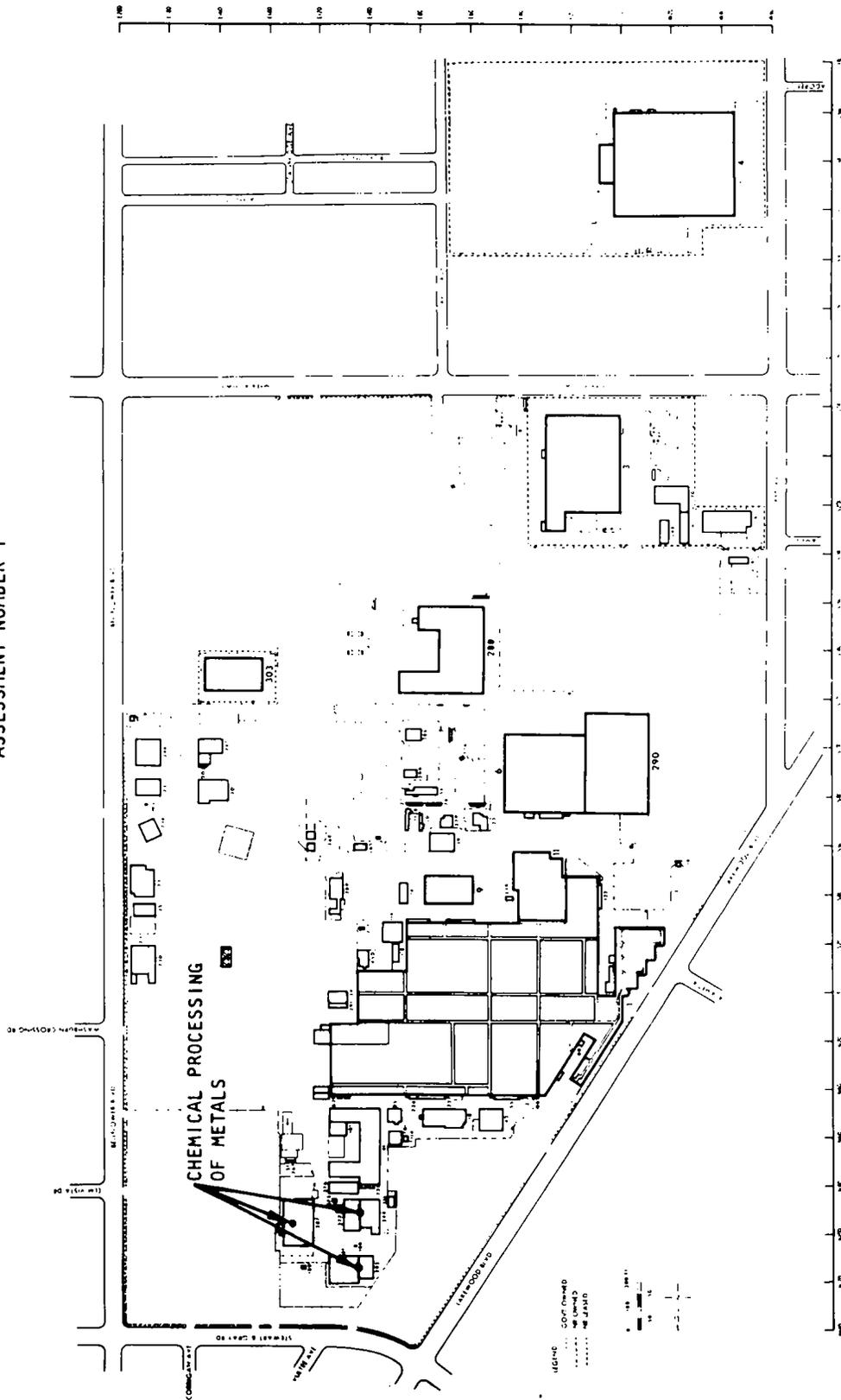


Figure 5. Chemical Processing Facilities

Probable Impact of Proposed Action on the Environment

This function will have negligible effect on the environment. The toxic fumes emitted from the facility are collected and scrubbed to meet acceptable limits prior to release to the atmosphere. The methods used to dispose of deionized rinse water, spent chemical baths, and toxic fumes will be within the framework of the regulations established by the responsible Los Angeles County agencies. There is no apparent potential for occupational health hazards or other danger to life systems.

Probable Adverse Environmental Effects

As long as chemical wastes are adequately treated before they are dumped in the public sewer or properly disposed of by a licensed hauler and toxic fumes are collected and scrubbed before they are released into the atmosphere, there will be no known adverse environmental effects. The methods used to treat waste chemicals and toxic fumes are acceptable to the responsible Los Angeles County regulatory agencies.

Alternatives to the Proposed Action

The chemical processing functions are essential to maintain schedule control of production details for the Space Shuttle Program. This area has been used for chemical processing since 1956 and is ideally suited because of the proximity of utilities, water treatment facility, sewers, sumps, steam boilers, etc. Relocation of this function to a more remote site is a possibility, but is not economically feasible. The operation of this function of the Space Shuttle Program at the Downey site appears to be environmentally compatible and economically necessary to conduct this NASA program.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned treatment of waste water and air exhausts will offer no appreciable short-term environmental degradation; hence, it will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the processing function. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon the completion of this program. Disposal of waste solutions generated by this proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 2

TITLE: PAINTING OF AIRFRAME, ASSEMBLIES, SUBASSEMBLIES, AND
SUPPORTING EQUIPMENT

B. PAINT SPRAYING FACILITIES

Description of Proposed Action

Although paint spraying occurs mainly in Building 041, Buildings 004, 236, 287, and 701 are also equipped with standard paints, protective coatings, dry-film lubricants, and thermo-control paint and coatings (Figure 6). Organic particles and toxic fumes are removed from the spray mist when they pass through an approved water wash and/or dry filter. The water wash system collects the organic particles which are then circulated through a water reclamation system. The residual or sludge solution, remaining from the water separation process, is released into a sump tank for collection. The waste solution is collected by a State of California licensed hauler for treatment and disposal. Approved solid waste particles are deposited in a land fill dump operated by the Los Angeles County Sanitation District.

Fumes or vapors which pass through a dry filter system are within the limitations of the Los Angeles County APCD before they are released into the atmosphere.

Probable Impact of Proposed Action on the Environment

The particles and fumes emitted from these facilities will have negligible effect on the environment, since the process for collection and filtering keeps emissions within acceptable limits. The methods used to dispose of paint, sludge, thinner, solvents, and fumes are within the framework established by the responsible Los Angeles County agencies and the State of California.

Probable Adverse Environmental Effects

This facility will cause no known adverse environmental effects, provided paint and chemical solutions are properly disposed of by a State of California licensed hauler, and the fumes are filtered or washed prior to release to the atmosphere. The method used to dispose of waste solutions and fumes is acceptable to the responsible Los Angeles County regulatory agencies.

Alternatives to the Proposed Action

The paint functions have been located and operated in this way during previous programs. They are a centralized function in the flow of orbiter assembly processes. The operation of this function appears to be environmentally compatible and economically essential for present and future programs. It is possible that the facilities could be relocated, but it would not be compatible or economical for maintaining schedule control and flow of production details.

DOWNEY COMPLEX
ASSESSMENT NUMBER 2

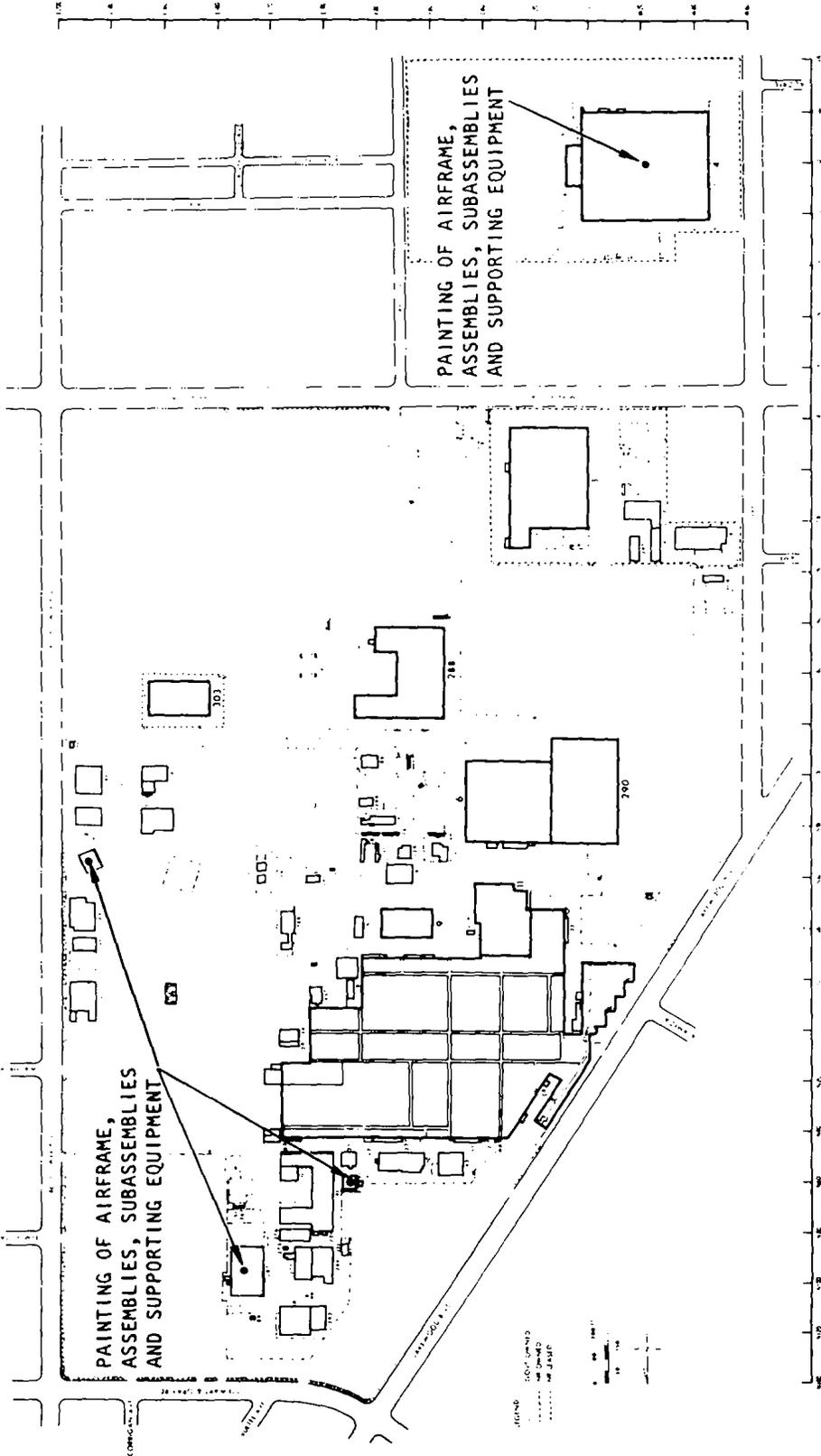


Figure 6. Paint Spraying Facilities

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned controlled treatment of paint residue, solvent, thinner, and fumes will cause no appreciable short-term environmental degradation; hence it will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. Disposal of waste materials generated by this proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 3

TITLE: DETAILED MACHINING OF PRIMARY AND SECONDARY STRUCTURE ASSEMBLIES

C. MACHINE TOOL OPERATION FACILITIES

Description of Proposed Action

Buildings 001 and 288 contain areas dedicated to the fabrication of machined detailed parts from forgings, tubing, extrusions, sheet plate, and bar stock (Figure 7). Building 001 has the primary machining tool operation for the fabrication of Shuttle/orbiter machined parts. Major machine operations will be performed on primary and secondary structures of the crew module, conical section, flight deck, hatches, window assemblies, forward and aft bulkheads, and aft fuselage. The crew module is designed as a separate pressure vessel requiring a seal-tight structure. The primary structure sections are machined alloy plate with integral stiffening stringers and waffles. The conical section is made of three conical panels. Integral stringers with bosses are machined for these panels. Flat bulkheads at the fore and aft ends are machined panels with integral stiffeners, attach bosses, etc. The upper floor, or flight deck, is integrally machined in three sections as is the lower floor. Each hatch is machined from aluminum billets for shape, and integrally machined internal stiffeners and bosses for attachment. The aft fuselage structural framework consists of frames, bulkheads, platform, and braces machined from aluminum billets which provide the interface mounting and thrust structures and carry through the beams for engine mountings.

Building 288 is used exclusively in engineering developmental support for Shuttle/orbiter structures testing. The machine shops are equipped with major machine tools, including numerical control tools. Machine equipment is available for grinding or lapping, drilling, milling, boring, burring, and lathe operations.

Spent soluble cutting oil and cooling fluid that is used in the machine tool operations is drained off into an independent reservoir or sump for each machine using these fluids. These waste fluids are drained from each machine's reservoir into a portable approved container. The collected spent fluids are deposited into an oil sump-type container, which is periodically pumped out by a State of California licensed commercial hauler for approved treatment and disposal. Approved solid waste particles are deposited in the Los Angeles County Sanitation District land fill dump.

Scrap products of ferrous and non-ferrous material from the machine tools are segregated, deposited into appropriate scrap containers for disposal as salvageable material, and sold.

Probable Impact of Proposed Action on the Environment

This proposed action will have no significant effect or impact on the environment. The present and proposed methods of disposal of cutting

DOWNEY COMPLEX
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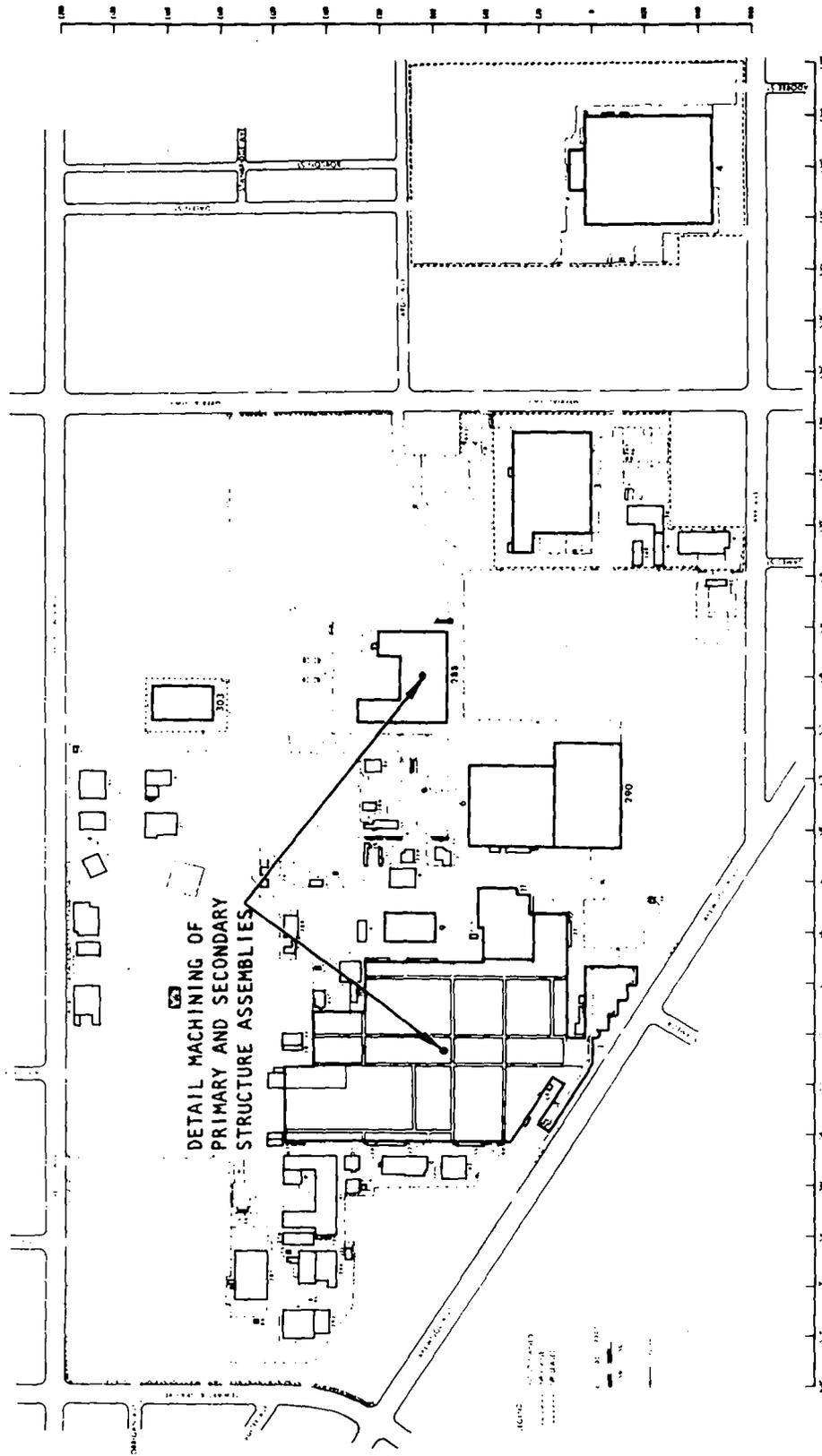


Figure 7. Machine Tool Operation Facilities

oil, coolant, waste material, and scrap cutting are within the regulations and framework established by the responsible Los Angeles County agencies.

