U.S. Department of the Interior
Bureau of Land Management

Salt Lake City, Utah

ENSR

Environmental Impact Statement
USPCI Clive Incineration Facility
Tooele County, Utah

ENSR Consulting and Engineering

(Formerly ERT)

April 1989

Document Number 6973-001

DRAFT

ENVIRONMENTAL IMPACT STATEMENT
USPCI CLIVE INCINERATION FACILITY
TOOELE COUNTY, UTAH

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Salt Lake City, Utah

April 1989

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James H. Parker
Bureau of Land Management

COVER SHEET
DRAFT ENVIRONMENTAL IMPACT STATEMENT
USPCI CLIVE INCINERATION FACILITY

(X) DRAFT ( ) FINAL

Lead Agency:	U.S. Department of the Interior Bureau of Land Management Salt Lake District Salt Lake City, Utah
Federal Cooperating Agency:	U.S. Environmental Protection Agency
Counties That Could be Directly Affected:	Tooele County, Utah

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Date Draft EIS made available to EPA and public: ________, 1989

Date by which comments on this Draft EIS must be received to be considered in the Final EIS: ________, 1989

ABSTRACT

USPCI proposes to construct and operate an industrial and hazardous waste transfer, storage, and incineration facility in Tooele County, Utah. The incinerator would be designed to thermally destruct both "hazardous" chemical waste materials, as defined under the Resource Conservation and Recovery Act (RCRA) and "toxic" chemical waste materials, as defined under the Toxic Substance Control Act (TSCA). The proposed facility would incinerate up to 130,000 tons of wastes per year. The transfer and storage area would operate 365 days a year, 24 hours a day. While the actual facility is proposed to be constructed on private land, the transportation and utility corridors would cross federal land administered by the Bureau of Land Management (BLM).

This Draft Environmental Impact Statement (EIS) for the proposed USPCI Clive Incineration Facility analyzes the environmental impacts of the proposed transfer, storage, and incineration facility, and the transportation and utility corridors through construction, operation, and closure. This Draft EIS addresses USPCI's proposed Clive site, two alternative sites (the Grassy Mountain Alternative site and the Section 23 Alternative site), and the No Action Alternative.

PUBLIC HEARING INFORMATION

The BLM will hold public hearings on this document during the 60-day public review period. The purpose of these hearings is to take oral testimony on the scope and adequacy of the Draft EIS. A BLM official will preside over each hearing. All testimony will be recorded and placed in the permanent project file. A summary of the substantive comments contained in the testimony will be included in the Final EIS (together with the written comments received on the Draft EIS). The Final EIS will present responses to comments made at the hearings and contained in the written comment letters.

Public hearings on this Draft EIS will be held at the following times and locations:

- Tooele - Tooele County Court House; 47 South Main; ________, 1989, 7:00 p.m.
- Salt Lake City - Salt Lake County Commission Chamber; 2001 South State, North Building, Room N1100; ________, 1989, 7:00 p.m.

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SUMMARY

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1.0

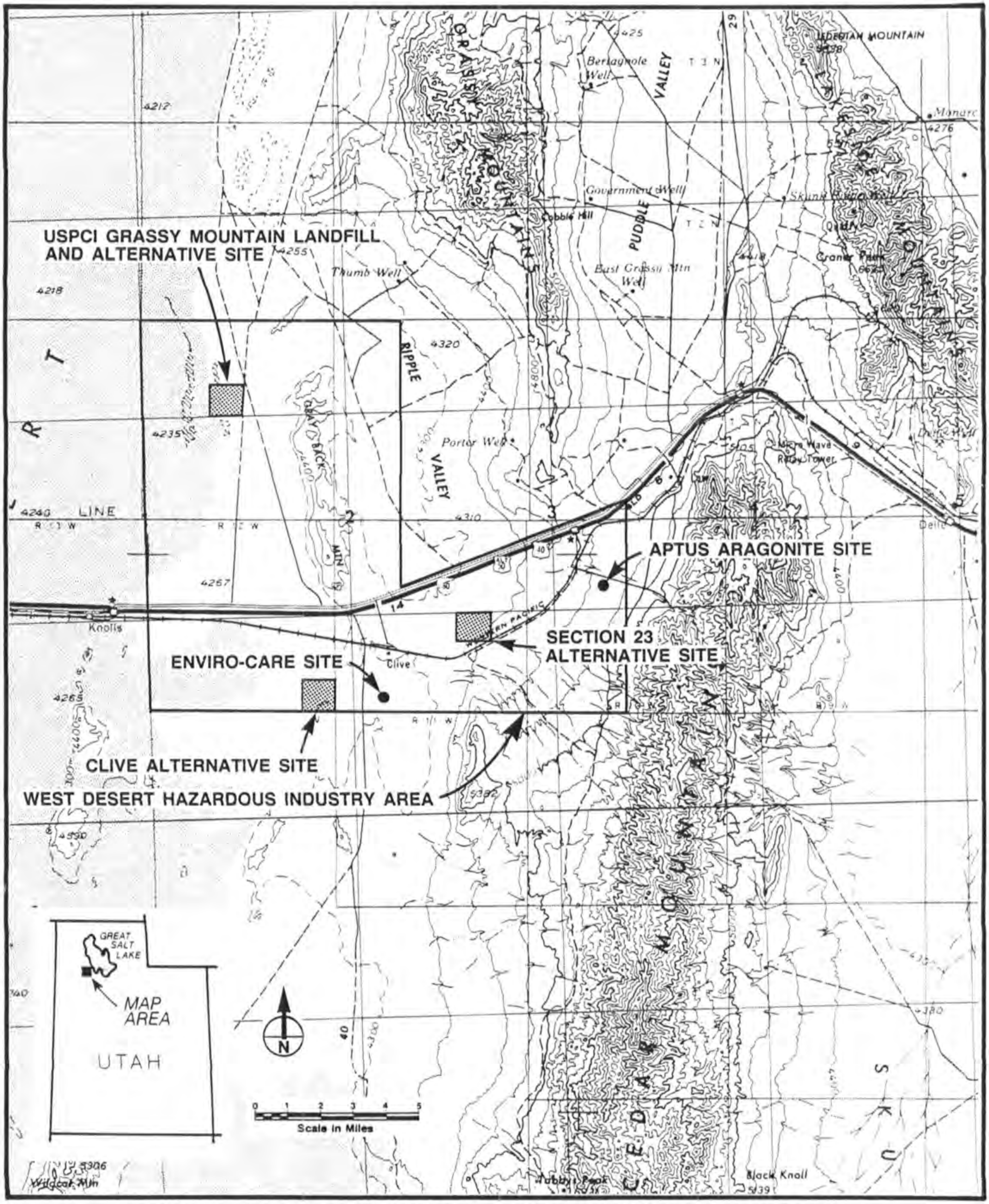
1.0 INTRODUCTION

1.1 History and Background

USPCI, Incorporated (USPCI), a wholly owned subsidiary of Union Pacific Corporation, has proposed to construct a commercial hazardous waste transfer, storage, and treatment facility that offers incineration as its primary treatment method. The incinerator would be designed to thermally treat wastes regulated under the Resource Conservation and Recovery Act (RCRA) and Toxic Substances Control Act (TSCA). USPCI's proposed facility site (the Clive site) is located on private land south of Interstate 80 (I-80), approximately 37 miles northwest of Grantsville in Tooele County, Utah (see Map 1-1). The proposed Clive site is located in T.1S, R.12W, Sec. 36. USPCI has applied for proposed land exchanges and rights-of-way (ROWs) across federal land for access to the 45-acre plant site.

The Federal Land Policy and Management Act of 1976 (FLPMA) and the National Environmental Policy Act of 1969 (NEPA), as amended, require that the Bureau of Land Management (BLM) provide for multiple use management with consideration and protection of environmental values. It has been determined that the granting of ROWs and the consumation of a land exchange for the project would constitute a "major federal action" which requires the preparation of an environmental impact statement (EIS) on the total project under the provisions of NEPA. The BLM is the federal agency responsible for the preparation of the EIS.

Incineration is not disposal by dumping or land filling, but rather a method to reduce the volume of hazardous waste and to detoxify organics by thermal destruction. There are currently 14 commercial incineration facilities in the United States (U.S.). A substantial increase in the number of facilities is needed to meet the current demand for the incineration of 24 to 36 million tons of hazardous waste generated per year. The commercial facilities operating now are:



MAP 1-1 USPCI CLIVE INCINERATION FACILITY PROJECT AREA

Operator	Location
Aptus	Coffeyville, Kansas
Caldwell Systems	Lenoir, North Carolina
Chem Waste	Chicago, Illinois
Chem Waste	Sauget, Illinois
ENSCO	El Dorado, Arkansas
IT Corp.	Martinez, California
Liquid Waste Disposal (LWD)	Calvert & Clay Counties, Kentucky
L.W.D.	Clay, Kentucky
Rollins	Logan, New Jersey
Rollins	Deer Park, Texas
Rollins	Baton Rouge, Louisiana
Ross Incineration Services	Grafton, Ohio
Stablex	Rock Hill, South Carolina
Thermal Oxidation	Roebuck, South Carolina

1.2 Purpose and Need

In 1985, the Environmental Protection Agency (EPA) estimated that industry in the U.S. generates more than 264 million metric tons of hazardous waste each year (EPA 1985b). The Congressional Budget Office (CBO) estimated that U.S. industries generated about 266 million metric tons of hazardous waste in 1983 (Journal of the Air Pollution Control Association 1985). The CBO estimated that if industry did not alter waste production rates, the volume of waste generated could grow by 6 percent (to 280 million metric tons) in 1990. The CBO report stated that over 99 percent of the hazardous waste is generated by industries as residuals to basic manufacturing processes. The study estimated that private industry paid between $4.2 and $5.8 billion in 1983 to treat and dispose of its hazardous residuals. While the amount of hazardous wastes generated is increasing, disposal options have become more limited.

On October 21, 1976, Congress passed RCRA, the first comprehensive attempt to regulate the management of hazardous waste. In November 1984, President Reagan signed the Hazardous and Solid Waste Amendments of 1984. The CBO estimates that the 1984 RCRA amendments could increase industrial compliance costs to between $8.4 billion and $11.2 billion in 1990. These new amendments state that land disposal should be the least favored method for managing hazardous wastes. The amendments set a timetable, phased over 5.5 years, for EPA to determine which hazardous wastes are safe for land disposal. New landfills and expansion of existing landfills are required to have double liners, leachate collection systems, and groundwater monitoring systems. As a result of these requirements to aid in the prevention of groundwater contamination, landfills have become more expensive as a means to dispose of waste.

The 1984 amendments adopted a regulation under the Safe Drinking Water Act (SDWA) which bans the disposal of hazardous waste by underground injection into or above any formation which contains a potential underground source of drinking water, if the distance between the well and the aquifer is within 0.25 mile. Under SDWA, final determination of wastes that can be safely injected was made in 1988.

Thus, two disposal options that were available to hazardous waste generators have been seriously constrained. In 1981 incineration, or thermal destruction, accounted for the destruction of 1.7 million metric tons, or 0.6 percent of the waste generated that year. EPA estimates that another 10 to 15 million metric tons of hazardous waste are burned in boilers each year. Combining incineration with boilers, 6.3 percent of the hazardous waste generated in 1981 was disposed of by some type of thermal process. Thermal treatment processes offer the advantages of: 1) minimizing landfill requirements; 2) eliminating certain health and environmental hazards associated with landfill disposal; 3) preventing the contamination of groundwater; and 4) minimizing the "cradle-to-grave" liability from re-surfacing in the future.

The EPA estimates that approximately 60 million metric tons of the hazardous waste generated annually are organic. Estimates vary of the percentage of the organic waste that is incinerable; however, 40 to 60 percent of waste could be successfully destroyed/disposed of using existing incineration technology, or 24 to 36 million metric tons annually. In addition, the regulations requiring the destruction of polychlorinated biphenyls (PCBs) under TSCA mandate thermal treatment or detoxification rather than landfilling. The EPA (1985b) estimated that given the 1984 RCRA amendments, the demand for new land-based incinerators <u>for liquids only</u> would be the equivalent of 82 additional units (20,000 metric tons/year average capacity); additional incinerators would be needed if non-liquid wastes were included.

Of the nation's 14 existing commercial incinerators, none are located in the Rocky Mountain region. However, the Aptus incinerator located in

Tooele County (see Map 1-1) is in the final permitting stage with construction expected to start in 1989. Waste currently produced in Utah is either landfilled at the USPCI Grassy Mountain facility in Tooele County (see Map 1-1) or shipped out-of-state for incineration or disposal. Under the Superfund Amendments Reauthorization Act of 1986 (SARA Title III), each state must certify by November 1989 that it has adequate capacity to dispose of its own wastes for the next 20 years. This can be accomplished either through providing waste treatment within the state's own boundaries, or entering into specific compacts with other states for proper disposal.

Approximately 1 million tons of hazardous waste is generated in Utah per year by 400 generators. Of the 1 million tons per year, approximately 30,000 tons are incinerable. This estimate of Utah incinerable waste does not include PCB waste, Superfund (CERCLA) waste, or waste from over 300 small quantity generators who produce less than 2,200 pounds per month of hazardous waste. Based on USPCI's proposed operating rate of 130,000 tons per year (75,000 tons per year of contaminated soils and 55,000 tons per year of solids and sludge residues from manufacturing processes), USPCI could process all the incinerable wastes produced by all Utah generators. However, it is unlikely that USPCI could capture all of the Utah market. This is a decision that can be made only by the generators, based on free-market considerations. It has been estimated that approximately 80 percent of the wastes (or 104,000 tons per year) transported to the proposed USPCI incinerator would be from California, Oregon, Washington, Idaho, Wyoming, and Colorado. The other 20 percent (or 26,000 tons per year, including 15,000 tons of soil and 11,000 tons of residues) would potentially be from Utah.

The proposed USPCI incineration facility is intended to accept contaminated soils and solids and sludge residues from manufacturing processes and dispose of them by carefully controlled burning. USPCI is a private company that would incinerate wastes with the purpose of financial profitability. The industrial and hazardous wastes received at the proposed facility for treatment and storage would be generated off-site. These off-site generators or customers may represent any sector of the waste-generating industries, although the primary customers would be the petrochemical and solvent-related industries.

If permitted treatment, storage, and transfer facilities are not constructed, the incidence of illegal waste disposal is likely to continue to increase. Using the $4.50/loaded-mile figure quoted by the Utah Manufacturers' Association, the current cost of transportation to distant treatment facilities only serves to encourage the illegal practice of improper disposal of waste.

1.3 Authorizing Actions

The permits, licenses, and approvals that would be required for the construction, operation, and closure of the proposed USPCI Clive Incineration Facility are listed in Table 1-1. The federal, state, and local agencies responsible for each action are identified in the table.

The Proposed Action and all of the alternatives analyzed in the Draft EIS, except No Action, would involve land exchange actions to obtain public lands currently managed by the BLM. These lands are referred to as selected lands. Lands that would be offered to BLM by USPCI in exchange for the selected lands have not yet been identified and are not addressed in this DEIS.

Offered lands will be identified and addressed either in the Final EIS or in subsequent documentation. They will be identified on the basis of equal value and the following objectives:

- increased opportunities for management and enhancement of riparian areas;
- increased opportunities for management of wildlife habitat;
- improvement of special management activities (such as public recreation, visitor access, environmental concerns, and preserving natural values); and
- resolving problems of management and use of renewable land resources resulting from intermixed land ownership patterns.

The analysis contained in this Draft EIS is less intensive than that required by some of the permitting agencies (e.g., the EPA TSCA review and the Utah Department of Health RCRA review). The EIS is not intended to replace or duplicate the reviews of these permitting agencies. The permitting agencies may require additional analysis as part of their application review and additional stipulations as part of the permits they may issue.

TABLE 1-1

AUTHORIZING ACTIONS

Agency	Nature of Action	Project Feature
FEDERAL AGENCIES		
Department of the Interior		
Bureau of Land Management	Consumate Federal Land Policy and Management Act (FLPMA) land exchange	Acquisition of federal land
	Issue right-of-way (ROW) grants	Water pipeline, railroad spur, electric and telephone lines, access roads
	Issue FLPMA temporary use permits in conjunction with ROW grants	Temporary construction activities; staging areas
	Issue mineral materials sales contract	Aggregate for facility or access road construction
Department of Defense		
Army Corps of Engineers	Issue nationwide or individual permit(s) (Section 404) for placement of dredged or fill material in waters of the U.S. or their adjacent wetlands (if required)	Stream crossings for pipeline and access roads (if required)
Department of Transportation		
Federal Highway Administration	Authorize permit(s) to cross federal aid highways	Electric and telephone lines, water pipeline, railroad spur
Environmental Protection Agency	Toxic Substances Control Act (TSCA) approval	Incineration facility
	Hazardous and Solid Waste Amendments (HSWS) Permit	Incineration facility
Federal Communications Commission	License to operate industrial radio service	Communications
Federal Aviation Administration	Determination of No Hazard (notice of proposed construction or alteration)	Emissions discharge stack
STATE AGENCIES		
Department of Business Regulation	Motor carriers permits	Transportation
Division of Environmental Health	Resource Conservation and Recovery Act (RCRA) permit	Incineration facility
	Air quality approval order Prevention of Significant Deterioration (PSD) Permit (if required)	Incineration facility

TABLE 1-1 (CONTINUED)

Agency	Nature of Action	Project Feature
STATE AGENCIES (Continued)		
	Approval of solid waste disposal facilities	All project features
Division of State History	Permit to conduct archaeological investigations	All project features
Industrial Commission	Safety regulations	All project features
State Engineer	Application to Appropriate Water	Process water supply well
Division of Lands and Forestry	Issue ROW to cross state lands	Access roads, electric and telephone lines, water pipeline, railroad spur
LOCAL		
Tooele County	Zoning approval	Incineration facility
	Conditional Use Permit	Incineration facility

USPCI facility operations would be monitored by the EPA and the Utah Department of Health for compliance with permit conditions. The frequency of RCRA inspections will be determined at the time of the permit approval and would be implemented by personnel from the Utah Bureau of Solid and Hazardous Waste of the Department of Health and/or EPA, as required, to maintain reasonable assurance that the facility is in compliance with RCRA permit conditions. State regulations require that hazardous waste treatment facilities be inspected at least once a year. The minimum number of inspections required for facilities receiving waste from a Superfund site is two per year. The State and EPA are currently assessing various funding sources to provide additional RCRA inspections, if permit requirements mandate. The number of TSCA inspections conducted by EPA Region VIII are projected to be twice a year and may be unannounced. The frequency of inspections under TSCA will be determined at the time of permit approval. In some instances, Tooele County might perform inspections in conjunction with or at the request of the state. However, the state of Utah has primacy in this area.

Under TSCA, as applied to incinerators of PCBs, USPCI would be required to monitor oxygen and carbon monoxide on a continuous basis and to monitor carbon dioxide periodically. RCRA requires continuous monitoring of carbon monoxide, oxygen, combustion temperature, waste feed rate, and combustion gas velocity. Under RCRA, hazardous waste incinerators are required to meet specific performance standards. To ensure that these performance standards are met, a permit would be issued specifying incinerator operating conditions that have been demonstrated in the trial burn to achieve required levels of performance. Periodically, the facility would be required to reaffirm its ability to achieve the RCRA performance standards. Additional parameters to be monitored under RCRA would be identified at the time of permit approval.

Under the Utah Hazardous Waste Management Regulations (UHWMR), the Department of Health requires that releases of reportable quantities of hazardous waste, as defined by CERCLA, RCRA, and TSCA, be verbally reported within 24 hours. Follow-up written notification must be provided. CERCLA, RCRA, and TSCA require that releases of reportable quantity of hazardous substances be verbally reported to the National Response Center within 24 hours.

Under SARA Title III, several reporting requirements would pertain to the USPCI incineration facility. Any releases reportable under CERCLA must be concurrently reported to the community emergency coordinator for the area's local emergency planning committee. A release of reportable quantity of an extremely hazardous substance (as defined by EPA), unless it is federally permitted, must be reported to the community emergency coordinator and the state emergency planning commission for any local area or state likely to be affected by the release. USPCI could also be subject to emergency and hazardous chemical inventory and annual toxic chemical release reporting requirements. USPCI's record of compliance includes two violations and one administrative enforcement action. These three TSCA-related incidents are described below.

USPCI paid a $6,600 penalty for violations cited in a March 1985, administrative complaint. The violations included improper disposal of PCBs from a leaking transformer and improper storage and marking of PCB wastes. A transformer and numerous containers of PCB oil were not in a storage area with adequate roof and walls or secondary containment.

USPCI and PPM (a wholly owned subsidiary of USPCI) paid a $500 penalty for a violation cited in a December 1986, administrative complaint. The violation was for the improper storage of PCB wastes. Several containers were not in a storage area with adequate roof and walls to prevent rain from contacting the container.

On September 29, 1988, U.S. EPA Region VIII filed an administrative enforcement action against USPCI, Inc. and PPM, Inc., alleging that PPM's Utah PCB dechlorination facility had failed to comply with certain provisions of its permit. The EPA has alleged a penalty of $1.4 million. The permit conditions which Region VIII claims were violated generally involve the monitoring and recording of certain internal operating data, technical issues regarding sampling and analysis activities, and certain recordkeeping matters. EPA's administrative complaint does not allege that PPM improperly disposed of PCBs or that the dechlorination facility was operated in a manner that posed any risk to human health and the environment.

PPM has contested the validity of EPA's allegations and has requested a formal hearing. PPM is cooperating fully with Region VIII on all issues of current compliance. It has also provided EPA with thousands of documents and records which it believes refutes many of the allegations contained in EPA's complaint.

Finally, PPM and EPA are presently in settlement negotiations, and PPM expects that the complaint will be settled shortly.

1.4 Environmental Review Process

The first step in the EIS process, as regulated by NEPA, is to publish in the Federal Register a Notice of Intent (NOI) to prepare an EIS. The NOI for the USPCI, Inc. Clive Incineration Facility Project was published on January 19, 1989.

The second step in the process is termed "scoping". The purpose of scoping is to determine the significant issues and concerns related to the proposed action and alternatives that should be included in the EIS. Public meetings were used to identify major issues and concerns. In February 1989, public scoping meetings were held in Tooele and Salt Lake City, Utah. A total of 9 persons attended the two scoping meetings.

A BLM representative opened each meeting by explaining the meeting's purpose; outlining the roles of the federal, state, and local government agencies; and introducing the project proponents. The proposed project was described using slides, and a question and answer period followed. The group was invited to identify major concerns and issues. Issues were either recorded in the meeting notes or written on a flip-chart, numbered, and posted for clear observation. Subsequent to the meetings, 12 written comment letters were submitted to the BLM.

The concerns and issues that were presented verbally at the scoping meetings or received in the written comments during the scoping period (January 25 through February 17, 1989) were summarized in a Scoping Summary Report. The comments were assigned, as appropriate, to one of the following five categories: comments identifying alternatives to the proposed project; issues and concerns to be addressed in the EIS; statements of opinion; general comments; and issues beyond the scope of the EIS. The following is a listing by category or discipline of issues and concerns submitted by commenters that are addressed in the EIS. Parenthetical number designations following each comment indicate the number of times the issue/concern was mentioned.

Purpose and Need

- The role of Utah in allowing other states to meet their hazardous waste disposal requirements under RCRA by November 1989. (1)
- The cumulative amount of hazardous waste that will be allowed in this part of the State of Utah. (1)
- Status of the Aptus project. (1)
- Effect of recycling or waste source reduction. (1)

Project Design/Description

- Total cost of the project. (1)
- Service area of the facility. (1)
- USPCI's record of past violations, including any fines paid. (2)
- The maximum capacity of the facility. (1)
- Main fuel sources. (1)
- Location and method of incinerator ash disposal. (1)
- Job descriptions/titles of employees at the facility. (1)
- Identification of specific lands to be acquired by the BLM in any proposed land exchange. (1)
- Closure plans, including available funding. (1)
- Financial liability provisions for closure of the facility. (1)
- Manual override of automatic incinerator monitoring and safety systems. (1)
- Frequency of site inspections by regulatory agencies. (1)
- Hazardous wastes remaining in ash. (1)
- Location of other USPCI operations. (1)
- Treatment (e.g., handling, storage, etc.) of process water. (1)
- Adequate facility maintenance and inspection procedures. (1)
- Costs of ash disposal. (1)
- Method of transportation and storage of hazardous wastes. (1)

- Identification of compounds to be incinerated. (1)

- Efficiency of incineration. (1)

Air Quality

- Off-site monitoring of emissions during facility operation. (1)

- Cumulative air quality impacts from mining and other hazardous waste operations. (3)

- Effects of PM-10 emissions on nonattainment areas, such as Salt Lake County. (1)

- Windroses and deposition map for pollutant dispersion and distribution. (2)

- Consumption of increments for criteria pollutants. (1)

- Air emissions and potential impacts during process upsets and/or accidents. (1)

- Potential for increases in impacts during air stagnation (temperature inversion) episodes. (2)

- Meteorological data needed for the project site. (1)

- Salt Lake City Airport data not representative of the West Desert. (1)

- Conflict with Solar Ponds (i.e., reduced evaporation due to air emissions). (1)

- Degradation of the existing "Class II" air. (1)

- Effects of air emissions on Grantsville's watershed in the Stansbury Mountains. (1)

- Effects from air emissions. (1)

- Effects on regional air quality. (1)

Water Resources

- Effects on aquifer recharge zones. (2)

- Effects on groundwater quality. (1)

- Migration of saline water into fresh water aquifers. (1)

- Contingency plans if groundwater aquifers are contaminated. (1)

- Water table changes at Clive due to West Desert Pumping Project. (1)

- Effects on area's aquifer. (1)

Geology and Soils

- Effects on mineral resources. (1)

Biological Resources

- Rehabilitation and revegetation of disturbed areas. (2)

- Effects on area wildlife including deer/antelope in Puddle Valley, and deer, raptors, chukars, etc. in the Cedar Mountains. (2)

- Effects on golden eagle nest sites. (1)

- Design of any new or upgraded powerlines to prevent raptor electrocutions. (1)

- Effects on the area's wildlife populations from this development and from disposal of any waste byproducts at USPCI's Grassy Mountain facility. (1)

- Effects on native vegetation including unusual populations of perennial Atripex (i.e., polyploid series, hybrid swarms), and Astragalus lentiginosus var. pohlii. (1)

- Completion of a plant survey prior to any disturbance. (1)

- Effects on the area's wildlife habitat. (1)

- Potential air quality impacts on the area's wildlife and the food-chain from accidental discharge. (1)

Human Resources

Transportation

- Mode of transportation delivering hazardous waste. (1)

- Distribution of truck deliveries versus rail car deliveries arriving at the facility per day. (2)

- Liability for the cost of cleanup of spills during the transportation of hazardous wastes. (1)

- Construction of a permanent Clive interchange. (1)

- Cumulative effect of all truck traffic in the vicinity. (2)

- Effects of increased traffic on freeway deterioration and cost of road repair. (1)

- Release of wastes along rail lines from accidents. (1)
- Effects on transportation, including accidents, exposure to populations, and drunk drivers from Nevada. (1)

<u>Land Use/Recreation</u>

- Consistency of the proposal with State of Utah and Tooele County siting regulations. (1)
- Location and construction of powerline corridors and any other energy transmission routes. (1)
- Consistency of development with the Pony Express Resource Area Resource Management Plan. (1)
- Conflict with commercial rocket launch facilities proposed by the State of Utah in 1974. (1)
- Conflict with military operations, including errant ordnance and low altitude flights. (1)
- Conflict with off-road vehicle (ORV) use at Knolls sand dunes. (1)
- Effects on wilderness qualities in the Cedar Mountains WSA. (1)

<u>Visual Resources</u>

- Visibility impacts. (1)
- Effects on scenic vistas from nearby mountains. (1)

Health and Safety

- Location of the emergency spill response team. (1)
- Effects on the health and welfare of Tooele County residents. (1)

Members of the public now have the opportunity to attend public hearings and/or to submit formal comments on this Draft EIS. Public hearing information is presented following the signature page of this document; the mailing address and submittal deadline for written comments are listed on the cover sheet.

ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.0

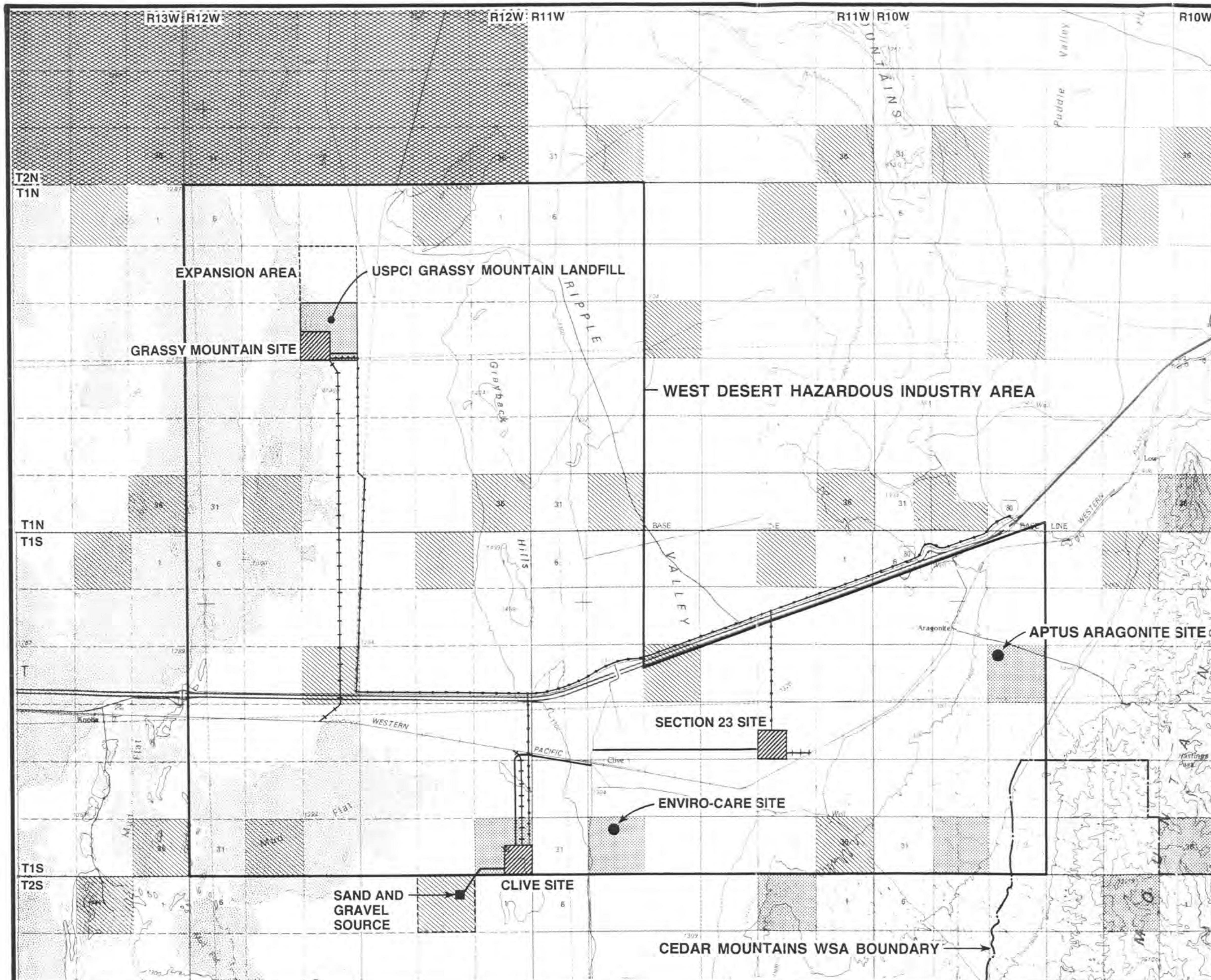
2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Introduction

This chapter describes USPCI's proposed hazardous waste incineration facility that would be located at the Clive site in T.1S, R.12W, SE¼ Section 36 in Tooele County, Utah (see Map 2-1). In addition to the Proposed Action, two alternative sites (the Grassy Mountain site in T.1N, R.12W, Sec. 16 and the Section 23 site in T.1S, R.11W, Sec. 23) and the No Action Alternative have been analyzed in this Draft Environmental Impact Statement (EIS). The following sections describe the components of the proposed Clive Incineration Facility as well as its construction, operation, and closure. Development at an alternative site would be essentially the same as development at the proposed Clive site, with linear facilities adapted to meet the requirements of the different location. The last section of this chapter presents a comparison of the significant impacts of the alternatives considered.

Many of the wastes that would be handled at the facility have been declared as hazardous under the Resource Conservation and Recovery Act (RCRA) or declared as toxic under the Toxic Substance Control Act (TSCA). The facility is designed to handle wastes in liquid, gaseous, solid, and/or semi-solid forms. USPCI proposes incineration as the preferred treatment process for an estimated 75,000 tons per year of contaminated solids and 55,000 tons per year of solids and sludge residues from manufacturing processes.

The information presented in this chapter of the Draft EIS is summarized from the RCRA and TSCA permit applications submitted by USPCI to the Utah Division of Environmental Health and the Environmental Protection Agency (EPA). Specific details on various aspects of USPCI's proposal are contained in this permit application and were reviewed by the project team during the preparation of the Draft EIS. For the sake of understandability and brevity, many of the engineering and design details are not presented in this document. However, specific questions on the project design can be addressed to the Utah Division of Environmental Health or EPA, the agencies that are responsible for regulating RCRA and TSCA compliance, respectively.



MAP 2-1 PROJECT VICINITY FOR PROPOSED PROJECT AND ALTERNATIVES

2.2 Description of the Proposed Project

The Clive Incineration Facility would be an industrial and hazardous waste treatment and storage facility owned and operated by USPCI. The proposed facility would receive a wide variety of wastes for storage and treatment. Wastes destined for the facility would include non-hazardous wastes, infectious wastes, and RCRA and TSCA-regulated wastes. Wastes to be processed by the proposed USPCI facility would originate throughout the Rocky Mountain, Pacific Northwest, and California regions. The site would operate as a regional industrial waste treatment facility, servicing an estimated 800-mile radius.

The proposed site, known as the Clive site, is located within the West Desert Hazardous Industry Area which has been designated by the Board of County Commissioners of Tooele County as the designated area for location of commercial hazardous waste treatment, storage, and disposal facilities. Compliance with state and county siting criteria for commercial hazardous waste facilities is discussed in Sections 3.2.7 and 4.2.7 of this document.

The proposed facility would be located south of Interstate 80 (I-80) about 80 miles west of Salt Lake City, Utah. There is an existing freeway overpass near the proposed site, but there is no permanent interchange on I-80 that provides access to the site. The west-bound exit and east-bound entrance have been temporarily established for the Vitro tailings project and are posted for authorized vehicles only. The interchange would be upgraded to accommodate the anticipated increase in vehicular traffic. An access road would be constructed to a load-bearing capacity of 100,000 pounds gross vehicle weight and would be paved with asphalt to eliminate fugitive dust.

Wastes would be received by road and by rail. The estimated average daily truck traffic arriving at the facility would be 6 to 8 trucks. The estimated average daily rail traffic to the proposed facility would be 4 to 6 railcars. Wastes received by rail would arrive via a spur to be built off the Western Pacific main line. The proposed Incineration Facility would be located approximately 14 road miles from USPCI's Grassy Mountain Facility. Nonincinerable wastes, residues, and bottom ash would be transported to the Grassy Mountain Facility for land disposal. This would require the future expansion of the Grassy Mountain Facility onto

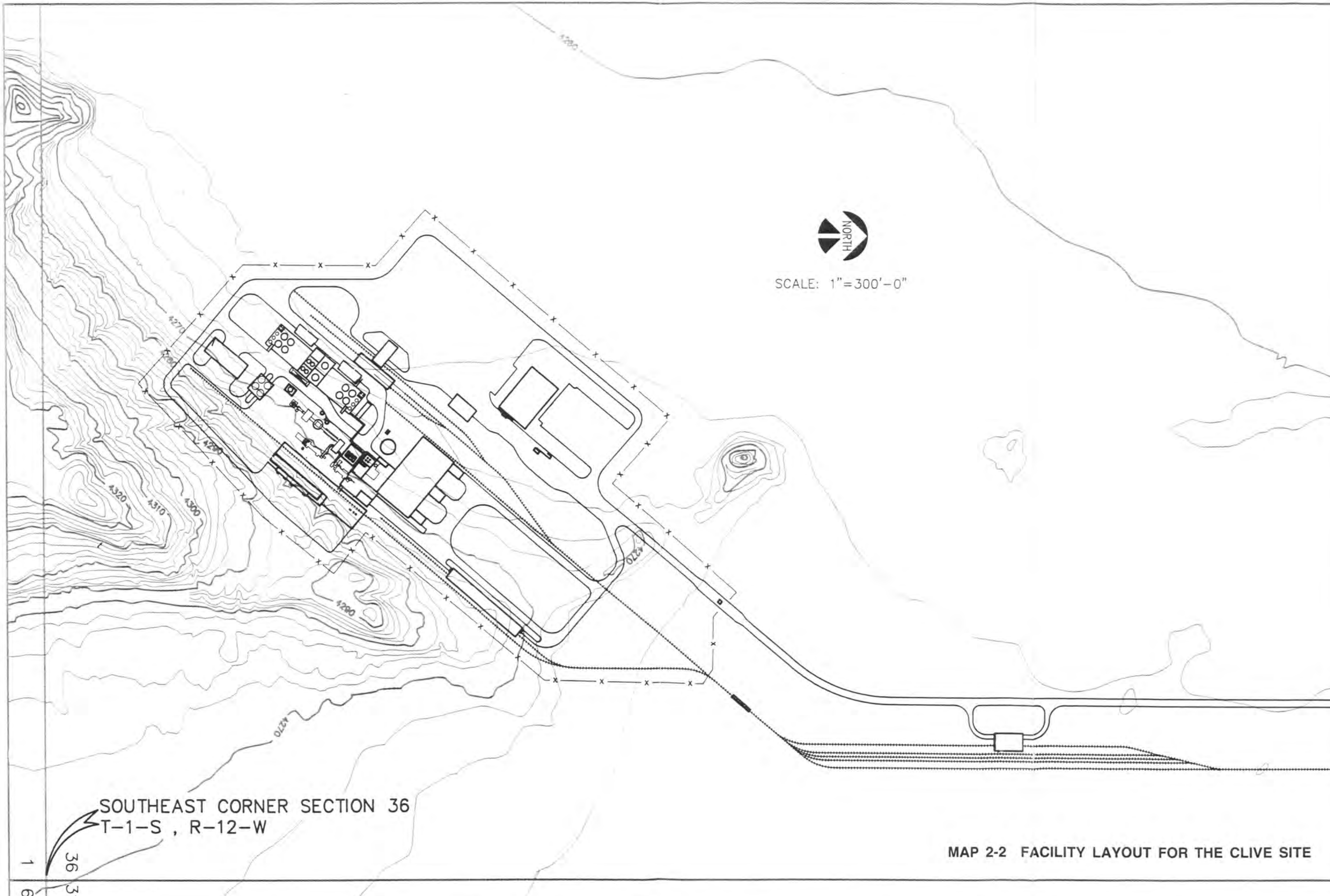
Section 9 immediately to the north. The land exchange required for this expansion is discussed at the end of this section.

Site development at the Clive site would start in late 1989 or early 1990, and would include such activities as road and rail spur construction, temporary and permanent power supply development, preliminary site grading, and water supply development and treatment. Construction of the facility is anticipated to start in the spring of 1990 and be complete by year's end. The total construction cost of the facility is estimated at $40 to $50 million. Disposal charges would be dependent on the type and volume of waste being treated.

Exclusive of road, rail, and power access corridors, the facility would occupy an area of approximately 45 acres. The major units to be constructed include an office/laboratory complex, maintenance building, bulk solid waste storage and processing units, containerized waste storage and processing units, waste fuel and pumpable sludge tank storage, aqueous waste storage, and the incineration and air pollution control system consisting of two rotary kilns, a secondary combustion chamber, quench chamber, spray dryer/absorber, baghouse, wet scrubber and stack, incinerator residue storage and loadout units, and an auxiliaries building to house equipment for water treatment and other plant utility services such as compressed air. Map 2-2 shows the layout of the proposed facility.

The facility and infrastructure would be designed and constructed for an anticipated operating life of 30 years. Through implementation of appropriate maintenance practices and routine replacement of equipment, the useful economic life of the facility could extend well beyond this period.

Development at the Clive site would require obtaining rights-of-way across Federal lands from the BLM, rezoning the site, and receipt of a Conditional Use Permit from Tooele County authorities. The rights-of-way required include a rail spur, road, and power line. Rights-of-way requirements for water lines from wells to the raw water storage tank at the facility and the exact location and number of wells have not yet been determined. Other permits and approvals required are listed in Section 1.3.



MAP 2-2 FACILITY LAYOUT FOR THE CLIVE SITE

[A discussion of any proposed land exchange, including Section 9, and reference to Table 2-1 needs to be inserted here.]

2.2.1 Construction

The proposed Clive Incineration Facility would be designed and constructed in accordance with all appropriate national, state, and local codes. Standard construction techniques would be employed on the project. Building construction would involve metal frame, masonry block, and cast-in-place concrete construction. Heavy footings would be required to support the weight of many of the units; however, no special construction techniques would be required.

Construction of the facility is anticipated to take about 14 months from the start of site development (see Figure 2-1). The peak construction force is estimated to be 211 people. To the extent possible, construction labor would be recruited from the Tooele County and Salt Lake City areas. It is anticipated that the Construction General Contractor would establish a temporary office on the site to support the construction effort. The maximum number of workers by trade that would be required during construction are listed below:

Construction Management	
Construction Manager	1
Project Superintendent	1
General Foreman	2
Carpenter Foreman	3
Laborer Foreman	4
Ironworker Foreman	4
Millwright Foreman	2
Boilermaker Foreman	1
Pipefitter Foreman	2
Electrical Foreman	1
Construction Labor	
Laborers	40
Carpenters	25
Ironworkers	40
Millwrights	20
Pipefitters	20
Electricians	15
Other Trades	30

Water would either be trucked in to the site or well water would be withdrawn and treated to provide potable water during construction. Assuming that an average of 100 construction workers are present every day

TABLE 2-1

LAND EXCHANGE/ROW REQUIREMENTS FOR THE

PROPOSED ACTION AND ALTERNTAIVES

Legal Description	Clive Site T.1S, R.12W, Sec. 36 (Proposed)	Grassy Mountain T.1N, R.12W, Sec. 16	Section 23 T.1S, R.11W Sec. 23
Facility site (acres)			
Federal	0	0	640
Grassy Mountain Landfill Expansion (acres)			
Federal	640	640	640
Sand and Gravel Source (acres)			
State	640	0	0
Linear facilities-acres (miles)			
Federal			
Land Exchange			
ROW			
State			
Private			
Total-acres (miles)			

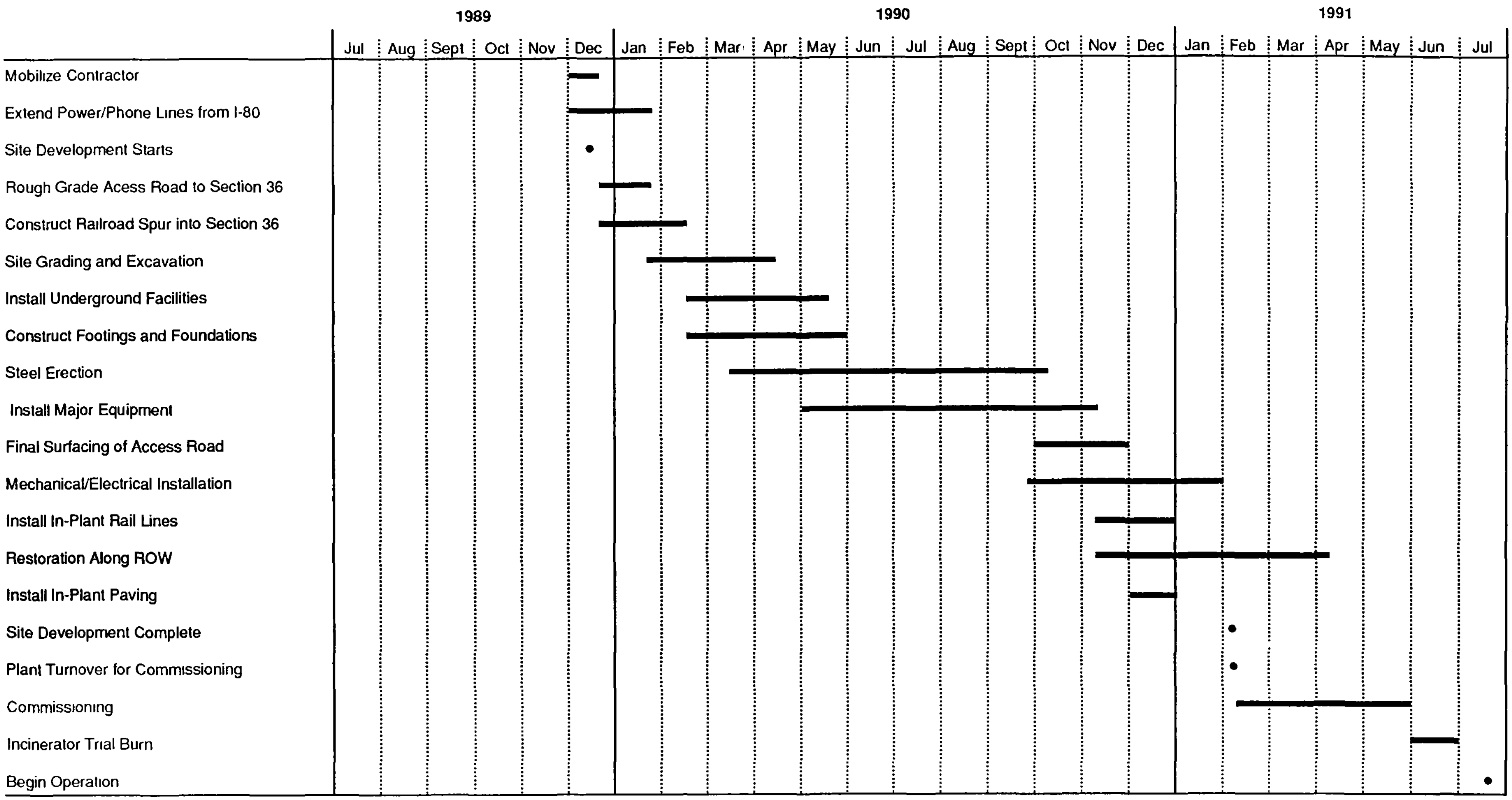


Figure 2-1. Clive Incineration Facility Tentative Construction Schedule

and that each person requires 40 gallons per day, then the water requirement for workers during the construction phase would be approximately 4,000 gallons per day. During construction, additional water requirements (approximately 1,000 gallons per day on average) may be necessary in order to control fugitive dust emissions and to ensure adequate compaction of road surfaces. Therefore, the estimated water requirement during construction would be approximately 5,000 gallons per day.

The extraction of gravel would be required for project construction. The amount of gravel required would be determined in the future. A potential source of sand and gravel is located in T.2S, R.12W, Sec. 2, immediately southwest of the Clive site. A short haul road 30 feet in width would be required to transport the sand and gravel. Power requirements during construction would be approximately 300 KWH per day.

Construction would include installing a rail spur, additional roads, transmission line, and the facility itself. Approximately 85 acres would be developed (including facility, road, rail spur). The area of disturbance associated with each project component is summarized in Table 2-2.

2.2.2 Operation and Maintenance

The operating staff required for the facility would be approximately 111 people. Key operating, technical, administrative, and analytical personnel would be recruited 12 to 18 months before facility commissioning. Control room and kiln operators would be hired approximately four to six months before commissioning. The balance of the positions would be filled approximately one to three months before operations commence. Facility positions are anticipated to be as detailed below.

Administration	
General Manager	1
Operations Manager	1
Environmental Manager	1
Technical Manager	1
Administrative Manager	1
Purchasing Agent	1
Receptionist	1
Secretary	1
Clerk Typists	4

TABLE 2-2

PROJECT DISTURBANCE BY COMPONENT FOR THE

PROPOSED ACTION AND ALTERNATIVES

	Clive Site (Proposed)	Grassy Mountain Site	Section 23 Site
Land developed for facility (acres)	45	45	45
Sand and gravel borrow pit (acres)	40	0	0
Railroad spur miles (acres)[1]	2.0 (12.1)	6.6 (50.0)[6]	0.5 (3.0)
New access road miles (acres)[2]	3.0 (14.5)	0.5 (2.4)	2.9 (14.1)
New sand and gravel haul road miles (acres)[3]	1.0 (3.6)	0	0
Upgraded access road miles (acres)[4]	1.7 (3.1)	6.0 (10.9)	1.5 (2.7)
New transmission line miles (acres)[1]	3.1 (18.8)	5.9 (35.7)	2.5 (15.2)
Upgraded transmission line miles (acres)[5]	9.1 (22.1)	11.4 (27.6)	4.4 (10.7)
New water pipeline[5]			
Total disturbance miles (acres)	19.9 (159.2)	30.4 (171.6)	11.8 (90.7)

[1] 50-foot wide ROW.

[2] 40-foot wide ROW.

[3] 30-foot width of new disturbance.

[4] 15-foot width of new disturbance.

[5] 20-foot width of new ROW and/or disturbance.

[6] 10 acres of additional disturbance were estimated for the railroad spur crossing of Interstate-80.

Engineering and Maintenance	
Plant Engineer	1
Mechanical Supervisor	1
Electrical/Instrument Supervisor	1
Process Engineer	2
Project Engineer	1
Maintenance Mechanics	11
Maintenance Electrician	3
Instrument Technician	3
Laboratory	
Laboratory Manager	1
Chief Chemist	1
Chemist	6
Laboratory Technician	4
Environmental Technician	1
Operations	
Operations Foreman	4
Control Room Operator	8
Kiln Operator	4
Bulk Materials Handling Operator	16
Container Handling Operator	21
Tank Farm Operator	4
Laborer	6
TOTAL	111

The maintenance crew would consist of about 20 people. A strong maintenance program is necessary to assure high equipment reliability and to comply with permit requirements for inspection and testing of key equipment and instruments.

Approximately 250 to 300 gallons per minute of water (approximately 130 million gallons per year) would be required on a continuous basis during operation. Water would be supplied from a well field that would be developed in late 1989. The water would be used for process demands (i.e., quench, wet scrubber), fire water, and potable water.

The proposed incinerator would require approximately 130 gallons per hour (914,000 gallons per year) of No. 2 fuel oil as supplemental fuel. Approximately 3,000 KWH per day of electrical power would be required for operation.

Anticipated emissions during operation are shown below:

Compound	Flow Rate (lb/hr)	Weight %
Oxygen	10,900	4.12
Nitrogen	136,100	51.42
Carbon Dioxide	32,700	12.35
Water	85,000	32.11
Hydrogen Chloride	6	<0.01
TOTAL	264,706	100.00

Fugitive dust emissions would be minimal during operation since the facility and incoming roads would be paved.

There are several variations of trucks that would be used to transport hazardous waste to the proposed site, including closed vans, flat-beds, dumps, tankers, and roll-on, roll-off hoist trailers. Closed-vans are totally enclosed boxes mounted on the truck chassis or on a trailer chassis. Many of the trailers would arrive by highway,but some would be shipped on specially equipped flatcars by rail. Dump trucks would be used for hauling non-hazardous material from Marblehead and for many of the contaminated-soil cleanups. Bulk liquids would be delivered in tankers. Most of the tanks would be made of stainless steel, but some would be carbon steel. Some of the carbon-steel tankers would be lined with a corrosion resistant material such as rubber, vinyl, Kynar, etc. Roll-on, roll-off hoist trucks are equipped with a special tilting frame and a hydraulic hoist and are used to transport containers fitted with bottom rails and rollers. These containers can be picked up from the ground and set down on the ground by the truck driver using the special equipment.

As with trucks, there are several variations of railcars that would be used to transport hazardous waste. There are box cars, flat cars, intermodal container cars, gondolas, and tankers. Gondolas are open-top box cars. They are distinguished from hopper cars in that the gondolas have solid bottoms and must be unloaded from the top. Bulk liquids would be delivered in tanker cars. Most of the tank cars would be made of carbon steel. Some would be lined with a corrosion resistant material.

Most of the truck service would be provided by trucks owned and operated by USPCI, Inc.; however, some truck service would be provided by other waste transporters. Railroad service would be provided by the Union Pacific Railroad, but many of the individual cars would be owned by other railroads or car leasers. All of the waste haulers would comply with the Utah Hazardous Waste Management Regulations, Part VI, "Hazardous Waste Transporter Requirements."

In general, all of USPCI's truck drivers must have several years of incident-free experience. Drivers with a common carrier background must have 10 years of acceptable experience. Drivers with an acceptable record in hazardous waste or chemical hauling could be hired with 6 years of experience. All of USPCI's drivers must complete a training program and be familiar with proper procedures and the Transportation Department's Contingency Plan.

The amount of ash produced during operation would depend upon the amounts and types of waste being fed to the incinerator. Estimated quantities of ash produced are provided below:

0 - 6 months	21,800 tons	(0 --> completion of trial burn)
6 - 12 months	51,400 tons	
After 12 months	113,400 tons/year	

As noted, initial output rates would be relatively lower for the first year. Full-scale output of approximately 113,400 tons per year would commence after the first year of operation. This includes ash from the primary and burner kilns, and spent lime from the spray dryer/baghouse.

