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ENVIRONMENTAL ASSESSMENT

FOR THE

PLATING SHOP REPLACEMENT

Y-12 PLANT

OAK RIDGE, TENNESSEE

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Prepared by
The U. S. Department of Energy
Oak Ridge Operations

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ACRONYMS

CDDF	Classified Document Disposal Facility
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CEQ	Council on Environmental Quality
CPCF	Central Pollution Control Facility
DOE	Department of Energy
EA	Environmental Assessment
FCAP	Facilities Capabilities Assurance Program
FONSI	Finding of No Significant Impact
HCN	Hydrogen Cyanide
IDLH	Immediately Dangerous to Life and Health
KwH	Kilowatt Hours
LI-50	Lethal Inhalation Concentration with 50 % Fatality Rate
MMES	Martin Marietta Energy Systems, Inc.
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
ORGDP	Oak Ridge Gaseous Diffusion Plant
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
PEIS	Programmatic Environmental Impact Statement
PRWTF	Plating Rinse Water Treatment Facility
PVC	Polyvinyl Chloride

RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SDP	Site Development Plan
TDEC	Tennessee Department of Environment and Conservation
TSCA	Toxic Substances Control Act
TSP	Total Suspended Particulates
TVA	Tennessee Valley Authority
WETF	West End Treatment Facility

EXECUTIVE SUMMARY

The existing Y-12 Plant Plating Shop provides vital support functions for the U.S. Department of Energy (DOE) Defense Programs operations. In addition to weapon component plating, the facility performs other plating services to support existing operations for the Y-12 Plant, other DOE facilities, and other federal agencies. In addition, the facility would also provide essential deplating services for weapons reclamation and teardown.

The existing Y-12 Plant Plating Shop is presently located in a structure which is rapidly deteriorating and obsolete. The existing building structure was originally designed to house a steam plant, not chemical plating operations. As such, vapors from plating operations have deteriorated the structure to a point where a new facility is needed for continued safe operations.

The potential environmental impacts of the proposed action are anticipated to be minimal and would affect no environmentally sensitive areas. Some short-term construction- and demolition-related effects would occur in an already highly industrialized setting. These include temporarily disturbing 72,000 square feet of land for the new plating shop and related site preparation activities, constructing a permanent building on part of the area, and using 80 construction personnel over a period of 18 months for site preparation and construction.

Demolition effects vary depending on the environmentally suitable option selected, but they could involve as much as 262 cubic yards of concrete rubble and approximately 1600 cubic yards of soil disposed as waste. Either 1600 cubic yards of fresh soil or 1850 yards of clay and fresh soil could be required. Soil erosion would be minimal. Approximately 20 construction personnel would be involved for 12 months in demolition activities.

Operational effects would be generally identical or very similar to current operations. Three exceptions are the reduction in cyanide emissions to the atmosphere, an approximately 75% reduction in plating rinse water (from 1,000,000 to 230,000 gallons per year), and potentially safer operating conditions due to better accident mitigation. There are no major changes to other waste streams or processes having potential for adverse environmental impact. Operating permits either exist or would be obtained for the new facility.

1.0 INTRODUCTION

1.1 BACKGROUND

The existing Y-12 Plating Shop, located in an old steam plant (Building 9401-2), is deteriorated and obsolete. The facility provides metal coatings and finishings for all facilities in the DOE weapons complex. Some component of every weapons program passes through the Plating and Coating Facility of the Y-12 Plant. The specific weapon programs supported by this facility have included B61, W61, W80, W83, W88, W89, and W91. The Plating Facility also provides essential support for the modification, upgrading, and maintenance of equipment used in weapons-related production. It is also essential in the fabrication of tooling required for production. In addition, the facility is equipped for use in supporting the deplating requirements associated with weapons reclamation and teardown.

The plating materials used in the existing Y-12 Plating Shop include nickel, copper, chrome, zinc, gold, silver, and lead. The primary substrates are ferrous metals and aluminum. Most of the parts that are processed have classified shapes and/or require classified procedures. In addition to plating, the facility is used for deplating, cleaning, surface treatment, and anodizing. The rigor, quality, and certification of parts that are processed at Y-12 meet very exacting standards difficult to duplicate anywhere else. The new facility would meet those requirements essential for providing a high quality product.

1.2 PURPOSE AND NEED

Although the existing Plating Shop was originally intended for use in weapons production plating, the mission of the Y-12 Plant now requires that the facility be used for alternative purposes in conjunction with production. Presently, one primary function of the facility is for weapons reclamation and teardown through deplating operations. The Y-12 Plant is the only DOE facility with the existing capability to perform plating/deplating operations. As such, this facility performs work for the other DOE sites as well as other federal facilities through the Work for Others Program. In addition, the Y-12 Plant must maintain minimum nuclear competence. Minimum nuclear competency for the Y-12 Plant lies in its general capabilities to manufacture weapons components. Coupled with these manufacturing capabilities are assembly and disassembly of weapons components and stockpiles. Plating and deplating are critical functions of these capabilities.

The Y-12 Plant plating capabilities are a required function of the DOE Defense Programs support operations justifiable for four key reasons: (1) deplating requirements for weapons reclamation and teardown, (2) continued support for other DOE facilities, (3) continued support for other federal agencies, and (4) maintenance of minimum nuclear competence.

A new General Plating Facility is needed at the Y-12 Plant because the current Plating Shop has deteriorated significantly. The building structure is more than 40 years old and was not originally designed to be a chemical facility. The building structure has deteriorated because of the severe and corrosive environment that results from the use of open plating tanks. Obsolete ventilation systems, plating vapors and process support equipment all pose potential personnel safety hazards and pollution risks which must be reduced. The existing building was constructed before occupational safety and health, waste minimization, industrial hygiene, and environmental concerns were prevalent in the work place.

Manual plating/deplating operations not only make it necessary for personnel to wear protective clothing in a very warm environment to protect themselves from hazardous liquids and fumes, but also create an unnecessarily complex waste stream. Although the current facility is operated in a safe manner, the facility contains numerous deficiencies which pose potentially serious threats to both worker safety and the environment. In addition, it is costly to maintain in a safe condition. The proposed project would build a modern, automated plating facility with covered and vented tanks that would result in improvements in operating efficiency, personnel safety, waste minimization, air emissions, and energy conservation in the short-term and long-term.

This project supports the ongoing Y-12 Facilities Capability Assurance Program (FCAP) by reducing costs through the elimination of substandard space. Objectives of this program are the reduction of plant facility costs, reduction of overall plant square footage, enhancement of the productivity of the plant space, and consolidation of related functions. These are all strategic objectives of the Y-12 Plant Site Development Plan (SDP) as well. According to the SDP, seventy two percent of the existing Y-12 Plant floor space is over 48 years old. In addition, much of this space is located in buildings constructed as temporary buildings (wood frame and other lightweight construction) for purposes other than those for which they are now used. As such, they are expensive to maintain for today's uses and, in a majority of cases, do not meet current occupational safety and health standards. The objectives of the FCAP Program and the SDP would be furthered by replacing the existing Plating Shop with a new General Plating Facility.

1.3 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

This Environmental Assessment (EA) evaluates potential impacts resulting from the replacement of the existing Plating Shop, construction of a new facility, demolition of the old plating shop, and various impacts including air emissions, effluent discharge, and solid waste generation under routine operating conditions. It is not the purpose of this document nor within its scope to discuss potential environmental impacts or other safety issues associated with the DOE mission in general or ongoing operations at the Y-12 Plant. Such issues are policy-level decisions more appropriately included in the scope of a programmatic or site-wide document.

This document has been prepared in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended; U.S. Department of Energy (DOE) NEPA Guidelines (Federal Register Volume 52, Page 47662-47669); and the requirements of the Council on Environmental Quality (CEQ) Regulations for implementing NEPA (40 CFR Parts 1500-1508).