Probable Adverse Environmental Effects

This facility will cause no known adverse environment effects, provided that the spent materials are properly disposed of by a State of California licensed hauler as specified by the Los Angeles County regulatory agencies.

Alternatives to the Proposed Action

There are no known alternatives as effective and economical for the disposal of waste material as those now in effect. The location of these facilities is dictated by their related requirements. These areas have been used in past programs and are ideally suited to their operations. It would not be economically feasible to relocate to another area.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned treatment of water soluble oil waste will cause no appreciable short-term environmental degradation; hence it will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. Disposal of waste materials generated by the proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 4

TITLE: SHEET METAL PROCESSING OF SECONDARY STRUCTURES, INTERIOR
FIXTURES, AND SUBASSEMBLIES

D. SHEET METAL DETAIL FABRICATION FACILITIES

Description of Proposed Action

Sheet metal detail fabrication operations are centered in Building 001 (Figure 8). This area is equipped to process a wide range of sheet metals, including various types of steel and aluminum alloys, that make up portions of the secondary structures and interior fixtures of the Shuttle/orbiter crew module, forward fuselage, and aft fuselage. These structures and fixtures require conventional techniques of fabrication and mechanical attaching.

The sheet metal detail operation can cut, shape, bend, form, shear, shrink, roll, and drill the materials required for special concepts and designs of the orbiter.

Waste materials, such as aluminum and steel alloys that make up various detailed assemblies, are segregated, deposited into appropriate scrap containers for disposal as salvageable material, and sold.

Probable Impact of Proposed Action on the Environment

The proposed action will have no significant effect or impact on the environment. The present and proposed methods of disposal of scrap metals as salvageable materials are within the framework established by the responsible Los Angeles County agencies.

Probable Adverse Environmental Effects

No known adverse environmental effects can result from the proposed action. The present and proposed methods used for the disposal of scrap material for reclamation are acceptable procedures within the Space Shuttle Program as established by NASA Procurement Regulations, Part 24.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned disposal of waste materials will cause no appreciable short-term environmental degradation, and hence will have no long-term adverse environmental effect.

DOWNEY COMPLEX
ASSESSMENT NUMBER 4

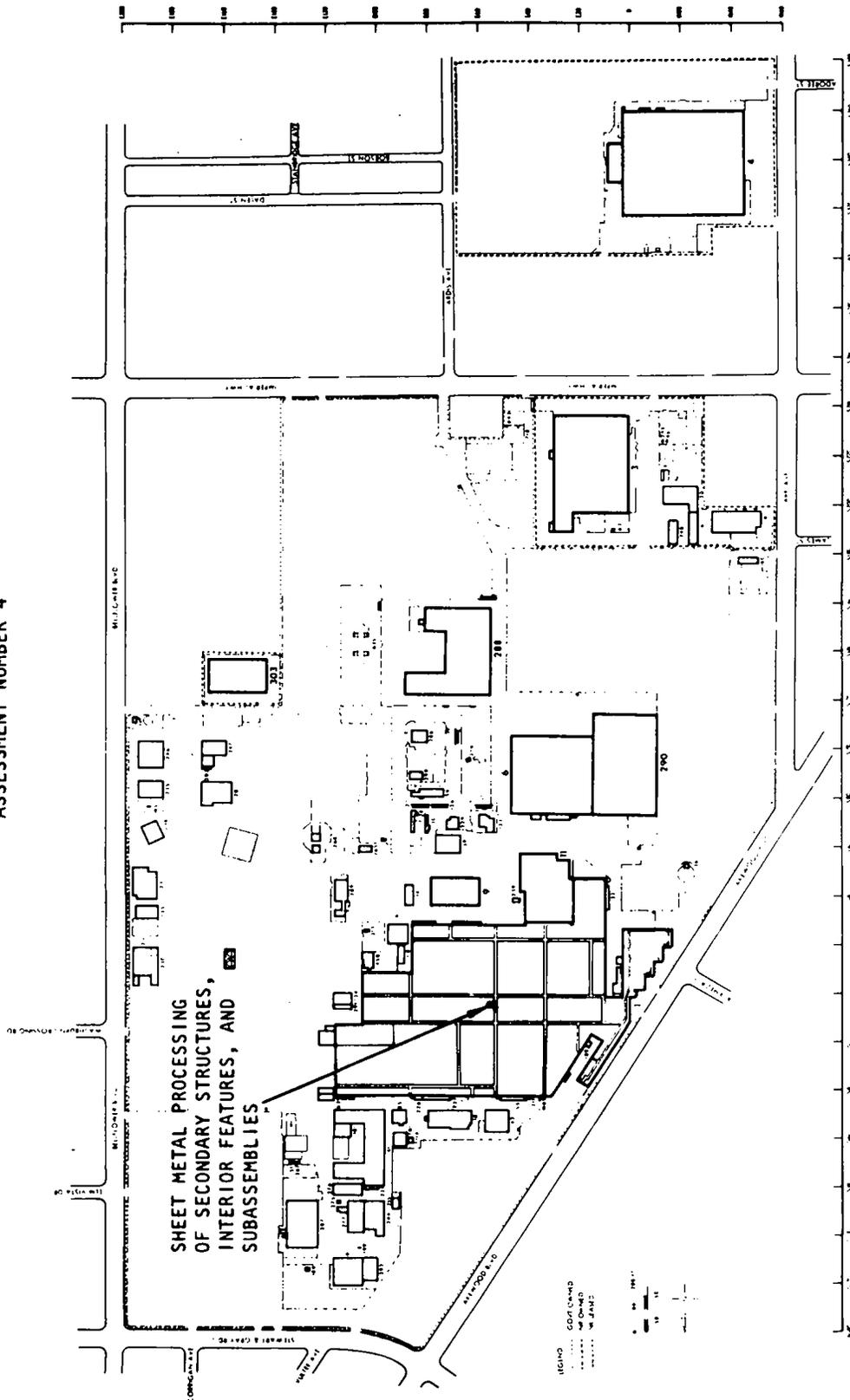


Figure 8. Sheet Metal Detail Fabrication Facilities

Irreversible and Irretrievable Commitments of Resources From
the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. Disposal of waste materials generated by the proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 5

TITLE: BONDING AND PLASTIC FABRICATION OF STRUCTURE, NON-STRESS
ASSEMBLIES, AND INTERIOR FIXTURES

E. DETAILED BONDED AND PLASTIC PARTS FABRICATION FACILITIES

Description of Proposed Action

The detailed bonded and plastic parts fabrication is located in Building 287 (Figure 9). This facility is capable of fabricating plastic details and assemblies, metal or non-metal honeycomb core structures, and bonding metallic and non-metallic materials. The Shuttle/orbiter has bonded and fiberglass structures throughout the following forward and aft compartments: fuselage panels and frames, airlock, flight deck (sections), lower deck (door), walls and partitions, storage bins, external and internal hatches, false ceiling (panels), struts, brackets, webs, heat shield, and fairing.

The operation consists of plastic mold preparation, laminating, potting, bonding, curing, compression molding, trimming, and profiling. This facility contains ovens, presses, clamshell and horizontal autoclaves, vacuum and pressure equipment, monitoring equipment, and trimming equipment.

Bonding, plastic, and fiberglass process waste materials are deposited in approved scrap containers. Reclaimable material is sold as salvage through surplus sales. Trimmings from non-metallic and metallic materials are hauled away by a contracted licensed hauler for disposal in a Los Angeles County Sanitation District land fill dump for disposable refuse.

Probable Impact of Proposed Action on the Environment

This proposed action will have no significant effect or impact on the environment. Fumes that are emitted from this facility are kept within the accepted limits of the Los Angeles County APCD. The present and proposed disposal methods for scrap metals as salvageable materials are within the framework established by the responsible Los Angeles County agencies and NASA Procurement Regulations, Part 24.

Probable Adverse Environmental Effects

The proposed action can cause no known adverse environmental effects. The present and proposed methods used for disposal of scrap material for reclamation are acceptable procedures.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

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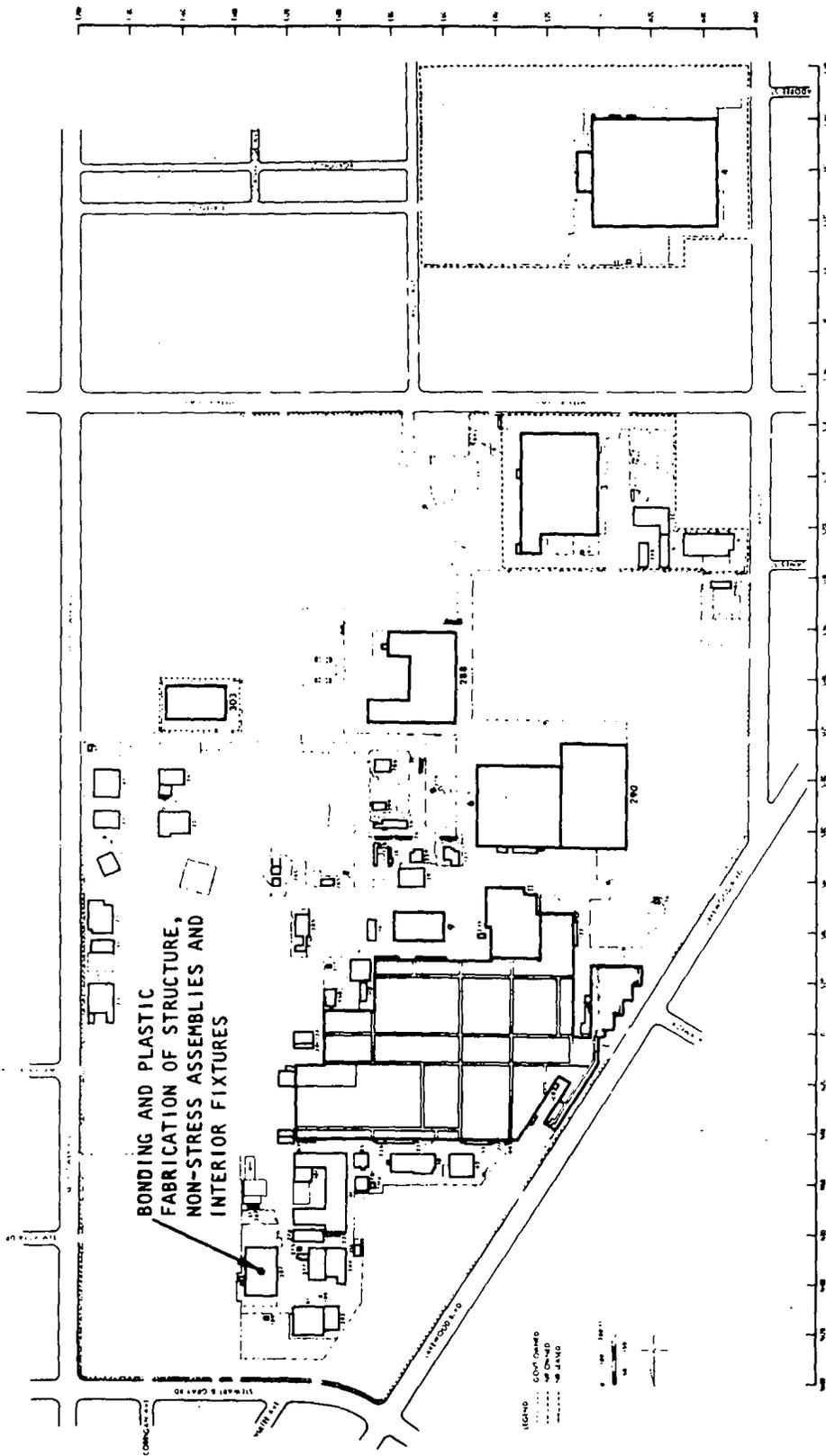


Figure 9. Detailed Bonded and Plastic Parts Fabrication Facilities

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned disposal of waste materials will cause no appreciable short-term environmental degradation and hence will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. Disposal of waste materials generated by the proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 6

TITLE: HEAT TREATING PROCESS OF MATERIALS

F. HEAT TREATING FACILITIES

Description of Proposed Action

Heat treating capabilities are located in Buildings 041 and 004 (Figure 10). Functions include stress relieving of mild and alloy steels; heating and aging of aluminum alloys; and annealing, normalizing, and tempering of stainless and alloy steel for detailed parts. Building 004 has a special-purpose capability for developing heat treat cycles for orbiter metal, including thermal treatment of metal from room temperature to 2500 degrees F. Exhausted air from the heat treat oven is expelled directly to the atmosphere, the quality of this emission being within the limitations of the Los Angeles County APCD.

Probable Impact of Proposed Action on the Environment

The proposed action will have no significant effect or impact on the environment. The present and proposed methods of exhausting heated air are within the framework established by the responsible Los Angeles County agencies.