In addition to the major components of the proposed facility that are associated with the Waste Receiving/Storage Units and Incineration Line (see below), several support units would be constructed to provide the services and house the personnel needed to operate the treatment facility. These structures would include an office building to house administrative, supervisory, and engineering personnel; a laboratory equipped with analytical equipment to provide accurate analysis of incoming waste streams and in-house quality assurance services; and a well-equipped maintenance facility to provide the level of support to fully maintain the sophisticated process units and instruments critical to the operation of the system. Integral to the maintenance building would be a decontamination unit where personnel who come into contact with wastes during the course of their work could discard their protective clothing, shower, and change into street clothes before departing. All wastewater generated by on-site employees, including wash water and sanitary wastes, would be disposed of in an on-site septic system. There would be no surface discharge of wastewater.

2.2.2.1 Waste Receiving and Storage Units. Bulk solids, primarily contaminated soils, would arrive at the facility in end dump trucks and railroad cars. Upon satisfactory completion of the waste acceptance procedures, wastes would be unloaded into storage tanks. Prior to being fed to the incineration system, wastes would be classified and oversize particles would be treated in size reduction equipment. Sized wastes would then be transferred to the rotary kilns. Overhead bridge cranes would be employed to handle wastes in these buildings. Ventilation air would be drawn through the buildings, with some being used as combustion air for the incineration line.

Containerized wastes, primarily 55-gallon drums, would arrive in semi-trailer vans and railroad boxcars. After waste acceptance procedures are completed, these vans and boxcars would be unloaded, and the wastes would be placed in specially constructed containment areas (buildings). Wastes which are potentially incompatible with other wastes would be segregated in dedicated areas of the building. Except during sampling procedures upon arrival and during decanting of free liquids, all containers would remain closed until processed to the burner kiln.

A variety of tank systems would be used at the Clive Incineration Facility. Tanks would be used to store and/or treat waste feeds (liquids, solids, sludges) and residues from the incineration system. The tank systems that would be installed at this facility are listed in Table 2-3.

The waste fuel tank farms would be used to store and blend waste fuels prior to being shipped off-site for energy recovery or incineration, or being burned as a fuel in the Clive incinerator. There would be two identical waste fuel tank farms located at the Clive Incineration Facility. These tank farms are designated Waste Fuel Tank Farm A and Waste Fuel Tank Farm B. Both tank farms would receive the same types of waste. Each tank farm would have a working capacity of approximately 429,600 gallons.

The decant tanks offer the option to perform phase separation of the liquids that are decanted from containers (e.g., liquids from drums in the container management building). The contents of the decant tanks would either be pumped to the waste fuel tank farm, aqueous waste tanks, or off-loaded into a tanker truck and taken to the direct burn bay.

TABLE 2-3

SUMMARY OF TANK SYSTEMS AT THE CLIVE INCINERATION FACILITY

Tank System	Quantity	Capacity (gallons)	Dimensions (feet)	Function
Waste Feed				
Waste Fuel Tank Farms	22 8 6	19,067 51,856 13,081	12d x 20h 22d x 18h 12d x 21h[1]	Storage/blending of energetic liquids and pumpable sludges.
Decant Tanks	4	2,480	6d x 15h[1]	Treatment of waste removed from containers in container management building.
Solids Storage Tanks	4	80,789	30 x 20 x 18	Storage of bulk solids (e.g., contaminated soil).
Energetic Solids Storage Tanks	6	21,993	15 x 15 x 15	Storage of bulk energetic solids.
Aqueous Waste Tanks	4 1	20,303 51,856	12d x 24h 22d x 18h	Treatment of aqueous waste prior to being fed to incinerator (i.e., for temperature control).
Absorbent Tank	1	8,746	10d x 12h	Storage of absorbent (e.g., contaminated soil) for absorbing free liquids in containers.
Truck Washwater Tanks	2	3,510	8d x 8h	Storage of rinsate from truck wash.
Railcar Washwater Tanks	2	1,212	6d x 4h	Storage of rinsate from railcar wash.

TABLE 2-3 (CONTINUED)

Tank System	Quantity	Capacity (gallons)	Dimensions (feet)	Function
Residue Storage Tanks				
Ash Storage Tanks	2	70,818	18 x 32 x 15	Storage of ash produced in the Primary Kiln.
Spent Lime Storage Tanks	2	70,818	18 x 32 x 15	Storage of residue from baghouse and dry scrubber.

[1] Cone bottom tanks.

Bulk solids (e.g., contaminated soil, non-energetic solids, containers, construction/demolition material, debris) would be received at the solid storage tanks by either dump trailers, roll-off boxes, or directly by rail car. Dump trailers or roll-off boxes would be unloaded into one of the storage tanks via dump chutes. Railcars would be unloaded by a rail-mounted back-hoe, and solids would be loaded into the storage tanks via a set of dump chutes.

The six energetic solids storage tanks would be fully contained within and surrounded by reinforced concrete foundations that are enclosed in a covered building. Energetic solids (e.g., bulk solids, containers, construction/ demolition materials, debris) would be received at the tanks by dump trailer, roll-off box, or other trailer type vehicle. The vehicles would be dumped either directly into a tank or into the portable shredder located over a tank. Although the tanks would be used primarily for storage, USPCI would occasionally use the tanks for blending. The contents of the tanks would be mixed with a monorail-mounted clamshell bucket to develop a mixture suitable for treatment in the incinerator. After waste have been placed in the tanks, the waste can be transferred to one of the other energetic solids tanks or to the burner kiln via one of the monorail-mounted clamshell buckets.

The aqueous waste tanks would be used for the treatment of incoming aqueous waste (e.g., wastewaters contaminated with trace amounts of organic compounds) and aqueous waste generated at the facility (e.g., stormwater from sumps, aqueous phases separated from energetic liquid/ pumpable sludge waste streams).

The absorbent tank would be used for the storage of absorbent material (e.g., spent lime, RCRA-contaminated soil). This material would be used in the container shredding/repackaging process for absorbing any liquids liberated during the shredding process. The tank would be loaded by a belt conveyor. The tank would be vented through filter bags to minimize the amount of dust released during operation.

The two truck washwater tanks would be used to store washwater that has been used to decontaminate empty trucks and empty containers (e.g., dump trucks, roll-off boxes). The tanks would be located inside a building. The liquids in these tanks would be periodically off-loaded into a tanker truck, transferred, and unloaded into the aqueous waste tanks.

After railcars of solids have been unloaded, any remaining solids would be removed, if possible, by facility personnel using shovels, brooms, and a vacuum system. The railcars may then be washed to remove any remaining waste solids. The washwater would be pumped from the railcars into one of the two railcar washwater tanks. The liquids in these tanks would be periodically off loaded into a tanker truck, transported to the aqueous waste tanks, and unloaded.

The two ash storage tanks would be vertical silos used for the storage of residue from the primary kiln. These two tanks would be located within a building with the two spent lime storage tanks. The ash storage tanks would be loaded by a fully enclosed conveyor and unloaded through a bottom rotary valve onto a belt conveyor that would feed the residue into trucks with dust control hoods.

The two spent lime storage tanks would be used for the storage of residue from the baghouse and dry scrubber. These tanks are identical to the ash storage tanks. A separate feed system, ventilation/emission control system, and unloading system would be installed for the spent lime storage tanks.

All tank levels would be continuously monitored. Each tank would be equipped with redundant level switches, which provide audible alarms and automatically shut off waste feed into a tank if a high tank level is reached. The tanks would be equipped with dip tubes (fill pipes) to minimize the generation of hazardous vapors. Dry disconnect coupling connections would be used to eliminate spills in the transfer operations.

The ten storage tanks in the waste fuel tank farm have vacuum relief valves. A combination of pressure control valves, pressure relief valves, and rupture discs would eliminate the possibility of over pressurizing the tanks. Upon delivery,the tanks would be inspected prior to unloading by an independent registered professional engineer or a qualified installation inspector. The inspector would also monitor the installation of the piping, valving, pumps, and other ancillary equipment to ensure compliance with plans and specification. Any discrepancies would be remedied before the tank systems are placed into service. All tanks and ancillary equipment would be tested for tightness prior to being placed into use. If leaks are found, all repairs necessary would be performed prior to the system being placed into service. All ancillary equipment would be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.

The tanks would be provided with a secondary containment system designed, installed, and operated to prevent any migration of wastes or accumulated liquid to the environment. The containment system would enable the detection of and collection of releases and accumulated liquids until the material can be removed. The secondary containment system for the tank system would consist of a concrete slab surrounded by concrete walls. The containment system would be designed to slope to a sump where any released material or other liquids may be retained until removed. The system would be designed and constructed to have sufficient structural strength and thickness to prevent failure caused by pressure gradients, physical contact with any waste, climatic conditions, and the stress of daily operations. The concrete containment area slab, walls, and sumps would be coated with a coating/sealant in order to protect against chemical attack of the concrete surface. The secondary containment system would be adequate capacity to contain the volume of the largest tank plus the precipitation from a 25-year, 24-hour rainfall event. The sump would be inspected daily for the presence of liquids. Accumulated liquids would be analyzed, removed (i.e., vacuum truck), and treated according to the procedures required in the permit conditions.

Ancillary equipment associated with the tank farm would be located within the tank systems secondary containment areas. All piping used to transfer hazardous waste to and from the tank farm would be aboveground and inspected daily for leaks or damage.

The waste fuel tank farm would be equipped with a nitrogen blanketing system and flame arrestors to aid in fire prevention. No smoking would be permitted in the vicinity of the tank system.

2.2.2.2 Incineration Line. The incineration system is shown in schematic form in Figure 2-2 and would consist of five principal sub-systems:

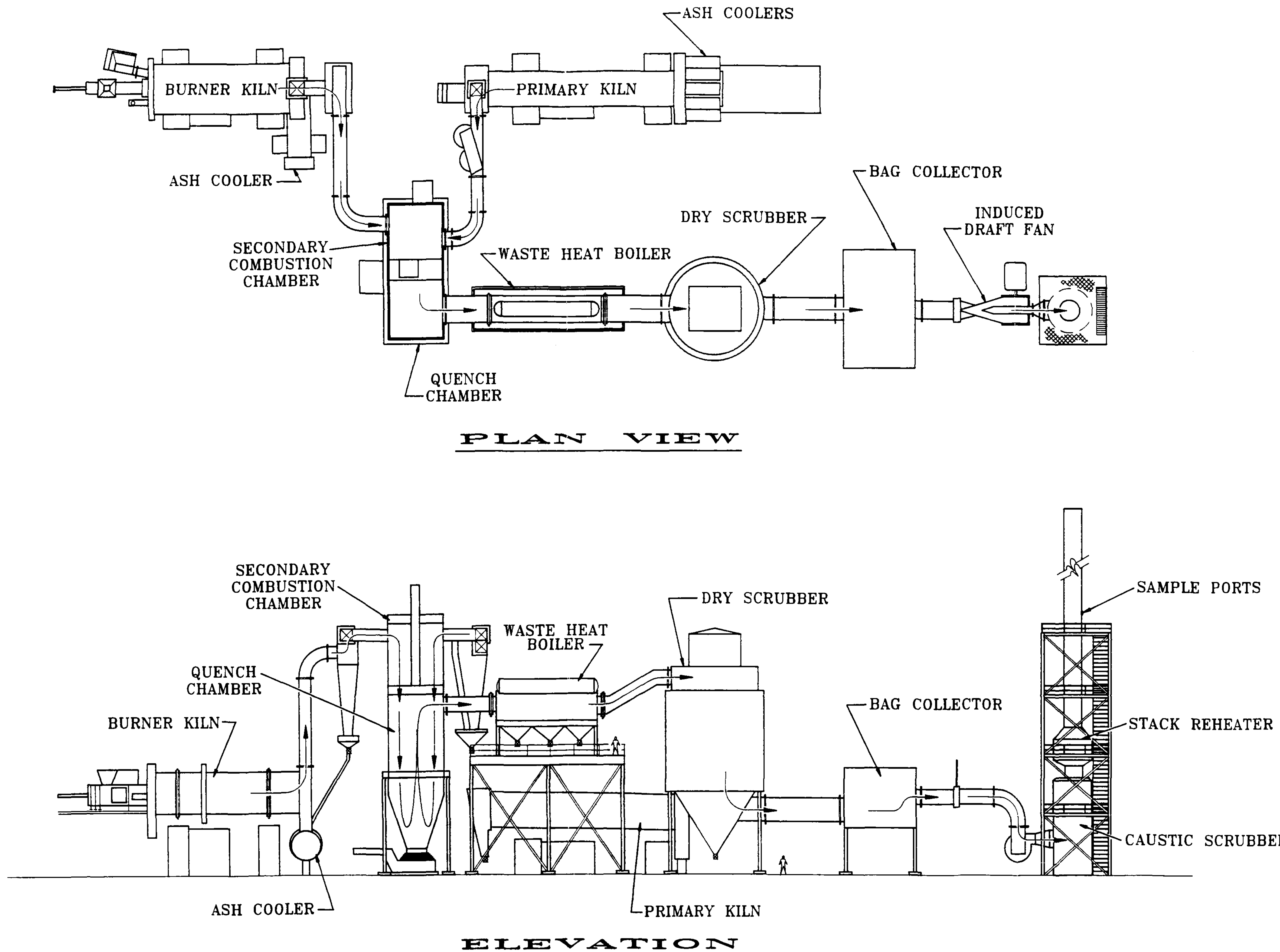


FIGURE 2-2 CLIVE INCINERATOR SCHEMATIC

- a Primary Kiln in which contaminated soils, along with energetic liquids, would be incinerated at relatively low temperatures to avoid vitrification;

- a Burner Kiln in which highly energetic liquids, infectious wastes, pumpable sludges, non-energetic liquids, bulk solids, and small combustible containers of waste would be incinerated at higher temperatures;

- a Secondary Combustion Chamber which would incinerate energetic and non-energetic liquids, promote mixing of the exhaust gases from the two kilns, and provide the residence time at temperatures necessary to achieve the required destruction efficiency of Principal Organic Hazardous Constituents (POHCs);

- an Air Pollution Control System which would quench, absorb acid gases, and remove particulate matter from the combustion gases; and

- an Ash Handling System which would cool the hot incinerated solids and incinerator residues and remove them from the system for disposal.

The Incinerator System, Air Pollution Control System, and associated equipment would be surrounded with a concrete pad to facilitate housekeeping and maintenance of the units.

Primary Kiln. The Primary Kiln would be a counter-currently fired unit, i.e., the gas stream would flow in the opposite direction to the flow of solids. This kiln would be equipped with a dual fuel burner at its lower end (soil discharge end) capable of burning fuel oil and energetic wastes and would process between 300 and 500 tons per day of contaminated soils. Ambient combustion air for the burner is supplied by a fan. All liquid feeds to the kiln would be atomized with high pressure air to promote good dispersion and combustion characteristics. Fuel oil would be employed to preheat the kiln to operating temperature, and to maintain such temperature should insufficient energetic wastes be available to do so. The burner system would be equipped with a flame detection system to monitor burner operation and cut off the fuel should a loss of flame occur. Maximum Heat Release Rate of the Primary Kiln would be 60 million BTUs per hour.

Preconditioned solids would enter the upper end (soil inlet) of the Primary Kiln through an auger feeder. By operating the kiln at a negative pressure, any leakage which occurs would be of air into the kiln as opposed to combustion gases out. Residence time of solids in the Primary Kiln would be approximately one to two hours. The average temperature of soils exiting the Primary Kiln would be about 1,200°F. Hot gases exhausted from the Primary Kiln would pass through a cyclone before entering the Secondary Combustion Chamber.

Burner Kiln. The Burner Kiln would be a co-currently fired unit, i.e., the gas stream would flow in the same direction as the flow of solids. This kiln would be equipped with a dual fuel burner at its upper end capable of burning fuel oil and energetic wastes. An injector system for non-energetic (aqueous) wastes and a small diameter pipe for non-atomizable, pumpable sludge are also provided at the kiln upper end. Energetic solids would be fed to the kiln through an auger. Soils may also be fed to this kiln if the Primary Kiln is not in operation. All liquid feeds to the kiln would be atomized with high pressure air to promote good dispersion and combustion characteristics. A ram feeder mechanisms would be provided to introduce combustible containers into the combustion zone. Fuel oil would be employed to preheat the kiln to operating temperature and to maintain such temperature should insufficient energetic wastes be available.

The burner system would be also equipped with a flame detection system. Maximum heat Release Rate of the Burner Kiln would be 90 million BTUs per hour. The temperature in the Burner Kiln would vary from about 1,500 to 1,800°F., except when incinerating soils. The kiln would be equipped with dual drive systems and graphite seals, similar to the primary kiln.

Secondary Combustion Chamber. The Secondary Combustion chamber would be a stationary, refractory lined vessel, approximately 46 feet high by 16 feet square. Gases from the Primary Kiln and the Burner Kiln become *intimately mixed in this* vessel, and the *internal volume of* the vessel provides adequate residence time to allow for complete combustion. Dual fuel burners would maintain a temperature of up to 2,200°F in the chamber. Final operating temperatures would ultimately be determined by the results of the trial burn, the incinerator permit conditions, and the mode of operation, RCRA or TSCA. Fuel oil would be employed to preheat the chamber to operating temperature, and to maintain such temperature should insufficient energetic wastes be available. An injection system for non-energetic (aqueous) wastes is provided at the top of the chamber. All liquid feeds to the chamber would be atomized with high pressure air to promote good dispersion and combustion characteristics. The burner system would be equipped with a flame detection system. Total Heat Release Rate of the Secondary Combustion Chamber would be 180 million BTUs per hour (including the heat releases of the kilns).

A thermal vent would be provided for protection of the downstream air pollution control equipment. Under normal operating conditions, this vent would be closed. Under certain conditions the vent would open and provide an alternative path to exhaust gases. Prior to opening of the vent all wastes streams to the incineration system would be cut off. Except on a loss of power, the chamber burners would continue to operate on fuel oil to maintain temperatures for a period of time and assure that all hazardous components of the waste already in the system are destroyed. The required destruction and removal efficiency (DRE) for organic hazardous constituents is 99.99 percent. The required DRE for PCBs is 99.9999 percent. The trial burn would need to demonstrate the ability of the incinerator to meet these performance standards. The vent system would create the draft necessary to provide a negative system pressure and prevent release of fugitive emissions.

Soil and Ash Handling Systems. Contaminated solids of less than 4 inches in size would be charged from the Solids Handling Building to the kilns. Solids would be introduced into the kilns through an auger.

Hot soils at approximately 1,200°F would discharge from the primary kiln and enter the soil cooler which consists of a series of cylinders mounted radially around the kiln shell. Cooling is effected by drawing air over the soils as they travel through the coolers. This preheated air then enters the kiln. The cooled solids would discharge at about 350°F through a sealing valve provided to reduce in-leakage of air and then be conveyed to storage bins. From the storage bins, the ash would be conditioned to reduce dusting, loaded into trucks, and transferred for disposal in a landfill cell at the USPCI Grassy Mountain Facility.

Solids from the Burner Kiln would enter a rotary cooler where heat is transferred from the solids through the shell into a constant stream of water being sprayed over the cooler shell. Solids exit at about 250°F and are discharged into a dumpster.

Air Pollution Control System

Quench Chamber and Waste Heat Recovery Boiler. From the secondary combustion chamber, the hot gases would pass into a direct contact Quench Chamber, where water sprays lower the gas temperature to approximately 1,200°F. This temperature drop is necessary to condition the gases prior to entering the Waste Heat Recovery Boiler and prevent possible freezing of slag droplets on the boiler tubes. Sufficient water can be injected and evaporated to drop the gas temperature to 650°F should a malfunction of the boiler require it.

The watertube boiler would absorb heat from the gases and produce steam at approximately 150 to 240 psig. Gases exit the boiler at about 650°F and enter a Dry Scrubber. Steam produced by this boiler would be used in other areas of the facility.

Dry Scrubber. The Dry Scrubber would have dimensions of 35 feet diameter by 85 feet high. A lime slurry mixture would be sprayed into the inlet of the scrubber and brought into intimate contact with the gases entering the vessel. The water in the slurry would be completely evaporated and would lower the exit gas temperature to approximately 350°F. The lime would react with hydrogen chloride in the gases and convert it to calcium chloride. Larger size particles would drop out of the gas stream as it swirls through the scrubber in a cyclonic action. The particles would be collected in a hopper and continuously discharged. Finer particles would exit the Dry Scrubber in the gas stream and enter the Baghouse.

Baghouse. Gases enter the baghouse section and pass through filter media (woven fabric bags) where the finer particles would be captured. Excess lime from the Dry Scrubber would coat the bags and continue to absorb and neutralize acids from the gases. The baghouse section would be divided into compartments, and periodically, a compartment would be isolated from the gas flow to permit the bag in that compartment to be cleaned and the accumulated particles removed. Particles dislodged from the bags would drop into a hopper and be discharged to a storage bin. The cleaned gases would be exhausted from the baghouse section by an Induced Draft Fan and enter a Wet Scrubber. The fan, located between the baghouse and wet scrubber, would be modulated to maintain negative pressure throughout the system and preclude the release of fugitive emissions from the incinerator system.

Wet Scrubber. This unit would provide a final mechanism for removal of acid gases. A constant flow of caustic solution would be recirculated over the packing media in the Scrubber and intimately contact the gases passing through the unit. Any residual hydrogen chloride in the gas would be converted to sodium chloride. Liquor would be purged from the Scrubber and used to supply the Quench Chamber and the lime slaker. As a result, there would be no discharge of wastewater from the system.

Stack. From the Wet Scrubber, the gases would pass directly into the Stack, which is mounted directly above the scrubber outlet. The gas would be discharged to the atmosphere at a temperature of about 220°F. On-line analyzers mounted in the Stack would monitor the gases and continuously record the concentrations of oxygen and carbon monoxide.

2.2.2.3 Process Instrumentation, Monitoring, and Control. The Incineration System would be provided with a comprehensive instrumentation and control system employing remote sensing. In addition to the remote sensing instruments, local indicators would be mounted on key pieces of equipment to provide information to the operator performing field inspections. The control system would automatically modulate and maintain conditions at their setpoints. If the control system detects that any of the measured process variables of a unit or sub-system are outside the operational range and cannot be controlled, the waste feed to the unit would be terminated. If the problem is of a serious nature, then the whole incineration system would be shut down. A shutdown would be performed in a controlled manner to minimize damage to equipment and releases to the environment.

Control of the Incineration System would be largely automatic and would be accomplished by the use of a distributed control system and process control computer. The primary parameters to be monitored and controlled are oxygen and carbon monoxide concentration of the gases and system temperatures. Master ratio and temperature controllers would modulate the operation of the two kiln burners and the Secondary Combustion Chamber burners to maintain the operation within the prescribed permit conditions. The automatic waste cut-off system would be triggered should the operation deviate beyond acceptable limits. Manual override of this system would not be possible.

2.2.2.4 Agency Inspections. The type, frequency, and quality of inspections of the Clive Incineration Facility by the regulatory agencies would rest with the Utah Department of Health (UDH) and EPA and would not be determined until the RCRA and TSCA permit actions are final. Options under discussion include locating a full time inspector in Tooele County under the UDH to inspect this proposed facility and other hazardous waste treatment facilities. Also under consideration is the possibility of connecting plant operations by computer to UDH. Further opportunity will be provided for public consideration of the inspection procedure during the subsequent RCRA permit process. Under the TSCA approval process, EPA projects that two, announced or unannounced, inspections would be accomplished per year.

For clarification, the following monitoring, reporting, and inspection activities would be required.

- Monitoring by USPCI of operating parameters of the incinerator, such as carbon monoxide, oxygen, combustion temperature, waste feed rate, and combustion gas velocity. This would be required under the RCRA and TSCA permits.

- Reporting by USPCI of incinerator operating performance and any spills of hazardous wastes to appropriate agencies.

- Inspection of the facility and its operating records by the Utah Bureau of Solid and Hazardous Waste and the EPA. The frequency of this inspection would be established as part of the RCRA and TSCA permits and is expected to be at least once per year for RCRA and twice per year for TSCA.

Thus, there would be continuous onsite monitoring of combustion efficiency to ensure required destruction and removal of hazardous wastes. If the incinerator exceeds its preset operating parameters, the automatic shut-down sequence would be triggered and the UDH and/or EPA would be notified. Adjustments or repairs would then be made to the incinerator before it could be restarted.

Tooele County, as part of its Conditional Use Permit, will also require monitoring, including the following:

- On-site monitoring for assessment of impacts to air, water, soil, vegetation, and public health exposures on all property under the control of USPCI; and
- Off-site monitoring and assessments in the event that any on-site threshold limit values for protection of public health and the environment are exceeded.

Tooele County also reserves the right to enter USPCI's facility to inspect monitoring records, equipment, facilities, practices, or operations as it deems necessary to ensure that conditions of the county permit are being met.

2.2.2.5 Emergency Response Provisions. Possible emergency situations at the Clive Incineration Facility could involve fire, explosion, and/or release of hazardous waste which could threaten human health or the environment. Emergency situations could occur either within the facility, or on rail or road transportation routes to the facility.

USPCI's Contingency Plan provides emergency response options for the respondents in the event of an emergency. A list of the emergency response equipment maintained at the facility is shown on Table 2-4. The Contingency Plan will be submitted to local and state parties that could be requested to assist in any response to an emergency. Facility personnel would receive training on the Contingency Plan in accordance with the USPCI training program.

TABLE 2-4

EMERGENCY EQUIPMENT MAINTAINED AT

THE CLIVE INCINERATION FACILITY

- Internal and external facility communications systems
- Overpack drums
- Stabilizing agents
- Fire water pump and hose
- Washout pump
- Assorted vacuum, trash, and sludge pumps
- Safety shower and eye wash stations
- Self-contained breathing apparatus
- Supplied-air breathing system
- First aid stations
- Trauma kits
- Safety equipment storage area
- Cartridge air mask
- Fire extinguishers
- Water trucks
- Pickup trucks
- Facility material handling equipment such as loaders, excavators, skidsteer loaders, and tractors
- Steam cleaners
- Protective clothing
- Lights
- Fire water tank
- Foam fire-fighting equipment
- Windsock

The proposed Clive site was selected by USPCI in part because of its remote location. This remoteness would result in a response time of typically less than two hours for assistance from outside parties, however, the remote location of the facility would minimize the risk of human exposure.

Interstate 80 (I-80) is the primary east-west transportation route through the northern portion of Utah. Approximately 5 miles of road would provide access to the facility from I-80. I-80 is routinely patrolled by the Utah Highway Patrol and would provide easy access for waste transportation and local and state emergency response vehicles destined for the Clive Incineration Facility.

The proposed Clive site is located within the Tooele County Hazardous Industries Area designated by the Tooele County Commission. The Commission's intention in establishing the Hazardous Industries Area was to isolate industries that could pose a risk to human health or the environment in an area separated by distance from residential communities. As a requirement of the Conditional Use Permit from Tooele County to locate and operate a hazardous industry within the Hazardous Industries Area, an impact mitigation agreement was negotiated. This agreement between USPCI and Tooele County will ensure that there are adequate emergency response capabilities within Tooele County.