1.4 RELATIONSHIP OF THE PROPOSED ACTION TO THE RECONFIGURATION OF THE DOE NUCLEAR WEAPONS COMPLEX

On February 11, 1991, DOE published a Notice of Intent to prepare a Programmatic Environmental Impact Statement (PEIS) on its proposal to reconfigure the existing nuclear weapons complex to create Complex-21; a smaller, less diverse, more effective complex at the present sites, or at relocated or consolidated sites. The Y-12 Plant is one of the DOE weapons production facilities under review in this PEIS. As such, no action can be taken at a site that would prejudice or foreclose alternatives being considered by the PEIS. The PEIS would consider, among other things, the alternatives of various forms of reconfiguration including the alternative of no action. No Action would assume that the weapons complex would not change but DOE would make those modifications necessary to ensure compliance with all regulatory directives and accomplish the Department's defense-related mission. Reconfiguration could consist of maximum consolidation, or downsizing and modernizing in place. Maximum consolidation would likely result in an integrated site which would consolidate much of the nuclear materials production and manufacturing elements at a single site. Downsizing would upgrade, replace, or consolidate facilities at their current sites, using existing support facilities and infrastructure as much as possible. The preferable alternative would be selected by the PEIS Record of Decision (ROD).

The proposed General Plating Facility would replace the existing facility which is presently at the end of its useful life capacity. As such, all tanks and platform supports are severely deteriorating; the building structure, not originally intended for plating operations, is decaying from chemical vapors; outdated process ventilation is inaccessible and is not functioning properly; and the roof and asbestos containing transite siding leaks and allows rain water intrusion into the facility thus creating additional unnecessary waste water which must be processed. In addition, there have been numerous violations of occupational safety and health requirements, fire protection appraisals, internal assessments, and DOE assessments.

The PEIS Reconfiguration options include downsizing and modernizing in place, or maximum consolidation at a single site. The proposed action of constructing a replacement General Plating Facility is independent of either of these alternatives. The replacement facility is anticipated to begin operation in 1994, having a useful life span of 25 years. In 2019, at the end of this life span, the capabilities of the facility would then be reevaluated and the facility would either be upgraded or decommissioned in

accordance with the engineering design. From current studies, it is anticipated that a replacement facility for general plating/deplating operations would be planned for incorporation into Complex-21 and that full operation of the Complex would be in 2015. Since the proposed replacement General Plating Facility would be scheduled for reevaluation in 2019, there exists a potential for a four year overlap in plating/deplating operations. Given the nature of project schedules and subsequent delays, this hypothesized four year overlap, if consummated, would only ensure the continued capacity for production/reclamation plating/deplating operations as required to accomplish the Department's defense-related mission and maintenance of nuclear competency. If a reconfiguration option is chosen by the PEIS ROD, the existing Plating Facility would not be capable of maintaining operational capabilities until prioritization and realization of Complex-21. If constructed as planned, the proposed facility would be at the end of its design life shortly after Complex-21 completion and would be available for either decommissioning (if maximum consolidation at a site other than Y-12 was chosen), or upgrading (if the Y-12 site is selected). Therefore, the proposed action would not prejudice a PEIS Reconfiguration option and is justified separately and independently of these options.

In summary, the proposed action of constructing the replacement General Plating Facility is justified separately and independently regardless of the alternatives considered by the PEIS and would not prejudice the PEIS ROD. Should the ROD decide for a form of reconfiguration, the General Plating Facility would complete its useful design life and be scheduled for normal decommissioning or upgrading (depending on the selected site) as Complex-21 comes on line. Therefore, regardless of the decision resulting from the PEIS ROD, and because the facility is vital to the weapons complex for both production and returns, the replacement for the General Plating Facility is needed immediately as a measure in the near-term to ensure continued, safe, and environmentally-sound operations. Failure to provide this facility would result in a breach of operations, continued jeopardy to worker safety and health, and continued potential for environmental insult.

2.0 THE PROPOSED ACTION AND ALTERNATIVES

The proposed action consists of the following four activities: (1) site preparation, (2) construction of new plating facility, (3) operation of new plating facility, and (4) demolition of old plating facility. Each of these activities is described in detail in the following sections.

2.1 THE PROPOSED ACTION: CONSTRUCT A NEW PLATING FACILITY AND DEMOLISH THE EXISTING FACILITY

2.1.1 Site Preparation

As shown on Figure 1, the new facility would be located to the east of the present plating facility located in Building 9401-2. The proposed site is in a previously cleared and highly developed area within the Y-12 Plant site. The site is bounded on the north by Second Street, by G Road on the east, and by a railroad spur on the south. The location of the proposed site within the Y-12 Plant is shown on Figure 2. The new plating facility would be housed in a two-story building of approximately 36,200 square feet. The building footprint would be approximately 24,000 square feet. The building site would be approximately 72,000 square feet.

Site preparation would require installation of temporary security fencing around the construction site, demolition of two existing buildings (9720-29 and 9811), removal and relocation of the railroad spur south of the site, rearrangement of storm sewers, demolition of existing asphalt paved staging area, relocation of underground water lines, relocation of overhead electrical and communication services, and excavation of the building site to the building rough grade.

A subsurface exploration of the site has been made, with samples taken, laboratory tests made, and a report and recommendation for foundation design made (MMES 1985). The area has been partially filled with poorly consolidated fill underlain with rock pinnacles. Excavation at the site is expected to be mostly earth with possibly some shale. Excavation would be made for relocation of existing underground piping, building footings, new roads, and equipment foundations.