Probable Adverse Environmental Effects

No known adverse environmental effects can result from the proposed action. The present and proposed methods of exhausting heated air into the atmosphere are acceptable procedures for the Space Shuttle Program.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned air emission will cause no appreciable short-term environmental degradation and hence will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. The heated air exhaust generated by the proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

**DOWNEY COMPLEX
ASSESSMENT NUMBER 6**

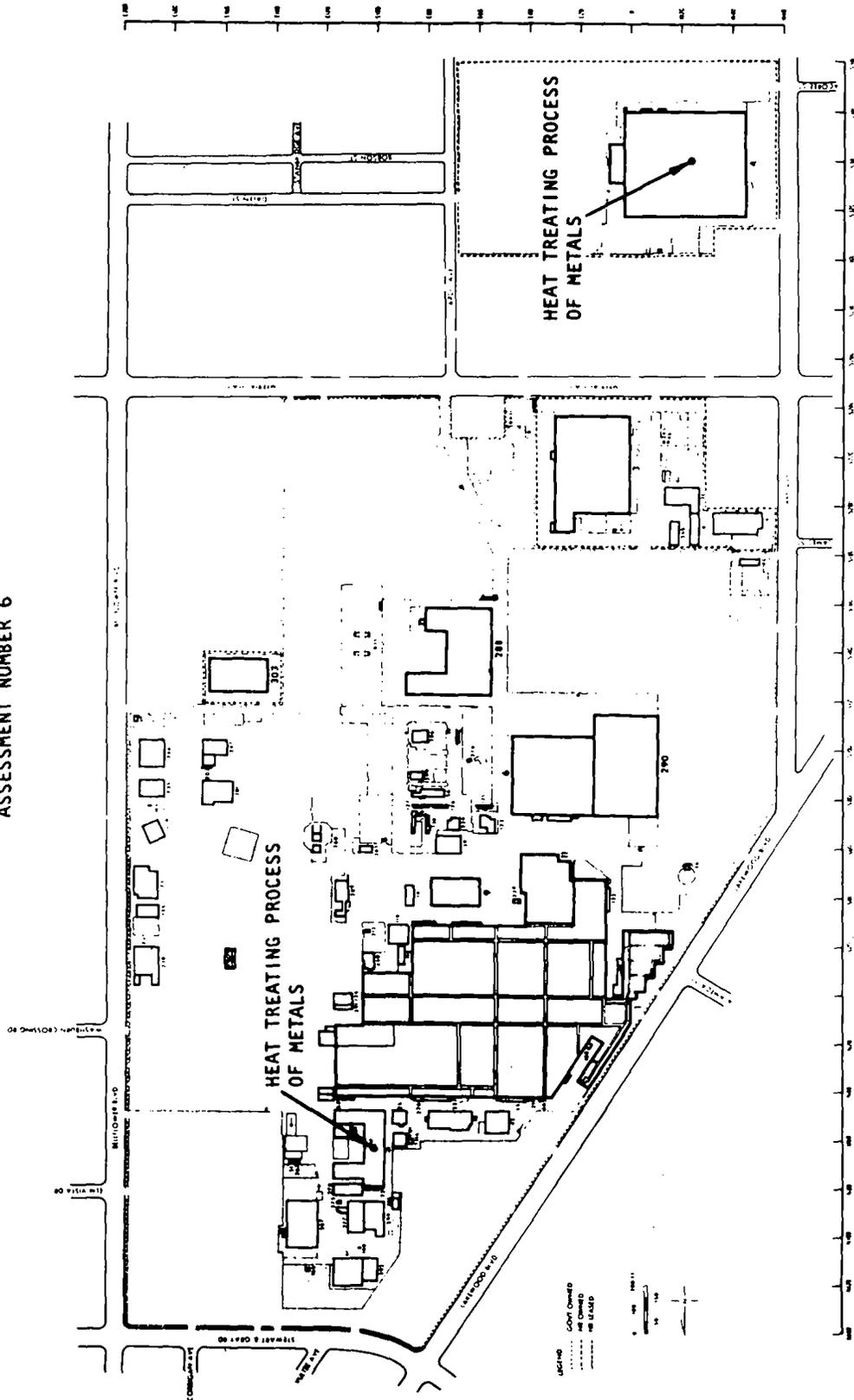


Figure 10. Heat Treating Facilities

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 7

TITLE: FLUXLESS BRAZING PROCESS OF THERMAL ASSEMBLIES

G. THERMAL COLDPLATE FACILITIES

Description of Proposed Action

This operation is located in Building 041/276 (Figure 11) which is dedicated exclusively to Shuttle/orbiter coldplate fabrication. A thermal coldplate by definition is a mechanical means of transferring heat from the on-board equipment to a heat-transfer fluid loop. This assembly is made by brazing metal sheets of either aluminum or stainless steel together in a heated platen press. The facility is equipped with heated platen presses, welding (electric) machines, and bench presses; tanks for cleaning, etching, and plating; and alcohol and freon systems for final cleaning, flushing, and leak/flow testing.

Rinse water and chemicals that are spent and dispositioned for disposal are drained into an approved container and then released for neutralization into a liquid waste treatment station. Neutralization occurs when the effluent meets the pH requirement of the Sanitation District of Los Angeles County; it is then drained into the public sewer.

Such contaminated cleaning chemicals as alcohol and freon are drained into an identified approved container for disposal and sold as salvage in accordance with existing County and State regulations.

Probable Impact of Proposed Action on the Environment

This proposed action will have no significant effect or impact on the environment. The collection and disposal processes are within the framework of the regulations established by the Los Angeles County agencies.

Probable Adverse Environmental Effects

No known adverse environmental effects can result from the proposed action, provided the methods used for expended chemical collection and disposal are kept within the regulations of Los Angeles County agencies.

Alternatives to the Proposed Action

The operation of the proposed action is centrally located to supporting functions like sewers, water treatment, sumps, and utilities. This facility was used for coldplate fabrication during the Apollo program and is ideally suited for this operation. It would not be economically feasible to relocate the facility.

DOWNEY COMPLEX
ASSESSMENT NUMBER 7

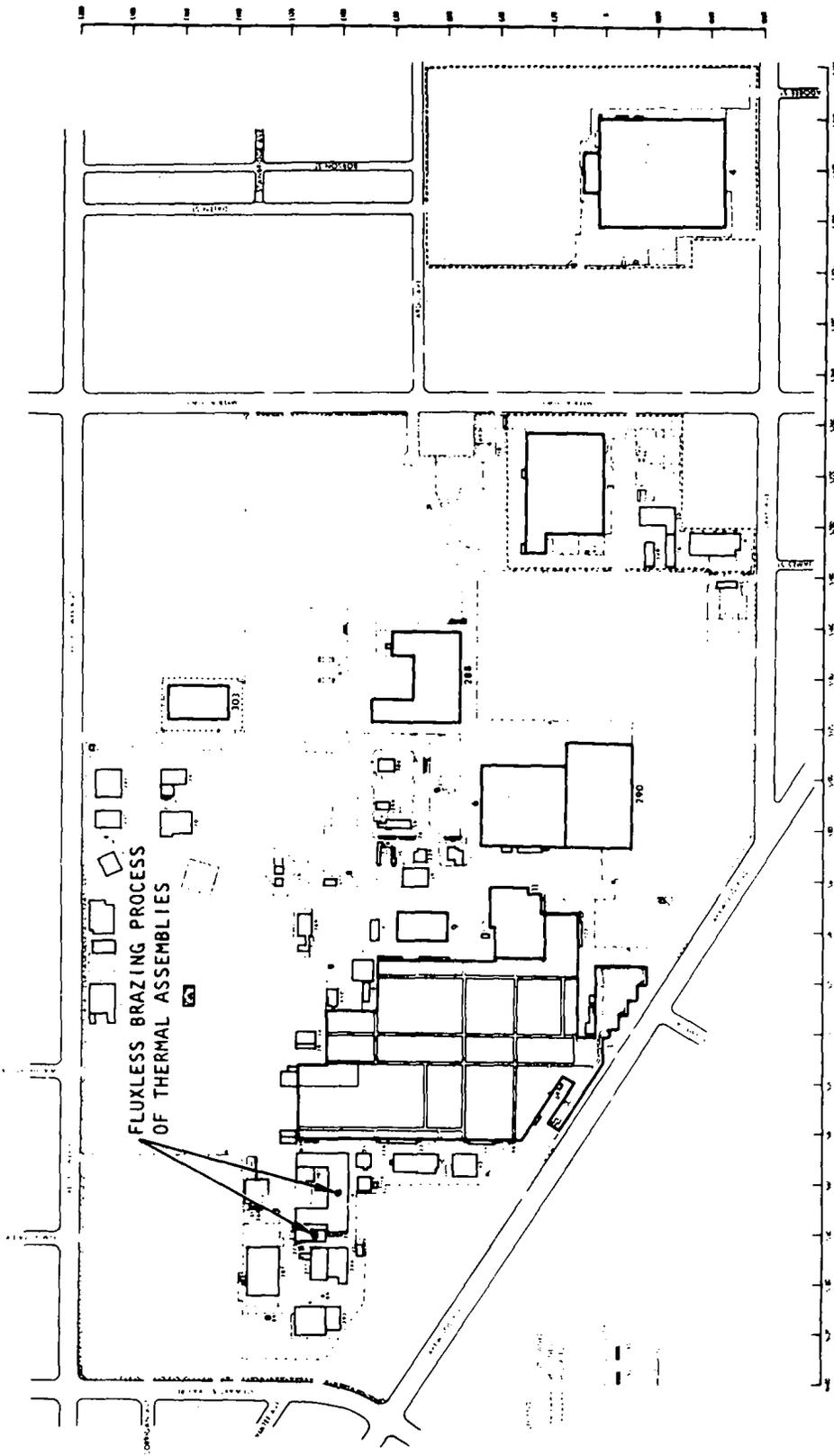


Figure 11. Thermal Coldplate Facilities

Relationship of Local Short-Term and Long-Term effects

Both short-term and long-term effects will be negligible. The planned treatment of waste and salvageable solutions will cause no appreciable short-term environmental degradation; hence it will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the processing function. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon the completion of this program. Disposal of waste solutions generated by this proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 8

TITLE: SILK SCREENING PROCESS FOR THE IDENTIFICATION OF ASSEMBLIES,
SUBASSEMBLIES, AND COMPONENTS

H. SILK SCREEN FACILITIES

Description of Proposed Action

The silk screening function is located in Building 061 (Figure 12) and is equipped for photo etch processing, silicated rubber application of decals, and working with other non-toxic materials. It contains a screening machine, a heat foil marking machine, and plate making machines. Waste materials from this facility are not reclaimable, since they are predominantly solvent saturated rags. Used and expended rags are deposited into nonflammable safety containers, properly transported by a contracted licensed hauler, and disposed of in a Los Angeles County Sanitation District land fill dump.

Probable Impact of Proposed Action on the Environment

This proposed action will not have significant effect or impact on the environment. The collection and disposal processes are within the framework of the regulations established by the Los Angeles County Sanitation District.

Probable Adverse Environmental Effects

No known adverse environmental effects can result from the proposed action, provided the methods used for waste collection and disposal are maintained in compliance with the regulations of the Los Angeles County agencies.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned disposal of waste materials will cause no appreciable short-term environmental degradation and hence will have no long-term adverse environmental effect.

DOWNEY COMPLEX
ASSESSMENT NUMBER 8

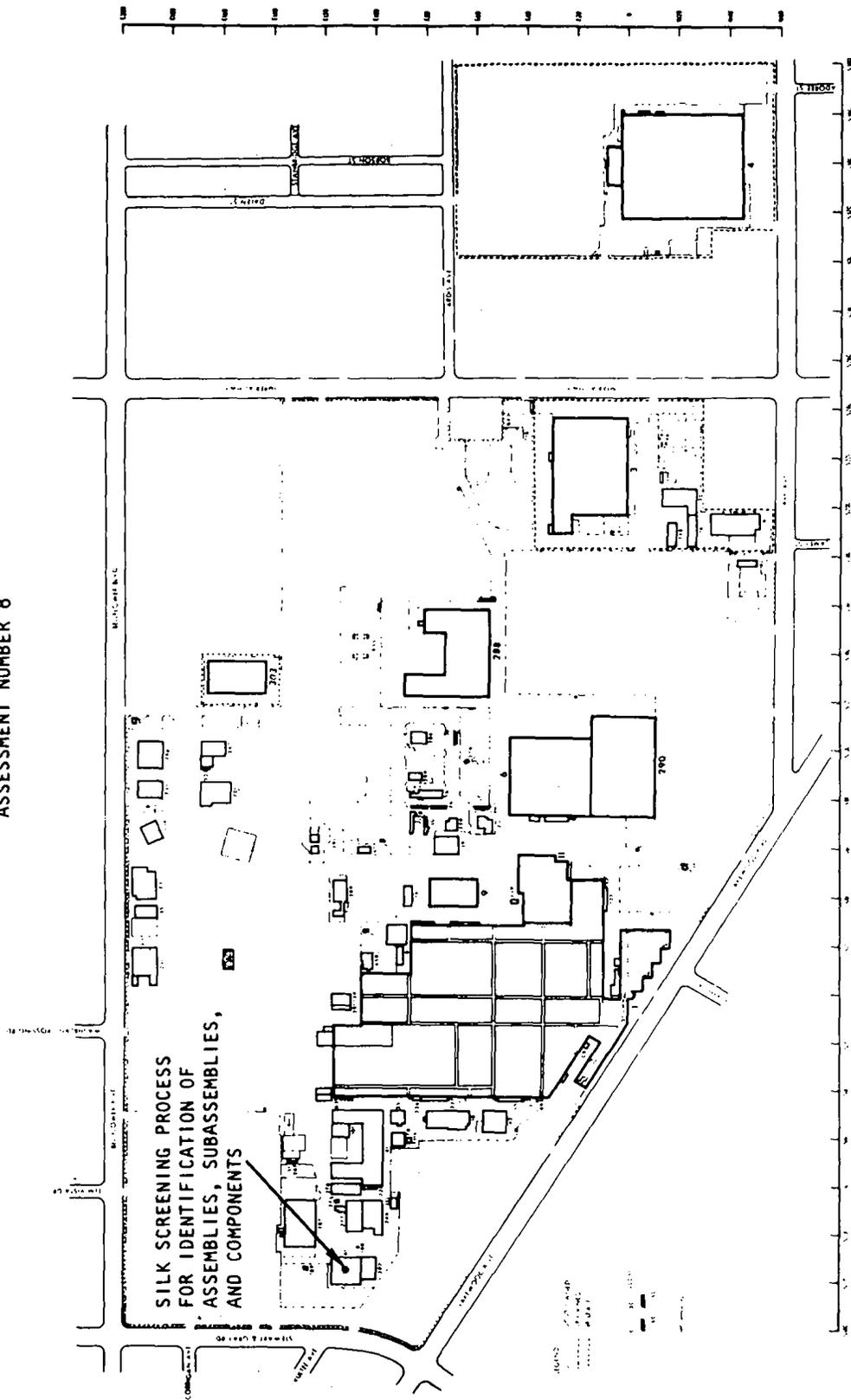


Figure 12. Silk Screen Facilities

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. Disposal of waste materials generated by the proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 9

TITLE: TUBE FABRICATION PROCESSING OF CONTROL SYSTEMS AND SUBSYSTEMS

I. TUBE FABRICATION PROCESSING FACILITIES

Description of Proposed Action

Buildings 061/292 and 288 contain areas dedicated to the fabrication of aluminum and stainless steel tubing (Figure 13). The facilities in Building 061/292 provide detailed tubing of various lengths and shapes for Shuttle/orbiter systems: such as, environmental control and life support subsystem (ECLSS), hydraulic system, reaction control subsystem (RCS), orbiter maneuvering system (OMS), auxiliary power unit (APU), air-breathing propulsion system (ABPS), electrical power system (EPS), and main propulsion subsystem (MPS). The tubing fabrication operation has equipment for cutting, bending, forming, squaring, flaring, burring, and honing of detailed tubing.

Building 288 is used exclusively as an engineering development operation for systems related to the Space Shuttle orbiter. This facility has the same type of equipment for tube fabrication requirements as it has for development of control systems related to the orbiter.

Waste materials from aluminum and stainless steel tube cuttings are segregated, deposited into appropriate scrap containers for disposal as salvageable material, and sold.

Probable Impact of Proposed Action on the Environment

This proposed action will have no significant effect or impact on the environment. The present and proposed methods for disposing of scrap metals as salvageable materials are within the framework established by the responsible Los Angeles County agencies.