Assistance or additional equipment would be transported to the facility to respond to an emergency if necessary. Coordination agreements between USPCI and local and state emergency response parties will be obtained and documented in the Contingency Plan. The Grassy Mountain Facility, located approximately 9 miles north of the proposed facility, is owned and operated by USPCI. In the event the Clive Incineration Facility Contingency Plan is implemented, resources from all USPCI facilities, including equipment and personnel, would be available for the emergency response as necessary. Emergency equipment available at the Grassy Mountain Facility includes heavy construction equipment (e.g., mobile vacuum tanks, front-end loader, road grader, bulldozer, and end-dump truck) useful in responding to hazardous waste spills. The Grassy Mountain personnel dispatched to respond to an emergency at the Clive facility would be trained in proper safety techniques and typical emergency response procedures in accordance with the Training Program for the Grassy Mountain Facility.

The USPCI Western Regional Office, located in Lakepoint, Tooele County, Utah, is used by various divisions of USPCI including Remedial Services. These divisions would be capable of supplying emergency response resources if necessary. The Remedial Services Division specializes in remedial and corrective actions for hazardous waste spills or releases. [USPCI to expand.]

2.2.3 Partial and Final Closure Activities

The closure of the entire facility requires that an orderly sequence of steps be followed. USPCI would implement steps 1 through 10, below, in order to accomplish closure of the entire facility. Steps 1 through 3 and the steps relevant to the particular unit being closed would be implemented to accomplish the partial closure of a given unit at the facility, should this be necessary at some time. Steps 1 through 10 are:

1. A "Notice of Intent to Close the Facility" would be sent to the Utah Department of Health (UDH) or to the EPA, Region VIII Administrator, at least 60 days prior to the date first unit closure is anticipated to begin (this would be a phased closure). The notice would also be sent to the Tooele County Office of Development Services. These notices would be accompanied by a copy of the closure plan and would indicate the date that closure activities are expected to commence. Should USPCI find it necessary to close a portion of the facility prior to final closure, a "Notice of Intent to Close" that portion of the facility would be filed, as previously indicated. The notice would specify the portion of the facility to be closed and the anticipated closure date. Applicable closure plans would accompany the notice.

2. If the closure has not been previously approved, or an amendment to the plan is requested, the plan would not be implemented until approval by UDH and/or other appropriate agencies has been received.

3. Within 90 days after receiving the final volume of hazardous wastes at the Container Management Building, USPCI must commence closure of the facility, in accordance with the approved closure plan, unless extensions are approved by the proper regulatory agencies. The estimated time requirement for total facility closure is approximately 12 months.

4. The waste storage buildings would be decontaminated and left as constructed. All process equipment (e.g., tanks, piping, the incinerators, etc.) would either be decontaminated and salvaged or cut apart and landfilled elsewhere.

5. All upgradient storm water diversions, dikes, and corrugated steel pipe conduits would be retained throughout closure in order to protect the facility from surface water run-on.

6. Decontamination or off-site landfilling at a RCRA-permitted landfill would be provided for contaminated soils, structures, and equipment.

7. Contaminated liquids generated by the closure process and compatible aqueous wastes removed from storage areas would either be incinerated or treated and disposed of off-site by stabilization and landfilling, deep well injection, or treatment and discharge by a properly permitted wastewater treatment system. Other treatment processes that are available at the time may also be used.

8. The fences, gates, and warning signs would be maintained, as per Utah and Tooele County standards, throughout closure.

9. Within 60 days of completion of closure, USPCI would submit the certification of closure to the UDH and the Tooele County Office of Development Services. This certification by a Utah Registered Professional Engineer would attest that the unit or units have been closed in accordance with the requirements of the closure plan.

10. No later than the submission of the certification of closure, USPCI would submit to the UDH and to the Tooele County Land Office a survey plat prepared by a professional land surveyor indicating the location and dimensions of any permanent structures with respect to permanently surveyed benchmarks. USPCI would record a notation on the property deed indicating that the facility has been used to store and treat hazardous wastes, to alert future owners.

Closure of the Clive Incineration Facility is expected to occur in the year 2020, or later. There are no partial closures planned before that date, but the final closure would be phased as described in this Closure Plan.

Copies of the closure plan would be maintained by the Facility Manager, USPCI corporate office, and the UDH. When facility operational changes dictate a modification to this plan, USPCI would submit a request for permit modification to make the necessary changes to the closure plan.

Corporate Engineering is responsible for updating the facility, corporate, and UDH copies of the plan. Copies of this revised Plan would be submitted to UDH and the Facility Manager.

While closure of individual units can be accomplished within 180 days of the final receipt of waste in that particular unit, closure of the entire facility is anticipated to take longer than the 180 days allowed in 40 CFR 264.113. USPCI has requested that UDH and EPA approve a longer closure time due to extenuating circumstances, as follows:

- The final closure would, of necessity, take in excess of 180 days to accomplish in a safe and workmanlike manner.
- USPCI would take all steps necessary to prevent endangerment of human health and the environment, and would continue to comply with all applicable laws, rules, and permits for the active portions of the facility while closure is proceeding at other units.

USPCI, as the owner/operator of the Clive facility, is required to provide assurances that there would be funds available to close the facility at some time in the future. The purpose of these assurances is to guarantee that closure can be performed by a third-party, if for some reason USPCI is unable to do so itself. The dollar amount to be guaranteed, as of February 1989, is $812,000. This figure would be updated at least annually in response to inflation, and as often as needed to reflect changes in the facility.

There are six different methods allowed by the RCRA rules to guarantee the Closure Costs:

- Closure Trust Fund
- Surety Bond for payment into a Trust Fund
- Performance Surety Bond
- Closure Letter of Credit
- Closure Insurance
- Financial Test and/or Corporate Guarantee

The owner/operator of a facility is not required to actually provide the financial assurance chosen until at least 60 days prior to the first acceptance of waste at the facility. The actual date of first waste receipt is projected as April 1, 1991. USPCI is currently investigating various means of providing the necessary assurances for the $812,000 in closure costs. The mechanism chosen for this assurance would be provided to the UDH a minimum of 60 days before the facility begins operations.

Since there would be no land disposal units at the Clive Facility, there is no requirement for any Post-Closure care, hence no need for any Post-Closure Financial Assurance. USPCI maintains liability insurance for sudden and non-sudden accidental occurrences, as required by the applicable rules and regulations. USPCI's liability coverage for sudden and nonsudden accidental occurrences is $5 million per occurrence with an annual aggregate of $10 million, exclusive of legal costs.

2.3 Grassy Mountain Alternative

The Grassy Mountain Alternative site is located in T.1N, R.12W, Sec. 16 on lands owned by USPCI. Linear facilities to the Grassy Mountain site are shown on Map 2-1 and summarized on Table 2-2. This alternative would require a rail spur 6.6 miles in length, and a 6.5-mile access road, of which 6 miles would be upgrading of an existing road and 0.5 mile would be new construction. Although there is an existing transmission line to the site, it would not be capable of delivering the required power. A new transmission line would likely be built that would originate at the Aragonite exit, follow I-80, and extend north to the site for a total distance of 5.4 miles. The facility components, construction, operation, and closure would be the same as described for the Proposed Action.

2.4 Section 23 Alternative

The Section 23 Alternative site is located in T.1S, R.11W, SW¼, Sec. 23. The site is located on public land managed by the BLM and would require a land exchange (see Table 2-1). Linear facilities to the site are shown on Map 2-1 and summarized on Table 2-2. The Section 23 Alternative would require the construction of a rail spur and access road. The access road would proceed in an easterly direction from the county road in Section 20 through Sections 21 and 22 and on to the facility for a distance of 2.9 miles. The rail spur would proceed in a westerly direction from the Western Pacific mainline (southeast quarter of Section 23) to the facility for a distance of 0.5 mile. As for the proposed Clive site, the Section 23 Alternative would require installation of a new 46-kV power line that would originate from the Aragonite exit, follow I-80, and turn south to the site. The length of the new transmission line would be 2.5 miles. The facility components, construction, operation, and closure would be the same as described for the Proposed Action.

2.5 No Action Alternative

Under the No Action Alternative, BLM would not issue the ROWs grants nor proceed with the land exchange necessary for USPCI to develop its incineration facility as proposed. No action would preclude USPCI from developing the facility utilizing public land as proposed; however, it would not preclude USPCI from identifying an alternative site and ROWs on private land and proceeding with their proposal. If private land were utilized, BLM would have no permitting authority. However, the facility would still require approval from the State of Utah, Tooele County, and EPA. Impacts associated with the No Action Alternative are discussed in Section 4.5 of this EIS.

2.6 Interrelationships with Other Projects

Projects potentially interrelated with the USPCI incineration facility were reviewed to determine if their impacts would interact in a cumulative manner with the USPCI project. Only projects that are currently proposed with a reasonable likelihood of continuing forward during the same time frame as the USPCI project and those that would compete for the same resources (e.g., available water or housing for workers) or have overlapping effects (e.g., increased traffic accidents or air emissions) were considered to be interrelated. Of the projects reviewed, only the proposed Aptus incinerator at Aragonite and the Enviro-Care of Utah low-level radioactive waste repository at Clive were considered interrelated (see Map 2-1).

The Aptus project was analyzed in detail in an EIS prepared by BLM in 1988. BLM is currently preparing an environmental assessment for the Enviro-Care project. EPA is considering the Enviro-Care facility for the disposal of radium wastes from a Superfund site in the Denver metropolitan area. These wastes would be transported to Utah by rail.

In late 1987 and early 1988, USPCI considered converting the lime kiln at Marblehead to a hazardous waste incinerator. This project was considered to be interrelated in the Aptus EIS. However, problems with permitting an incinerator at Marblehead (the site is located outside of Tooele County's West Desert Hazardous Industry Area) caused USPCI to end consideration of the Marblehead site and pursue an entirely new incinerator project. USPCI subsequently selected Clive as its preferred site for an incineration facility. Therefore, the Marblehead incinerator is not included as an interrelated project in this EIS.

Cumulative impacts resulting from the USPCI facility and the interrelated projects are discussed in Section 4.6 of this EIS. The cumulative impact analysis focuses on four areas of concern: air quality, groundwater utilization; transportation; and socioeconomics.

2.7 Alternatives Considered but Eliminated from Detailed Analysis

As part of the planning process for the USPCI Clive Incineration Facility, one additional site was also investigated for facility location. This site is owned by USPCI and is located east of Skunk Ridge in T.2N, R.9W, Sec. 32. Since the site is not located within Tooele County's West Desert Hazardous Industry Area, it was not judged to be viable from a permitting perspective and was not carried forward for detailed analysis.

Alternative approaches or methods of hazardous waste disposal are not analyzed in this EIS. These include waste reduction or minimization, physical/chemical/biological treatment, chemical stabilization, and solidification methods. These methods are not relevant to USPCI's proposed project addressed in this Draft EIS. Land disposal of hazardous waste was not considered as an alternative due to the prohibition under the Hazardous and Solid Waste Act (HSWA) of 1984 of land disposal of specified concentrations of hazardous waste (see HSWA 3004[d], [e], [f], and [g]).

2.8 Comparison of Impacts for the Proposed Action and Alternatives

In comparing the three siting alternatives, the impacts associated with the following resource areas or concerns were determined to be both similar and not significant: air quality, geology and soils, water resources, biological resources, transportation, land use, recreation, visual resources, and cultural resources. No significant impacts were identified regarding transportation concerns; however, the lack of a permanent freeway interchange at Clive has been noted in the EIS. All alternatives would result in a significant increase in the local tax base; this would be a beneficial impact. Table 2-5 provides a summary comparison of concerns and impacts associated with the alternatives.

For each alternative, significant impacts could potentially occur to emergency response personnel, bystanders, sensitive biological resources, and water resources in the event of a spill along a transportation route. If a spill was followed by a fire, evacuation of bystanders could be required to prevent inhalation exposure to volatilized wastes and combustion products. However, the probability of a toxic spill occurring at a sensitive location is extremely low, so significant impacts to these resources are not anticipated. Impacts associated with the project's linear facilities would be the same for the three alternative sites and would not be significant.

Selection of the No Action Alternative would have no adverse impacts on the resources discussed above; however, the employment, income, and tax revenues that would result from implementation of the proposed project would not occur.

TABLE 2-5

SUMMARY OF CONCERNS AND IMPACTS FOR THE USPCI CLIVE INCINERATION FACILITY[1]

	Alternatives			
	Clive (Proposed)	Grassy Mountain	Section 23	No Action
<u>Air Quality</u>				
Criteria pollutants compliance	Y[2]	Y	Y	Y
Non-criteria (toxic) pollutants compliance	Y	Y	Y	Y
<u>Geology and Soils</u>				
Site within 200 feet of Holocene fault	N	N	N	NA
Disturb mineral or paleontological resources	N	N	N	N
Disturb erosive soils that could not be restabilized	N	N	N	N
Impact soil productivity following a spill and cleanup	N	N	N	N
<u>Water Resources</u>				
Surface water quality or quantity reduced below standards or affected existing users	N	N	N	N
Construction within 100-year floodplain	N	N	N	N
Groundwater use affects existing water rights	N	N	N	N
Groundwater quality modified by spill affecting established users	N	N	N	N
<u>Biological Resources</u>				
Inadequate revegetation cover to prevent erosion	N	N	N	N
Inadequate revegetation cover to support land uses	N	N	N	N

TABLE 2-5 (CONTINUED)

	Alternatives			
	Clive (Proposed)	Grassy Mountain	Section 23	No Action
Biological Resources (Continued)				
Rare, unique, or sensitive habitat, species, or communities lost due to construction, spills, or emissions	N	N	N	N
Known critical ranges for game species affected during season of use or critical periods	N	N	N	N
Threatened or endangered or candidate species affected	N	N	N	N
Toxic spill into Great Salt Lake or surface streams	N[3]	N[3]	N[3]	N[3]
Transportation				
Truck or rail accidents in Utah or Nevada resulting in the spill of hazardous materials (including wastes) increased by more than 2 percent over existing levels.	N	N	N	N
Traffic volume on I-80 increased so that the roadway volume-to-capacity relationship results in the traffic operating Level of Service falling below Level of Service C.	N	N	N	N
Traffic volume on I-80 increased so that change in Level of Service indicates a corresponding increase in accident frequency.	N	N	N	N
Roadway facilities required upgrading and capital expenditure to mitigate vehicle flow and/or safety deficiencies that are beyond the fiscal capabilities of the responsible agency.	N	N	N	N

TABLE 2-5 (CONTINUED)

	Alternatives			
	Clive (Proposed)	Grassy Mountain	Section 23	No Action
Deterioration and related maintenance costs of area roadways accelerated beyond those scheduled by the responsible agency.	N	N	N	N
Rail/highway at-grade crossing leading to the site generates more than three train/vehicle accidents during the life of the project.	N	N	N	N
<u>Socioeconomics</u>				
Housing or service demands could not be met by existing or currently planned facilities.	N	N	N	N
Changes in area population or employment of 5 percent or more in any year.	N	N	N	N
Changes in local tax base greater than 5 percent.	Y	Y	Y	N
<u>Land Use/Recreation</u>				
Consistent/compatible with land use plans, regulations, or controls				
Federal	Y	Y	Y	Y
State	Y	Y	Y	Y
County	Y	Y	N[4]	Y
Site within the West Desert Hazardous Industry Area	Y	Y	Y	NA
<u>Visual Resources</u>				
Visual contrasts exceed BLM's visual quality objectives.	N	N	N	N
<u>Cultural Resources</u>				
Effects on sites eligible for, or listed on, the NRHP.	5/	5/	5/	N

TABLE 2-5 (CONTINUED)

	Alternatives			
	Clive (Proposed)	Grassy Mountain	Section 23	No Action
Health and Safety				
Increased cancer risk resulting from small spills during transport of hazardous wastes exceeds 10^{-5} per lifetime.	Y[3]	Y[3]	Y[3]	N
Increased cancer risk resulting from a large spill during transport of PCB wastes exceeds 10^{-5} per lifetime.	Y[6]	Y[6]	Y[6]	N
Probability of exposures from incomplete combustion of hazardous wastes exceeds that of similar facilities.	N	N	N	N

[1] Impact summary includes the implentation of the mitigation measures presented in Section 4.7.

[2] Y = Yes
N = No

[3] Such an event is not predicted to occur during the life of the project.

[4] The Clive and Grassy Mountain sites have been rezoned for industrial use. An application for rezoning on the Section 23 site has not been submitted.

[5] Impacts to cultural resources cannot be specifically determined until intensive surveys are completed.

[6] The analysis presented in Appendix B indicates that exposure of people in the immediate area of a large spill of PCBs with an ensuing fire could be significant and could require the evacuation of people within 650 feet (200 m).

NA - Not Applicable

AFFECTED ENVIRONMENT

3.0

3.0 AFFECTED ENVIRONMENT

3.1 Introduction

This chapter of the Draft Environmental Impact Statement (EIS) for the USPCI Clive Incineration Facility discusses the components of the natural and human environment that could potentially be affected. The area of influence for the project would vary from resource to resource. For example, the affected area for certain land-based resources such as soils and vegetation would be confined to the immediate area of disturbance. For other resources such as air quality and socioeconomics, a more regional area would be affected.

The discussion for each resource reflects the significance of impacts anticipated for that resource and the scope of issues for the resource. Resources that would not be significantly affected by the implementation of the proposed USPCI facility or the alternatives, and issues that were not identified by the public or regulatory agencies during the scoping process as areas of concern have not been discussed in detail. The criteria used for determining the significance of impacts and the assumptions used during the analysis for each resource are discussed in Chapter 4, Environmental Consequences.

3.2 Clive Alternative (Proposed Action)

3.2.1 Air Quality

The existing climatology at the proposed and alternative sites is representative of an arid or semi-arid continental location. The area is characterized by large annual and diurnal variations in temperature and limited precipitation. Representative temperature and precipitation data from three locations surrounding the proposed and alternative incinerator sites are available. These sites are Dugway (about 40 miles southeast of the proposed incinerator site), Tooele (about 44 miles east of the proposed site), and Wendover (about 48 miles west of the proposed site). In addition, limited climatological data are available from USPCI's Grassy Mountain landfill location, about 10 miles northwest of the Clive incinerator site. Table 3-1 lists monthly and annual precipitation and temperature summaries for these locations.

TABLE 3-1

AVERAGE TEMPERATURE AND PRECIPITATION SUMMARY

Month	Dugway[1]		Tooele[1]		Wendover[2]		Grassy Mountain[3]	
	Temp (°F)	Ppt (inches)	Temp (°F)	Ppt (inches)	Temp (°F)	Ppt (inches)	Temp (°F)	Ppt (inches)
January	27.7	0.47	28.8	1.27	27.1	0.31	19.2	0.11
February	34.5	0.52	33.0	1.45	32.7	0.30	25.4	0.29
March	40.2	0.54	40.1	1.93	41.7	0.38	37.7	0.17
April	48.6	0.79	48.6	2.17	52.2	0.58	--	--
May	59.3	0.66	57.4	1.72	61.7	0.58	--	--
June	68.8	0.65	66.8	0.98	70.1	0.49	--	--
July	78.5	0.42	75.4	0.75	80.0	0.34	79.0	0.0
August	75.9	0.49	73.5	0.88	77.8	0.40	75.0	0.40
September	64.5	0.48	63.9	0.91	66.8	0.35	62.9	1.23
October	52.3	0.55	51.6	1.57	53.5	0.51	56.8	0.0
November	38.8	0.54	39.3	1.52	38.1	0.27	39.1	2.17
December	28.9	0.57	30.4	1.35	30.3	0.31	24.1	2.19
ANNUAL	51.5	6.68	50.7	16.50	52.7	4.82	46.6	6.56

Source: [1]Bureau of Land Management; Unit Resource Analysis, Tooele Area.

[2]National Oceanic and Atmospheric Administration; Climates of the States, Volume 2.

[3]Data for 1988, 1989 (incomplete); provided by USPCI, Inc.

The temperature data indicate relatively wide seasonal variability, a typical phenomenon in deserts and middle latitude regions. Average monthly temperatures range from a low of between 19°F and 29°F in January to a high of between 75°F and 80°F in July. Temperature extremes in the area can range from 105°F to -22°F.

As is the case with much of the western interior United States, precipitation patterns are such that spring is the wettest time of the year. The slight precipitation maximum in the spring is a result of storms from the Pacific Ocean being strong enough to get past the Cascade-Sierra Nevada Mountain Ranges to the west. The remainder of the precipitation received is the result of occasional penetration by Gulf of California or Gulf of Mexico moisture. Annual average precipitation amounts range from near 5 inches at Wendover, near 7 inches at Dugway, and over 16 inches at Tooele. The higher Tooele precipitation amounts show the influence of moisture advecting to the area from the Great Salt Lake.

Limited site-specific wind data are available from the USPCI Grassy Mountain location. These data are recorded only once per day and do not characterize the diurnal variability of the winds. However, comprehensive wind data from Salt Lake City Airport, located about 55 miles east of the Clive site, can be expected to be representative of the possible incinerator sites. Salt Lake City is the closest representative source of adequately detailed and quality controlled wind data. Salt Lake City data are detailed enough to allow examination of wind speed and wind direction frequency separated into the six standard Pasquill-Gifford stability classes. Monthly and annual wind speed and wind direction frequencies from Dugway are also available, but these data are not separated into stability classes, as required for detailed climate characterization and for air quality modeling.

Figure 3-1 depicts the annual wind direction distributions for Salt Lake City and Dugway. Comparisons of Dugway and Salt Lake City wind data show similarities between the two sites. Each site depicts frequency maximums from the southeast and northwest, while southwesterly and northeasterly winds are less common. This distribution is typical of Great Basin locations situated adjacent to north-south oriented mountain

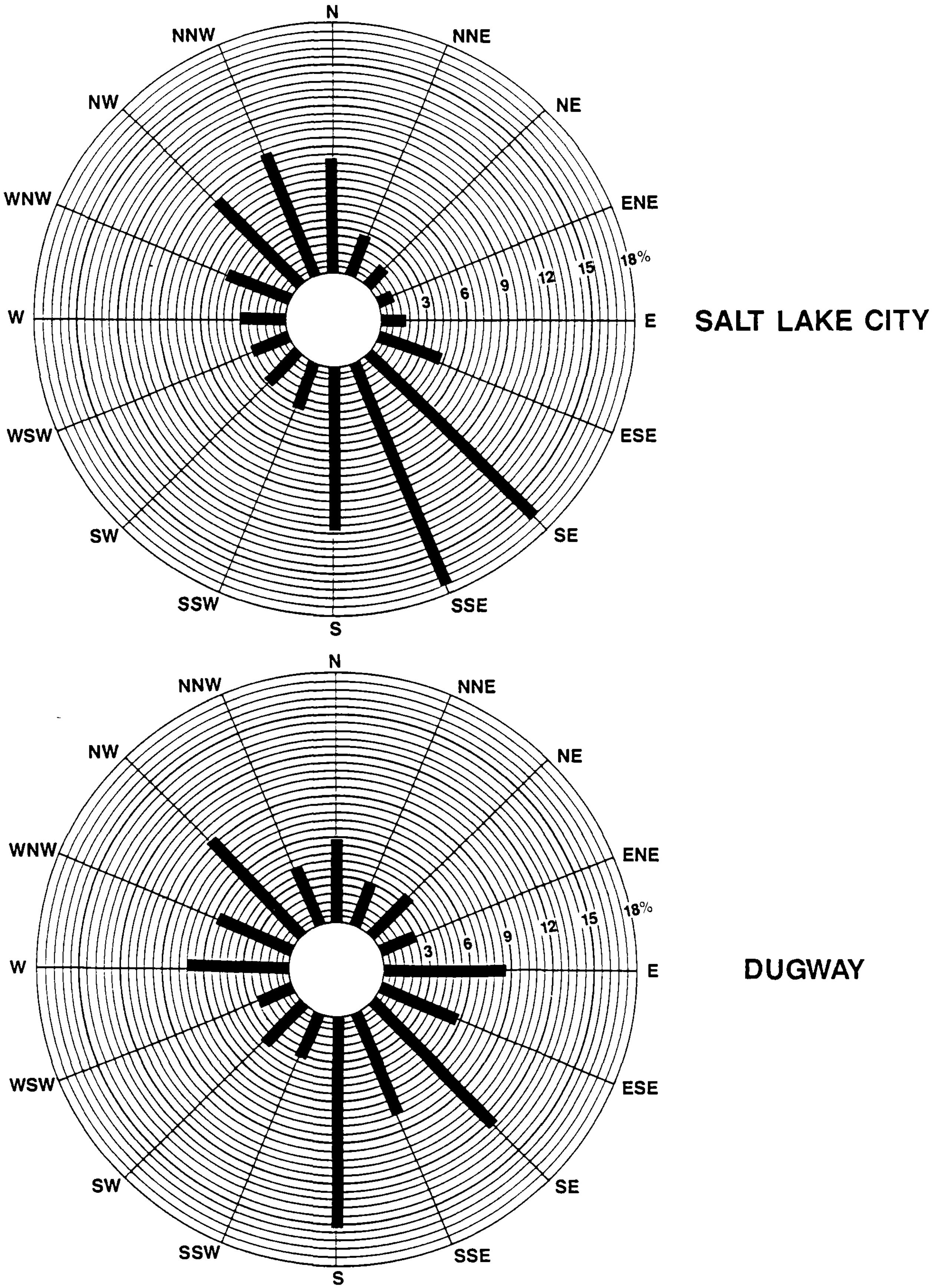


FIGURE 3-1 ANNUAL WIND DIRECTION DISTRIBUTIONS FOR SALT LAKE CITY AND DUGWAY

ranges and valleys. The similarities also suggest there is no widespread geographical variability in wind patterns, although local topographic influences may be important for site-specific considerations.

The atmospheric dispersion potential at Salt Lake City is described by the annual frequency distribution of the Pasquill stability categories presented in Table 3-2. This summary shows that over 50 percent of the time, conditions were neutral, with stable conditions occurring about 30 percent of the time, and unstable for 20 percent. Stable atmospheric conditions produce poor atmospheric dispersion and often result in poor air quality. The 1985 data compare reasonably well with the climatological norm for the period 1948 to 1964 as reported by Doty (1976). These data show 22 percent unstable, 43 percent neutral, and 35 percent stable.

No appreciable climatic effects due to the West Desert Pumping Project are expected at the potential sites. The project involves pumping water from the Great Salt Lake into ponds in the Great Salt Lake Desert to control the elevation of the lake. The ponds are expected to increase surface moisture in the area by increasing precipitation and decreasing evaporation. Quantifying the magnitudes of these changes with available data and methods of analysis is not possible. In general, the ponds could increase the approximate 6 inches of precipitation that falls on the West Desert annually. Because of shallowness of the ponds, the effect on precipitation levels is not expected to be great (NAWC 1983). The most likely areas to receive increased precipitation are areas such as the west side of the Grassy Mountains or Cedar Mountains (NAWC 1983). The ponds could decrease evaporation by increasing fog, cloud cover, and humidity (Hill 1985; USAFLC 1985).