Figure 1. Location of the Proposed General Plating Shop Replacement

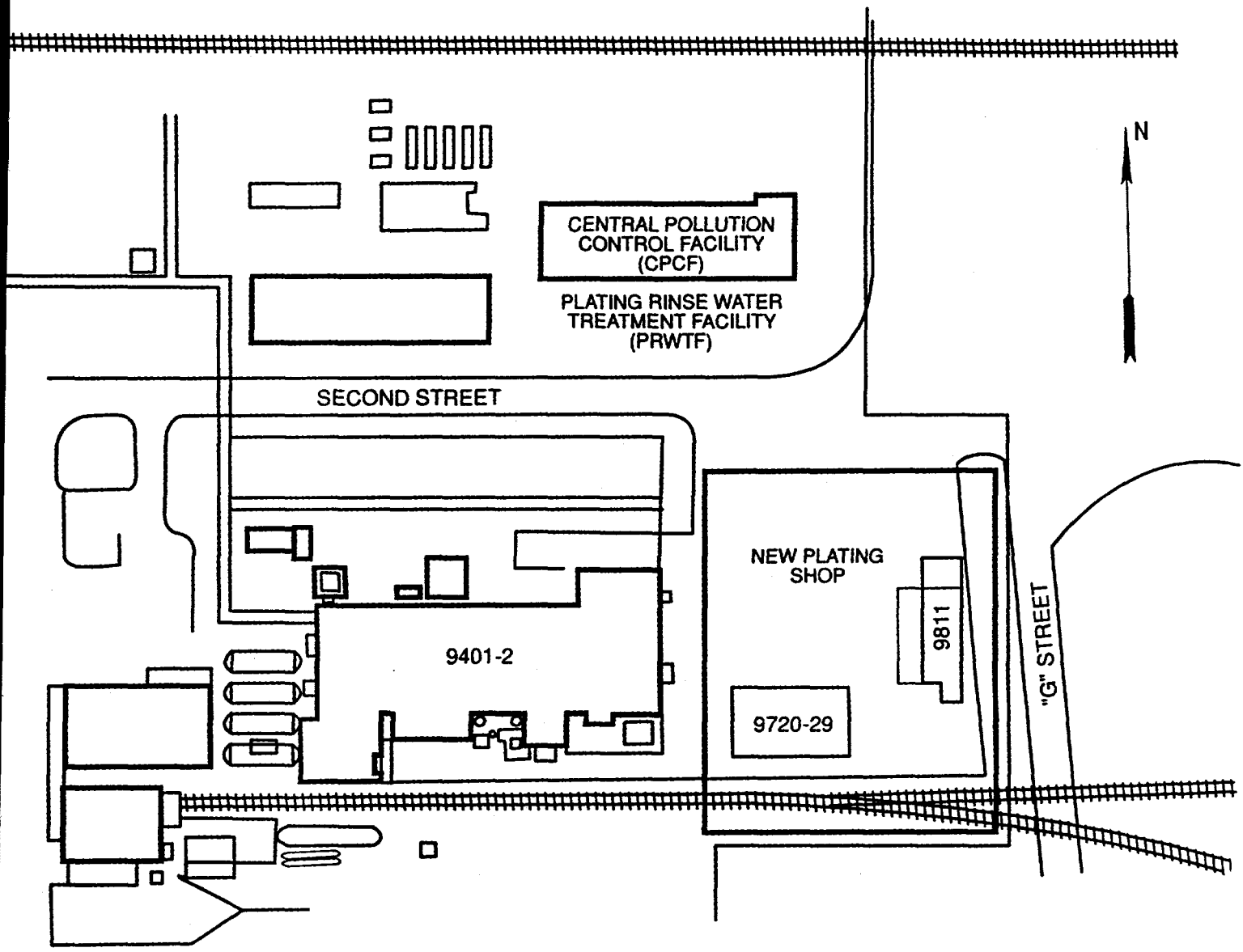

FIGURE 1

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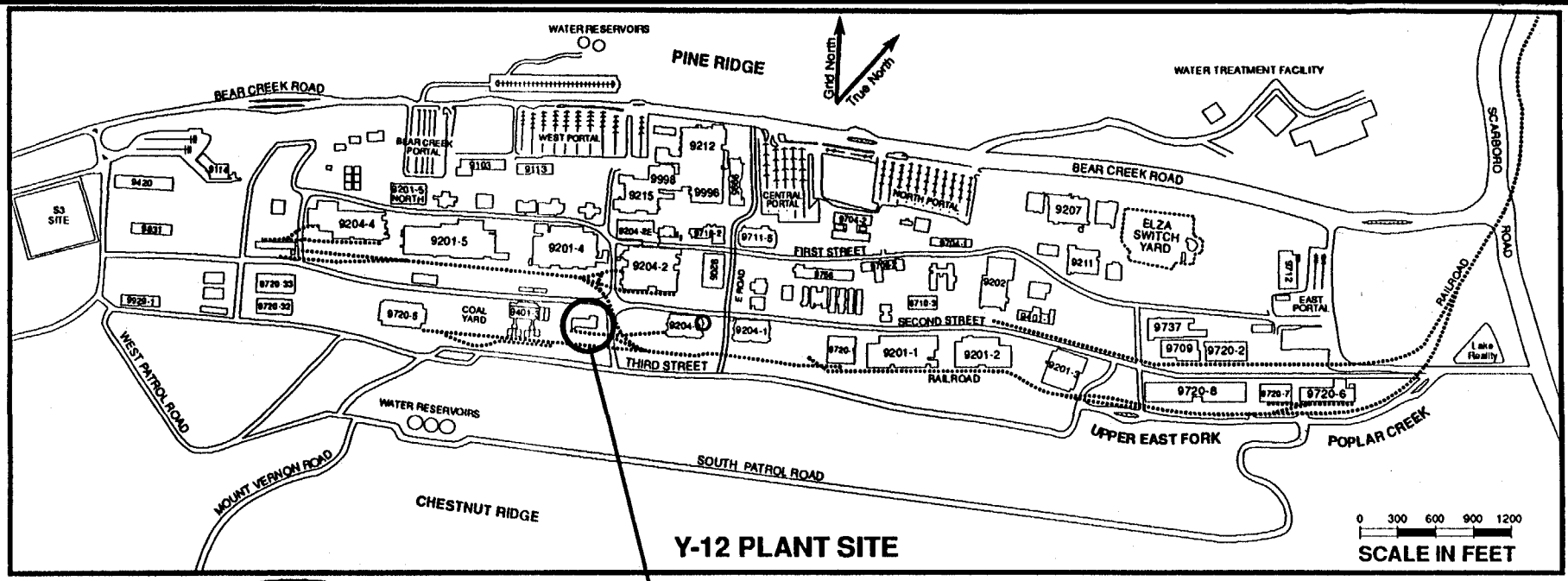
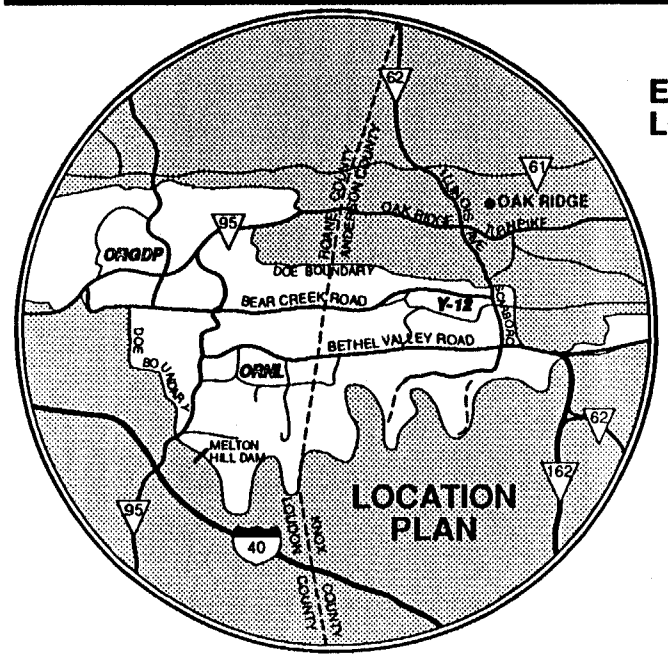




EXISTING PLATING SHOP 9401-2 & LOCATION OF PROPOSED ACTION

FIGURE 2

Location of the Proposed Action Within the Y-12 Plant Site

2.1.1.1 Demolition of Buildings 9720-29 and 9811

These two buildings are both of concrete block construction and occupy areas of approximately 1500 and 1000 square feet, respectively. Building 9720-29 is currently used for storage of tooling, supplies, and chemicals for Building 9401-2. The functions of Building 9720-29 would be incorporated into the new building. Building 9811 houses the Classified Document Disposal Facility (CDDF). These activities would be relocated to an existing building (9720-32) in the west end of the plant (see Figure 3). Existing utilities would be disconnected and removed, and other components, such as ductwork, would be checked for contamination before disposal in an approved manner.

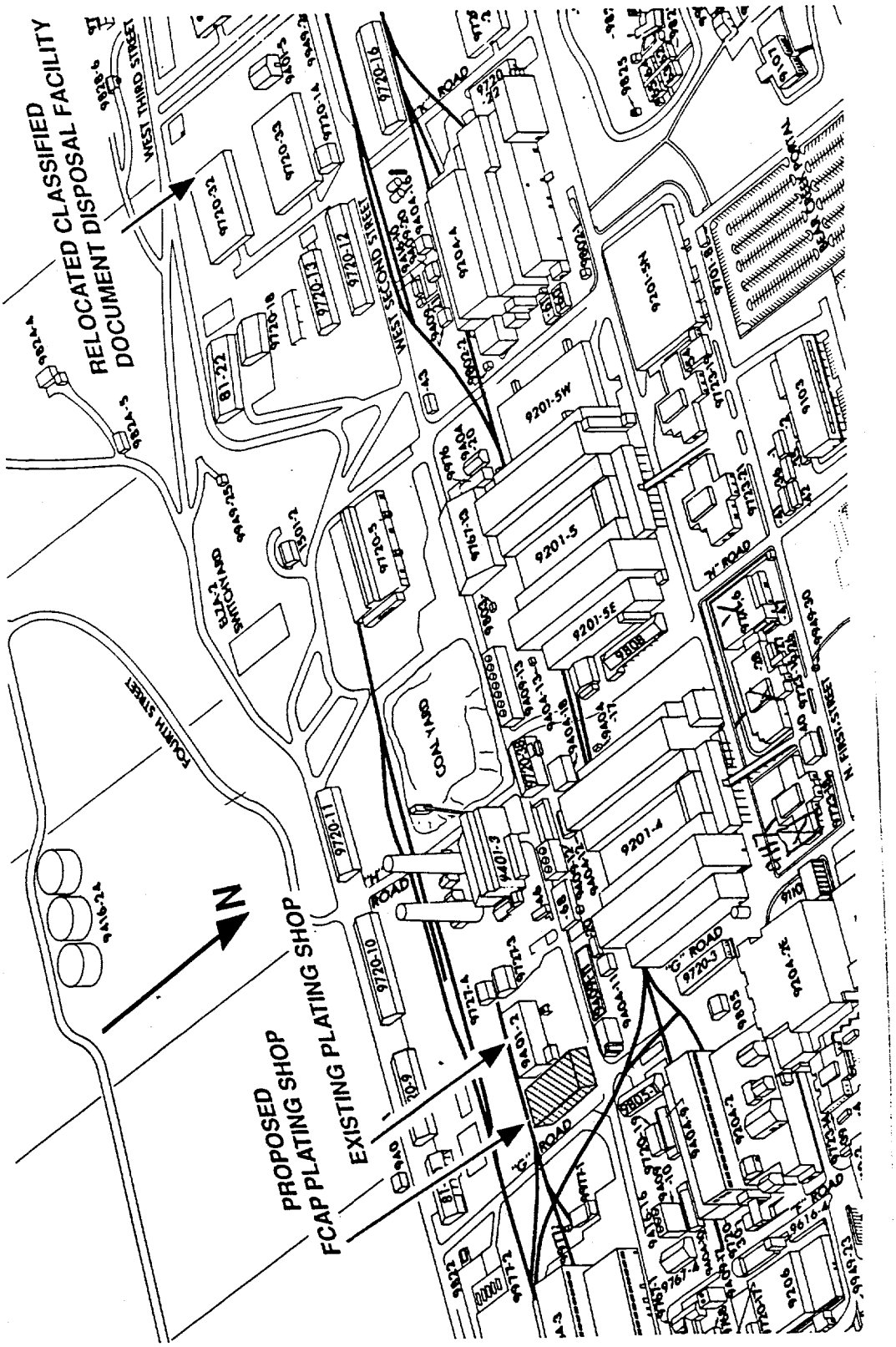
2.1.1.2 Installation of New Equipment in the Relocated Classified Document Disposal Facility