Probable Adverse Environmental Effects

No known adverse environmental effects can result from the proposed action. The present and proposed methods used for the disposal of scrap material for reclamation are acceptable procedures for the Space Shuttle Program, as established by NASA Procurement Regulations XXIV.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

DOWNEY COMPLEX
ASSESSMENT NUMBER 9

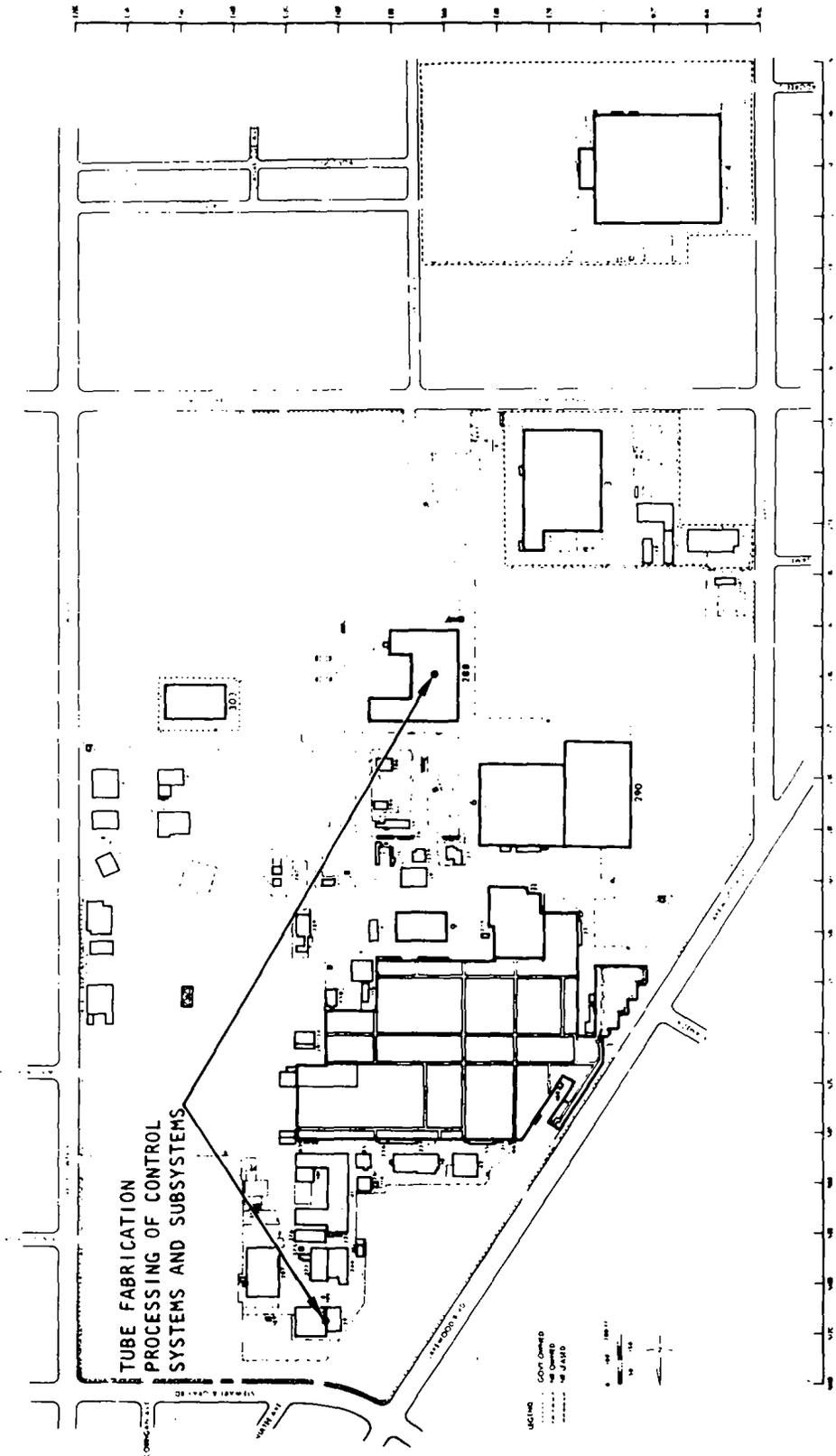


Figure 13. Tube Fabrication Processing Facilities

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned disposal of waste materials will cause no appreciable short-term environmental degradation and hence will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. Disposal of waste materials generated by the proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 10

TITLE: WELDING AND BRAZING PROCESSES, SYSTEMS, AND TOOLING

J. WELDING AND BRAZING FACILITIES

Description of Proposed Action

The welding and brazing facilities are located in Buildings 001, 004, 006, 231, 288, and 290 (Figure 14). Capabilities are for the fabrication of Shuttle orbiter tooling, crew compartment, forward fuselage, aft fuselage and detail, subassembly, and assembly operations. Facilities of manufacturing and laboratory operations use ac and dc inert gas tungsten arc welding, ac and dc (rod) welding, oxygen/hydrogen gas welding, electronic beam welding, and ac and dc RF generators for induction brazing. Each welding and brazing process has technological characteristics for the various operations of metal joining which relate to the development, fabrication, and assembly of the orbiter and supporting equipment. Certain amounts of waste ferrous and non-ferrous metals from welding and brazing operations are accumulated primarily in the tooling and development areas. These wastes are segregated, deposited into appropriate scrap containers as salvageable material, and sold.

Probable Impact of Proposed Action on the Environment

No known adverse environmental effects can result from the proposed action. The present and proposed methods used for the disposal of scrap material for reclamation are acceptable procedures within the Space Shuttle Program, as established by NASA Procurement Regulations, Part 24.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned disposal of waste materials will cause no appreciable short-term environmental degradation and hence will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. Disposal of waste materials generated by the proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

DOWNNEY COMPLEX
ASSESSMENT NUMBER 10

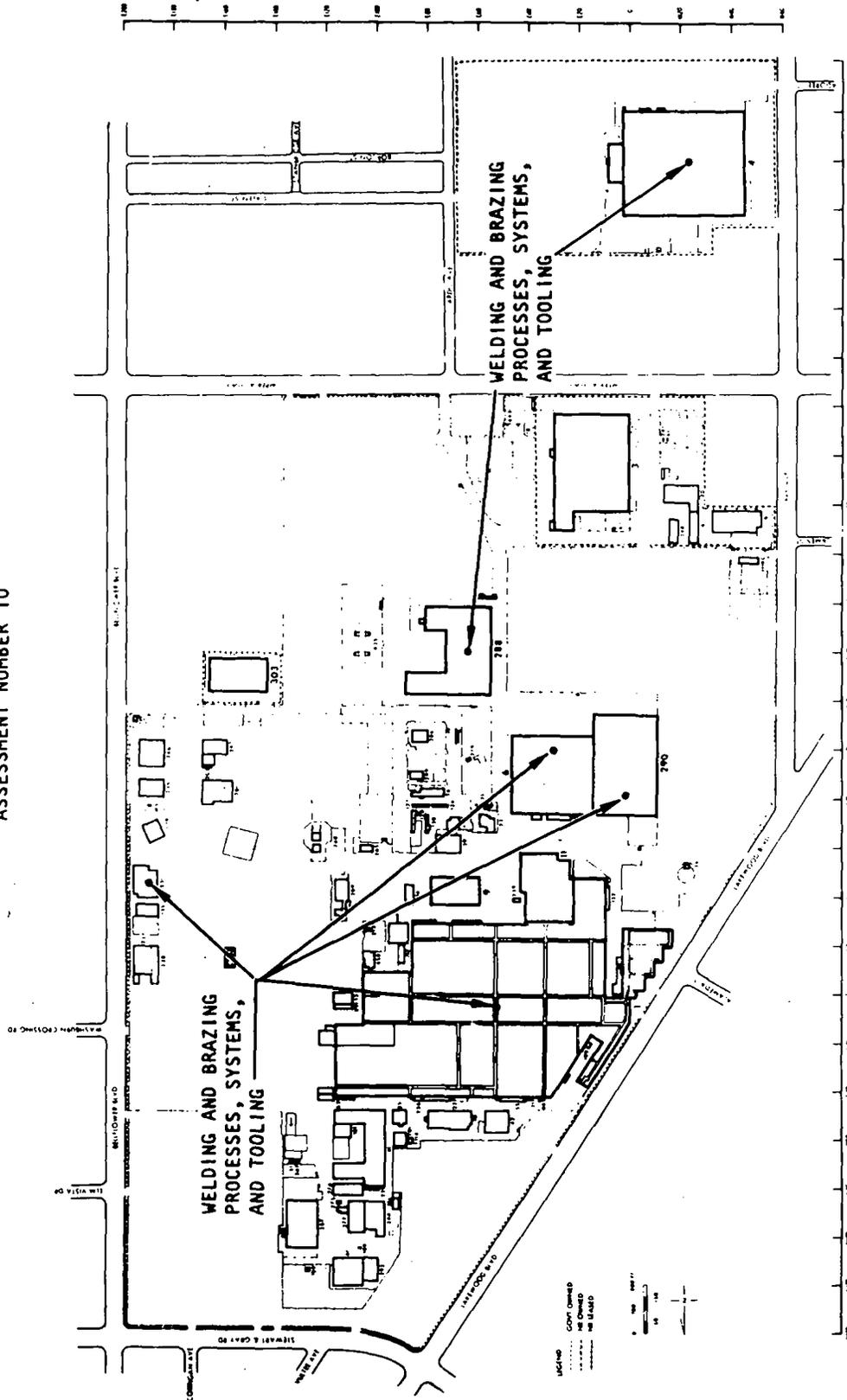


Figure 14. Welding and Brazing Facilities

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 11

TITLE: NON-DESTRUCTIVE TESTING OF FERROUS AND NON-FERROUS
MATERIAL

K. NON-DESTRUCTIVE TESTING FACILITIES

Description of Proposed Action

Non-destructive testing methods are used to determine the integrity of a structure's or component's physical composition without changing its material characteristics. These methods include liquid penetrant, magnetic particle, electromagnetic, vibrasonic, and radiographic techniques. The location of these facilities is as follows: Building 291/134 - radiographic and ultrasonic; Building 244 - liquid penetrant, magnetic particle, and electromagnetic; Buildings 001, 006, and 290 - portable radiographic; and Building 287 - ultrasonic (Figure 15).

Primary non-destructive test facilities are ultrasonic, radiographic, and liquid penetrant. Ultrasonics is used for the inspection of the adhesive bond of honeycomb, sandwich, and plastic laminated panel structures. Radiographics is used to inspect welded, brazed, or soldered joints. Mandatory precautions for its use include collimating devices, lead shielding, warning lights and warning signs, personnel barricades, and area surveillance by qualified radiographics personnel. Materials are controlled in accordance with the State of California Administrative Code. The liquid penetrant is used for porous and sand casting, threads, keyways, rough weldment, etc. Rinse water, penetrant, and developer solutions that are spent and dispositioned for disposal are drained or pumped from the tanks into the public sewer. Disposed solutions are within the requirements specified by the Sanitation District of Los Angeles County.

Probable Impact of Proposed Action on the Environment

This proposed action will have no effect on the environment. The methods used to dispose of rinse water, penetrant, and developer solutions are within the framework of the regulations established by the Los Angeles County Sanitation District. The methods used during radiographics processing will not be a potential for occupational health hazard or other danger to life systems, provided the necessary procedures are maintained.

Probable Adverse Environmental Effects

No known adverse environmental effects can result, provided that all precautions for the use of radiographics are maintained before and during operations. Rinse water, penetrant, and developer solution disposals into the public sewage are within the regulatory requirements of the Los Angeles County Sanitation District.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but it is not

economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned disposal of waste materials will cause no appreciable short-term environmental degradation and hence will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. Disposal of waste materials generated by the proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 12

TITLE: CHEMICAL STORAGE

L. CHEMICAL STORAGE FACILITIES

Description of Proposed Action

Chemical storage is located in Building 235 (Figure 16). The Shuttle orbiter requires various paints and chemicals for manufacturing and laboratory processes. A minimal amount of these materials is stored in sealed containers in a locked area. Access to the area is permitted only to those who show proper identification and requirements to an attendant. The area is also widely posted with signs indicating chemical storage and limited access. Some of the items stored are toluene, perchlorethylene, and caustic soda--each in a sealed container marked with a caution sticker and locked within a fenced open-air area. Paints are stored inside a locked building adjacent to the fenced-in area. All paints and chemicals are stored to comply with safety and hazardous chemical storage regulations of the State of California and Los Angeles County.

Probable Impact of Proposed Action on the Environment

This proposed action will have no significant effect or impact on the environment. The present and proposed methods of storing chemical materials are within the framework established by the responsible Los Angeles County agencies and the State of California.

Probable Adverse Environmental Effects

No known adverse environmental effects can result from the proposed action. The present and proposed methods for the storage of chemical material are acceptable procedures for the Space Shuttle Program, as established by the responsible Los Angeles County agencies and the State of California.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function to a more remote site is a possibility, but it is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned methods of chemical material storage will cause no appreciable short-term environmental degradation and hence will have no long-term adverse environmental effect.

**DOWNEY COMPLEX
ASSESSMENT NUMBER 12**

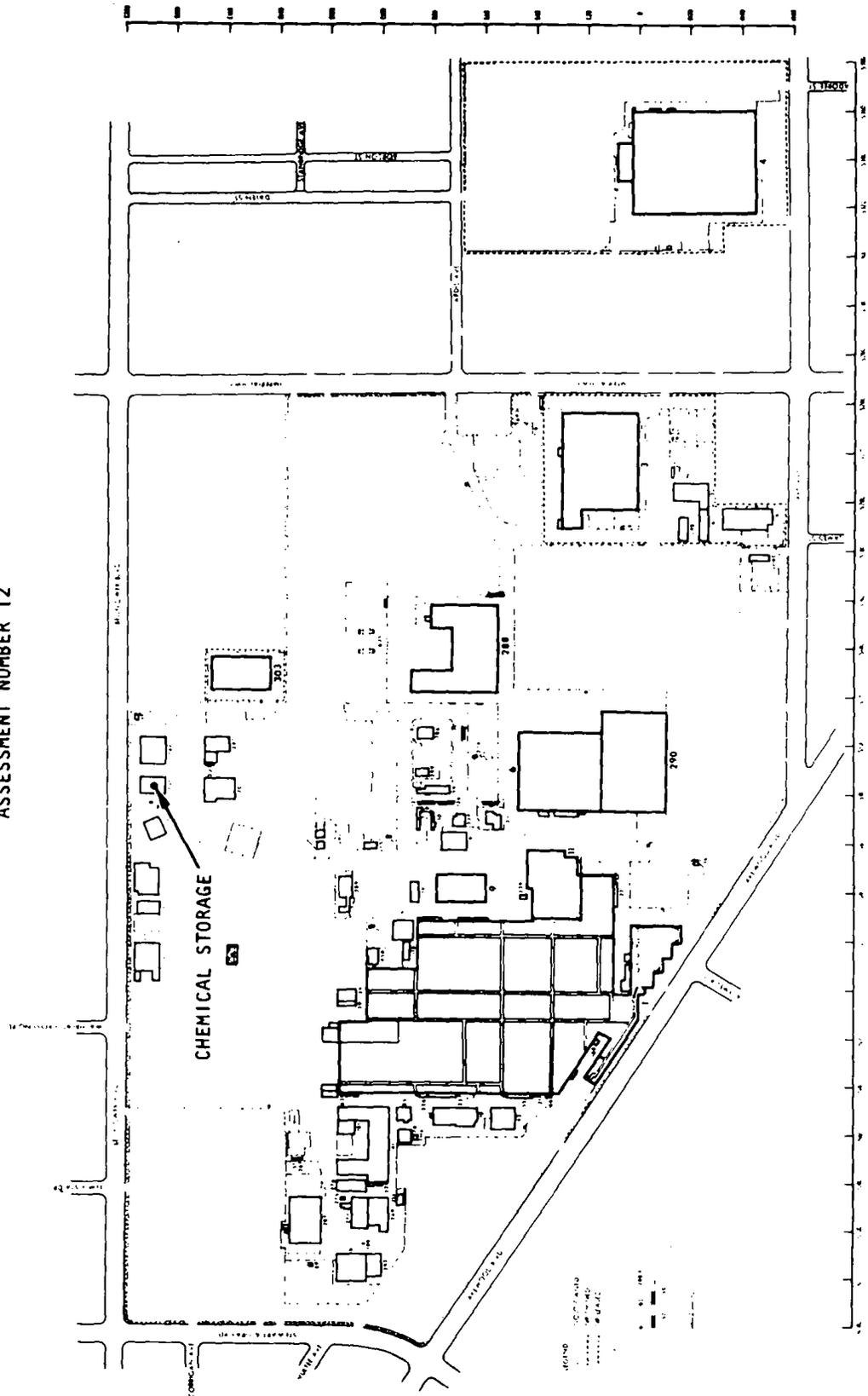


Figure 16. Chemical Storage Facilities

Irreversible and Irretrievable Commitments of Resources From
the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. The proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 13

TITLE: TOOLING FIXTURES FOR THE FABRICATION OF MAJOR ASSEMBLIES,
SUBASSEMBLIES, AND SYSTEMS

M. TOOL FIXTURE FABRICATION FACILITIES

Description of Proposed Action

The tooling fixture fabrication functions are located in Buildings 001, 135, 201, 203, 231, 236, 237, and 246 (Figure 17). Functions include cutting, machining, grinding plaster and plastics, and welding. Tooling will provide specially designed assembly tools--usually each tool being one of a kind--to satisfy the basic part locaters, personnel access, contours, etc. of the primary and secondary structure, substructure, system, and subsystem of the orbiter and supporting equipment. Certain amounts of waste--ferrous and non-ferrous, plaster, and plastic materials--are accumulated from the various tooling functions. These wastes are segregated and deposited into appropriate scrap containers. The salvageable materials, like ferrous and non-ferrous materials, are released to salvage sales and sold. The other wastes, such as grindings, trimmings, plaster, and plastics, are transported by a contracted licensed hauler and properly disposed of in a Los Angeles County Sanitation District land fill dump.