The only baseline air quality sampling that has been conducted near the potential incinerator locations was performed adjacent to the proposed Clive site. During that study, total suspended particulate (TSP) data were collected as background air quality information during calendar year 1982. These data yielded monthly means ranging from 5 micrograms/cubic meter ($\mu g/m^3$) to 42 $\mu g/m^3$ with an average annual mean of about 18 $\mu g/m^3$ (DOE 1984), relatively low concentrations. These levels should be representative of background TSP concentrations at all potential incinerator sites.

TABLE 3-2

1985 ANNUAL FREQUENCY DISTRIBUTION OF PASQUILL STABILITY CLASSES AT SALT LAKE CITY, UTAH

Stability Class	Definition	Annual Frequency (percent)
A	Extremely unstable	0.4
B	Unstable	5.2
C	Slightly unstable	14.7
D	Neutral	50.6
E	Slightly stable	16.8
F	Stable to extremely stable	12.3

Areas potentially affected by the proposed project include Tooele County, containing the three alternative incinerator sites, as well as Salt Lake City and other cities along the Wasatch front range which may be downwind of the proposed incinerator. Tooele County is designated an attainment area for the pollutants carbon monoxide, TSP, ozone, nitrogen dioxide, and lead. However, portions of Tooele County and adjacent sections of Salt Lake County along the Oquirrh Mountains are nonattainment for sulfur dioxide primarily due to emissions from the Kennecott Corporation copper smelter near Magna. Salt Lake County is also nonattainment for carbon monoxide, ozone, and particulates. Designation as an attainment area for one of these priority pollutants implies that National Ambient Air Quality Standards (NAAQS) are being achieved.

Tooele County has also been designated as a Class II Prevention of Significant Deterioration (PSD) area. Class II areas are areas where moderate deterioration is allowed. Unless otherwise designated, all areas are Class II. Class I PSD areas are areas such as national parks, national sea shores, and some designated wilderness areas. Class I areas nearest to the proposed site include the National Parks in southern Utah (i.e., Capitol Reef, Zion, Bryce Canyon) and the Jarbridge Wilderness in northeastern Nevada administered by the U.S. Forest Service. No Class I areas would be affected by the proposed action.

An inventory of Tooele County air emissions is listed in Table 3-3. The largest emission source (in terms of TSP, nitrogen oxides, and chlorine) is the Amax Magnesium operation near Rowley. Other large sources also include Tooele Army Depot and Dugway Proving Grounds. Dugway is also a large source of fugitive dust emissions. Several sources have been proposed or have gone into operation subsequent to the 1987 Utah air emissions inventory which are included in the list on Table 3-3. These sources include the proposed Aptus incinerator at Aragonite; the West Desert Pumping Project; the Radiation, Safety, and Nuclear Vitro tailings disposal operation near Clive; and Amax/Knolls.

3.2.2 Geology and Soils

Geology. The Clive site is located in the extreme eastern edge of the Great Salt Lake Desert which is part of the Basin and Range Province

TABLE 3-3

EMISSION INVENTORY FOR PROCESS INDUSTRIES AND POWER GENERATION SOURCES IN TOOELE COUNTY, UTAH

	Tons Per Year								
Point Source	FD[1]	TSP	SO_x	NO_x	HC	CO	Cl_2	Hydrogen Chloride	Aldehydes
Amax Magnesium	0.0	1097.0	69.0	420.0	9.0	84.0	33839.0	4422.0	0.0
American Salt	27.5	53.1	0.4	11.2	0.5	2.7	0.0	0.0	0.0
Aptus	0.0	17.5	144.5	297.8	2.6[2]	83.2	14.5	0.0	0.0
Barrick	293.3	9.3	7.5	80.8	5.1	25.6	0.0	0.0	0.0
Chemstar	38.3	43.9	3.9	78.6	0.7	55.1	0.0	20.0	0.0
Climax Chemical	0.0	4.2	0.0	4.6	0.2	1.0	0.0	0.0	0.0
Concrete Products	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dugway Proving Grounds	3177.0	8.0	75.4	37.8	37.5	226.9	0.0	0.0	1.2
Glen's Excavating	56.6	10.4	7.7	18.8	2.5	9.1	0.0	0.0	0.6
Interstate Brick	4.8	0.0	0.0	0.3	0.0	0.1	0.0	0.0	0.0
Ireco Chemicals	0.0	16.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kaiser Chemical	6.7	38.8	13.4	59.7	4.3	15.4	0.0	0.0	0.0
La Grand Johnson	15.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lake Point Salt	17.2	12.8	0.5	8.1	0.6	1.9	0.0	0.0	0.0
Lost Dutchman	40.7	1.9	2.9	27.6	1.7	11.4	0.0	0.0	0.0

TABLE 3-3 (CONTINUED)

Point Source	Tons Per Year								
	FD	TSP	SO_x	NO_x	HC	CO	Cl_2	Hydrogen Chloride	Aldehydes
Tooele Army Depot	506.2	415.7	154.6	266.3	514.3	950.6	0.0	0.0	0.0
Tooele Army Depot/ Rocket Motor Destruction[3]	0.0	247.8	0.0	0.0	0.0	144.1	0.0	145.6	0.0
USPCI/Marblehead Lime Kiln	26.7	38.7	71.4	84.7	8.4	57.1	0.0	0.0	0.2
W. W. Gardner (W. W. Clyde)	15.5	0.3	1.1	0.2	0.1	0.2	0.0	0.0	0.5
West Desert Pumping Project	0.0	0.0	1.0	156.3	104.2	187.5	0.0	0.0	0.0
Radiation, Safety, and Nuclear	0.0	151.0	37.2	14.8	0.0	0.0	0.0	0.0	0.0
Amax/Knolls	0.0	28.5	0.0	81.3	0.0	0.0	0.0	0.0	0.0

Source: 1987 Utah Air Emission Inventory and permits on file with Utah Bureau of Air Quality.

[1] Fugitive dust.

[2] Based on 30 percent hydrocarbons in waste stream.

[3] Based on 174 tests per year.

of North America. Basin and Range topography is typified by block-faulted mountain ranges that generally trend north to south. The ranges are discontinuous and separated by the basins (valleys).

The Great Salt Lake Desert is bounded on the east by the Cedar Mountain Range which rises from the valley floor 8 miles east of the Clive site. The site area elevation is approximately 4,300 feet, while the Cedar Mountains attain an elevation of 7,700 feet (DOE 1983). The Grassy Mountains northeast of the Clive site are over 6,000 feet in elevation.

The mountains and valleys are characterized by distinct lithologic types. The rocks that outcrop locally in the Cedar Mountains and Grassy Mountains are Paleozoic limestones, dolomites, and shales; scattered exposures of Tertiary volcanics are also found (Moore and Sorensen 1979). The valley sediments are composed of alluvial fans, evaporites, and semi-consolidated to unconsolidated valley fill (Stephens 1974).

The alluvial fans, of Quaternary Age, generally fringe the mountain ranges. They are composed of coarse gravel and sands near the mountains and become progressively finer grained at the mountain edges. Another important deposit in the Great Salt Lake Desert consists of evaporites formed by the precipitation of lake water. The evaporites are present farther west at the Bonneville Salt Flats and are not present in the eastern area.

The most predominant sediments are the semi-consolidated to unconsolidated valley fill deposits. Quaternary valley fill is unconsolidated and is composed mainly of clay and silt, with local occurrences of coarse-grained sand and gravel in lakeshore deposits (Stephens 1974). This valley fill is generally 500 feet thick or less (DOE 1983). The Clive site rests on these Quaternary lakebed deposits (Stephens 1974). The underlying Tertiary age valley fill is composed of semi-consolidated clays, sands, and gravel and can be thousands of feet thick. In the south part of the Clive site (Section 36) is an outcrop of undifferentiated Pennsylvanian-Permian rocks.

The predominant geologic structural feature is basin and range topography created by extensional normal faulting. Most of the faulting occurred between 1 million and 25 million years ago (DOE 1983). Little active faulting occurs in the area since much of the seismic activity occurs along the Wasatch mountain range many miles east of the Great Salt Lake Desert. Recent seismic activity is believed to be the result of rebound from the de-watering of ancient Lake Bonneville 15,000 years ago (Machette 1987). No active Holocene faults occur in the vicinity of the Clive site. According to Buchnam (1977) and Barnhard and Dodge (1988), the nearest Holocene faulting is located 19 miles to the northeast in the northwest Puddle Valley, east of the Grassy Mountains. In addition, a prominent scarp is located on the west side of the Stansbury Mountains, estimated to be 15,000 years old or greater. Although the DOE (1984) identified fault scarps on the northeast and east side of the Cedar Mountains and on the southwest side of the Lakeside Mountains, these faults are not present according to Barnhard (1988). There are difficulties in the interpretation of fault scarps; relic shore lines, fire burns, and other geomorphic features can often be mistaken for fault scarps. No earthquakes greater than 2.5 on the Richter Scale have been recorded in the area since 1962. The evidence of small earthquakes is inconclusive prior to 1962 because detection was based on a worldwide network and "felt" reports. According to DOE (1984), all earthquakes above 5.5 magnitude have been reported since 1850. The most recent earthquake that resulted in surface rupture was the Hansel Valley earthquake of 1934. The epicenter was 100 miles north of the Clive site near Great Salt Lake and the magnitude was 6.6 on the Richter Scale (BLM 1986a). Numerous small seismic events occurred within a 31-mile radius of Clive, Utah from 1974 to 1983, but most or all of these events were attributable to blasting from quarrying and mining operations (DOE 1984).

Recent earthquake activity on the west side of the Great Salt Lake has been concentrated in an area approximately 32 miles north of the proposed Clive site (University of Utah 1988 and 1989). These earthquakes have generally ranged between 2 and 4 on the Richter scale, with 4.7 being the largest magnitude reported in that area.

Seismic zoning maps of the U.S. (Algermissen et al. 1982) indicate the type of energy release that can be expected from earthquakes based on historical records. The Clive site is located in an area in which accelerations would range from 0.1 to 0.2 g, with a 90 percent probability of not being exceeded for 50 years.

Mineral resources in Tooele County include limestone, precious metals, potassium salts, tungsten, salt, clays, and sand and gravel. However, the resources in this area of the Great Salt Lake Desert are generally sparse. Gravel quarries have been located in the alluvial fans that flank the Cedar Mountains (DOE 1984). Reported locations of nearby gravel sources are: T.1N, R.9W, Sec. 18; T.1S, R.11W, Sec. 34, and T.2S, R.11W, Sec. 3. Gravel sources also occur in the Grayback Hills and Grassy Mountains, and other gravel sources are located near the Interstate-80 (I-80) right-of-way (ROW) (Utah Department of Highways 1966). Until recently there was little demand for gravel locally. In the last few years, building of dikes for evaporation ponds, the West Desert Pumping Project, and construction of USPCI's hazardous waste landfill facilities have increased demand for sand, clay, and gravel.

Mineral extraction by evaporation of brine occurs near Knolls, about 9 miles west of Clive. Limestone is quarried in the Cedar Mountains 10.5 miles east of the Clive site. Utah Calcium operates the quarry in T.1S, R.10W, Sec. 23 (Tripp 1985). Limestone is taken from the Pennsylvanian age Oquirrh Formation and is used for landscaping and building stone. Utah Marblehead also operates a quarry in the north end of the Cedar Mountains in T.1N, R.9W, Sec. 32. Although no oil and gas production takes place in the area, the West Desert area is speculatively valuable for petroleum and natural gas (BLM 1988). The Permian rocks exposed in the Cedar Mountains may be speculatively valuable for phosphate. There is no coal production in the area or geologic formations with coal resources. No active or pending mining claims or mineral leases are located on the site. In addition, it is unlikely that paleontological sites would occur in the area, due to the geological conditions found at the Clive site.

Soils. The proposed Clive site is located on two different types of land surfaces and each has its own dominant soils. The larger surface area consists primarily of level to gently sloping low lake terraces and basin floors. Skumpah silt loam is the dominant soil series in this area (SCS 1987). It formed in alluvium and lacustrine sediments derived from mixed rock sources. Slopes are long and linear. Skumpah is a very deep, well drained soil with slow runoff, moderately slow permeability, and moderate shrink-swell potential. The hazard of water erosion and soil blowing is also moderate. This soil map unit is in capability unit VIIs, nonirrigated, and in the Desert Flat ecological site. Typically, the surface layer of Skumpah is a nonsaline light gray silt loam about 5 inches thick. The upper 9 inches of the subsoil is a moderately saline light yellowish brown silty clay loam. The lower 14 inches is a strongly saline pale brown silt loam. A layer of sodium accumulation is between depths of 5 to 14 inches. Common flakes of gypsum are at depths of about 14 to 60 inches. This soil is used for rangeland and wildlife habitat.

Included in this map unit with Skumpah are small basin floor areas of the saline Skumpah soil under greasewood, the poorly drained Saltair soil, the fine sandy loam Mazuma soil on low fan terraces, and barren playas. These inclusions are intermingled throughout the map unit, and make up about 15 percent of the total acreage.

A hilly, bedrock controlled upland is found in the southeast corner of the Clive site. The Amtoft-Rock Outcrop soil map unit is found on this upland. It is on ridge crests and hillsides with short, convex slopes. This unit is 60 percent Amtoft very cobbly loam, and 15 percent Rock Outcrop. Included in this unit are small areas of shallow to bedrock Lodar and Lindy soils on upper slopes that receive more moisture, the very deep gravelly Hiko Peak soils on upper fan terraces and in drainageways, and the shallow to hardpan Spager soils. Included soils make up about 25 percent of the upland area.

The Amtoft soil is shallow and well drained. It formed in residuum and colluvium derived dominantly from limestone. Typically, the surface layer is light brownish gray and pale brown very cobbly loam about 9 inches thick. The subsoil to a depth of 14 inches is very pale brown extremely cobbly loam. Fractured limestone bedrock is at a depth of 14 inches. Depth to bedrock ranges from 10 to 20 inches. Permeability of the Amtoft soil is moderately rapid, runoff is rapid, and the hazard of water erosion is moderate. This map unit is used for rangeland and wildlife habitat. The unit is in capability class VIIe, nonirrigated, and in a Semidesert Shallow Loam ecological site.

An additional, narrow soil map unit is found at the base of the upland on fan terraces and low lake terraces. The Timpie silt loam soil dominates this unit. It formed in alluvium and lacustrine sediments derived dominantly from limestone and quartzite. Typically, the surface layer is a pale brown silt loam about 3 inches thick. The upper 18 inches of the underlying material is very pale brown moderately saline silt loam. The lower part to a depth of 60 inches or more is very pale brown strongly saline silt loam. In some areas the surface layer is fine sandy loam or loam. Permeability of the Timpie soil is moderately slow, runoff is slow, the hazard of soil blowing is moderate, and the hazard of water erosion is slight. This unit is also used for rangeland and wildlife habitat. This unit is in capability class IVs, nonirrigated, and in an Alkalie Flat ecological site.

Soils along the proposed access road and rail spur corridors are dominated by the Skumpah soil in non-upland areas with Timpie, Yenrab, and Tooele soils found on higher elevations. Skumpah and Timpie soils have been described above. The Yenrab soil is formed in sands from mixed sources, and is found on fan and lake terraces. It is very deep and somewhat excessively drained. Typically the surface layer is very pale brown loamy sand 5 inches thick. The underlying material to a depth of 60 inches or more is very pale brown fine sand. Runoff is slow and the hazard of water erosion is slight. The hazard of soil blowing is severe. The Tooele soil is very deep, well drained, and formed in alluvium derived dominantly from sedimentary rocks. It is also on fan and lake terraces. The surface layer is pale brown fine sandy loam about 3 inches thick. The underlying material to a depth of about 42 inches is very pale brown, strongly to very strongly alkaline fine sandy loam. Very pale brown, strongly alkaline fine sand is encountered between 42 to 60 inches. Tooele has slow runoff, moderately rapid permeability, and has moderate to severe water erosion and soil blowing hazard.

3.2.3 Water Resources

Surface Water. The Clive site is located on the eastern edge of the Northern Great Salt Lake Desert which is part of the Basin and Range Physiographic Province. The Great Salt Lake Desert area consists primarily of barren saline clay flats surrounding occasional north-south trending mountain ranges. Water periodically tends to accumulate in the lower topographic areas of the clay flats since the flats are generally located at the bottom of drainage basins and the clay is of very low vertical permeability (Dames and Moore 1985). Salt crusts often form on the surface of the flats due to evaporation of the standing water. Mountain ranges of generally low relief rise abruptly from the flats and are only sparsely vegetated with drought tolerant species (Dames and Moore 1985). The Cedar Mountains border the eastern edge of the southern part of the study area (Clive and Section 23 Alternative sites) rising to an elevation of about 7,700 feet (about 3,500 feet above the desert floor). The northern part of the study area (Grassy Mountain Alternative site) is bounded on the east by the Grayback Hills rising to an elevation of only about 4,500 feet above sea level (about 300 feet above the desert floor).

The climate of the Great Salt Lake Desert is semi-arid to arid. The climate near Clive is arid, indicating that evapotranspiration is at least five times the precipitation (DOE 1984). Annual precipitation in this area ranges from less than 5 inches per year in the valleys to as much as 20 inches per year in the mountains (Stephens 1974). Annual precipitation at Wendover, the closest climatologic station to the Clive site, approximately 47 miles to the west, has ranged from a low of 1.77 inches in 1926 to a high of 10.31 inches in 1941. The last several years have been wetter than average (Dames and Moore 1985). Almost all of the precipitation is lost through evapotranspiration or temporarily stored in the soil (Stephens 1974). Surface drainage in the Great Salt Lake Desert is internal and no streams flow out of the basin (Gates 1984).

Calculated annual runoff in the area, including runoff from the higher mountains, averages less than 1 inch per year (Dames and Moore 1985). In very extreme events, such as the Probable Maximum Flood (PMF), sheetflow (Hogg 1980) could pass over the study area but it would be nonchannelized (DOE 1984).

Annual precipitation at the Clive site is less than 6 inches per year. There is no surface water in the area. The closest intermittent stream is unnamed and is approximately 1.75 miles from the Clive site. The area is essentially flat with a small (approximately 40 feet high) hill at the southern edge of the area. The gradient from the hill is to the northwest.

Groundwater. Groundwater is a very important source of water in the Great Basin part of the Basin and Range Province of Utah with about 85 percent of water withdrawn from wells being withdrawn in this area (Gates 1987). The Clive site is located on the eastern edge of the Great Salt Lake Desert regional groundwater flow system (Harrill, Gates, and Thomas 1988). The flow system includes recharge from the mountains and plateaus along the eastern edge of the Basin and Range Province and discharge of water along paths to the topographically lowest discharge or sink area in the Great Salt Lake Desert (Gates 1987).

Three major groundwater aquifers exist in the Great Salt Lake Basin: 1) the shallow brine aquifer in surficial lakebed deposits, 2) the alluvial fan aquifer, and 3) the valley fill aquifer (Stephens 1974; Gates 1984 and 1987). The shallow brine aquifer consists of lakebed clay and silt and crystalline salt deposits. The shallow brine aquifer underlies about 1,650 square miles of the Northern Great Salt Lake Desert (Stephens 1974). The brine is commonly found in shallow thin horizontal zones of salt-impregnated clay. In general, only the upper 25 feet of the lakebed clays function as an aquifer. Stephens (1974) suggested that the brine probably moves through the shallow lakebeds by intergranular flow and by flow in vertical open joints (dessication cracks) that extend to a depth of about 25 feet. Both water table (unconfined) and artesian (confined) conditions exist in this shallow aquifer. Recharge to the shallow brine aquifer in the Bonneville Flats is by infiltration of precipitation and by lateral subsurface inflow from adjacent aquifers with a minor contribution from runoff from adjacent uplands. In other parts of the basin, infiltration of precipitation contributes only minor amounts of recharge due to the rapid closure of the smaller dessication cracks in the surface. Discharge is primarily by evaporation. Stephens (1974) estimated that 9.6 million acre-feet of brine was in storage in the shallow brine aquifer.

Surficial alluvial deposits bordering the floor of the Great Salt Lake Desert together with underlying unconsolidated to well-cemented older alluvium comprise the alluvial fan aquifer (Stephens 1974). The alluvial fan aquifer is important as a conduit of groundwater recharge from the consolidated rock aquifers and springs in the mountains (Stephens 1974; Gates 1987). Along the eastern flank of the Silver Island Range, the alluvial fan aquifer is a significant part of the groundwater system and conditions are thought to be similar elsewhere in the basin alluvium (Stephens 1974). Water levels range from about 10 feet below land surface in Ripple Valley to at least 360 feet below the surface in the Grassy Mountains. Water quality is relatively good, with water being used for livestock purposes in a number of locations. Recharge to the alluvial fan aquifer is from precipitation infiltration and subsurface inflow, and discharge is via evapotranspiration, pumping from wells, and subsurface outflow. No springs are known to discharge from the alluvial-fan aquifer. The extent of the alluvial fan aquifer is unknown (Stephens 1974).

The major aquifer in the basin is the valley-fill aquifer (Gates 1984 and 1987). Most of the water wells in the area are completed in the valley-fill aquifer; therefore, the majority of the groundwater data available in the area is from the valley-fill aquifer. The valley-fill may be several thousand feet in some areas, but for the most part is 700 to 1,500 feet thick in the region (Gates 1987). Water moves laterally in the valley-fill aquifer from the alluvial-fan aquifer with some movement downward of brine from the shallow brine aquifer through damaged wells and interfingering permeable strata (Stephens 1974). The aquifer yields brine for commercial purposes in the Bonneville Salt Flats area and water quality is generally briny with total dissolved solids being on the order of 150,000 mg/l or more. Recharge is from subsurface inflow from adjacent alluvial-fan aquifers and from consolidated Paleozoic rocks. Discharge occurs from pumping by wells with negligible subsurface outflow. Total storage in the valley-fill is estimated to be about 220 million acre-feet (Stephens 1974).

Other aquifers in the area include discontinuous aquifers in mountainous areas in which water is stored locally in thin weathered zones and in fractures in Tertiary granite and Paleozoic carbonate rocks, and in intergranular spaces in unconsolidated Quaternary alluvial deposits. Springs and seeps often issue from these local water sources (Stephens 1974). Water quality ranges from fresh to saline with most areas having at least 500 mg/l total dissolved solids (Stephens 1974).

Extensive investigations were conducted by DOE (1984) in Section 32, 2 miles east of the Clive site in connection with the Vitro Uranium Mill Tailing Reclamation and Control Act (UMTRCA) project. According to DOE (1984) only the valley-fill and alluvial-fan aquifers are present in the

Clive site vicinity. Direct infiltration of precipitation is considered to be an insignificant part of recharge to the groundwater regime in this area. Depth to groundwater is probably about 20 to 30 feet below the surface (DOE 1984). The groundwater flow direction is generally to the west. Locally, however, the flow direction is modified by the local topographic conditions (DOE 1984). Harrill, Gates, and Thomas (1988) indicate the flow direction is to the northwest with the area including the Clive site being depicted as an area of consumption of groundwater by evapotranspiration. The hydraulic gradient is approximately 3 feet per mile (DOE 1984). Permeabilities in the vicinity, range from about 0.28 to 2.8 feet per day (DOE 1984).

Five monitoring wells were sampled for water quality at the UMTRCA site about 2 miles east of the Clive site. Water quality analyses indicated that primary and secondary water quality drinking standards were exceeded. Parameters included sulfate, chloride, total dissolved solids (secondary standards) and arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver (primary standards) (DOE 1984). In addition, some radionuclides also exceeded primary drinking water standards (DOE 1984). Water was classified as "briny".

3.2.4 Biological Resources

Vegetation. The overall dominant vegetation in Tooele County, and on the Clive site in particular, is the desert shrub/saltbush type (BLM 1988). Representative of the desert shrub/saltbush community are low widely spaced shrubs, totaling approximately 10 percent ground cover (Cronquist et al. 1972). Dominant shrubs on the Clive site include shadscale, Nuttall's saltbush, and winterfat (SCS 1987; Kidd 1989). Dominant grasses and forbs on the site include Indian ricegrass, alkali sacatan, cheatgrass, gray molly, and seepweed. Proposed utility, railroad, and access road ROWs are located within the same vegetation type and should contain similar species.

Wildlife. The Clive site is located within the yearlong range of the pronghorn antelope. The West Desert Herd Unit 2A occurs south of I-80 and includes the Clive site (BLM 1988). Pronghorn are rare in the project area south of I-80. The area is considered poor pronghorn habitat (Nelson 1989). I-80 acts as a barrier to most pronghorn movement south from the Puddle Valley Herd Unit (Ekins 1989). No critical pronghorn habitat occurs on the West Desert Herd Unit near the Clive site (Ekins 1989).

Mourning doves are summer residents, arriving in February or March and migrating out of the area in August or September. Doves are most abundant in edge or ecotone areas, particularly interspersions of agricultural, sagebrush, and pinyon-juniper types. Mourning doves are the only gamebird occurring on the Clive site.

Other wildlife species located within the proposed project area include the black-tailed jackrabbit, mountain cottontail, desert cottontail, and pygmy cottontail which is unique to the Great Basin (BLM 1982). Furbearers, including the kit fox and coyote, are found throughout the area.

A variety of non-game mammals, birds, and reptiles are supported by habitats found in the proposed project area and associated utility, railroad, and access road ROWs. Species that may occur include the Townsend's ground squirrel, Ord's kangaroo rat, desert woodrat, western harvest mouse, side-blotched lizard, gopher snake, Brewer's sparrow, black-throated sparrow, and horned lark (BLM 1982 and 1987).

Aquatic ecosystems do not occur on the Clive site.

Threatened, Endangered, or Special Status Species. No federal or state-listed threatened, endangered, or candidate plant species are known to occur within the Clive project area (Snyder 1989; BLM 1983, 1987, and 1988).

The bald eagle and American peregrine falcon are federally-listed endangered species that could occur within the project area (Benton 1989; USFWS 1987). The bald eagle is a winter resident from late November to mid-March in the project vicinity. The majority of wintering eagles are found in Rush Valley with others occurring in Skull and Cedar Valleys. No bald eagle roosts are located within the proposed project area; however, the black-tailed jackrabbit is the primary food source utilized by bald eagles in Tooele County (Benton 1989; BLM 1988), and eagles may potentially hunt within this area.

One historical eyrie of the American peregrine falcon was located near Timpie Springs Wildlife Management Area (WMA) in the northern end of the Stansbury Mountains. The nest site became inactive following the construction of I-80 in the late 1960s (Benton 1989; BLM 1988). In an attempt to re-establish a breeding pair of peregrines, the Utah Division of Wildlife Resources, in cooperation with the U.S. Fish and Wildlife Service (USFWS), erected a hack site at the Timpie Springs WMA, approximately 26 miles from the Clive site. The hack site became active in 1983 and 1984, and a peregrine pair was observed using the site in Spring 1987. The hack site is currently (Spring 1989) occupied by a nesting pair of peregrines (Benton 1989). Peregrines are known to arrive in the area in March and, if nesting, may remain until September (Benton 1989). Due to the distance between the Clive site and the eyrie, it is unlikely any peregrines utilize the project area.