Construction of the proposed plating facility necessitates removal of the existing CDDF currently housed in Building 9811. Because of the critical nature of the CDDF, installation of new disposal equipment would be required before demolition of Building 9811 and site preparation for the proposed General Plating Facility can begin. The present facility is used to destroy classified paper documents, microfilm, microfiche, punch cards, carbon paper, typewriter ribbons and cartridges, and computer printouts. These items are destroyed by burning in a gas-fired incinerator or by disintegration in a mechanical shredder. The CDDF is currently permitted for particulate emissions and for operation of a gas-fired incinerator that meets all state and federal standards.

Replacement disposal equipment would be installed at the west end of Building 9720-32. The equipment would occupy approximately 1100 square feet inside and approximately 500 square feet outside the west wall of the building. Replacement equipment would consist of a new incinerator. The mechanical shredder is being replaced with new equipment to be located in Building 9720-32 on another project. Figure 3, a block diagram map looking south, shows the new location in relation to the existing plating shop and the new facility site.

Activities within the relocated CDDF building would be essentially the same as in the old facility. Classified materials would be either pulverized or incinerated. X-ray film would be pulverized for sale to a silver recovery facility. The incinerator would be a gas-fired design with an automatic feeder mechanism. The minimum capacity of the incinerator would be 400 pounds per hour of Class 1 waste and would be permitted to comply with all applicable state and federal air-pollution control regulations. The incinerator would be capable of handling computer paper, binders, loose paper, books, and 10% plastic.

Figure 3. Perspective Map Looking South, Showing the Existing Plating Facility the Proposed General Plating Facility, and the Proposed CDDF 2.1.2 Construction



2.1.2 Construction

The proposed General Plating Facility building would be of structural steel construction and have approximately 36,200 square feet of floor space in two wings (Figures 4 and 5). The south wing of approximately 12,200 square feet would house five plating machines in a high-bay area. The automatic plating machines would provide the operator with additional safety by reducing the time spent with the process chemicals. The operator loads and unloads the machine from a position away from the processing tanks. The operator would only need to approach the tank for maintenance of the plating solutions. The machines would be contained in a common curbed area of approximately 100 feet by 100 feet to isolate any leaks or spills. Processes using cyanide would be contained within a separated curbed area and would drain to an isolated sump. The support area would be a slab on grade floor with a 5-ton, floor-operated bridge crane. Special structural and architectural features would protect the plating machine area and support area from corrosive chemical fumes. These features may include floor toppings and coatings, precast concrete wall panels, column encasements, and a suspended corrosion resistant ceiling to protect the roof structure.

The north wing would be two stories high with approximately 12,000 square feet of floor space on each floor. The first floor would be a concrete slab on grade, and the second floor would be of reinforced concrete. This wing would house laboratories, plating/deplating development facilities, service areas, storage areas, offices, and general shop facilities. Spill containment curbing would be provided around workstations and plating machine areas. The same protective features used in the south wing would be utilized in appropriate areas of the north wing.

Labor and materials for the site preparation and construction phases of the proposed action would be supplied by fixed price contractors. A work force of approximately 80 persons would be expected to spend 18 months onsite for preparation and construction. Their total estimated construction cost would be approximately $16 million. Labor and costs for operation and demolition of the existing plating shop are discussed in Section 2.1.3 and 2.1.4, respectively.