Probable Impact of Proposed Action on the Environment

This proposed action will have no significant effect or impact on the environment. The present and proposed methods of disposal of scrap metal and other waste materials are within the framework established by the responsible Los Angeles County agencies.

Probable Adverse Environmental Effects

No known adverse environmental effects can result from the proposed action. The present and proposed methods used for the disposal of scrap material are acceptable procedures for the Space Shuttle Program.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned disposal of waste materials will cause no appreciable short-term environmental degradation; hence it will have no long-term adverse environmental effect.

DOWNEY COMPLEX
ASSESSMENT NUMBER 13

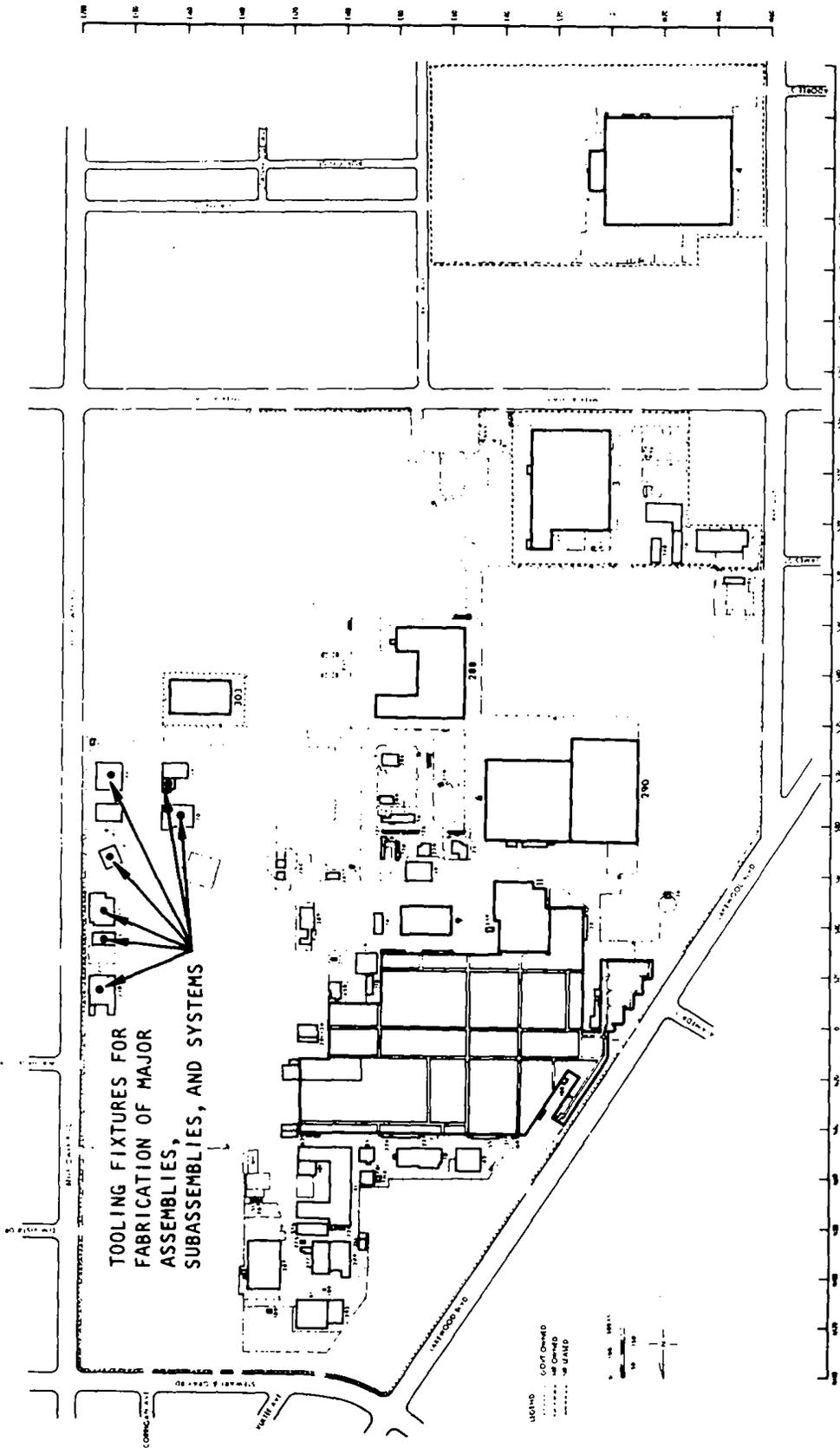


Figure 17. Tool Fixture Fabrication Facilities

Irreversible and Irretrievable Commitments of Resources From
the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the processing function. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon the completion of this program. Disposal of waste materials generated by this proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 14

TITLE: SIMULATION AND DEVELOPMENT LABORATORY

N. SIMULATION AND DEVELOPMENT LABORATORY FACILITIES

Description of Proposed Action

The simulation and development laboratory is located in Building 004 (Figure 18) and consists of five functional laboratories: computing and simulation, avionics, materials and processes, metrology, and hydraulics/controls. These functions are described below.

Computing and Simulation

The computing and simulation laboratory can simulate manned orbiter situations by using hybrid, analog, and digital solutions. External out-the-window visual scenes showing the earth, stars, rendezvous vehicles, and simulations of entry and terminal approach landing are presented through direct viewing and closed circuit television. Internal instrumentation is simulated by special graphic alphanumeric presentation, closed circuit television, and special-purpose or prototype instrumentation.

Avionics

The avionics laboratory is capable of developing and evaluating Shuttle orbiter guidance, navigation and control, communication and tracking, operational flight instrumentation, displays and controls, and electrical power distribution and control. These areas are located next to the flight simulation facilities and provide support through interfaces into the analog and digital computer station and vehicle simulator for mission evaluation studies.

Materials and Processes

The materials and processes laboratory consists of four major functional areas: (1) metallic materials, (2) non-metallic materials, (3) chemical and physical analysis, and (4) mechanical properties. These facilities are described as follows:

1. The metallic materials function is comprised of three sections: metal joining, heat treating, and metallurgy. Among the specific activities carried on in these laboratories are research, development, evaluation, and process control of basic metallurgical studies, metal composition, metallurgical phenomena associated with metal alloys, and welding and brazing techniques.

2. Non-metallic functions are concerned with the selection, development, and evaluation of elastomers, seals, sealants, coatings, adhesives, plastics, and composites. Capabilities range from compounding materials to producing prototype products to determine performances in various environmental extremes.
3. Chemical and physical functions include chemical analyses of all types of materials used in the manufacture of the orbiter. Analytic instruments of these laboratories have broad capabilities for developing leak detection techniques, outgassing materials, detecting contaminants, and measuring material physical properties for thermal expansion. The chemical processes conduct material and process investigations that deal with precision cleaning, cleanliness verification, surface conditioning, chemical milling, passivation, and deoxidation of ferrous, non-ferrous, and refractory alloys.
4. The mechanical properties function investigates mechanical properties of metals, plastics, and composite materials by conducting tension, compression, fatigue, and shear tests. The facility consists of load application equipment, universal testing machines, creep and stress rupture machines, and fatigue test machines.

The materials and processes laboratory will be a major contributor to the Shuttle orbiter development, fabrication, and assembly. These facilities are dedicated only to laboratory functions and procedures. Spent and/or waste materials, such as chemicals, fluids, metallic materials, and non-metallic materials, that are generated from these facilities are disposed of in accordance with existing State of California and Los Angeles County policies and regulations.

Metrology

The metrology laboratories can calibrate, service, repair, and identify electrical and mechanical measuring instruments, such as electronic counters, oscillators, RF systems, multimeters, gaseous and liquid flow devices, pressure and vacuum measuring instruments, accelerometers, power supplies, optical tooling, transites, etc. These facilities have a wide range of calibration equipment and are certified through the National Bureau of Standards.

Hydraulics/Controls

The hydraulic and controls laboratory will oversee the orbiter integration and verification of checkout, servicing, and maintenance procedures. Recent aircraft development shows that this approach is highly effective for vehicle control elements, e.g., power source, intermediate linkage loads, and avionics.

The test article consists of elements from the hydraulic subsystems mounted on a structural steel frame that approximates the shape of the orbiter. For an adequate assessment of the dynamics of hydraulic power generation, the fluid lines of the test article will duplicate the actual vehicle as nearly as possible. Electrical commands to solenoid valves, servoactuators, and control servos will come from selected elements of the avionics subsystem through a test control complex.

During a normal test cycle of the hydraulic system, a failure could conceivably occur in one or more of the developmental components. In the event of a failure, the hydraulic system may be drained; the fluid would be deposited into approved containers and sold as salvage. Waste materials, such as hydraulic fluid soaked rags, are not reclaimable. Used or expended rags are deposited into nonflammable safety containers for disposal in accordance with the Los Angeles County regulatory agencies.

Probable Impact of Proposed Action on the Environment

This function will have negligible effect on the environment. The toxic fumes emitted from the facility are collected and scrubbed to meet acceptable limits prior to release to the atmosphere. The methods used to dispose of deionized rinse water, spent chemical baths, and toxic fumes will be within the framework of the regulations established by the responsible Los Angeles County agencies. There is no apparent potential for occupational health hazards or other danger to life systems.

Probable Adverse Environmental Effects

No known adverse environmental effects can result, provided the chemical wastes are adequately treated prior to dumping in the public sewer or are properly disposed of by a licensed hauler, and the toxic fumes are collected and scrubbed prior to release to the atmosphere. The methods used to treat waste chemicals and toxic fumes are acceptable to the responsible Los Angeles County regulatory agencies.

Alternatives to the Proposed Action

The chemical processing functions are essential to maintain schedule control on production details for the Space Shuttle Program. This area has been used for chemical processing since 1956 and is ideally situated near the utilities, water treatment facility, sewers, sumps, steam boilers, etc. Relocation of this function to a more remote site is a possibility, but is not economically feasible. The operation of this function of the Space Shuttle Program at the Downey site appears to be environmentally compatible and economically necessary for this program.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned treatment of waste water and air exhausts will cause no appreciable short-term environmental degradation, and hence will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the processing function. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon the completion of this program. Disposal of waste solutions generated by this proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 15

TITLE: STRUCTURES TEST LABORATORY

O. STRUCTURES TEST LABORATORY FACILITIES

Description of Proposed Action

The structures test laboratory, located in Building 288 (Figure 19), is responsible for tests to verify the integrity of orbiter structural components for the forward fuselage, aft fuselage, and crew module. The laboratory includes capabilities for testing structural specimens 45 feet tall and over 60 feet wide. The laboratory floor includes beams (39) which are capable of reacting 75,000 pounds for each 10 feet of length, and columns (4) which can react 10 million inch-pounds of moment. A large variety of equipment is available for supporting test activities, including hydraulic struts which range up to a 500,000-pound capacity. Structural components may be tested in high and low temperature environment. Supporting the structures laboratory during testing are the strain gauge and measurement systems laboratories. The primary functions of these laboratories are to instrument structural components and to collect, record, and reduce the data from the tests. Waste materials of aluminum and steel alloys, bonding materials, electrical wiring, etc. may result from test setup work and failures experienced during structural integrity tests. These materials are segregated, deposited into appropriate scrap containers for disposal as salvageable material, and sold.

Probable Impact of the Proposed Action on the Environment

This proposed action will have no significant effect or impact on the environment. The present and proposed methods for disposing of salvageable scrap materials are within the framework of the responsible Los Angeles County agencies.

Probable Adverse Environmental Effects

No known adverse environmental effects can result from the proposed action. The present and proposed methods for disposing of scrap material for reclamation are acceptable procedures for the Space Shuttle Program as established by NASA Procurement Regulations, Part 24.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned disposal of waste materials will cause no appreciable short-term

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ASSESSMENT NUMBER 15

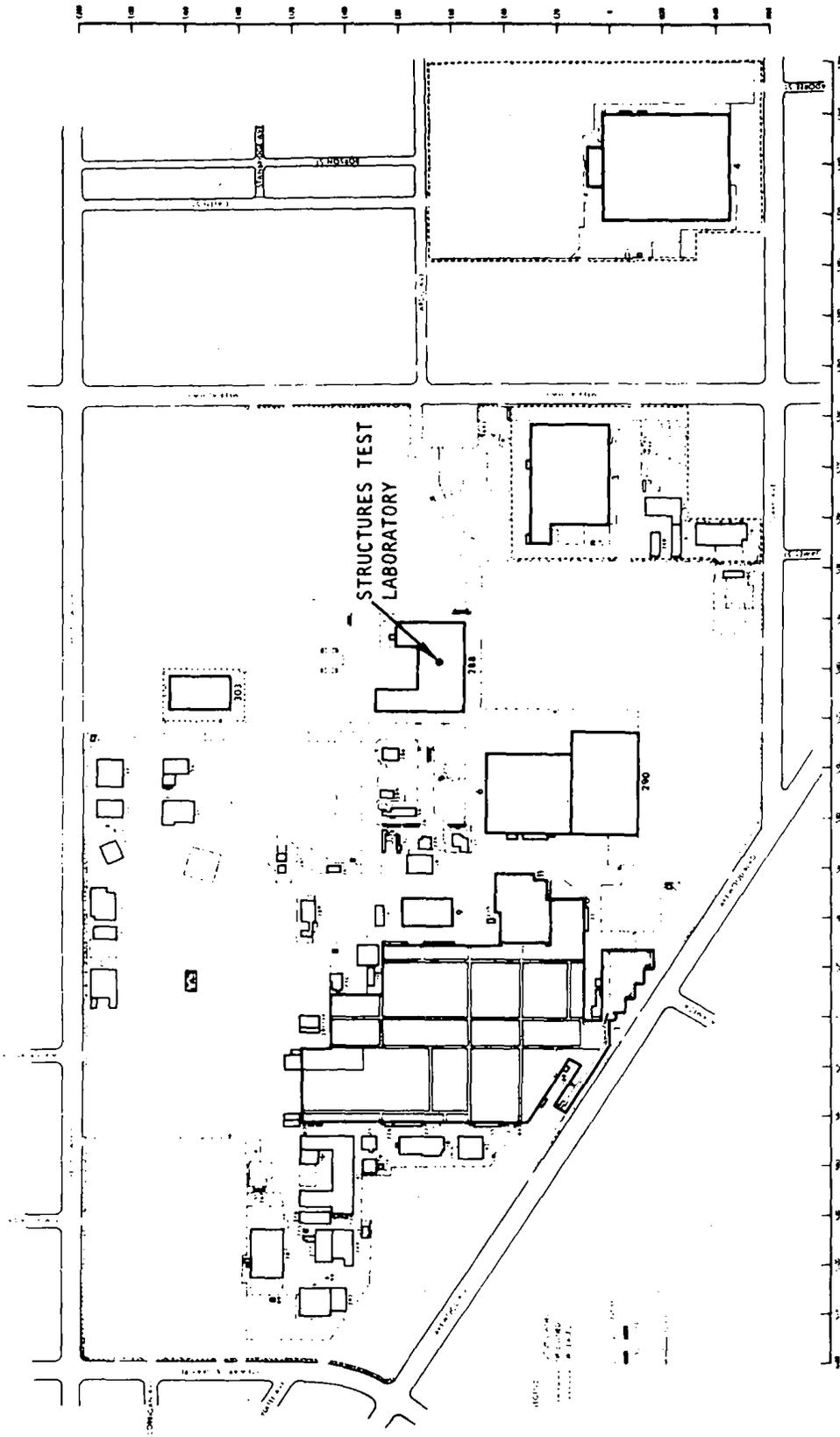


Figure 19. Structures Test Laboratory Facilities

environmental degradation, and hence will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. Disposal of waste materials generated by the proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 16

TITLE: DYNAMIC SIMULATION LABORATORY

P. DYNAMIC SIMULATION LABORATORY FACILITIES

Description of Proposed Action

The dynamic simulation laboratory, located in Building 288 (Figure 20), is equipped for vibration, shock, and acoustic development tests of appropriate structural elements, components, panels, and small subassemblies of the orbiter's forward fuselage, aft fuselage, and crew module. The vibration section of the laboratory is equipped with both hydraulic and electromagnetically actuated shakers, whose capacities range from 1500 to 100,000 force-pounds. The shock section of the laboratory can subject specimens of up to 8 cubic feet to 100 to 300 g's. The acoustic section of the laboratory can subject specimens to sound pressure over the frequency range of 37.5 to 9600 Hz and intensities of up to 170 db. Dynamic test specimens may be subjected to various environmental extremes, such as cryogenic temperature, high temperature, and other flight profile conditions.