The ferruginous hawk and Swainson's hawk occur within the project area (Benton 1989) and are both listed as federal candidate species (C2 and 3C, respectively) and state-listed candidate species (USFWS 1989). Other raptors commonly found in the area include the golden eagle, prairie falcon, turkey vulture, red-tailed hawk, and burrowing owl. No nesting raptors have been identified within 0.5 mile of the facility site (Nelson 1989).

The Cedar Mountains contain a wild horse herd protected under the Wild and Free Roaming Horse and Burro Act of 1971. The Cedar Mountain herd presently contains an estimated 125 horses and extends from 4 miles north of Eight Mile Spring to the southern portion of the Cedar Mountain range (BLM 1988). Wild horses are seldom encountered on the Clive site (Kidd 1989). The state sensitive kit fox may occur throughout the West Desert Hazardous Industry Area (Johnston 1989).

3.2.5 Transportation

The proposed Clive site is located approximately 2 miles south of I-80, and approximately 70 road miles west of Salt Lake City. The only access to the site from both the east and west is provided by I-80 which is a 4-lane, divided highway. Road conditions along this section of I-80 are generally well maintained. Regional access to the site is also provided by I-15 and I-84 which travel in a north/south direction. While there is an existing freeway overpass near the Clive site, there is no permanent interchange on I-80 that provides direct access to the Clive site. Existing truck traffic reaches the Envirocare and Vitro tailings site in Section 32 by pulling off I-80 onto a temporary dirt exit road. The west-bound exit and east-bound entrance roads were temporarily established for the Vitro tailings project and are posted for authorized vehicles only.

Traffic count data are available for I-80 from the Utah Department of Transportation. Annual average daily traffic (AADT) for several locations along I-80 are listed in Table 3-4. The AADT data show that in 1987 traffic was fairly uniform along I-80 and exhibited a gradual increase from west to east. Traffic increased at these locations by approximately 7 to 9 percent between 1986 and 1987. There are currently 20 trains per day on Union Pacific's tracks west of Salt Lake City (Alder 1989).

3.2.6 Socioeconomics

Population. Between 1970 and 1980, the Tooele County area population increased by approximately 21 percent, from 21,545 to 26,033. The state's growth rate was 38 percent for the same period, with a total population of 1,461,037 in 1980 (U.S. Bureau of the Census 1980). Since 1980 the county has shown moderate growth to an estimated 1987 level of 28,100 (Bureau of Economic and Business Research 1988). Tooele County is a rural area with a 1987 population density of approximately 4.1 persons per square mile. The majority of the population is concentrated in or near the communities of Tooele City, Grantsville, and Wendover. Since 1980, Salt Lake County's population increased by almost 13 percent to an estimated 1986 level of 697,000. Salt Lake City's population decreased by almost 3 percent during the same time period (Bureau of Economic and Business Research 1988). Population numbers for Salt Lake County, Salt Lake City, Tooele County, and its communities are given in Table 3-5.

Communities in Tooele County exhibited a broad range of population changes in the 1970s. Grantsville, Wendover, and Tooele City grew 51, 41, and 14 percent, respectively, between 1970 and 1980, while Ophir, Rush Valley, and the unincorporated areas decreased 45, 34, and 19 percent, respectively. These data imply a movement of population from the more

TABLE 3-4

AVERAGE ANNUAL TRAFFIC DATA FOR I-80

Location	1983	1984	1985	1986	1987	Percent Change 1983-1987	Annual Average Change (%)
Wendover	3,840	4,020	4,075	4,425	4,775	+24.3	+5.7
Bonneville Speedway	3,830	4,010	4,075	4,415	4,755	+24.2	+6.0
Knolls	3,830	4,010	4,025	4,400	4,775	+24.7	+5.7
Aragonite	3,830	4,010	4,065	4,460	4,855	+26.8	+6.2
Lakeside	3,830	4,010	4,225	4,635	5,045	+31.7	+7.2
Delle	3,830	4,010	4,335	4,755	5,135	+34.1	+7.6
Rowley Junction	4,770	4,940	5,265	5,375	5,775	+21.1	+4.9

Sources: 1983-1986 Data - Utah Department of Transportation 1986.
1987 Data - Wood 1989.

TABLE 3-5

POPULATION NUMBERS FOR SALT LAKE COUNTY, SALT LAKE CITY, TOOELE COUNTY, AND ITS COMMUNITIES

Unit	1970[1]	1980[1]	Estimated Population July 1, 1986[2]	Percent Change 1980 - 1986
Tooele County	21,545	26,033	28,100	+7.9
Grantsville	2,931	4,419	5,130	+16.1
Ophir	76	42	N/A	N/A
Rush Valley	541	356	N/A	N/A
Stockton	469	437	N/A	N/A
Tooele	12,539	14,335	15,760	+9.9
Vernon	N/A	N/A	N/A	N/A
Wendover	781	1,099	1,670	+52.0
Unincorporated Areas	4,208	3,403	N/A	N/A
Salt Lake County	N/A	619,066	697,000	+12.6
Salt Lake City	175,885	163,033	158,440	-2.8

NA = Not Available.

[1]U.S. Bureau of the Census. 1980 Census of Population.

[2]Bureau of Economic and Business Research, Profile of Tooele County, August 1988.

rural areas to the communities of Grantsville and Tooele City, in addition to the growth from births and in-migration from outside the county. The growth of Wendover is at least partially explained by an increase in the tourist industry related to increased visits by people from the Wasatch Front area to the gambling casinos and hotels on the Nevada side of the community (BLM 1984; Bureau of Economic and Business Research 1988). Tooele City is the largest community in the county with a population that reached 15,760 in 1986, or more than 55 percent of the county total for the same period. Grantsville is the second largest city with an estimated population of 5,130 in 1986.

Population projections for the county indicate that the number of people living in Tooele County in the year 2000 will exceed 34,000 for about a 31 percent increase over 1980 levels (Bureau of Economic and Business Research 1988).

Employment and Income. Tooele County is characterized by an economy with a high concentration of skilled craft workers and office and clerical workers. In 1987, the civilian labor force in Tooele County totaled 11,255, of which skilled craft workers accounted for 19 percent or 2,140 jobs. Office and clerical workers accounted for an additional 1,889 jobs (see Table 3-6) (Bureau of Economic and Business Research 1988). The average annual unemployment rate in Tooele County in 1987 was 7.5 percent, which was slightly higher than the state unemployment rate of 6.3 percent for the same period (Bureau of Economic and Business Research 1988).

As shown in Table 3-7, the government sector accounted for 6,535 jobs in Tooele County in 1987, more than 64 percent of total nonagricultural employment (Utah Department of Employment Security 1989). This is due to the presence of two government installations in the area, the Tooele Army Depot (TAD), which employs nearly 73 percent of the City of Tooele's nonagricultural work force, and Dugway Proving Ground which employs virtually all of Dugway City's workforce in defense-related or other government jobs (Bureau of Economic and Business Research 1988).

TAD is located in the City of Tooele and accounts for nearly 40 percent of total nonagricultural employment in the county. It should be noted that not all government employees in Tooele County are residents of that area; actually, many persons commute from Salt Lake City and other

TABLE 3-6

OCCUPATIONS OF CIVILIAN LABOR FORCE

TOOELE COUNTY

1985/1986 ANNUAL AVERAGES

Occupational Category	Number of Persons 1985	1986	1987	1987 Percent of Total
Officials and Managers	1,031	1,055	997	8.9%
Professionals	1,265	1,293	1,222	10.9
Technicians	283	289	273	2.5
Sales Workers	588	602	569	5.1
Office and Clerical Workers	1,955	1,999	1,889	16.8
Skilled Craft Workers	2,214	2,264	2,140	19.0
Operatives	1,690	1,728	1,634	14.5
Laborers	870	890	841	7.5
Service Workers	1,692	1,730	1,636	14.5
Unemployed, No Civilian Work Experience Since 1980	56	57	54	0.5
Total	11,645	11,907	11,255	100.0

Sources: Utah Department of Employment Security, Job Service, Labor Market Information Services, 1987. Bureau of Economic and Business Research, August 1988.

Note: 1985, 1986, and 1987 estimates based on 1980 Census distributions.

TABLE 3-7

NONAGRICULTURAL EMPLOYMENT BY INDUSTRY SECTOR AND MAJOR WORK SITE DISTRICT
TOOELE COUNTY AND SELECTED COMMUNITIES
1987[1]

	Tooele County		Grantsville		Tooele City		Wendover		Remainder of County	
	1987 (#)	% of 1987	1987 (#)	% of 1987	1987 (#)	% of 1987	1987 (#)	% of 1987	1987 (#)	% of 1987
Total	10,172	100.0	546	100.0	7,026	100.0	245	100.0	2,167	100.0
Mining	262	2.6	[2]	NA	[2]	NA	[2]	NA	[2]	NA
Construction	367	3.6	66	12.1	138	2.0	[2]	NA	108	5.0
Manufacturing	791	7.8	157	28.8	59	0.8	[2]	NA	[2]	NA
Transportation, Communication, Public Utilities	179	1.8	[2]	NA	115	1.6	10	3.9	[2]	NA
Trade	1,145	11.3	135	24.7	763	10.9	75	29.5	183	8.4
Finance, Insurance, Real Estate	153	1.5	[2]	NA	121	1.7	[2]	NA	[2]	NA
Service	740	7.3	14	2.6	538	7.7	45	17.7	267	12.3
Government	6,535	64.2	145	26.6	5,084	72.4	54	21.3	1,107	51.1

NA = Not available.

[1] Sources: Utah Department of Employment Security, Labor Market Information Report, February 1989.
Bureau of Economic and Business Research, Profile of Tooele County, August 1988.

[2] Included in totals, but not shown to avoid disclosure of individual firm data (data are not disclosed if there are fewer than 3 individual firms in the industry).

nearby counties to the military jobs in the area. In the Grantsville area, many residents are self-employed in agriculture, particularly in cattle production. However, of those who work in nonagricultural occupations, most are employed in manufacturing and processing; many are employed by salt and chemical companies in the area.

Largely because of the higher-than-average wage rates in the high risk military jobs at Dugway Proving Grounds, the average monthly wage rates for Tooele County workers are higher than those for the state as a whole. The wage levels in Tooele County are about 26 percent higher than the average monthly nonagricultural wage in the rest of the state (Bureau of Economic and Business Research 1988). Traditionally, wage and salary payments at TAD have been higher than those in many industrial sectors in Utah. The nonagricultural wage in Tooele County has been steadily increasing over the last several years and reached $1,890 per month in 1987 (see Table 3-8).

Per capita income in Tooele County is also higher than the state average, although very near the state average in recent years. In 1986, per capita income in Tooele County reached $11,087, up 39 percent from 1980. The rise in per capita income for the State of Utah over the same period was 38 percent. Table 3-9 shows per capita personal income for Tooele County, the State of Utah, and the United States for 1980, 1984, and 1986.

Mineral Resources. Mineral resources in Tooele County include limestone, precious metals, potassium salts, tungsten, salt, clays, and sand and gravel. In 1983, the latest year for which dollar value statistics are available, Tooele County produced $37 million worth of nonfuel minerals (Bureau of Economic and Business Research 1988).

Taxes. Beginning in 1986 mill levies were abandoned and property in Utah was appraised at a percentage of its "reasonable fair cash value." This appraised market value is discounted by 40 percent in the case of primary residential property and by 20 percent in the case of other locally-assessed real property to determine the assessed value that is subject to taxation. Taxes are computed using tax rates which can vary considerably from county to county and from city to city within a county.

TABLE 3-8

AVERAGE MONTHLY NONAGRICULTURAL WAGE

TOOELE COUNTY

1980 - 1987

Year	Tooele County	Utah	U.S.
1980	$ 1,270	$ 1,111	$ 1,198
1981	1,427	1,232	1,307
1982	1,455	1,300	1,395
1983	1,563	1,352	1,462
1984	1,728	1,409	1,529
1985	1,772	1,440	NA
1986	1,827	1,463	NA
1987	1,890	1,501	NA

Sources: Utah Data: Utah Department of Employment Security, Utah Labor Market Report (Salt Lake City, May 1986); U.S. Data: U.S. Bureau of Labor Statistics, Employment and Wages Annual Averages 1984 -- Bulletin 2249 (Washington D.C., November 1985); Utah Data: Bureau of Economic and Business Research, Profile of Tooele County (Draft) (August 1987), Bureau of Economic and Business Research, Profile of Tooele (August 1988).

NA - Not Available.

TABLE 3-9

PER CAPITA INCOME

TOOELE COUNTY

1980, 1984, 1986

Area	1980	1984	1986
Tooele County	$ 7,968	$ 10,502	$ 11,087
State of Utah	7,952	10,115	10,986
United States	9,919	13,116	14,639

Source: Bureau of Economic and Business Research, August 1988.

The 1988 tax rate for the unincorporated areas of Tooele County was 1.2677 percent (Caldwell 1989). For example, the approximate tax for a 10,000 square foot industrial building valued at $200,000, and for an $80,000 home would be $2,028 and $608, respectively. The total 1988 property valuation for Tooele County was approximately $623 million (Caldwell 1989).

In the State of Utah, there are basically five sources of sales tax revenue. These include revenue from: 1) utilities, 2) motor vehicles, 3) direct sales (i.e., in-state sales), 4) merchandise purchased out-of-state and brought into Utah for use, and 5) merchandise sold in Utah by a company not located in Utah. Sales tax revenue is distributed throughout the state based on population percentages (Hillebrandt 1987). The 1987 state sales tax rate was 5-3/32 percent, with a local option of up to 58/64 of 1 percent. A corporation franchise tax of 5 percent on corporate net income before deduction for federal taxes is imposed (Bureau of Economic and Business Research 1988). The 1988 sales tax rate for Tooele County was 6 percent. Gross taxable sales in Tooele County for the calendar year 1988 totaled almost $126 million (Katayama 1989) generating sales tax revenue of more than $7.5 million.

Hazardous Waste Fee. There is a commercial disposal fee for hazardous wastes disposed of in Tooele County, implemented by the State of Utah. Currently, the rates are $8 per ton for hazardous wastes generated in state, and $20 per ton for hazardous wastes generated outside the state. Tooele County currently receives 10 percent of the commercial disposal fee.

Housing. The total number of housing units in Tooele County increased from 6,455 to 8,566 (32.7 percent) between 1970 and 1980 (U.S. Department of Commerce 1981). Housing unit growth was greatest, percentage-wise, in the Grantsville area, at 64.8 percent, but Grantsville's 1980 housing stock was still small at only 1,348 units. The 1980 Census indicated that approximately 6 percent of all units in Grantsville were vacant. Tooele's housing stock grew by 26.5 percent, to 4,877 units. The 1980 Census indicated that approximately 5 percent of all units in Tooele were vacant. Wendover had a total of 409 units and a vacancy rate of approximately 16 percent, in 1980. The county averaged 3.23 persons per dwelling unit in 1980.

It is difficult to get an accurate count of the number of rental units, homes, apartments, mobile homes, and condominiums currently available in Tooele County. In general, each of the county's realtors manages between 3 to 5 homes at a time (102 to 170 total). This does not include apartments or mobile homes. The vacancy rate of these rentals is about 10 percent (Gillette 1989).

Generally, 2 and 3-bedroom apartments will range between $275 to $350 per month. Home rentals range from $350 to $550 per month, depending on size and condition. Utilities are usually paid by the tenant (Gillette 1989).

According to the Tooele County Multi-Listing Service (MLS), as of March 18, 1989, there were 160 residential listings in the Tooele County area, including Tooele City (107), Grantsville (29), Stansbury Park (15), and outlying areas (9). Homes in these areas range from $30,000 to $120,000 (Gillette 1989). Specific information for Wendover was not available.

Public Facilities and Services. Total enrollment in the Tooele County School District, as of January 19, 1989, was 7,233 students, 3.2 percent lower than the enrollment as of October 1, 1987 (LeFevre 1989). The Tooele County School District has not reached full capacity and the projected enrollment numbers indicate there should be no physical capacity problems in the short-term future (Skiles 1989).

Tooele, Grantsville, and Wendover have their own police protection and volunteer fire departments. Police protection is provided to the unincorporated areas of the county by the Sheriff's Department. There are special service districts for fire protection, with several substations located throughout the county (Simon 1987; Urbanik 1989).

The county's single hospital, with 42 beds, is located in Tooele. Other medical services include two health clinics in Tooele, one health clinic in Grantsville, and one health clinic in Wendover. There are two ambulance services in Tooele, one service in Grantsville, and one in Wendover (Simon 1987; Urbanik 1989).

3.2.7 Land Use, Grazing, Recreation, and Wilderness

Land Use. The federal government owns and controls the greatest percentage of land in Tooele County, 82 percent of the county land area of 4.43 million acres. The greatest portion (1,952,852 acres) of the federal land is public domain administered by the BLM. The U.S. Department of Defense controls the next greatest portion of 1,558,862 acres, with national forests occupying 152,223 acres (BLM 1988). Approximately 6 percent of the county land area is administered by the State of Utah, which leaves approximately 12 percent in private ownership (BLM 1988). The Clive site occupies one section of private land (Section 36) owned by USPCI. The development of private land would be required to be consistent with the Tooele County Master Plan, Zoning Ordinance, and facility siting regulations, and would require the necessary permits from EPA, the State of Utah, and Tooele County.

Tooele County has a County Master Plan for 1970 to 1990 (Mountain Area Planners 1972), and a County Zoning Ordinance of 1975. Land use in Tooele County is generally described throughout the Master Plan as encouraging multiple and cooperative use. The Clive site is located in a multiple use zoning district that requires a minimum lot size of 40 acres. The Tooele County Master Plan states: The major part of unincorporated land in Tooele County is shown on the Master Plan Maps as multiple-use areas. It is proposed that these lands be subjected to conditional use permits for all uses; that primary uses allowed be forestry, stock grazing, mining and recreational activities in appropriate areas; and that emphasis of management practices be placed on conservation and wise use of natural resources, to permit and encourage improvement in soils stability, plant cover, water quantity and quality, and scenic beauty. Contemplated in this classification are large-scale planned developments considered on their special merits and in keeping with the residential and industrial potential of the County.

On January 12, 1988, the Tooele County Commission established the West Desert Hazardous Industry Area (see Map 1-1). The Clive site is located within this area. Rather than being a formal zone designated for hazardous waste disposal activities, the area retains its multiple use designation. However, the West Desert Hazardous Industry Area is the only area in the county where site-specific zoning changes for hazardous industries will be considered.

Tooele County amended the uniform zoning ordinance by adding the "Hazardous Industrial District" zoning classification (MG-H), and this would be the classification to which hazardous industry sites within the West Desert Hazardous Industry Area would be rezoned. The purpose of the new zoning classification is to provide for appropriate locations where hazardous industrial processes necessary to the economy may be conducted, and prohibiting such activities in all other zoning classifications of Tooele County. The regulations of this classification are designed to protect the environmental quality of the site and Tooele County. All activities relating to commercial storage, treatment, and disposal of wastes classified as "hazardous wastes" under Section 26-14-2(6) of the Utah Solid and Hazardous Waste Act or otherwise regulated as a "waste" under the Toxic Substance Control Act (TSCA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or other federal or state laws and regulations are covered under this new zoning ordinance amendment.

Tooele County established performance standards for the storage, treatment, or disposal of hazardous wastes which may be authorized in the Hazardous Industrial Zoning District (MG-H). These performance standards are intended to be used as a mechanism to review and assess the potential social, health, and environmental impacts and risks that may be associated with any proposed hazardous industrial activity or proposed MG-H Zoning District. In the case of a conflict between the county's siting standards and those promulgated by the State of Utah Solid and Hazardous Waste Committee, the stricter of the two would apply.

The Planning and Zoning Commission would be responsible for reviewing each application on a case-by-case basis. All zoning changes and conditional use permits for development(s) located in this area must then be reviewed and approved by the Tooele County Commission prior to taking effect.

Existing industrial activities in the Clive area include an aragonite mine, and crushing and loading facility located in the Cedar Mountains to the northeast of the Clive site, the Enviro-Care and Vitro tailings site east of the Clive site, and the USPCI Grassy Mountain Landfill and proposed Amax Knolls solar evaporation pond system to the northwest (see Maps 1-1 and 2-2).

Grazing. The Clive site occupies one section of private land (Section 36). The land is currently utilized for grazing purposes and dispersed recreation. The Clive site is located within the Skull Valley Grazing Allotment. There are 268,800 acres in the Skull Valley Grazing Allotment. Allocations in the allotment area total 6,000 AUMs for sheep, 11,785 AUMs for cattle, and 1,099 AUMs for deer; totaling 18,884 AUMs for the Skull Valley allotment area (BLM 1983; Kidd 1989). Historically, the immediate area around the Clive site has not been heavily utilized for grazing. However, since development of the Vitro tailings site, cattle have been attracted to the area and there is some livestock use in the area. Cattle utilize the area heavily during winter periods when snow is present and when puddles of water exist during wet periods. The Skull Valley cattle have been seen as far west as Knolls. The creation of water sites and ponds in conjunction with the Vitro activity has also created favorable conditions for livestock to frequent this site.

Recreation. The most popular recreation activity in the Clive area is off-road vehicle (ORV) use. The area receives an estimated 500 to 1,000 visits annually, mostly coming from Aragonite or Knolls (Morgan 1987 and 1989). The Clive site is located immediately adjacent to the 37,760-acre Knolls Special Recreation Management Area (SRMA). The purpose of SRMAs is to establish a basis for determining priority for management and funding, and to delineate units that will require activity planning. An SRMA is an area where a commitment has been made, within the parameters of multiple use, to provide specific recreation activity and experience opportunities on a sustained yield basis (BLM 1988). The Knolls SRMA is identified for increasing use by ORV enthusiasts and permitted races (averaging 100-mile courses).

Wilderness. The Cedar Mountains Wilderness Study Area (WSA) is located approximately 9 miles east of the Clive site, 14.5 miles southeast of the Grassy Mountain Alternative site, and 4.5 miles east of the Section 23 Alternative site. Generally, the Cedar Mountains WSA contains 50,500 contiguous acres of public land located in east-central Tooele County, approximately 65 highway miles west of Salt Lake City. Specifically, the unit consists of public land in the central portion of the Cedar Mountains, between Hasting's Pass on the north and Rydalch Pass on the south.

The Cedar Mountains WSA consists of a long, single ridgeline, typically Basin and Range in geologic structure. At 5,000 feet elevation, the mountains gradually become more pronounced, as outwash fades into a smooth, almost inconspicuous blending of canyons, washes, and gullies which narrow without prominent twisting. The mountains' crests vary from the 7,712-foot Cedar Peak to numerous 6,000-foot elevations scattered along a 20-mile long ridgeline.

Vegetation along the lower slopes of the Cedar Mountains consist of a mixture of shadscale/cheatgrass/halogeton ground cover. Sagebrush, rabbitbrush, and wheatgrasses combine with individual juniper trees at approximately 5,000 feet to add an obvious vegetative texture to the landscape.

At higher elevations (above 5,800 feet), the main ridge and south-facing slopes are often bare and unshaded, with occasional stands of juniper trees.

Estimated annual precipitation ranges from 8 inches along the lower contours of the unit to 16 inches along the 7,000-foot mountain crest. Temperatures range from a low of -30°F in the winter to over 100°F in the summer.

The Cedar Mountains WSA is in the final stages of an EIS which is anticipated to be published in fall 1989 (Thane 1989). At the conclusion of the EIS process, BLM will review and consider all of the information received and at that time will formulate a final recommendation of areas found suitable for wilderness designation. Rationale for such recommendations will be included in a Wilderness Study Report to be submitted to the Secretary of the Interior and subsequently to Congress. Congress will make a decision on wilderness designation for the area sometime after 1991. Until such time, the WSA is being managed as wilderness under interim regulations.

Areas of Critical Environmental Concern (ACEC). The nearest existing Area of Critical Environmental Concern (ACEC) is the Bonneville Salt Flats ACEC, located approximately 30 miles northwest of the Clive site (BLM 1988).

3.2.8 Visual Resources

The BLM's Visual Resource Management (VRM) System provides a systematic approach to the management of aesthetic resources on public lands. The VRM System provides for inventory of existing scenic quality and assignment of visual resource inventory (VRI) categories based on a combination of scenic values, viewing distance zones, and visual sensitivity. Four visual resource classes have been established to serve two purposes: (1) as an inventory tool portraying relative value of existing visual resources, and (2) as a management tool portraying visual management objectives. Management objectives for each of the visual resource classes are listed in Table 3-10.

The proposed Clive site is sparsely vegetated which makes the greyish tan, sandy soil more visible and contributes to a more barren visual character. Vegetation colors are tans, browns, and olives, tending to be duller than at the other sites. Ridges and mountains are distant and correspondingly not very prominent. Manmade features include the Enviro-Care facility, the Vitro tailings operation, rural roads, a railroad, and small power lines. The Clive site is designated VRI Class IV.

3.2.9 Cultural Resources

Background research was conducted with the Utah State Historical Society/Division of State History and the BLM Salt Lake District. Previous cultural resource surveys and known cultural resource sites were noted for complete sections containing incinerator sites and associated ROW facilities (powerlines, access roads, rail spurs).

TABLE 3-10

VISUAL RESOURCE MANAGEMENT CLASSES

Class I Objective:	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II Objective:	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III Objective:	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV Objective:	The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.
Rehabilitation Areas:	Areas in need of rehabilitation from a visual standpoint should be flagged during the inventory process. The level of rehabilitation will be determined through the resource management planning (RMP) process by assigning the VRM class approved for that particular area.

Source: BLM Manual 8411.

Records indicate that six intensive (Class III) cultural resource inventories have been conducted in the immediate vicinity of facilities associated with the proposed Clive site. No surveys are associated with the actual site although a 640-acre block survey has been conducted 1 mile to the east (Weder 1981). The proposed land exchange area north of Grassy Mountain (Section 9) has been partially surveyed (Berry 1985). No cultural resources were recorded. The powerline associated with the Clive site crosses two previously surveyed block areas (Russell 1987a; Tipps 1984) and one surveyed road ROW (Senulis 1987), and is near, but does not cross, another block survey area (Russell 1987b) and ROW (Jacklin 1981). The Clive access road partially traverses one of the above-named block survey areas (Tipps 1984), and for a short distance coincides with the corridor of a ROW survey (Billat et al. 1986). No portion of the rail spur has been inventoried. No cultural resource sites have been recorded near any of the ROW facilities. To date just 5 percent of the total ROW facilities has been inventoried for cultural resources.