Figure 4. Plan View of the Proposed General Plating Facility, 1st Floor

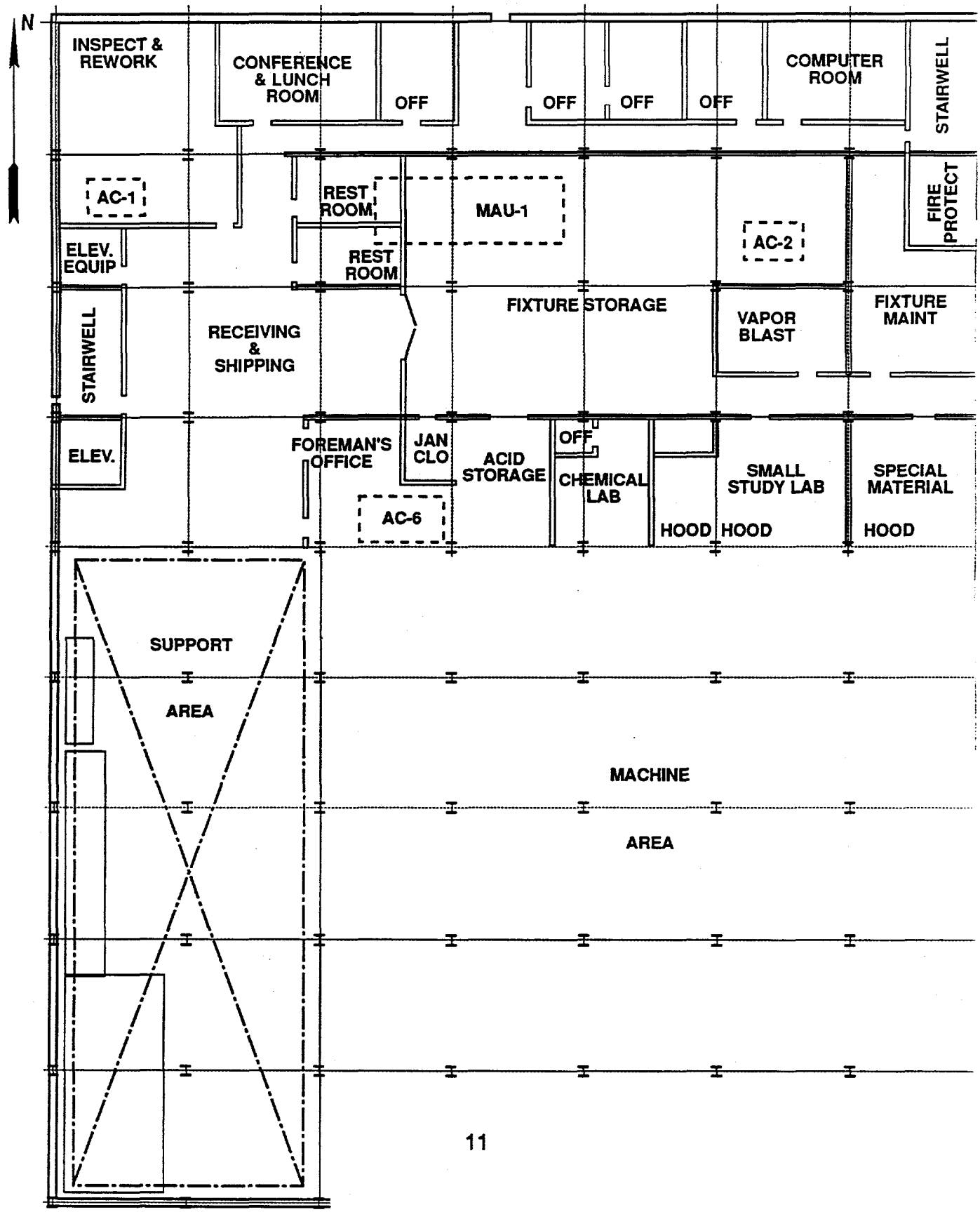
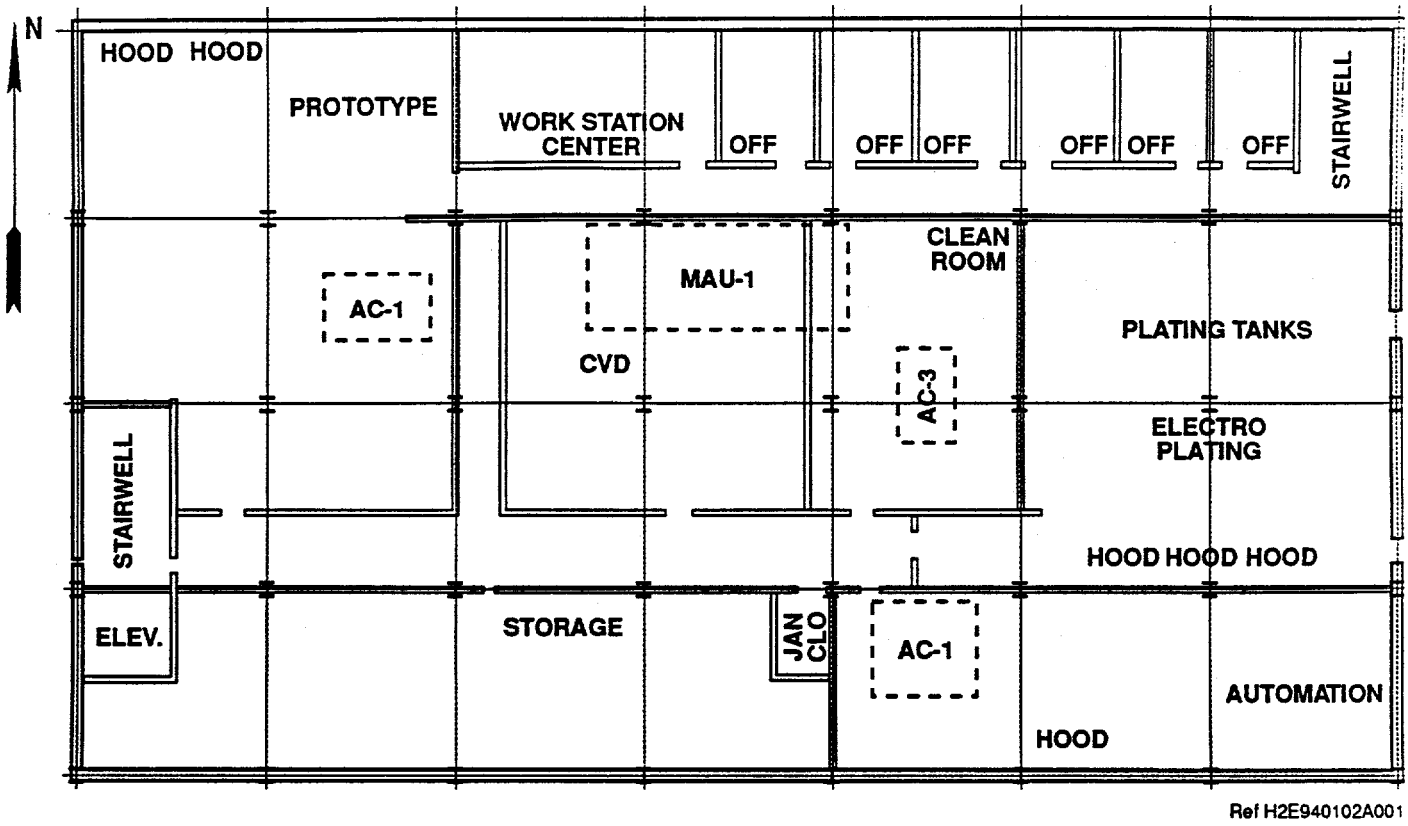


Figure 5. Plan View of the Proposed General Plating Facility, 2nd Floor



2.1.3 Operation and Waste Streams

Ventilation

The plating/deplating machine area and support areas would be served by two air handling systems located adjacent to the building. The units would be variable volume with 100 percent outside air, 95 percent efficient filters, prefilters, steam heating coils, cooling coils, and pneumatic controls. A reduced flow exhaust system which contains and vents the vapors from the plating tanks would be provided for each of the five plating lines. Two exhaust scrubber systems would be operated. One system would be dedicated to exhaust systems with a potential to contain cyanide compounds; the other system would treat exhaust from all other vented plating tanks and similar exhausts. Specific airborne chemicals are identified in the Permit Compliance section of this assessment.

Plating/deplating operations require the preparation of batches of chemicals that could evolve toxic gases due to an accident. A severe accident would be the mixing of an acid into a cyanide tank. This would produce an extremely toxic gas, hydrogen cyanide (HCN), which if inhaled can be lethal at acute exposures of 100 ppm. The existing plating shop is equipped with an obsolete ventilation system which would not be useful in mitigating such an accident. The results of a safety assessment for the proposed General Plating Facility are provided in Section 4.2.

Waste Streams

Each plating/deplating line would have connections for one or more of the following liquid waste streams: rinse water, nitrate rinse water, cyanide waste, concentrated chrome waste, concentrated nitrate waste, other concentrated waste, floor sump waste, condensate and cooling water, and/or oily waste.

Based on operation of the existing Plating Shop, these wastes streams would normally be low concentration rinse water, though occasionally concentrated plating solutions would be collected. A central collection system would collect the segregated waste streams. The quantities of these wastes would not change significantly from the existing operations except that plating rinse water would be reduced about 75 percent from 1 million gallons per year to 230,000 gallons per year.

Liquid waste streams from plating or deplating operations would be processed at one of four existing facilities. In general, diluted liquid waste would be treated in the Plating Rinse Water Treatment Facility (PRWTF). These wastes would be piped by aboveground process lines to the PRWTF, which is located just north of the proposed site (see Figure 1). Any waste streams containing more than 100 ppm of nitrates would be sent to the West End Treatment Facility (WETF). These wastes would be transported by tank trailers to the WETF. Depending on nitrate content, concentrated waste streams

resulting from spills or replacement of plating bath would be treated in the Central Pollution Control Facility (CPCF), located in the same facility as the PRWTF or the WETF. Concentrated waste would be transported in 600 gallon poly tanks. All cyanide wastes would be treated as concentrated wastes and would be drummed and transported to the Cyanide Destruction Unit located in 9201-5N.

Solid waste generated from the proposed General Plating Facility would be expected to contain spent anodes, nickel, zinc, copper, solid caustic residues (sodium hydroxide), and other metal scrap (as much as 11,000 pounds per year). Some sludges may be formed from the plating salts due to spills (50 pounds per year). Industrial trash consisting of gloves, wipes, and paper would be generated (15,000 pounds per year). The generation and disposal of these solid wastes would not be significantly different than the current operation for the existing plating shop.

Solid metal scrap that can be recycled would be sent to a salvage yard onsite. Industrial trash would be landfilled. All other solids would be packed in lined drums and stored on the DOE reservation or disposed of offsite by licensed hazardous waste disposal facilities in accordance with current operating procedures.

Permit Compliance

Liquid effluents, like those from the existing plating facilities, would be treated at existing onsite facilities. The transport and treatment of the liquid wastes from the new facility would be identical to the current treatment of these wastes streams from the existing Plating Shop. One significant benefit of the proposed action would be the reduction in volume of plating rinse water by about 75%. Because no changes in the treatment of the waste streams are proposed, modifications to the National Pollutant Discharge Elimination System (NPDES) permits would not be required.

Applications for new air permits would be filed with the Tennessee Department of Environment and Conservation (TDEC), Division of Air Pollution Control, for the new plating facility. Like the existing permits, the new permit application would include emissions for chrome, nickel, silver, aluminum, copper, sodium hydroxide, tin, zinc, gold cyanide, potassium cyanide, copper cyanide, nitrates, sulfates, chlorides, and organic solvents. A benefit of the proposed action would be the operation of scrubbers on the ventilation stacks to remove cyanide and acid from the exhaust fumes.

All wastes generated at the Y-12 Plant are handled according to standard operating procedure 70-903, Discard of Waste (MMES, 1990). The procedure complies with all environmental laws and regulations including RCRA. No permit modifications would be required as a result of the proposed action.