Shock, vibration, and noise are principal environmental elements created in this laboratory and may occur at any time during every working day. Shock and vibration environments are minimized through seismic isolation and total enclosure. Acoustic environments are always enclosed and modulated to safe levels. Noise penetration through walls and doors is minimized by design, and no annoyance is experienced outside the test enclosure.

Procedures require ear protection for all personnel exposed to these environments.

Waste materials of aluminum and steel bonding materials, electrical wiring, etc., may result from test setup work and failures of test specimens. During dynamic testing, these materials are segregated, deposited into appropriate scrap containers for disposal as salvageable material, and sold.

Probable Impact of Proposed Action on the Environment

This proposed action will have no significant effect or impact on the acoustic environment. Shock, vibration, and noise created in the dynamic testing laboratory are controlled by seismic isolation and total enclosure, and will not affect areas surrounding the enclosed laboratory.

The present and proposed method for disposing of salvageable waste material created by testing is within the framework established by the responsible Los Angeles County agencies.

DOWNEY COMPLEX
ASSESSMENT NUMBER 16

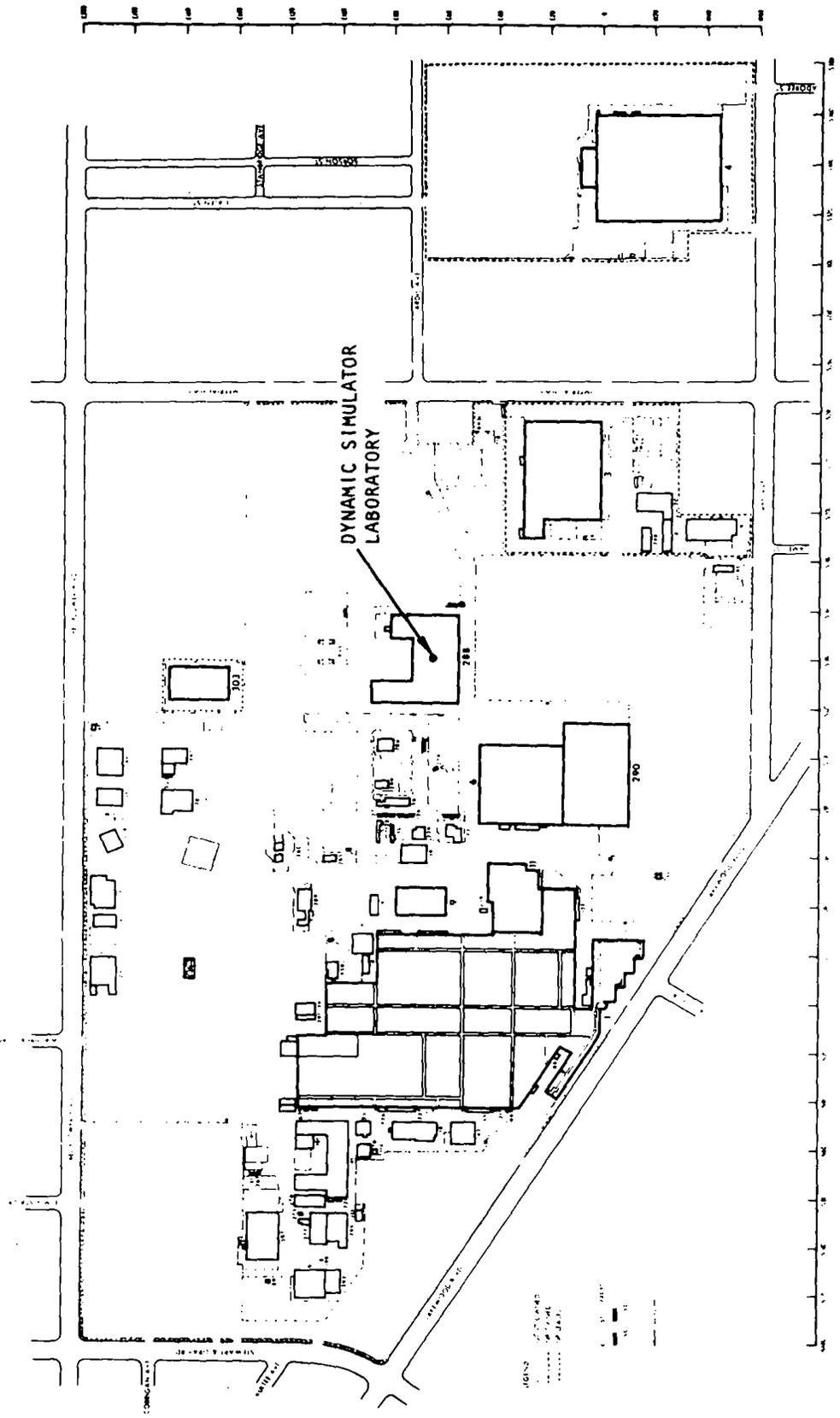


Figure 20. Dynamic Simulation Laboratory Facilities

Probable Adverse Environmental Effects

No known adverse acoustic environmental effects can result from noise pollution created during dynamic testing. Noise pollution is controlled by seismic isolation and total enclosure so that there is no adverse effect on the environment.

The present and proposed method for the disposal of test scrap material is by reclamation. The method is an acceptable procedure for the Space Shuttle Program, established by NASA Procurement Regulations, Part 24, and causes no known adverse environmental effects.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned disposal of waste materials will cause no appreciable short-term environmental degradation, and hence will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources from the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. Disposal of waste materials generated by the proposed action complies with Los Angeles County regulations and will not irreversibly affect the land or other resources.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 17

TITLE: CLIMATICS LABORATORY

Q. CLIMATICS LABORATORY FACILITIES

Description of Proposed Action

The climatics laboratory, located in Building 288, exposes test specimens to environments which simulate most conditions encountered by orbiter vehicle systems, materials, and support equipment. Among the environmental conditions produced by this laboratory are (1) altitudes from sea level to 200,000 feet at temperatures of -300 to +250 degrees F and relative humidities of 20 to 95 percent over a temperature range of 50 to 200 degrees F, (2) cyclic temperatures over the range of -300 to +350 degrees F and constant temperature from ambient to 1200 degrees F, (3) constant or cyclic humidities of 20 to 95 percent at temperatures of 50 to 260 degrees F, (4) salt fog at variable concentrations and constant temperatures in the range of ambient to 125 degrees F, (5) constant or cyclic salt immersion in variable salt solution concentrations, (6) rain at rates up to 4 inches per hour over a temperature range of 35 to 180 degrees F, (7) weathering, and (8) fungus tests. This laboratory also contains an oxygen-humidity chamber designed to test components, sub-systems, and small systems in a 100-percent oxygen environment. Salt fog testing occurs in a totally enclosed chamber, the salt concentration liquid having a designed controlled maximum discharge rate of 10 gallons in a twenty-four-hour period. The quality and amount of the spent liquid discharged into the public sewer is within the limitations of the Los Angeles County Sanitation District.

Probable Impact of Proposed Action on the Environment

This function will have negligible effect on the environment. The controlled discharge of the spent salt solution into the sewer is within the framework of the regulations established by the responsible Los Angeles County Sanitation District.

Probable Adverse Environmental Effects

No known adverse environmental effects can result from the proposed action. The present and proposed method used for discharging the spent liquid is an acceptable procedure to the Los Angeles County Sanitation District.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

DOWNEY COMPLEX
ASSESSMENT NUMBER 17

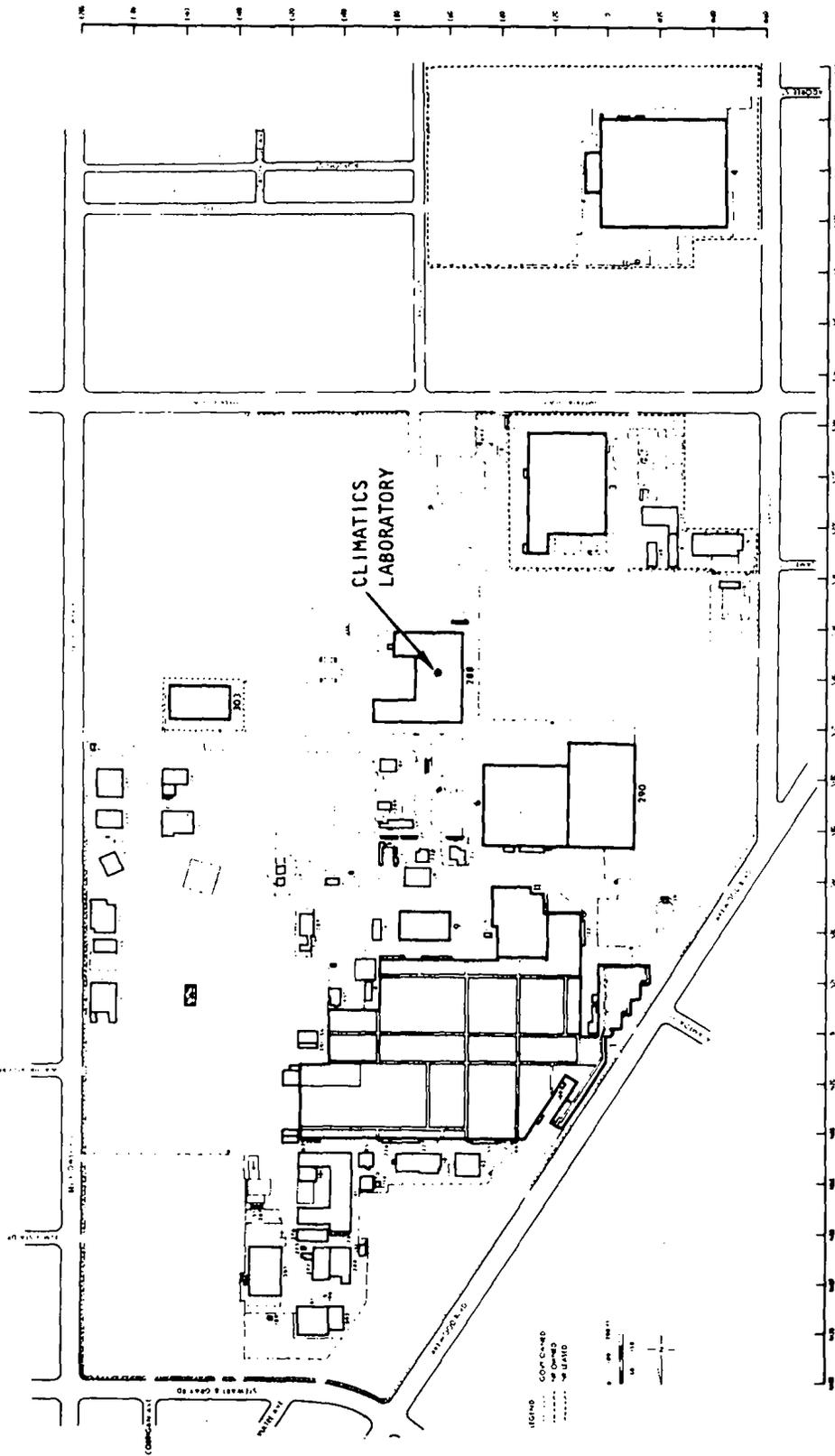


Figure 21. Climatics Laboratory Facilities

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned disposal of the waste liquids will cause no appreciable short-term environmental degradation, and hence will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. Disposal of waste liquids generated by the proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 18

TITLE: CRYOGENICS LABORATORY

R. CRYOGENICS LABORATORY FACILITIES

Description of Proposed Action

The cryogenics laboratory, located in Building 288, tests cryogenic designed systems and components (Figure 22). Included in the facility are capabilities for (1) testing with LN₂ and LH₂, (2) determining mechanical and physical properties of materials in cryogenic environments, (3) measuring seal/flange assembly leakage rates down to 10⁻¹⁰ cc/sec under simultaneous extreme temperature and/or pressure and load stress, and (4) testing functions of cryogenic system components in cryogenic environments. Mandatory precautions and controls for the use of cryogenics must be observed in accordance with the State of California General Industrial Safety Regulations. The waste by-product of this test facility is gaseous nitrogen which is expelled directly into the atmosphere.

Probable Impact of Proposed Action on the Environment

This proposed action will have no significant effect or impact on the environment. The methods used for expelling gaseous nitrogen are within the framework established by the responsible Los Angeles County agencies.

Probable Adverse Environmental Effects

No known adverse environmental effects can result from the proposed action. The present and proposed method for the emission of gaseous nitrogen to the atmosphere is an acceptable procedure for the Space Shuttle Program.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned proposed action will cause no appreciable short-term environmental degradation, and hence will have no long-term adverse environmental effect.