Data indicate that the eastern Great Basin has been inhabited for the past 11,000 to 12,000 years. Major stages of prehistoric occupation are Paleo-Indian (12,000/11,000 to 7,000 years before present [BP]), Archaic (7,000 to 1,600 BP), Fremont (1,600 to 600 BP), and Numic (600 to 200 BP). Prehistoric inhabitants participated in a hunting/gathering economy which at times focused intensely on the shallow water resources of the Great Salt Lake margins. Semi-sedentism may have characterized the Fremont stage of occupation (Marwitt 1986; Madsen 1982; Aikens and Madsen 1986).

Archaeological sites tend to occur in upland (but not rugged) settings near the lake, in sand dune areas, and in association with the more recent fossil shorelines. Anglo-American use and occupation of the area began in the early 19th century and continued to the present. Prevalent historic themes are exploration and the fur trade, transportation, western settlement and ranching, and mining (e.g., salt extraction) (Morgan 1947). Historic sites may occur in a variety of settings in the project vicinity but are not abundant.

3.2.10 Health and Safety

Health and safety concerns associated with hazardous wastes would be expected only during the operation phase of the project. The populations that would be potentially exposed to various health and safety risks would be comprised of truck drivers, railroad crews, facility operations personnel, travelers on I-80, and residential populations located near the facility or near transportation routes to the facility. These groups are described below.

Transportation of hazardous wastes to the facility would be provided by truck or rail car. USPCI anticipates annual average deliveries of 8 trucks per day and 5 rail cars per day (see Section 2.2). From these figures, an estimated 49 truck drivers and 7 train crews would deliver waste to the facility each week.

USPCI plans to employ approximately 111 people in the operating facility (see Section 2.2.2). Approximately 25 workers would be involved in management or office work with a small likelihood of potential daily exposure to hazardous waste. Roughly 86 workers would be involved in the day-to-day operations of the facility, with potential for exposure on a daily basis.

Residential populations would have the potential for being affected by upset conditions and spills along highways and railroad lines. The towns closest to the Clive site are Grantsville (37 miles), Tooele (47 miles), Wendover (47 miles), and Salt Lake City (68 miles) (approximate air miles). Population totals taken from 1980 census data are discussed in Section 3.2.6. Passengers in vehicles traveling along the stretch of I-80 near the proposed Clive site would have the potential for exposure to airborne emissions from the facility and to toxic spills along the highway. The 1986 average daily count for this section of I-80 was about 4,700 vehicles. If an average vehicle occupancy rate of 2 is assumed, approximately 9,400 travelers would pass the site daily. Both I-80 and the Union Pacific Railroad pass directly through Wendover and Salt Lake City. Grantsville is located 6 miles from I-80 and the railroad, while Tooele is 8 miles from I-80 and 10 miles from the railroad (approximate air miles).

The Salt Lake City Hazardous Material Response Team, which operates through the City's fire department, is trained to handle emergencies dealing with all classes of hazardous materials. Response time to an incident varies. In general, fire team response within the city limits ranges from 2.5 to 4 minutes, with hazardous materials response on the scene within 4 to 10 minutes. The team routinely responds to Salt Lake County calls, when a fire deputy from the county initiates the call. In addition, the team will respond to a neighboring county call with the approval of the Salt Lake Chief or Deputy Chief (Rylee 1987). In the event that aid from the Salt Lake City Hazardous Material Response Team was requested by a neighboring county, the entity (hauler, processor, etc.) responsible for creating the hazardous incident would be billed for the Team's response effort. Response time to various locations would be a function of distance plus dispatch time (Greer 1988).

In Tooele County, law enforcement personnel (Utah Highway Patrol or Sheriff's Department) are the first responders to a hazardous materials incident. The first responders would call either the Environmental Health Supervisor of the Tooele County Department of Environmental Health or the hazardous materials response officers with the Utah Highway Patrol to determine the nature of the material in question. Other resources available consist of the Sheriff's Department Hazardous Materials Response Team and an information service 1-800 number provided by Chemtrec. In addition, Tooele County has an informal agreement with the TAD by which the Army will provide aid in the event of a spill, if so requested (Bateman 1987). First responders usually arrive at a spill site in Tooele County in less than 1 hour. Once the material is identified, cleanup is left to the handlers or owners of the materials. Companies such as Union Pacific and Kennecott have their own spill response crews (Bateman 1987), as does Aptus and USPCI. USPCI would provide emergency response cleanup for the Clive facility and their clients through trained hazardous response teams, including a regional response team located at Lakepoint, Utah (see Section 2.2.2.5, Emergency Response Provisions).

For rural areas outside Salt Lake and Tooele Counties, the Utah Highway Patrol would be the on-scene coordinator for highway incidents. The local fire department would be the primary responder (Goldner 1987).

If any spill were severe enough, the EPA Region VIII Emergency Response Team, based in Denver, Colorado would respond to requests for assistance. The EPA on-scene coordinator would respond to the spill within a matter of hours and has the authority to assume site cleanup, if deemed necessary (Kercher 1988). Both the EPA and the State of Utah have 24-hour emergency numbers for spill reporting. There are no plans for a state-wide emergency response team (Bateman 1987).

Emergency evacuation of the public can be ordered by local law enforcement officials including the Sheriff, the Fire Department, or the Health Department. Normally, officials will evacuate all areas within 0.5 mile (2,640 feet) of a volatile spill. This distance is 2.5 times the distance cited by the EPA as posing a significant immediate hazard (EPA 1983).

Emergency medical treatment would be provided by local hospitals or clinics in the vicinity of a spill. These are discussed in Section 3.2.6.

3.3 Grassy Mountain Alternative

3.3.1 Air Quality

Air quality at the Grassy Mountain site is the same as described for the Clive site in Section 3.2.1.

3.3.2 Geology and Soils

Geology. The Grassy Mountain site is also located in the extreme eastern segment of the Great Salt Lake Desert, approximately 9 miles north of the Clive site. The site is flat at an elevation of 4,300 feet. To the east are the Grayback Hills, composed of Tertiary volcanic rocks, consisting mainly of basalt lava flows and pyroclastics (Stephens 1974). The site itself is located on Quaternary lakebed deposits as described for the Clive site. There are no active faults in the area, the nearest active faults are located on the east side of the Grassy Mountains in the Puddle Valley (Barnhard and Dodge 1988). Although the site is classified as prospectively valuable for oil and gas, no active or pending mining claims or mineral leases are located on the site; and no oil, gas, coal, or other economic minerals are extracted here. In addition, it is unlikely that paleontological sites would occur in the area, due to the geological conditions at the Grassy Mountain site.

Soils. The Grassy Mountain site contains three soil map units, each with distinctive characteristics. The eastern two-thirds of Section 16 consist primarily of level to gently sloping low lake terraces and basin floors. Skumpah silt loam is the dominant soil series in this map unit (SCS 1987). It formed in alluvium and lacustrine sediments derived from mixed rock sources. Slopes are long and linear. Skumpah is a very deep, well drained soil with slow runoff, moderately slow permeability, and moderate shrink-swell potential. The hazard of water erosion and soil blowing is also moderate. A description of a typical Skumpah soil profile, as well as information concerning soil inclusions in this map unit, has been provided in Section 3.2.2.

The Dynal-Tooele soil complex, 0 to 15 percent slopes, is the second soil map unit on the site and occupies a narrow band that extends from north to south across the eastern half of the western one-third of Section 16. This map unit is on slightly elevated old beach line areas, stabilized dunes, and lake terraces on the edge of the salt playas. This unit is 55 percent Dynal loamy sand, and 25 percent Tooele fine sandy loam. Included in this unit are small areas of Skumpah silt loam, poorly drained Saltair silt loam, and playas. Included soils make up about 20 percent of the map unit.

The Dynal series consists of very deep, somewhat excessively drained, rapidly permeable soils formed in very strongly calcareous oolitic sand. Typically, the surface layer is very pale brown loamy sand about 1 inch thick. The substratum to a depth of 60 inches is very pale brown to light gray sand with strong to very strong alkalinity (pH ranges from 8.5 to 9.2). The calcium carbonate equivalent ranges from 40 to 90 percent and in some areas up to one-third of this is gypsum. Almost all areas of Dynal soils are used for rangeland and wildlife habitat. The hazard of water erosion is low and the hazard for soil blowing is high.

The Tooele series consists of very deep, well drained, moderately rapid permeable soils that formed in alluvium derived dominantly from sedimentary rocks. Typically, the surface layer is pale brown fine sandy loam about 3 inches thick. The underlying material to a depth of 42 inches is very pale brown fine sandy loam. Very pale brown find sand is encountered between 42 and 60 inches. The profile is strongly calcareous and strongly to very strongly alkaline with the range of exchangeable sodium between 15 and 35 percent. Coarse fragment content is 0 to 15 percent throughout the profile. Tooele is also used for rangeland and wildlife habitat. The hazard of water erosion is high and the hazard of soil blowing is moderate.

The third map unit on the site is composed of playas which occupy the extreme western portion of Section 16. Playas are barren, undrained basins subject to repeated inundation by salt water and salinization by evaporation of this accumulated water. They are commonly ponded in springtime. The surface is smooth and often covered by salt crystals and patterned by cracks when dry. The materials are strongly calcareous, stratified lake sediments of silt, sand, and clay texture. Playas contain sufficient salts to generally prohibit growth of plants although scattered shrubs and grasses may be present. Playas are not suitable for rangeland.

3.3.3 Water Resources

Surface Water. Annual precipitation at the Grassy Mountain site is less than 6 inches per year. There is no surface water in the area. The closest intermittent stream is unnamed and is about 1 mile east of the Grassy Mountain site. The area is essentially flat with a very slight gradient to the northwest.

Groundwater. No specific groundwater information could be found for the Grassy Mountain site. The closest well is approximately 3.5 miles to the northeast. It is expected that groundwater is probably more saline than the other two alternative sites since the site is located farther away from the eastern edge of the Great Salt Lake Desert. In general, salinity of groundwater increases toward the center of the Desert (Stephens 1974). It is probable that the shallow briny aquifer is present at this site. The Grayback Hills, formed by remnants of Late Tertiary basalt and basaltic andesite flows (DOE 1984) may provide potable water.

3.3.4 Biological Resources

Vegetation. In general, the vegetation on the Grassy Mountain site is similar to that of the Clive site (see Section 3.2.4). The Grassy Mountain site is located at an elevation of around 4,250 feet, adjacent to a mud flat. The dominant vegetation types of this site are greasewood and desert shrub/saltbush (BLM 1988; Kidd 1989). The greasewood type occurs along the edges of the mud flat. Dominant shrubs of this type include greasewood, shadscale, and bud sagebrush. Dominant grasses and forbs of this type include alkali sacatan, saltgrass, cheatgrass, seepweed, pickleweed, and gray molly (BLM 1988; Kidd 1989). The desert shrub/saltbush type occurs in areas above the greasewood type. The dominant plants of the desert shrub/saltbush community are similar to those of the same community on the Clive site. However, shadscale is not as common on the Grassy Mountain site. Proposed utility, railroad, and access road ROWs associated with this alternative, are located within the same vegetation types.

Wildlife. Wildlife species found in the vicinity of the Grassy Mountain Alternative are similar to those described for the Clive site. The Grassy Mountain site is located in the yearlong range of the Puddle Valley pronghorn herd (BLM 1988). This herd occurs north of I-80. An important pronghorn fawning area for the Puddle Valley herd occurs along the southwest edge of the Lakeside Mountains, approximately 19 miles east of the Grassy Mountain site (BLM 1988; Ekins 1989). Pronghorn fawning also occurs in the Grassy Mountains approximately 8 miles northeast of the Grassy Mountain site. The 1988 population estimate for the Puddle Valley herd was 425 animals (Ekins 1989).

Other game and non-game species occurring near the Grassy Mountain site are similar to those listed for the Clive site (see Section 3.2.4).

No surface water occurs on the Grassy Mountain alternative site.

Threatened, Endangered, or Special Status Species. No special status plant species are known to occur within the Grassy Mountain area (Snyder 1989; BLM 1983 and 1988). However, the bald eagle, American peregrine falcon, Swainson's hawk, and ferruginous hawk may be found within the area, as described for the Clive site (Benton 1989; BLM 1982). The state sensitive kit fox may occur on the site (Johnston 1989). There are no known nesting raptors within 0.5 mile of the facility site (Nelson 1989).

3.3.5 Transportation

The Grassy Mountain site is located north of I-80, west of Salt Lake City, and northwest of the Clive site. The regional transportation network and existing traffic data for this site are essentially the same as that for the Clive site, which was described in Section 3.2.5. Local access to the Grassy Mountain site is provided by an existing gravel road that extends from the I-80 frontage road to the existing Grassy Mountain and Grayback Mountain facilities. Access to the frontage road is provided by the I-80 Knolls Interchange. The existing Union Pacific rail line is located south of I-80. Provision of rail service into the Grassy Mountain site would require that approximately 7 miles of new rail line and a crossing of I-80 be constructed.

3.3.6 Socioeconomics

Socioeconomic conditions are the same as described for the Clive Alternative (see Section 3.2.6).

3.3.7 Land Use, Grazing, Recreation, and Wilderness

Land Use. The Grassy Mountain site occupies one section of private land (Section 16) owned by USPCI. The existing Grassy Mountain and Grayback Mountain facilities occupy the same section of land and are operated by USPCI. The Grassy Mountain site is located in a multiple-use zoning district which requires a minimum lot size of 40 acres, and is within the West Desert Hazardous Industry area (see Section 3.2.7 for additional details regarding land use). Existing industrial activities in the Grassy Mountain area include the two USPCI facilities and the AMAX Knolls Solar Evaporation Pond System.

Grazing. There are 45,278 acres in the West Grassy grazing allotment. Allocations in the allotment area totaled 1,633 AUMs for sheep and 42 AUMs for antelope, totaling 1,675 AUMs (approximately 27 acres per AUM) for the West Grassy allotment area (BLM 1983; Kidd 1989).

Recreation. There is very limited dispersed recreation use in the vicinity of the Grassy Mountain site (Morgan 1989). The site is adjacent to a small sand dune area which receives very limited ORV use. The Grassy Mountain site is located in an area that is open to ORV use on public land. Permits are required for: 1) commercial ORV use; 2) competitive ORV use; and 3) ORV events involving 50 or more vehicles (BLM 1986).

Wilderness. The Grassy Mountain site is located approximately 14.5 miles northwest of the Cedar Mountains WSA. Wilderness information at the Grassy Mountain site is the same as that described for the Clive site in Section 3.2.7.

Areas of Critical Environmental Concern (ACEC). The nearest existing Area of Critical Environmental Concern (ACEC) is the Bonneville Salt Flats ACEC, located approximately 28 miles west of the Grassy Mountain site (BLM 1988).

3.3.8 Visual Resources

The Grassy Mountain site is situated in an area designated VRI Class IV, indicating major modifications of the existing landscape character would be permissible. There has already been substantial modification of the existing landscape in the immediate vicinity of the Grassy Mountain site from the existing USPCI Grassy Mountain and Grayback Mountain facilities. The Grassy Mountain site is adjacent to a mud flat.

3.3.9 Cultural Resources

Data collection methods were the same as described for the proposed Clive site (see Section 3.2.9). Records indicate that six cultural resource surveys have been conducted in the immediate vicinity of facilities associated with the Grassy Mountain alternative. The Grassy

Mountain site itself has not been inventoried for cultural resources although it does lie within an area subjected to a previous literature search (no report) and is within 0.6 mile of one small block survey area (Senulis 1987). The proposed land exchange area north of Grassy Mountain (Section 9) has been partially surveyed (Berry 1985). No cultural resource sites have been recorded as a result of these surveys. The powerline associated with the Grassy Mountain alternative site crosses two previously surveyed block areas (Russell 1987a; Tipps 1984) and two surveyed road ROWs (Senulis 1987), and is near, but does not cross, another block survey area (Russell 1987b) and ROW (Jacklin 1981). The Grassy Mountain rail spur crosses a small survey block and a road ROW associated with the second survey block (Senulis 1987). No portion of the access road has been surveyed. No cultural resource sites have been recorded along any of the Grassy Mountain ROW facilities. To date just 5 percent of the total ROW facilities has been inventoried for cultural resources.

3.3.10 Health and Safety

The populations potentially exposed to various health and safety risks from an incinerator located at the Grassy Mountain Alternative site are the same as detailed in Section 3.2.10 for the Clive site. The towns closest to the Grassy Mountain site are Grantsville (43 miles), Wendover (44 miles), Tooele (53 miles), and Salt Lake City (71 miles). Distances from the towns to I-80 and the Union Pacific Railroad are given in Section 3.2.10.

3.4 Section 23 Alternative

3.4.1 Air Quality

Air quality at the Section 23 site is the same as described for the Clive site in Section 3.2.1.

3.4.2 Geology and Soils

Geology. The Section 23 site is located on the eastern edge of the Great Salt Lake Desert. The site is flat and the elevation is generally 4,400 feet. The Section 23 site is about 5 miles west of the Cedar

Mountains. The geologic units that underlie the site consist of Quaternary lakebed deposits. The site is located about 16 miles south of the Holocene fault scarps in the Puddle Valley (Barnhard and Dodge 1988). The Section 23 Alternative is similar to the Clive site in terms of economically extractable minerals, unique geological features, and paleontological sites (see Section 3.2.2).

Soils. The Section 23 Alternative site is dominated by one soil map unit, Tooele fine sandy loam, 0 to 5 percent slopes. The Tooele series consists of very deep, well drained, moderately rapid permeable soils that formed in alluvium derived dominantly from sedimentary rocks. The hazard of water erosion is high and the hazard of soil blowing is moderate. A description of a typical Tooele soil profile has been provided in Section 3.3.2. Included with the Tooele soil profile are small areas of Yenrab soils formed in sands on fans, lake terraces, and dunes; soils found in depressions that are similar to Tooele with a fine sandy loam or silt loam surface texture; Clowfin soils with greater than 35 percent coarse fragments found on ridges and in drainageways; and Timpie silt loam soils found on lower fan terraces under shadscale vegetation. Included soils comprise about 20 percent of the Tooele map unit.

A very small portion of the Section 23 Alternative site, located on the west side of Section 23, contains the Timpie-Tooele soil complex, 0 to 5 percent slopes. These soils have been described in previous sections. The hazard of soil blowing for both Timpie and Tooele is moderate; the water erosion hazard is slight for Timpie and high for Tooele.

The proposed access road for the Section 23 Alternative site crosses Skumpah, Timpie, Tooele, and Swingler soils. All except Swingler have been previously described. Swingler soils are very deep, well drained, and found on fan terraces and low lake terraces. They formed in alluvium and lacustrine sediments derived dominantly from limestone and quartzite. Permeability of the Swingler soil is moderately slow. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

3.4.3 Water Resources

Surface Water. Annual precipitation at the Section 23 site is less than 6 inches per year. There is no surface water in the area. The closest intermittent stream is about 0.25 mile southeast of the Section 23 site. The area is essentially flat with a very slight gradient to the northwest.

Groundwater. Depth to water is approximately 300 feet below the surface as indicated by the potentiometric map in Stephens (1974). A test well drilled recently by Aptus approximately 5 miles to the northeast of the Section 23 site encountered water at a depth of 460 feet below the surface (EarthFax 1988). Significantly more saline water was encountered at a depth of 770 feet at which depth the well was cemented. A 6.5-hour pump test performed on the well indicated an average transmissivity of 1,600 square feet per day with a drawdown of approximately 25 feet while pumping at 138 gallons per minute (gpm). Based on the results of the test, a well yield of 500 gpm was considered feasible.

Analytical results of water samples obtained indicated that the water meets all the primary drinking water standards and all the secondary drinking water standards with the exception of chloride (580 mg/l - standard is 250 mg/l) and total dissolved solids (1,370 mg/l - standard is 500 mg/l).

3.4.4 Biological Resources

Vegetation. The Section 23 Alternative site is located at an elevation of around 4,300 feet. The dominant vegetation type on the Section 23 site is the desert shrub/shadscale type (BLM 1988; Kidd 1989). The vegetation on this site is similar to the Clive site but has been more influenced by grazing and fires (Kidd 1989). Annuals like cheatgrass, pepperweed, halogeton and Russian thistle have replaced much of the native vegetation. Shadscale and other shrubs are limited on this site due to fire. Proposed utility, railroad, and access road ROWs are located within the same vegetation types.

Wildlife. The wildlife species found in the vicinity of the Section 23 site are similar to those listed for the Clive site (see Section 3.2.4). The Section 23 site is located within 1 mile of an important waterhole. Thus, this site receives higher use by the West Desert pronghorn herd. No aquatic habitats occur on the Section 23 Alternative site.

Threatened, Endangered, or Special Status Species. No special-status plant species are known to occur within the Section 23 area (Snyder 1989; BLM 1983 and 1988). Bald eagles could occur on the site during the winter. It is unlikely that peregrine falcons would utilize the site due to its distance from the Timpie Springs eyrie (Benton 1989). Other raptor species do occur in the area, including the other federal and state-listed species described for the Clive site. There are no known raptor nests within 0.5 mile of the facility (Nelson 1989). The state sensitive kit fox may occur on the site (Johnston 1989).

3.4.5 Transportation

The Section 23 site is located south of I-80, west of Salt Lake City, and east of the Clive site. The regional transportation network and existing traffic data for this site are essentially the same as that for the Clive site, which was described in Section 3.2.5. Local access to the Section 23 site would be via the Clive overpass on I-80, along the existing access road to the Envirocare and Vitro tailings site, and then east through Sections 21 and 22 along a new access road which would have to be constructed as part of the project. The existing rail line crosses the southeast quarter of Section 23.

3.4.6 Socioeconomics

Socioeconomic conditions are the same as described for the Clive Alternative (see Section 3.2.6).

3.4.7 Land Use, Grazing, Recreation, and Wilderness

Land Use. The Section 23 site occupies one section of federal land managed by the BLM. This section of federal land is primarily used for grazing purposes and dispersed recreation. The Section 23 site is located in a multiple use zoning district which requires a minimum lot size of 40 acres, and is within the West Desert Hazardous Industry area (see Section 3.2.7 for additional details regarding land use). Existing industrial activities in the Section 23 area include an aragonite mine, and crushing and loading facility located in the Cedar Mountains, and the Envirocare and Vitro Tailings site.

Grazing. The Section 23 site is divided between the Aragonite and Skull Valley grazing allotments. The bulk of the section is in the Aragonite allotment (Kidd 1989). There are two permittees on each allotment.

There are 16,050 acres and 268,800 acres in the Aragonite and Skull Valley grazing allotments, respectively. Allocations in each allotment area total 1,582 AUMs for sheep and cattle in the Aragonite allotment and 6,000 AUMs for sheep, 11,785 AUMs for cattle, and 1,099 AUMs for deer, totaling 18,884 AUMs for the Skull Valley allotment area (BLM 1983; Kidd 1989).

Recreation. There is moderate dispersed recreation use, primarily ORVs, in the Section 23 site area (Morgan 1989). The Section 23 site is located in an area that is open to ORV use on public land. Permits are required for: 1) commercial ORV use; 2) competitive ORV use; and 3) ORV events involving 50 or more vehicles (BLM 1986).

Wilderness. The Section 23 site is located approximately 4.5 miles west of the Cedar Mountains WSA. Wilderness information at the Section 23 site is the same as that described for the Clive site in Section 3.2.7.

Areas of Critical Environmental Concern (ACEC). The nearest existing Area of Critical Environmental Concern (ACEC) is the Bonneville Salt Flats ACEC, located approximately 35 miles northwest of the Section 23 site (BLM 1988).

3.4.8 Visual Resources

The Section 23 site is situated in an area designated VRI Class IV, indicating major modifications of the existing landscape character would be permissible. The site is visually undistinguished. Manmade features include a rail line across the southeast quarter of the section. The Section 23 site is visually similar to the Clive site but has been more influenced by grazing and fires.

3.4.9 Cultural Resources

Data collection methods were the same as described for the proposed Clive site (see Section 3.2.9). Records indicate that five cultural resource surveys have been conducted in the immediate vicinity of facilities associated with the Section 23 Alternative. The Section 23 site itself has not been inventoried for cultural resources although a ROW survey corridor lies just 0.2 mile to the southeast (Billat et al. 1986). The proposed land exchange area north of Grassy Mountain (Section 9) has been partially surveyed (Berry 1985). No cultural resources have been recorded in or near the Section 23 Alternative site or Section 9. The powerline associated with the Section 23 Alternative crosses one small portion of a block survey area and one ROW survey (Tipps 1984; Jacklin 1981). The rail spur crosses one ROW survey (Billat et al. 1986). No cultural resource sites have been recorded along any of the Section 23 ROW facilities. To date just 3 percent of the total ROW facilities has been inventoried for cultural resources.

3.4.10 Health and Safety

The populations potentially exposed to various health and safety risks from an incinerator located at the Section 23 Alternative site are the same as detailed in Section 3.2.10 for the Clive site. The towns closest to the Section 23 site are Grantsville (33 miles), Wendover (51 miles), Tooele (43 miles), and Salt Lake City (63 miles). Distances from the towns to I-80 and the Union Pacific Railroad are given in Section 3.2.10.

3.6 No Action Alternative

The affected environment for the No Action Alternative would be the same as described in the preceding sections for the three alternatives.

ENVIRONMENTAL CONSEQUENCES

4.0

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

Chapter 4 presents a discussion of the environmental consequences that would result from implementation of the proposed USPCI Clive Incineration Facility or the alternatives. In keeping with the directive of the National Environmental Policy Act (NEPA), this chapter focuses on impacts that are considered significant; criteria used to establish significance are stated at the beginning of each analysis. Where these criteria would be exceeded, impacts are deemed "significant." In many cases, anticipated impacts are compared to the significance criteria and found to be "not significant." The general approach followed throughout the chapter is to briefly describe the range of impacts that would occur and then provide a detailed discussion of those impacts that are considered significant. Exceptions are made, however, when a question of potentially significant impact is identified as an issue by law or agency regulation (such as endangered species), during the scoping process, or during the impact analysis process. More detailed discussions are included for these areas. Where appropriate for the discipline under consideration, impacts are discussed for the construction, operation, and closure phases of the project.

4.2 Clive Alternative

4.2.1 Air Quality

Significance Criteria. The significance criteria for air resources have been established for this environmental impact statement (EIS) at levels which represent the lowest concentration levels at which adverse health or ecological effects are known or suspected to occur. For criteria pollutants, these levels are well established by the National Ambient Air Quality Standards (NAAQS). The NAAQS are concentrations set by law designed to protect public health and welfare from six different air pollutants. The NAAQS are given in Table 4-1.

Pollutants not regulated by a NAAQS are referred to as non-criteria pollutants. Non-criteria pollutants also include those pollutants commonly referred to as "air toxics." For the proposed incinerator,

TABLE 4-1

NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	NAAQS ($\mu g/m^3$)
Particulate (PM-10)	24-hour	150
	Annual	50
Sulfur dioxide (SO_2)	3-hour	1,300
	24-hour	365
	Annual	80
Nitrogen dioxide (NO_2)	Annual	100
Carbon monoxide (CO)	1-hour	40,000
	8-hour	10,000
Ozone (O_3)	1-hour	235
Lead (Pb)	Quarter	1.5

important non-criteria pollutants that are expected to be emitted include polychlorinated biphenals (PCBs), dioxins, furans, metals, chloride/hydrogen chloride, and various organic compounds. PCBs and dioxins are probable carcinogens.