2.1.4 Demolition of Existing Plating Shop

The existing Building 9401-2 was originally constructed as a coal-fired steam plant in 1944. The building was stripped of its original equipment and converted into a plating shop approximately 30 years ago. The modification consisted of building offices, adding a quarry tile over a rubber membrane processing area, and installing plating tank platforms, bridge cranes, ventilation, and utilities.

The building is a structural steel frame approximately 52 feet wide, 171 feet long, and 45 feet high. The building is covered with corrugated transite. The roof deck is precast concrete slabs covered with built-up roof. A prefabricated metal building has been added at the southwest corner of the main shop. Several appendages have been added at the outside walls.

Many of the construction materials, such as the transite siding, pipe insulation, and roofing felts, may contain asbestos. These materials would require procedural removal and disposition according to an approved Waste Management Plan to be prepared by the project engineer. The Waste Management Plan would adhere to all applicable regulations regarding the transport and disposal of waste materials. The building also contains chemical residues and equipment which would be checked for contamination before disposition according to the Waste Management Plan.

Because of the age of the building and deterioration due to the corrosive chemicals which have been used, there is a potential for contamination under the foundation of the building. The Y-12 Environmental Restoration Program would assume responsibility for the necessary assessments and investigation required to determine the disposition of the site. The site would likely undergo site investigation and sampling under RCRA and/or CERCLA. Such studies would determine if further characterization or remedial action is necessary. At this time, it is impossible to know what actions may be required at the site. However, the following paragraph describes possible actions which might occur.

The building would be demolished and the area returned to an environmentally acceptable condition, preferably to an open area sown with grass. However, because of the nature of the chemicals used in the plating shop, the potential exists for contamination of both the concrete floor and the soil under the floor. Thus, a graded approach would be used in building demolition. The building would be demolished to the point that the roof, floor, and walls are left standing. The roof would be left on the building to prevent any rainfall from washing materials from the floor and away from the building. Sampling for chemical contaminants would then be done for the floor and for the soil underlying the floor. (For operational reasons, this sampling cannot be done while the plating shop is still in use.) Based on the findings of the contaminant sampling, further demolition and site restoration would be done in an environmentally acceptable manner. The following three options are examples of actions which might be taken:

(1) remove the remaining building and reseed the soil, (2) remove the remaining building, excavate and replace up to three feet of contaminated soil with fresh soil, or (3) remove the remaining building except the floor and cover the site including the floor with a "RCRA cap" (i.e., two feet of compacted clay with a 1×10^{-7} centimeters per second permeability, a PVC liner, a geosynthetic drainage net, filter fabric, and 1 1/2 feet of soil suitable for vegetative cover).

The site is not currently on a list of remedial action projects since there is no evidence to suggest contamination beneath the building. However, without the demolition of the building, as proposed in the EA, no site investigations or remedial actions can be implemented.

In general, nonhazardous, nonmetallic construction debris would be disposed of at the Y-12 Sanitary Landfill. Noncontaminated metallic debris would be segregated and stored at the Y-12 Salvage Yard before being sold as scrap. Any waste characterized as being hazardous would be stored onsite at Y-12 until scheduled to be incinerated at the RCRA/TSCA incinerator at the Oak Ridge Gaseous Diffusion Plant (ORGDP) or disposed of at a licensed, offsite commercial hazardous waste facility (only if not radioactive). Any radioactively contaminated materials would be disposed at existing storage facilities at ORGDP.

Labor and materials for the demolition of the existing plating shop would be supplied by a fixed price contractor. Although the work force projections vary due to the demolition option finally selected, the most intensive option would require approximately 20 people over a 12-month period. Total estimated cost would be approximately $5 million.

2.2 ALTERNATIVE 1: NO ACTION

Under the No Action alternative, the existing plating facility would continue operating on existing programmatic funding. Improvements to the facility would continue to be made as funding allows.

This alternative is considered unsatisfactory due to the deteriorating building and antiquated equipment. Because the structure was not originally designed as a chemical facility, corrosive vapors generated by the plating processes have caused structural and equipment deterioration. The ventilation equipment is an exhaust system only and a significant quantity of chemical bath vapors escape from the open tanks into the working environment and pose a threat to the operator's health. The new facility would utilize covered tanks and the space between the surface of the bath and the tank cover would be individually vented to remove chemical vapor. When the cover would be opened, a push-pull type vent system would be used to sweep the vapors across the tank and vent them before they escape into the shop environment. Thus the required environmental conditions are maintained in the shop while minimizing energy usage. In the "no action" alternative, vapors would continue to be released resulting in continued structure and

equipment degradation and continued compromise of worker health. Some structural members are in need of replacement due to rusting and corrosion. Wooden platforms which support the plating tanks are deteriorating and rotten in many places. Utility piping has rusted and is generally in poor condition.

Obsolete plating and part handling equipment contributes to safety hazards and unnecessary waste streams. For example, the facility is a major source of complex heavy metal wastes because single rinse tanks must be used to rinse several incompatible processes. This results in a high rinse water turnover rate in order to maintain rinse water purity. The new facility would reduce the rinse water to one tenth of the existing facility requirements.

Existing plating technology support areas, located in Building 9202, are remotely located in seven laboratories which have deteriorated to the point that many utilities cannot be used. Some of these facilities, which were not designed to handle corrosives, are located on the top floor of the building and allow chemical spills to leak onto the floors below.

Impacts of selecting this alternative would result in a breach of operations, continued increasing jeopardy to worker safety and health, and continued increasing potential for environmental insult. Operating in the "no action" alternative would include continued generation of complex waste streams, and continued violations of occupational safety and health requirements, fire protection appraisals, internal assessments, and DOE surveillances. Continued use of the deteriorating structure would increase the risk of platform failure and tank leakage which could result in discharges to the environment and would also pose increased risk of accidents compromising worker safety and health. In addition, current manual operations present the continued risk of splash hazards while lowering and raising parts in and out of the tanks. Although personnel protective equipment is currently utilized, the Occupational Safety and Health Administration has directed that engineering controls are preferable to the use of personnel protective equipment such as splash-resistant clothing and respiratory protection. Fire protection appraisals have shown that the existing fire suppression system is questionable in reliability and requires manual activation. In general, if the "no action" alternative were selected, the existing Plating Facility would be forced into shutdown in the near future due to the noted deficiencies. Initially, shutdowns would be short-term for frequent maintenance-related repairs. However, a long-term, permanent shutdown would be eminent as the structure continues to erode. DOE would therefore be unable to continue its defense related mission of weapons support due to the lack of plating/deplating capabilities.

2.3 ALTERNATIVE 2: PROCURE PLATING FROM OUTSIDE SOURCES

A "Buy-Make" study completed in April 1989 investigated the possibility of procuring some plating services from outside vendors (North and Backus, 1989). For the technical

analysis, three processes were chosen to represent the diversity of technical difficulty and the greatest volume of work: electroless nickel plating, passivation, and acid copper plating. It was assumed that if vendors could do these, the technical capability to do the other processes also existed. Expressions of interest were sent to 12 vendors, complete with a general questionnaire and sample drawings. Four vendors responded and were visited by an evaluation team. All four vendors had experience in electroless nickel plating, but only three had experience in passivation and copper plating. Other plating processes were also observed in these visits.

For the financial analysis, these initial five options, four vendors and Y-12, were reduced to two. This was due to the inability to obtain a response from two vendors and a lack of confidence in the cost estimate received from a third vendor.

The study recommended that acid copper plating of some regular and routine special production could be obtained from outside vendors. Other routine anodizing, black oxide coating, and cyanide copper plating are possible candidates for outside procurement but need further investigation. Other techniques essential to plant operation, such as passivation and electroless nickel plating, cannot be obtained outside the plant for a variety of technical, scheduling, and quality reasons. Also, plating services of all kinds must be maintained onsite for emergency plant support and nonroutine plating. Thus, this alternative is unacceptable.

2.4 ALTERNATIVE 3: MODIFY THE EXISTING FACILITY

In summary, this alternative is unacceptable because of its impact on operation of the existing plating facility. Due to the major modifications required to upgrade the facility and the lack of floor space, it would be impossible to maintain capabilities during the upgrade. It is anticipated that operations would cease for approximately 18 months during this transition. Because of limited existing floor space, the upgrade to an efficient operating facility would require a building addition to house the installation of additional processing tanks, improved ventilation systems, waste isolation collection systems, and automated process control and data acquisition. These capabilities and additions would be provided in the new replacement facility as well. The impact of this alternative would be the interruption of operation and the increased cost of facility upgrades verses new construction.