**DOWNEY COMPLEX
ASSESSMENT NUMBER 18**

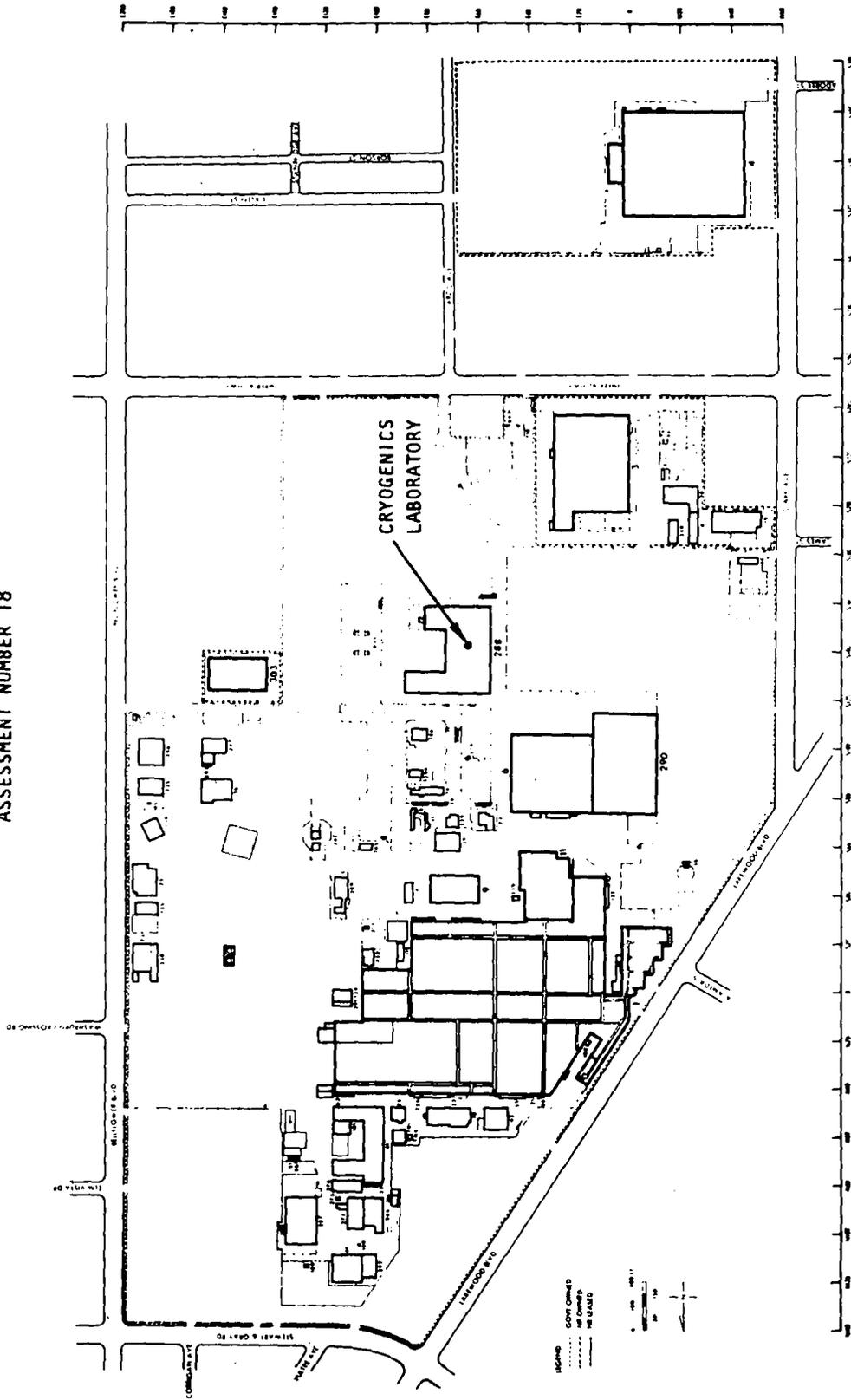


Figure 22. Cryogenics Laboratory Facilities

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. Disposal of gaseous nitrogen generated by the proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 19

TITLE: PNEUMATICS LABORATORY

S. PNEUMATICS LABORATORY FACILITIES

Description of Proposed Action

The pneumatics laboratory, located in Building 299, develops and tests pneumatic orbiter components and systems (Figure 23). The laboratory consists of two principal facilities, the pneumatic facility and the pressure systems development facility (PSDF). The pneumatics facility conducts flow, pressure, burst, functional (including high and low temperature), and leak detection tests. The PSDF uses a blowdown pneumatic system to evaluate orbiter pressurization systems, subsystems, and components. The facility is capable of evaluating engineering, verifying reliability tests of airborne pressurization systems, and testing the qualifications of support equipment.

Noise generated during pneumatic blowdown of gaseous nitrogen or helium will occur periodically during testing, but is contained and absorbed by design within the confines of the test enclosure or cell. All personnel are restricted and isolated from the test during the blowdown operation. Tests and blowdowns normally occur during the daylight hours.

Probable Impact of Proposed Action on the Environment

This proposed action will have no significant effect or impact on the environment. The present and proposed methods of minimizing acoustic environment and exhausting gaseous nitrogen and helium to the atmosphere are within the framework established by the responsible Los Angeles County agencies.

Probable Adverse Environmental Effects

No known adverse environmental effects can result from the proposed action. The present and proposed methods for pollution control are acceptable procedures for the Space Shuttle Program.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned disposal of exhausted gaseous material (nitrogen and helium) will cause no appreciable short-term environmental degradation, and hence will have no long-term adverse environmental effect.

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ASSESSMENT NUMBER 19

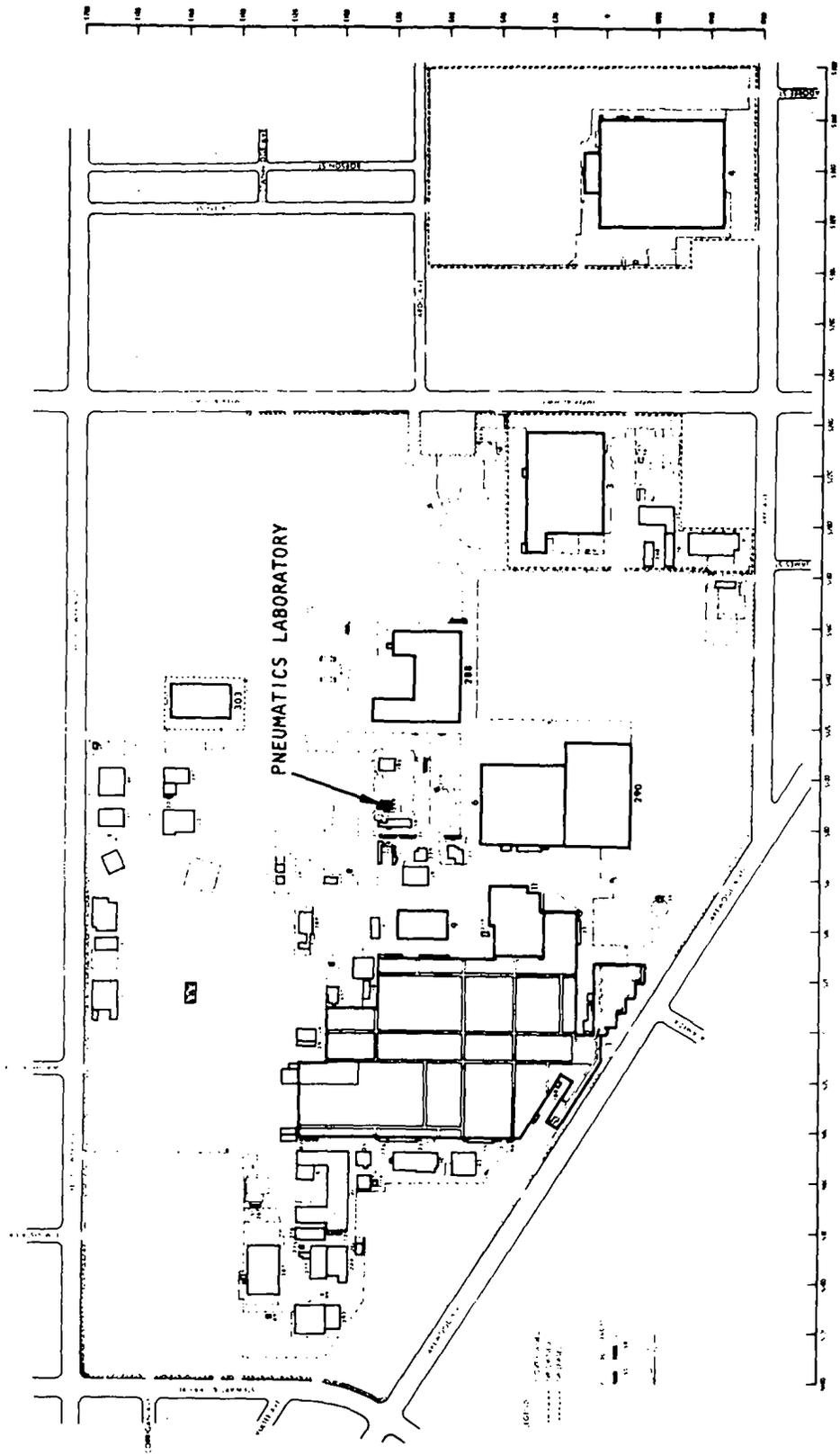


Figure 23. Pneumatics Laboratory Facilities

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon completion of this program. Disposal of exhausted gaseous material generated by the proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 20

TITLE: MECHANICAL POWER SYSTEM LABORATORY

T. MECHANICAL POWER SYSTEM LABORATORY FACILITIES

Description of Proposed Action

The mechanical power system laboratory, located in Building 289 (Figure 24), is capable of exposing the auxiliary power unit (APU) to various test environments which simulate most mechanical power conditions in the orbiter. These conditions serve to evaluate, develop, and demonstrate the APU, APU components, and plumbing in a breadboard subsystem configuration. A referee fluid will be used to demonstrate the fuel storage and feed assembly during static and flow to evaluate transient and steady-state performance. A referee fluid, by definition, has approximately the density and flow characteristics of the propellant fuel, but does not burn or create any hazard in the test environment. Gaseous nitrogen and helium will be used during various phases of testing for the purging and drying system, leak check, pressure test, and flow restriction test.

The referee fluids that are spent are deposited into approved and identified containers, and sold as salvage material. The expelled gaseous nitrogen and helium are exhausted directly into the atmosphere.

Probable Impact of Proposed Action on the Environment

The proposed action will have no significant effect or impact on the environment. The present and proposed methods for disposing of spent liquids as salvageable material and exhausting gases are within the framework established by the responsible Los Angeles County agencies.

Probable Adverse Environmental Effects

No known adverse environmental effects can result from the proposed action. The present and proposed methods for disposing of spent liquids for reclamation and exhausting gases are acceptable procedures for the Space Shuttle Program.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is currently located near related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned method for disposing of spent liquids and gaseous exhausts will cause no appreciable short-term environmental degradation; hence it will have no long-term adverse environmental effect.

DOWNEY COMPLEX
ASSESSMENT NUMBER 20

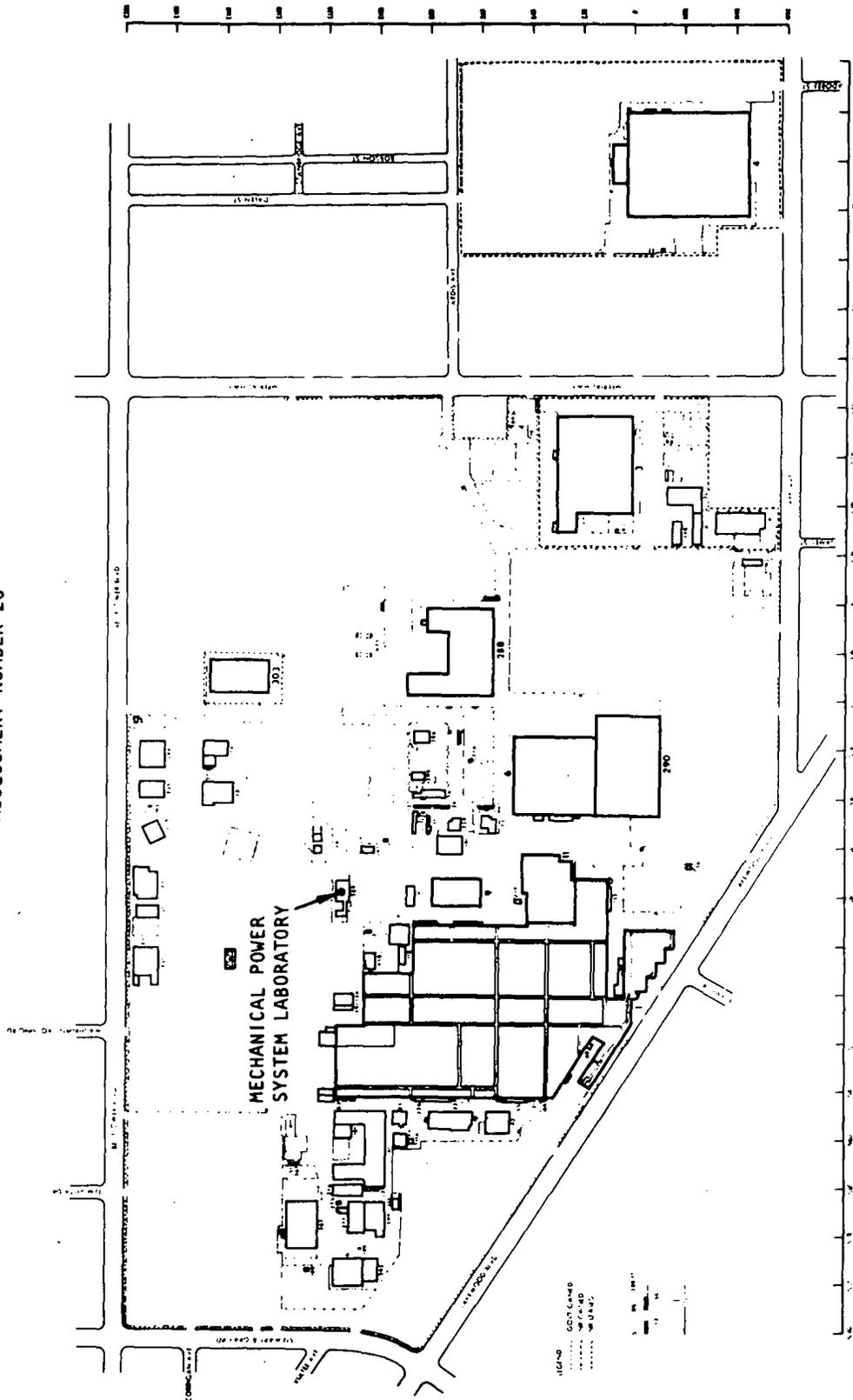


Figure 24. Mechanical Power System Laboratory Facilities

Irreversible and Irretrievable Commitments of Resources From
the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the processing function. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon the completion of this program. Disposal of spent solutions and gases generated by this proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 21

TITLE: PRESSURE TEST CELL LABORATORY

U. PRESSURE TEST CELL LABORATORY FACILITIES

Description of Proposed Action

The pressure test cell laboratory, located in Building 289 (Figure 25), conducts pneumatic tests to verify the integrity of the crew compartment, related systems, and subsystems. The test cell is 23 by 24 by 25 feet and is designed to withstand high burst pressures. Gaseous nitrogen and helium are used as the primary test media to demonstrate and evaluate the pressure systems. During high-pressure tests, the test specimen is completely isolated from the test control room and personnel. Expended gases from blowdown, purge, leak check, pressure tests, and flow restriction tests are exhausted directly into the atmosphere through vent pipes.

Probable Impact of Proposed Action on the Environment

This proposed action will have no significant effect or impact on the environment. The present and proposed methods for disposing of exhausted gases are within the framework established by the responsible Los Angeles County agencies.

Probable Adverse Environmental Effects

No known adverse environmental effects can result from the proposed action. The present and proposed methods for the disposal of exhausted gases are acceptable procedures for the Space Shuttle Program.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned disposal of gaseous exhausts will cause no appreciable short-term environmental degradation; hence it will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the processing function. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon the completion

of the program. Disposal of gases generated by this proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 22

TITLE: ENVIRONMENTAL CONTROL AND LIFE SUPPORT SUBSYSTEM LABORATORY

V. ENVIRONMENTAL CONTROL AND LIFE SUPPORT SUBSYSTEM LABORATORY FACILITIES

Description of Proposed Action

The ECLSS laboratory is located in Building 290 (Figure 26) and includes capabilities for assembly-level testing in preparation for the ECLSS/crew cabin test and flight test of the orbiter. These development and verification tests will assess the proper conditioning of the cabin, the interface between major assemblies and various control systems, the control ratio of cabin gases, and the control temperature of electronic equipment. In addition to cooling fluids of chilled water and water glycol-gaseous nitrogen, helium, and air are the primary test support media. The cooling fluids are used to reduce heat during the operation of the on-board equipment. The gases are used during demonstration and evaluation of various requirements for qualification of the ECLSS prior to thermal and horizontal flight tests.

Spent liquids are deposited into approved and identified containers, and sold as salvage material. The expelled gases are exhausted through vent pipes directly into the atmosphere.