This alternative is not acceptable if DOE is to maintain active plating/deplating capabilities. The existing General Plating Facility is currently located in a building that has deteriorated to the point where it is no longer upgradable. The building structure is approximately forty years old and has corroded support structures, deteriorated service lines and an inefficient equipment layout. Basically, a facility that was expected to be used ten years, and was not originally intended to be a plating facility, has been used for an additional thirty years with minimal refurbishing. Correction of this situation requires a new facility as justified as part of the continuing FCAP at the Oak Ridge Y-12 Plant. This ongoing

program replaces deteriorated DOE facilities as they reach the end of their life capacity. Through this program, experience has shown that upgrades to existing facilities are more expensive than construction of new facilities.

2.5 OTHER ALTERNATIVES

Design Alternatives

Various design alternatives were evaluated for components of the plating shop processes. For instance, three ventilation concepts were evaluated before the system described in section 2.1.3., a modified low flow system, was selected (DOE/ORO, 1990).

Push-pull ventilation is the industry standard for plating tank ventilation, but is a large consumer of electrical energy because of its associated large air flow rate. This large air flow rate results in increased capital costs, and the potential for larger releases of toxic or hazardous gases to the environment. It was not accepted as the preferred design.

Low-flow ventilation utilizes approximately 5 to 10 per cent of the air volume as an equivalent push-pull system. The concept was not accepted because of the limited industrial experience with the system and the unsure availability of the necessary components.

Another alternate process investigated was a non-cyanide, copper on aluminum plating system. This process was rejected because of limited industry experience. However, tests and studies of this system are still in progress. If the process is perfected, it is fully compatible with the equipment to be installed in the new plating shop.

Each machine would also be procured with provisions to add recirculation and purification to each processing tank. These systems are not commercially available at this time, but when available would further reduce or recover plating wastes.

Location Alternatives

The only other alternative would be to build the new facility at a location other than the one proposed. This alternative was not analyzed in detail because it was obvious early in the decision making process, that the site of the proposed action would have fewer environmental impacts than a pristine site or one located some distance from the existing PRWTF. The proposed site is compatible with surrounding industrial use and would be compatible with proposed future usage as identified in the Y-12 Site Development Plan. Moreover, the PRWTF which treats process wastes from the Plating Shop is located directly across Second street (see Figure 1).

3.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

The existing environments that could be potentially affected by the proposed action are land use in the Y-12 Plant, atmospheric resources, and water resources. Socioeconomic factors are also discussed in this section.

3.1 LOCATION AND LAND USE

The Oak Ridge Y-12 Plant is one of three major facilities located on the DOE Oak Ridge Reservation (ORR) in East Tennessee. As shown in the inset of Figure 2, the Y-12 Plant is in the eastern portion of the reservation, about three miles from the main business district of Oak Ridge.

The Y-12 Plant (see Figure 2) is situated in Bear Creek Valley between Pine Ridge to the north and Chestnut Ridge to the south. Bear Creek Valley Road, the main access to the plant, lies immediately north of the plant at the base of, and parallel to, Pine Ridge. The South Patrol Road, also shown on Figure 2, parallels the plant along the north slope of Chestnut Ridge. The developed portions of the plant are approximately 2.3 miles long and 0.5 miles wide. The Y-12 Plant site contains approximately 820 acres, 630 of which are enclosed by perimeter security fencing. The site supports 492 buildings or other facilities totalling approximately 7.2 million square feet of space.

The site for the proposed General Plating Facility is in a previously disturbed and highly developed area within the Y-12 Plant site. This location is shown in Figure 2 and is discussed in section 2.1.1. The proposed site does not support natural habitat for any known state or federally-listed endangered or threatened plant or animal species. This site is not within the known 100-year floodplain of East Fork Poplar Creek and is not a wetland area (Pounds, et al., 1992). In addition, the site contains no objects of archaeological/cultural/historical significance (DuVall, 1992).

3.2 ATMOSPHERIC RESOURCES

Oak Ridge has a temperate, continental climate with warm, humid summers and cool winters. Severe weather such as tornadoes, severe thunderstorms, or extreme conditions of temperature or precipitation are rare. Oak Ridge is on one of the lowest average-wind-speed areas in the country. Local terrain dominates the influences on daily wind patterns and contributes to the low annual wind speed. Prevailing wind directions are up-valley (from the southwest) and down-valley (from the northeast). Local meteorological conditions at the Y-12 Plant are measured at two towers to the northeast and west of the plant.

Air emissions at the Y-12 Plant are almost exclusively as a result of plant fabrication operations and occur through several hundred point sources within the facility. The plant has over 700 permitted air pollution sources that are tied into the exhaust ventilation

systems. Approximately 85 of these exhausts serve areas where depleted or enriched uranium is processed, and these are monitored continuously for radioactive emissions. Twelve ambient air monitoring stations around the plant perimeter routinely measure uranium particulates, fluoride, total suspended particulates (TSP), and sulfur dioxide.

The existing Plating Shop in Building 9401-2 has 17 existing air permits issued by the Tennessee Air Pollution Control Board. All of the permitted air releases are from vents and hoods over plating tanks or working areas. The fumes released contain sulfates, nitrates, chlorides, organic solvents, potassium cyanide, and gold cyanide. One permit is for small amounts of metallic dusts of copper, nickel, iron, aluminum, tin, and zinc.

3.3 WATER RESOURCES

Water is drained from the ORR by a network of small streams that are tributaries of the Clinch River. The Clinch River provides the regional control of both surface and groundwater flow from the reservation. The Clinch River is controlled by Tennessee Valley Authority (TVA) dams upstream at Norris Dam and Melton Hill Dam and downstream at Watts Bar Dam on the Tennessee River. The Y-12 Plant (including those sites within the proposed action) lies within the headwaters of East Fork Poplar Creek. The headwaters of this creek originate on the west end of the plant, the southeast slope of Pine Ridge, and the northwest slope of Chestnut Ridge, adjacent to the Y-12 Plant (see Figure 2). Within the plant itself, the drainages that contribute to the creek are contained below the surface in culverts ranging in size from 52 to 72 inches. These subsurface culverts exist through approximately one-half of the built-up plant area. Near E Road and Third Street (see Figure 2), the creek is contained in an 8 feet high by 10 to 15 feet wide riprapped ditch. The site of the proposed action is approximately 10 feet from the nearest storm drain and approximately 1000 feet from the open creek at E Road and Third Street. Sedimentation and streamflow is controlled by Lake Reality on the east end of the plant.

Water Releases

All liquid waste streams from the existing Plating Shop are processed through one of the following facilities: Dilute wastes and concentrated waste resulting from spills or replacement of plating baths are processed at the PRWTF and the Central Pollution Control Facility (CPCF) located just north of 9401-2 (see Figure 1); any waste containing more than 100 ppm nitrates is trucked to the WETF. All cyanide wastes are treated as concentrated wastes and are sent to a cyanide destruction facility at 9201-5N. All of the Y-12 Plant's permitted outfalls are upstream of Lake Reality, within the channelized and riprapped stream.

3.4 SOCIOECONOMICS

Oak Ridge was created to provide homes and services for thousands of people employed to help produce materials for the world's fist nuclear weapons during World War II. Since then the community has grown up with DOE's nuclear weapons facilities. The surrounding area provides a good mix of skilled and semiskilled labor and professional expertise. The labor supply is expected to continue as a result of strong educational programs offered by local colleges and universities. Regional support is particularly strong because of the beneficial economic impact that DOE facilities have on a region-wide basis. Energy Systems is one of East Tennessee's largest employers. As such, East Tennesseans in general whole-heartedly support the presence of the Y-12 Plant. Currently, the Oak Ridge Environmental Peace Alliance and the Center for Global Sustainability are the only known organizations in East Tennessee opposing DOE's nuclear weapons operations at the Y-12 Plant.

The Y-12 Plant is populated with a technically and vocationally diverse group of employees. The site population at the end of Fiscal Year 1991 was 8,288. This consists of 7,398 Energy Systems employees, 78 DOE employees on site, and 812 prime support contractors.