Probable Impact of Proposed Action on the Environment

This proposed action will have no significant effect or impact on the environment. The present and proposed methods for disposing of spent liquids as salvageable materials and exhausted gases are within the framework established by the responsible Los Angeles County agencies.

Probable Adverse Environmental Effects

No known adverse environmental effects can result from the proposed action. The present and proposed methods for the disposal of spent liquids for reclamation and exhausted gases are acceptable procedures for the Space Shuttle Program.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The planned disposal of spent liquids and gaseous exhausts will cause no appreciable short-term environmental degradation; hence it will have no long-term adverse environmental effect.

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ASSESSMENT NUMBER 22**

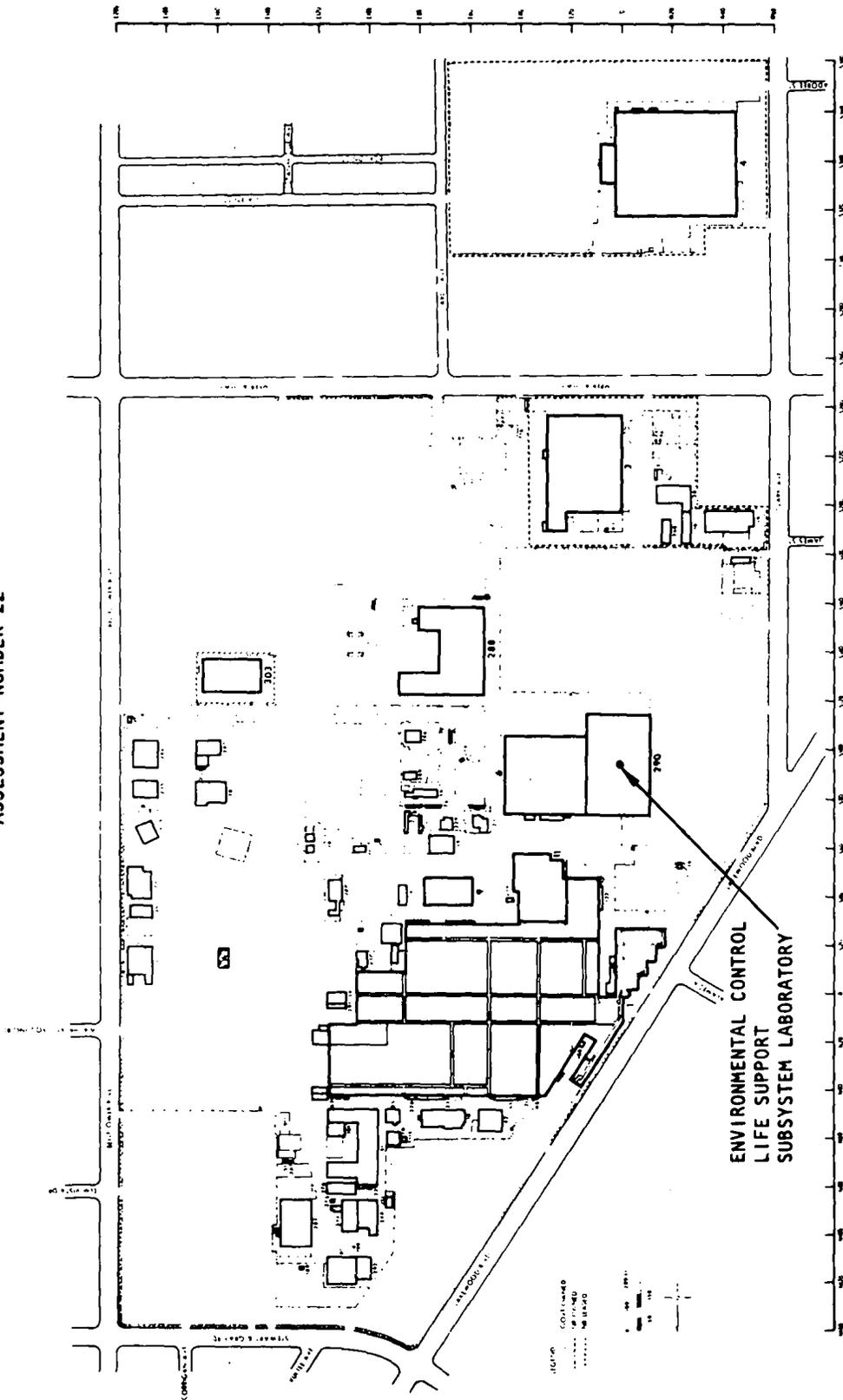


Figure 26. Environmental Control and Life Support Subsystem Laboratory Facilities

Irreversible and Irretrievable Commitments of Resources From
the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the processing function. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon the completion of this program. Disposal of spent solutions and gases generated by this proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 23

TITLE: HYDRAULICS LABORATORY

W. HYDRAULICS LABORATORY FACILITIES

Description of Proposed Action

The hydraulics laboratory facility, located in Building 229 (Figure 27), performs hydraulic checkout and failure analysis evaluations on the flight control simulator and loading systems. The facility supports and services the hydraulic system assemblies and components for the hydraulic flight control simulator test program. It also tests and evaluates the suitability of hydraulic system components from available off-the-shelf-type hardware, contamination controls, and proposed operating procedures. After test specimens are checked out, evaluated, and tested, they are returned to the responsible engineering development department.

Probable Impact of Proposed Action on the Environment

The proposed action will have no significant effect or impact on the environment. The methods used during the checkout, evaluation, and test programs create no waste material or pollutants. Operations are conducted within the framework of the regulations established by the responsible Los Angeles County agencies. There is no apparent potential for occupational health hazards or other danger to life systems.

Probable Adverse Environmental Effects

There are no known adverse environmental effects or impact on the environment. The present and proposed methods create no known waste material or pollutants and are acceptable procedures for the Space Shuttle Program.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future programs.

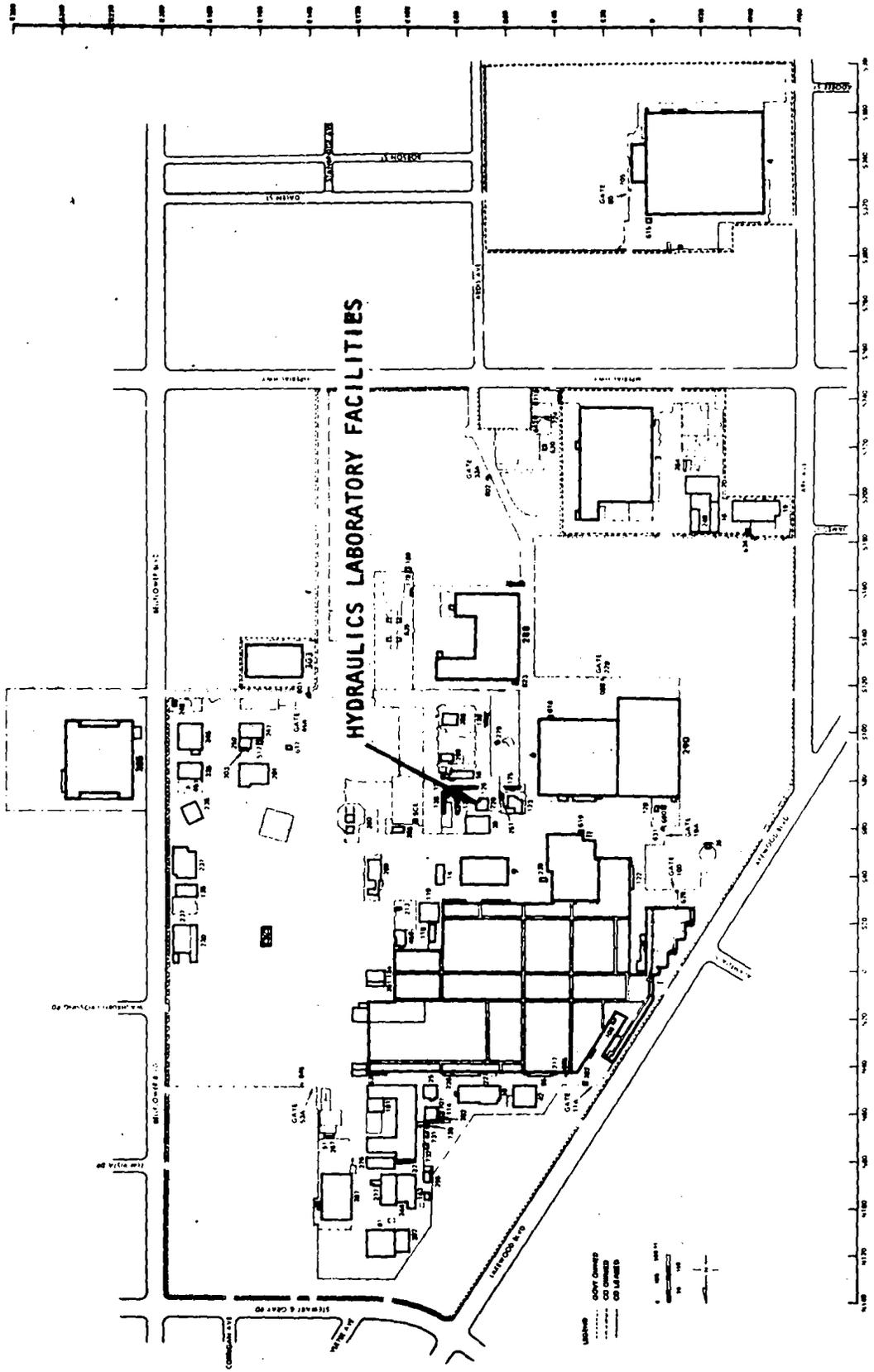
Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The methods used will cause no appreciable short-term environmental degradation; hence, they will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon the completion of the program. The proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

**DOWNEY COMPLEX
ASSESSMENT NUMBER 23**



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Figure 27. Hydraulics Laboratory Facilities

There will be no significant emission or discharge of pollutants from these facilities. Neither on-site nor off-site changes in the environment will be caused by the hydraulics laboratory functions.

NASA INDUSTRIAL PLANT (DOWNEY, CALIF.)
ENVIRONMENTAL IMPACT
ASSESSMENT NUMBER 24

TITLE: ORDNANCE LABORATORY

X. ORDNANCE LABORATORY FACILITIES

Description of Proposed Action

The ordnance laboratory facility, located in Building 123 (Figure 28), conducts development, evaluation, qualification, and reliability testing of explosives and explosive-operated crew escape systems, separation joints, docking ring separation mechanism systems, hardware, and subsystems. During thermal test operations, liquid nitrogen (LN₂) and gaseous nitrogen (GN₂) cylinders and/or trailers must be on hand at the facility. The waste by-products of this test facility are gaseous nitrogen, which is expelled directly into the atmosphere, and powder residue from explosive devices, which is flushed from the test cell with water.

Probable Impact of Proposed Action on the Environment

This proposed action will have no significant effect or impact on the environment. The gaseous nitrogen which is expelled into the atmosphere and the residue which is flushed into the sewer system are within the framework established by the responsible Los Angeles County agencies. There is no apparent potential for occupational health hazards or other danger to life systems.

Probable Adverse Environmental Effects

The proposed action can cause no known adverse environmental effects, provided the methods used are kept within the regulations of the Los Angeles County agencies.

Alternatives to the Proposed Action

The operation of the proposed action for the Shuttle program is centrally located to related functions as it was during previous programs. Relocation of this function is a possibility, but is not economically feasible. The present location is environmentally compatible and economically essential for the present and future program.

Relationship of Local Short-Term and Long-Term Effects

Both short-term and long-term effects will be negligible. The proposed action will cause no appreciable short-term environmental degradation; hence, it will have no long-term adverse environmental effect.

Irreversible and Irretrievable Commitments of Resources From the Proposed Action

There are no known irreversible or irretrievable commitments of resources from the proposed action. Facilities dedicated to the Space Shuttle Program can be modified for other uses upon the completion of the program. The proposed action will not irreversibly affect the land or other resources, and is in compliance with regulations of the Los Angeles County agencies.

**DOWNEY COMPLEX
ASSESSMENT NUMBER 24**

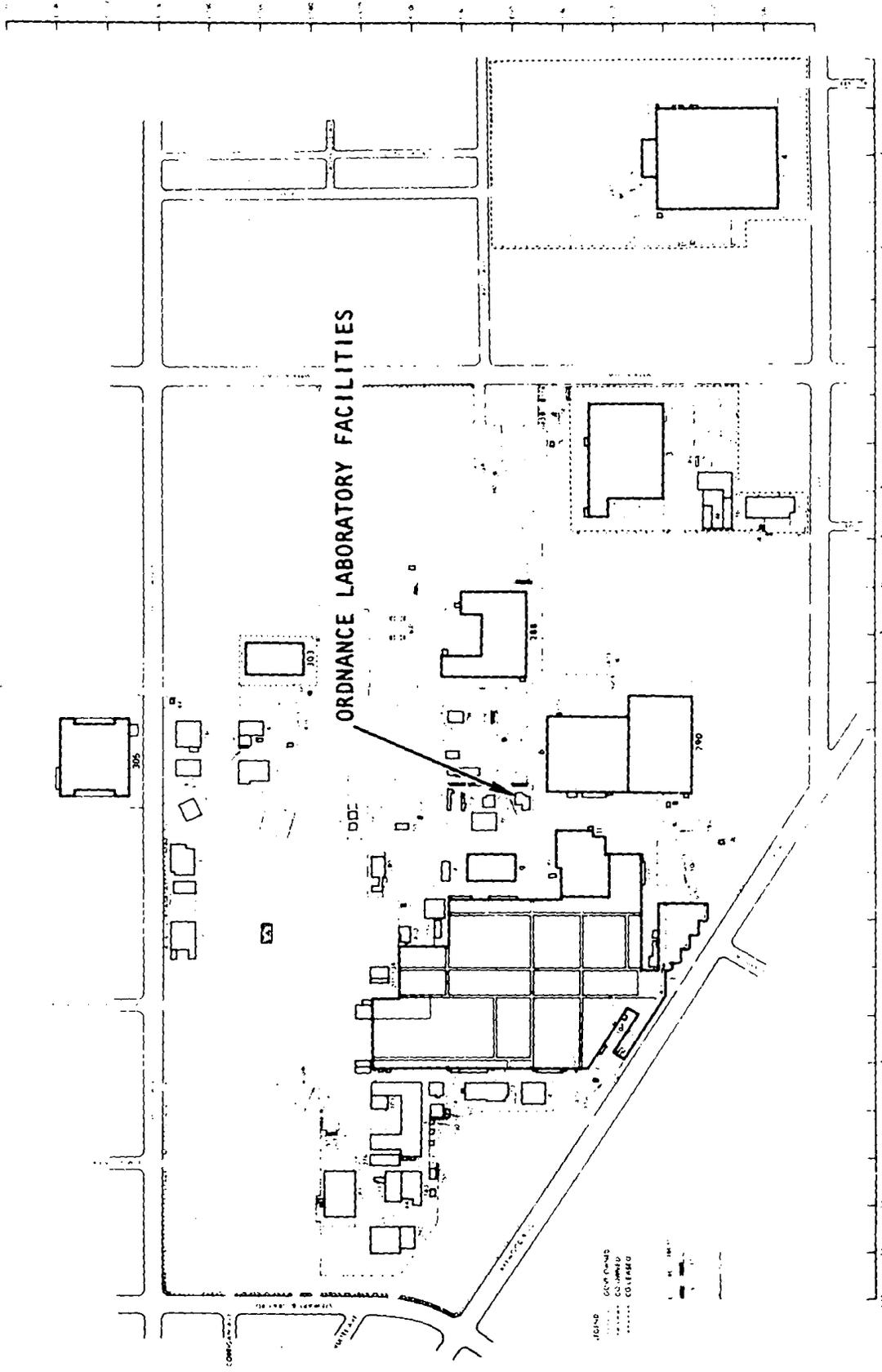


Figure 28. Ordnance Laboratory Facilities