Construction equipment and materials for new building and demolitions associated with this proposed action would be supplied by fixed price contractors. See Sections 2.1.2 and 2.1.4 for the anticipated cost and work force required. Currently, electrical costs for the existing Plating Shop are approximately $200,000 per year (for approximately 2500 KwH). Most of these electrical costs are associated with the ventilation system. See Section 4.4 for anticipated reductions in these costs as a result of the proposed action.

4.0 ENVIRONMENTAL EFFECTS

The potential environmental effects of the proposed action are anticipated to be minimal and would affect no environmentally sensitive areas. Some short term construction effects would occur in an already highly industrialized setting. Operational effects would be generally identical or similar to current operations. Three exceptions are the reduction in cyanide emissions to the atmosphere, the reduction of plating rinse water by approximately 75% and associated reduction of vapors from the plating systems, and the reduction in electrical power consumption of approximately 50%. Environmental effects are discussed in detail below.

4.1 LAND USE

Potential impacts to land include those associated with the demolition and construction activities described in Sections 2.1.1, 2.1.2, and 2.1.4. Site preparation and construction activities would temporarily disturb a site of approximately 72,000 square feet within a heavily industrialized area. This site, in addition to the new 36,200 square foot building, includes the area necessary to relocate the railroad spur and reroute utilities and storm sewers. These activities may include collection and disposal of materials such as roofing felt and insulation as described in Section 2.1.4. Such activities would be conducted according to a Waste Management Plan to be approved before construction begins. Disposal of these materials would follow procedures in the Waste Management Plan and would conform to all applicable environmental regulations. The volume of concrete and soil to be handled as waste depends upon the demolition and restoration option determined to be environmentally preferable. Removal of the concrete floor would result in 262 cubic yards of waste material. It is possible that up to 1600 cubic yards (assumes 10,600 square feet of floor space for Plating Shop and appendages to the original building plus a 35% margin of error) of soil would have to be replaced with fresh soil and the contaminated soil properly disposed of. Disposal of all materials would be done in accordance with an approved Waste Management Plan. A RCRA cap, if used, would leave the concrete floor and soil underlying it in place and would require approximately 1850 cubic yards of clay and soil. This would constitute an irrevocable commitment of land resources under the cap. Potential soil erosion would be controlled by good construction practices and would be minimal. None of the anticipated impacts to land or land use as a result of this proposed action would be permanent.

4.2 ATMOSPHERIC RESOURCES

Normal Operations

Potential impacts to air resources are from operational waste streams which would be released through the ventilation system in the new facility, as described in Section 2.1.3. Exhaust fumes collected from the new facility would not differ significantly from those vented from the existing Plating Shop, since the processes would be essentially the same. The proposed ventilation system would employ wet scrubbers which would further reduce the already low releases of cyanide and acid fumes. As described in Section 2.1.3, these control technologies would reduce emissions of cyanide and acid. The new incinerator, to be installed in Building 9720-32, would be permitted for the same quantities of particulates as in the existing CDDF. According to the State of Tennessee, New Source Performance Standards (Rule 1200-3-16 New Source Performance Standards) do not apply to the CDDF because the incinerator's charging rate of less than 2 tons/year would not exceed the 50 tons per day charging rate. It is not anticipated that impacts to air resources as a result of the proposed action would be significant, although the new control technologies on the ventilation system would reduce emissions compared to existing activities. The new ventilation system would also prevent the degradation of the environment due to corrosive fumes which occurred in the existing plating shop. The ventilation system in the proposed General Plating Facility would reduce the cost and effort associated with maintenance of the facility.

Accidents

A Safety Assessment of the General Plating Facility was conducted and the results reported in April 1990 (Y/ENG/SA-1835). That report concluded that the activity with the highest potential exposure is the preparation of chemical batches in the plating tanks. These tanks range in volume from 533 to 645 gallons. The severe accident would be a result of operator error in which an acid was accidentally poured into a cyanide tank producing a toxic vapor release. This would produce an extremely toxic gas, HCN, which if inhaled can be lethal at acute exposures of 100 ppm. Depending upon the amounts of chemicals involved and other circumstances of the accident, a toxic vapor release could have impacts outside the building.

Scenarios were examined to determine bounding events for onsite and offsite releases due to accidents in plating chemical makeup. One scenario assumed that a makeup accident occurred concurrently with a power failure that shut down the ventilation system, thus creating a severe accident situation bounding the releases inside the building. Another scenario assumed the ventilation system was working properly, but the exhaust gas scrubber fails so that toxic vapors could be emitted from the ventilation stack. This latter scenario is the severe accident scenario, bounding the releases offsite.

Cyanides and other chemicals involved were analyzed for potential dispersion levels in terms of the IDLH (immediately dangerous to life and health) concentrations. The IDLH concentration for a particular substance is that for which a person could escape within 30 minutes without experiencing any irreversible health effects. The dispersion levels were also calculated in terms of LI-50. This is the concentration at which 50% of the people would be fatally harmed if they inhaled this amount of the chemical into their lungs.

The calculated concentration onsite (inside the building) and offsite (approximately 1,300 feet away) are summarized in the following table:

Terms	Onsite		Offsite
IDLH	Inside the facility, a 30-ft-diameter sphere with an average concentration of 1 IDLH	Outside at ground level downwind from the stack less than 0.1 IDLH	Downwind of the stack less than 0.1 IDLH
LI-50	Less than 0.001 LI-50		Less than 0.001 LI-50

As shown by the table, the maximum concentration would occur inside the building and would be equivalent to the IDLH. The scenario assumes a severe situation where the maximum concentration occurs instantaneously within the 30-ft-diameter sphere. Therefore, personnel inside the building would have 30 minutes to evacuate without irreversible health effects. Outside the building concentrations would be less than one tenth this concentration.

DOE Order 5481.1B categorizes hazards into three classes: low, medium, and high. The bounding events for toxic vapor release from the General Plating Facility are calculated to be low hazards which present minor onsite and negligible offsite impacts to people or the environment (Y/ENG/SA-1835, p33-34). Measures that would mitigate exposures to toxic vapors are audible and visual alarms, which are activated whenever an exhaust fan or scrubber pump fails, and building evacuation plans.

Since similar accidents are possible at either the existing or the new plating facilities and since the existing plating shop lacks scrubbers, alarms, or ventilation systems which would mitigate a similar accident in the existing facility, the proposed action would result in safer conditions. Further safety documentation in the form of a Safety Study would be prepared (Y/ENG/SA-1835 p.19) per DOE Order 5481.1B as final design is approved.

4.3 WATER RESOURCES

Potential impacts to water resources would be from operational waste streams which would be treated in the four onsite treatment facilities described in Section 2.1.3. Effluents from these facilities would not be expected to change significantly as a result of the proposed action. The majority of the liquid effluents from the new facility would be treated at the PRWTF. In 1988, the first full year of operation, the PRWTF treated approximately 1 million gallons of plating rinse waters. The volume of these liquids would be expected to be reduced by about 75%.

The segregation of wastes and the smaller volume of plating rinse water used in the new facility should make treatment of plating wastes easier and more efficient. Segregation of wastes would also allow potential recycling of certain resources.

4.4 SOCIOECONOMICS

The total cost of the project would be $34.3 million. Labor and materials would be supplied by fixed price contractors as discussed in Sections 2.1.2 and 2.1.4. Compared to the 1200 construction employees currently working onsite, the 20 to 80 person work force involved in this proposed action would not be significant. The construction of a new plating shop would be expected to reduce maintenance and repair costs compared to those of the existing facility which is in a deteriorated condition. A savings of electrical power would be significant due to the greater efficiency of the proposed ventilation system. Currently 2500 Kw--hr/year are used to ventilate the existing plating shop at a cost of approximately $200,000. These costs are expected to be reduced by approximately 50%.

The work force employed at the new facility would not be significantly different in the number of or skill mix from the current facilities.

5.0 AGENCIES/PERSONS CONTACTED

Army Corps of Engineers

L. A. Barclay and R. T. Bay, U.S. Fish and Wildlife Service.

Charles Brown, Tennessee State Planning Office

G. D. DuVall, DuVall and Associates, Inc., Cultural Resources and Environmental Services.

Environmental Protection Agency

Fish and Wildlife Service

Soil Conservation Service

Tennessee Department of Environment and Conservation

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