Safe ambient levels for non-criteria pollutants are the subject of considerable scientific debate. Available data from the scientific literature vary widely on this topic. One source of information on acceptable levels of air toxics which has fairly widespread use among air quality regulatory agencies is the publication of American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) and Short-Term Exposure Limits (STELs) (ACGIH 1987). The TLVs and STELs have been established to provide guidelines regarding the control of potential health hazards in the workplace. The TLVs represent the time-weighted average concentration for a normal 8-hour work day and 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect. The STEL represents the concentration to which workers can be exposed continuously for short periods of time without suffering from irritation, chronic or irreversible tissue damage, or narcosis of sufficient degree which increases the likelihood of accidental injury. The STEL is generally applicable to an exposure of 15 minutes. TLVs and STELs cover a wide variety of non-criteria pollutants commonly found in the workplace environment.

When using TLVs or STELs to define acceptable levels of ambient air exposure to non-criteria pollutants, it is common practice among regulatory agencies to incorporate a safety factor into the acceptable concentrations. The safety factors are divided into the appropriate TLV/STEL, producing a more stringent concentration threshold for comparison of potential impacts. These factors transform the TLV/STEL from an occupational exposure level (where persons exposed are generally healthy and exposed during a 40-hour work) week to a general public exposure level (where persons may be more susceptible and potentially exposed over an average lifetime of 70 years). In this EIS, the safety factor has been arbitrarily set at 100 for most compounds and 1,000 for compounds that are known or suspected carcinogens. The use of such safety factors is consistent with current policy of the State of Utah and other states, regarding concentrations of toxins.

In addition, the Environmental Protection Agency (EPA 1986a) has established concentrations for various carcinogens which are equivalent to a cancer risk of 10^{-6} (or 1 chance in 1 million). These concentrations are referred to as a Risk Specific Dose (RSD). The RSD represents a chronic exposure over a 70-year lifetime.

A final source of information on safe levels of toxic air contaminants are the toxic air quality standards which have been set by several states across the country. These standards have been compiled by the EPA's National Air Toxics Information Clearinghouse (EPA 1987a). In Utah, there are no official guidelines or air quality standards for ambient levels of air toxics.

Significance levels for concentration of toxic air contaminants in ambient air have been set at the most stringent levels identified from the sources above. These levels are stated in Table 4-2 along with the source from which the acceptable concentration was derived.

Please note the following about the significance levels established for the various toxic air contaminants. Safe levels for dioxins and furans have been established at the limit for tetrachlorodibenzodioxin (TCDD-2,3,7,8), which has the most stringent concentration threshold of any of the various dioxins and furans. Metal emissions have been represented by beryllium and organic compounds have been represented by pentachlorophenol, primarily because of the relatively high combination of emissions and toxicity of the compounds.

Construction. Construction activities for the proposed incinerator would generate some fugitive dust. Based on an emission factor for construction activities of 1.2 tons/acre-month from EPA (1985a), reduced by 50 percent for watering, a 15-acre disturbed area at any given time, and a 14-month construction schedule, fugitive dust emissions should be approximately 125 tons per year. Impacts from construction-related fugitive dust would be highly localized and occur only in the immediate vicinity of the plant. USPCI is required by Utah air regulations to control dust emissions using water sprays or similar techniques.

TABLE 4-2

SIGNIFICANCE LEVELS FOR TOXIC CONTAMINANTS IN AMBIENT AIR

Pollutant	Averaging Time	Significance Concentration ($\mu g/m^3$)	Comments on Data Source
PCBs	8-hour	0.024	Nevada Standard (EPA 1987)
	Annual	0.002	RSD for 10^{-6} cancer risk (EPA 1986)
TCDD-2,3,7,8	Annual	4.0×10^{-8}	RSD for 10^{-6} cancer risk (EPA 1986)
Chlorine	1-hour	30.0	STEL with 100 safety factor (ACGIH 1987)
	8-hour	15.0	TLV with 100 safety factor (ACGIH 1987)
	Annual	7.14	Kansas Standard (EPA 1987)
Beryllium	8-hour	0.002	TLV with 1,000 safety-factor (ACGIH 1987)
Pentachlorophenol	8-hour	5.0	TLV with 100 safety factor (ACGIH 1987)
	Annual	1.67	New York Standard (EPA 1987)
Hydrogen Chloride	1-hour	2000.0	Rhode Island Standard (EPA 1987)
	8-hour	70.0	TLV with 100 safety factor (ACGIH 1987)

Operation. One of the major air quality concerns related to the proposed USPCI industrial waste incinerator is that the incinerator design reflect the present level of incinerator technology so as to provide for safe operation, minimize emissions, and comply with regulatory requirements. USPCI proposes to incinerate wastes regulated under both the Resource Conservation and Recovery Act (RCRA) and Toxic Substance Control Act (TSCA) at the incinerator. The major engineering and emissions requirements of RCRA and TSCA are summarized below.

To obtain a TSCA permit for the destruction of polychlorinated biphenyls (PCBs), the proposed facility must demonstrate 99.9999 percent (six nines) destruction and removal of PCBs. In addition, under TSCA certain combustion criteria must be met. These include:

- Dwell time/oxygen content - A 2-second dwell time at 1200°C (2192°F) and 3 percent excess oxygen or a 1.5-second dwell time at 1600°C (2912°F) and 2 percent excess oxygen is required.

- Combustion efficiency must be 99.9 percent or greater.

The TSCA permit will be reviewed and issued by EPA-Region VIII.

For the destruction of hazardous wastes regulated under RCRA, USPCI must demonstrate in a trial burn that its facility can meet the following requirements:

- At least 99.99 percent (four nines) destruction and removal efficiency (DRE) for each principal organic hazardous constituent (POHC) in the waste feed, with the exception of dioxins and furans which require 99.9999 percent DRE;

- At least 99 percent removal of hydrogen chloride or 1.8 kg/ hour (whichever is larger) from the exhaust gas; and

- Particulate emissions not exceeding 0.08 grains/dry standard cubic foot (dscf) corrected to 7 percent oxygen in the stack gas.

The RCRA permit will be reviewed and issued by the State of Utah and EPA-Region VIII.

A preliminary engineering review of the proposed incineration facility was conducted by BLM based on design and other data provided by the applicant. Information reviewed included the TSCA/RCRA permit application submitted by USPCI to EPA and the State of Utah and a series of material balance calculations prepared by the applicant as supporting documentation for the incinerator design.

The engineering assessment prepared for the EIS is a preliminary evaluation only. It is not intended to replace or prejudge the independent regulatory reviews to be conducted by EPA and the State of Utah as part of the RCRA and TSCA permitting process. EPA and the State of Utah retain the authority to conduct their own independent engineering evaluation of the proposed incinerator. In addition, conclusions regarding the design review described here should not be interpreted as EPA or State of Utah concurrence that the project meets all RCRA and TSCA requirements.

The design of the proposed incineration system is relatively unique, comprising two parallel rotary-type incineration kilns followed by a common secondary combustion chamber. The primary kiln is sized nominally to treat a maximum of 20.8 tons per hour (tph) of waste, mostly solids and contaminated soils, although by the use of oxygen enrichment combustion techniques, maximum waste capacity increases by 50 percent to about 31.2 tph. Liquid energetic wastes may also be burned in the primary chamber, primarily as fuel to provide adequate heat for the destruction of solid wastes. Fuel oil will be used in the event insufficient energetic wastes are available. The second kiln, refered to as the burner kiln, is much smaller in capacity, sized at a maximum feed of about 6 tph waste solids. This incinerator will handle primarily liquid wastes and sludges, but can also handle bulk solids as required. Fuel oil will also be used in the burner kiln should the heat provided by the energetic wastes be inadequate.

Exhaust gases from both the primary kiln and burner kiln will be directed to the secondary combustion chamber, which will hold the gases for a maximum 2.5 seconds at a temperature around 2,200°F to ensure complete destruction of any wastes. This chamber is sized at 180 MMBtu per hour.

Exhaust emissions from the incinerator are expected to include a variety of air pollutants, both criteria and noncriteria pollutants. Criteria pollutant emissions will include sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and particulate. Noncriteria pollutant emissions are expected to include a small quantity of residual waste matter not destroyed in the incineration process, metals, and chlorine and hydrogen chloride gases. Also, the incinerator is expected to emit small quantities of Products of Incomplete Combustion (PICs), which are formed by incomplete combustion of treated wastes. PICs of primary concern for waste incineration are dioxins and furans.

Air pollution emissions from the incinerator will be controlled by a variety of techniques. Exhaust gases from the incineration kilns and secondary combustion chamber will pass through a quench tower (to cool the high temperature exhaust gases and reduce the volume of exhaust to be treated), a dry scrubber (which uses a calcium oxide slurry to help control acid gas emissions), a baghouse for control of particulate emissions, and a packed column wet scrubber (using sodium hydroxide) for final control of any residual acid gases. All of these emission control systems represent standard technologies and their application on waste incinerators is fairly well proven.

The conclusion of the engineering review indicates the proposed facility design should be capable of meeting both the TSCA and RCRA requirements, provided the applicant's operation follows good engineering practice and that the trial burn waste feed compositions given in the TSCA/RCRA permit application are reasonably representative of the waste streams which would actually be treated. One area where the design proposed by USPCI is somewhat innovative is higher than normal lime concentrations (on the order of 10 percent) in the dry scrubber. Because this scrubber application is somewhat unique, its performance cannot be judged by comparison to existing systems. However, the design should achieve the emission control efficiencies claimed by USPCI. The proposed emissions control equipment should also be capable of meeting the Best Available Control Technology (BACT) requirements imposed by the Utah Air Conservation Regulations.

The magnitude of incinerator emissions would vary somewhat from hour-to-hour and be strongly dependent on the waste feed to the incinerator. The precise waste characteristics cannot be presently determined. In addition, the waste streams would change periodically depending on the source of the waste to be treated by USPCI. However, USPCI has characterized those wastes to be tested by the required trial burns of the incinerator and has identified the types of waste that their market analysis indicates are the presently expected wastes. The incinerator emission estimates derived from these data are listed in Table 4-3. Data on expected emissions for both normal and upset conditions have been provided. Details of how these emissions were estimated is provided below.

Particulate. The regulatory limit for particulate emissions under RCRA is 0.08 grains/dscf corrected to 7 percent oxygen. The applicant's proposal contains a baghouse for particulate control, which should reduce levels to 0.02 grains/dscf. However, using the regulatory maximum of 0.08 grains/dscf yields a particulate emission rate of 37.5 pounds per hour (lb/hr). Actual particulate emissions should be about 25 percent of this level or 9.4 lb/hr.

Sulfur Dioxide. The sulfur dioxide (SO_2) emission levels are based on a sulfur removal efficiency of 90 percent by the proposed emission control equipment. Based on a sulfur balance and 100 percent conversion of input sulfur to SO_2, emissions of SO_2 are estimated at 20 lb/hr.

Nitrogen Oxides. The basis for the nitrogen oxides (NO_x) emission estimates assumes 25 percent of fuel nitrogen is converted to NO_x. The fraction of nitrogen in the air which is converted to NO_x has been estimated from standard engineering combustion tables (see ASME publication, "Combustion Fundamentals for Waste Incineration"). The estimated NO_x emissions are 42.6 lb/hr.

Hydrogen Chloride and Chlorine. Estimated emissions for hydrogen chloride (HCl) and chlorine (Cl_2) are based on a maximum chlorine feed rate of 4,500 lb/hr. Engineering estimates are that 98 percent of the elemental chlorine is converted to HCl, while the remaining 2 percent is converted to Cl_2. Overall HCl scrubber efficiency has been estimated by USPCI at 99.5 percent, which exceeds the 99.0 percent minimum required by RCRA regulations. However, for these calculations, the RCRA minimum of 99 percent HCl removal has been used to establish the emissions. For Cl_2,

TABLE 4-3

ESTIMATED INCINERATOR EMISSIONS (lb/hr)

Pollutant	Normal Conditions RCRA Feed	Upset Conditions[1] RCRA Feed
Principal Organic Hazardous Constituents (POHC)		
Pentachlorophenol	1.40	1.40
Polychlorinated Biphenyls (PCBs)[2]	0.009	0.009
Hydrogen Chloride (HCl)	44.1	4,410
Chlorine (Cl_2)	4.5	90.0
Particulates	37.5	2,735.0
Sulfur Dioxide (SO_2)	20.0	200.0
Nitrogen Oxides (NO_x)	42.6	42.6
Carbon Monoxide (CO)	1.3	1.3
Dioxins	7.29×10^{-6}	7.29×10^{-6}
Furans	1.58×10^{-4}	1.58×10^{-4}
Beryllium	0.0023	NA[3]

[1] Upset conditions last for approximately 5 to 15 minutes as residual material in the secondary combustion chamber is burned out. Hourly rates are calculated from peak feed rate and represent emission levels at the start of the upset. These rates decrease over time as the material in the incinerator is burned and/or exhausted to the atmosphere.

[2] Based on TSCA feed rate and DRE of 99.9999 percent.

[3] NA = Not Available

scrubber efficiency has been set at 95 percent, based on engineering data for another incinerator. This results in HCl emissions of 44.1 lb/hr and Cl_2 emissions of 4.5 lb/hr, respectively.

PCBs. The TSCA regulations specify a minimum removal efficiency of 99.9999 percent for PCBs by the incinerator. Based on a PCB input of 6,800 lb/hr, this destruction rate yields a PCB emission rate of 0.009 lb/hr for the TSCA feed. For RCRA wastes, PCBs may be present in the waste up to concentrations of 50 parts per million (ppm). This converts to a PCB input of about 7 lb/hr given a nominal waste feed of 70 tons per hour (ton/hr). Using the minimum RCRA DRE of 99.99 percent, PCB emissions for the RCRA case are estimated at 0.0007 lb/hr. Since the TSCA feed represents the worst-case emissions scenario for PCBs, these emissions were used for the air quality analysis.

POHCs. Principal Organic Hazardous Constituent (POHC) emissions are based on the quantity of POHC in the feed and the DRE. Some POHCs are easier to incinerate than others. USPCI identified over 30 potential POHCs which may be present in concentrations up to about 10 percent, which converts to a maximum feed rate of about 7 ton/hr. Given the minimum RCRA requirement of 99.99 percent DRE, emissions of POHCs are estimated at a maximum of 1.4 lb/hr. For many POHCs, where the DRE has been proven to exceed 99.99 percent, emissions may be far less. POHCs are relevant only to the RCRA waste stream.

The relative significance of the POHCs have also been evaluated by comparing the expected feed levels, DRE, and the relative toxicity of each individual compound. The emissions level, when compared to the acceptable ambient concentration level, gives the relative potential for significant impacts. Acceptable ambient concentration levels have been set based on the TLV for each compound, divided by the appropriate safety factor. The largest emission-to-concentration ratio, indicative of the POHC with the greatest potential for impact, was for pentachlorophenol. This compound was used as the evaluated POHC in this Draft EIS. If the ambient concentration for pentachlorophenol would not exceed the acceptable level, then the other POHCs would also be within acceptable levels.

Dioxins and Furans. Dioxins and furans are products of incomplete combustion (PICs) formed during incineration of hazardous wastes. Dioxins and furan emissions for the proposed incinerator were estimated based on the PCB inputs to the incinerator. Based on trial burn data for other incinerators, a peak dioxin-to-PCB ratio of 1.43×10^{-5} was calculated. Using the same data, a peak furan-to-PCB ratio of 2.71×10^{-4} was calculated. Given PCB emissions of 0.009 lb/hr as determined above, this yields a dioxin emission rate of 1.28×10^{-7} lb/hr and a furan emission rate of 1.48×10^{-6} lb/hr.

Different species of dioxins and furans have varying levels of toxicity. The estimated dioxins and furan emissions were converted to an equivalent emission of TCDD-2,3,7,8 which is the most toxic of the dioxin and furan compounds known. The relative toxicity levels of the various dioxins and furans present were taken from EPA (1987b), "Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and -Dibenzofurans." The presence of the various dioxin and furan compounds was estimated using trial burn data from other incinerators.

Based on this technique, an equivalent TCDD-2,3,7,8 emission rate of 2.0×10^{-7} lb/hr was calculated. This emission was used to evaluate dioxins and furan emissions in this EIS.

Metals. Metal emissions for hazardous waste incinerators are not well documented. Metal emissions should depend largely on the metals content of the waste to be treated. Limited data on incinerator metal emissions are available in Oppelt (1987), expressed in percentage of total particulate mass. Based on these data and the expected total particulate emissions (0.02 grains per dscf basis), estimates of metal emissions for the proposed incinerator are as follows:

- Beryllium 0.0023 lb/hr
- Cadmium 0.0013 lb/hr
- Chromium 0.0089 lb/hr
- Nickel 0.0061 lb/hr
- Lead 0.0291 lb/hr
- Antimony 0.0028 lb/hr
- Selenium 0.0863 lb/hr

The relative emissions and toxicity levels of the metal emissions were compared in the same manner as described for POHC emissions above. Based on these comparisons, beryllium was selected as the metal emission with the greatest potential for significant impact. Further evaluations of metals focus on beryllium.

Upset Conditions. A process upset at the proposed USPCI incinerator would occur if some of the equipment or systems malfunctioned during operation. In such a condition, there is a chance that air emissions of at least some pollutants would increase over normal levels. Fortunately, based on historical experience, the occurrence of incinerator upsets is relatively rare.

USPCI is required by the RCRA and TSCA rules to closely monitor various operating parameters for the incinerator. If any of these parameters exceeds predefined limits, waste feed to the incinerator would be automatically shut-off. In a worst-case upset scenario, such as a power failure, an emergency vent located downstream of the secondary combustion chamber would open, release pollutants without processing by the pollution control equipment. Opening of the emergency vent would affect emissions of only SO_2, HCl, Cl_2, particulates, and metals. However, if the upset conditions were such that the downstream pollution control devices could be maintained on-line, these emissions would remain fairly comparable to emissions during normal operating conditions.

Because the waste feed to the incinerator would be automatically shut-off during a power failure or process upset, the magnitude of air emissions from such an event would be dependent on the quantity and type of waste present in the kilns and secondary combustion chamber at the time of the upset. This waste would continue to be destroyed by addition of auxiliary fuel to the secondary combustion chamber for a short period of time, expected to be on the order of 10 minutes or so. Thus, emissions of pollutants like PCBs, dioxins, furans, and POHCs would typically be unchanged from normal conditions during an upset. Once all the residual waste in the system were either destroyed or isolated, pollutant emissions would drop to zero.

An estimate of peak upset emissions for the proposed USPCI incinerator are given in Table 4-3. Here, we have assumed that the emergency vent would open and pollution control systems would be bypassed. Upset emissions rates represent rates present at the start of the upset, and would decrease over time as residual material in the incineration system is burned and/or exhausted to the atmosphere. After about 10 minutes, the residual waste would be destroyed and air emissions would be essentially zero.

Dispersion Modeling. The air quality impacts of the proposed incinerator project were evaluated using standard atmospheric dispersion models. A dispersion model refers to a series of mathematical equations which are used to predict the ground-level concentrations resulting from emissions of a particular pollutant. Inputs to a dispersion model include the emission source terms; characteristics of the emission release such as stack height, exhaust temperature, and flow rate; and atmospheric dispersion parameters such as wind, temperature, stability, and mixing height.

The models chosen for use on this study were the EPA Industrial Source Complex (ISC) model (Bowers et al. 1979, Wackter and Foster 1986), and the EPA COMPLEX I model (EPA 1980). COMPLEX I is a steady-state, multiple-source, Gaussian dispersion model designed for use with stack emission sources situated in terrain where ground-level elevations exceed the stack heights of the emission sources. The ISC model is similar, except it is used for receptors which do not exceed stack top elevation. ISC also permits treatment of complex phenomena such as building-induced plume downwash and the gravitational settling and deposition of particulate matter, although these features of ISC were not selected for this work.

COMPLEX I and ISC both use horizontal and vertical dispersion parameters as described in Pasquill (1961) and Gifford (1960). Plume rise is calculated using the methods of Briggs (1969, 1971, and 1975). Required meteorological input data include sequential hourly values of wind direction, wind speed, temperature, stability class, and mixing height. The values of wind speed are adjusted to stack height by standard wind shear profile equations and exponents. For this study, the default wind profile exponents used in regulatory modeling applications were employed. For cases where the effective plume height is below the mixing height, ISC and COMPLEX I both assume the plume is reflected at the mixing height. When the effective stack height (i.e., stack height and plume rise) is above the mixing height, then the entire plume is assumed to be isolated above the mixing height with no ground-level impact. However, mixing height is not considered in model calculations during stable dispersion conditions.

Technical options selected for the COMPLEX I and ISC modeling are listed in Table 4-4. Use of these options follow EPA (1986b) modeling guidance and/or sound scientific practice.

Meteorological inputs to the ISC and COMPLEX I models were taken from surface and upper air observations collected by the National Weather Service (NWS) at Salt Lake City airport for the 1985 calendar year. No on-site data were available to use as modeling input. A discussion of the available data sources and the rationale for selecting Salt Lake City airport data as model input is given in Section 3.1.

The use of Salt Lake City data as representative of conditions at the Clive site introduces some uncertainty into the modeling study. Based on theoretical principles and observations of wind patterns in western Utah, the most frequent wind flow is parallel to the nearby terrain features (Gebhart 1979). For the Clive site, this would yield the expectation that predominant wind flow would be along a north to south orientation. This compares quite favorably to the Salt Lake airport wind rose (Figure 3-1), which shows a frequency maximum along a south-southeast to north-northwest orientation. Thus, the use of Salt Lake City airport data to predict air quality impacts at the Clive site is believed to be fairly accurate and should not introduce large errors into the analysis.

The predicted maximum pollutant impacts from incinerator emissions at the proposed Clive site are shown in Table 4-5. Impacts are shown for the criteria pollutants and various toxic contaminants of concern. For criteria pollutants, impacts are compared to the NAAQS (see Table 4-1) and for toxic pollutants, impacts are described to the

TABLE 4-4

TECHNICAL DISPERSION MODELING OPTIONS
SELECTED FOR USPCI TOOELE COUNTY
INCINERATOR AIR QUALITY ANALYSES

Option	ISC	COMPLEX I
Gradual Plume Rise	No	No
Stack-Tip Downwash	Yes	Yes
Buoyancy-Induced Dispersion	Yes	Yes
Building Wake Effects	No	Not Available
Particle Deposition	No	Not Available
Receptor Elevations	Yes	Yes
Calm Wind Processing	No	No

TABLE 4-5

MAXIMUM AIR QUALITY IMPACTS FOR THE CLIVE ALTERNATIVE - USPCI SOURCE ONLY

Pollutant	Averaging Time	Predicted Maximum Concentration ($\mu g/m^3$)	Receptor Location (UTM) East	North	Elevation (ft)	NAAQS or Significance Conc. ($\mu g/m^3$)	% of Criteria
NO_2	Annual	0.3	316.843	4507.015	4,265	100	<1
SO_2	3-hour	6.9	318.621	4504.630	4,290	1,300	<1
	24-hour	1.3	319.414	4503.951	4,265	365	<1
	Annual	0.1	316.843	4507.015	4,265	80	<1
CO	1-hour	1.01	318.220	4504.702	4,350	40,000	<1
	8-hour	0.2	318.950	4504.234	4,265	10,000	<1
Particulate	24-hour	2.4	319.414	4503.951	4,265	150	2
	Annual	0.3	316.843	4507.015	4,265	50	<1
HCl	8-hour	7.9	318.950	4504.234	4,265	70	11
Chlorine	1-hour	3.5	318.220	4504.702	4,350	30	12
	8-hour	0.8	318.950	4504.234	4,265	15	<1
PCB	8-hour	0.002	318.950	4504.234	4,265	0.024	7
	Annual	$1x10^{-4}$	316.843	4507.015	4,265	0.002	5
Dioxin/Furan	Annual	$1.3x10^{-9}$	316.843	4507.015	4,265	$4x10^{-8}$	3
Pentachlorophenol	8-hour	0.3	318.950	4504.234	4,265	5.0	5
Beryllium	8-hour	0.0004	318.950	4504.234	4,265	0.002	20

significant impact levels identified earlier (see Table 4-2). These impacts address only USPCI emissions. For a discussion of the combined impacts with other sources (i.e., Aptus), please see Section 4.6, Cumulative Impacts.

For criteria pollutants, all predicted maximum concentrations are far below the respective NAAQS. In most cases, impacts are less than 1 percent of the respective NAAQS. In the case of particulates, concentrations have been compared to the new standard for inhalable particulates (PM-10). The assumption implicit in this comparison is that all particulate emissions occur in the PM-10 fraction.

For toxic contaminants, impacts of all pollutants are predicted to be less than the acceptable concentration threshold at the point of maximum impact. Most of the air toxics fall in a range between 5 and 20 percent of their respective concentration thresholds.

Worker safety will also not be threatened by plant emissions, as impacts within plant property are below the levels given in Table 4-5. This is due to the elevated release height of the incinerator emissions, expected to be about 200 feet.

A special air quality concern addressed in this analysis is the potential for increased air quality impacts during long-term air stagnation conditions. These types of conditions are correlated with the occurrence of elevated pollutant concentrations in urban areas of northwestern Utah, and the concern is that such conditions could also lead to worst-case impacts for the proposed USPCI incinerator. Traditional regulatory models such as ISC and COMPLEX I are not accurate in simulating these conditions. Instead, a new model called WYNDVALLEY, developed at the University of Washington, was used which does allow for treatment of special conditions associated with air stagnation. The WYNDVALLEY results are given in Table 4-6. [This section will be completed once the WYNDVALLEY modeling is performed by U.S. EPA, Region 8.]

Another air quality concern raised about the proposed USPCI incinerator was over the potential deposition of toxic metals and their takeup into native plants and soils. Metals deposition was estimated by assuming all metals in the lowest cubic meter of air would be deposited

TABLE 4-6

WYNDVALLEY MODEL RESULTS
USPCI EMISSIONS ONLY

Results not yet availbale. These results are to be provided by USEPA in time for the Draft EIS release.

and leached to a soil depth of 1 meter. In an estimated project lifetime of 30 years, increases in soils concentrations of various metals would be on the order of a fraction of a part per trillion. Since metals in most soils already exist in concentrations on the order of parts per billion, deposition of incinerator metals onto native soils should not result in any toxic effects.

Closure. Closure of the project would result in elimination of the process emissions from the incinerator. There may be fugitive dust emissions associated with any plant demolition activities. No significant impacts are expected.

Significant Impact Summary. The proposed Clive alternative would have no significant impacts to air quality because concentrations of criteria pollutants would be below NAAQS and concentrations of toxic contaminants would not exceed acceptable concentration thresholds.

4.2.2 Geology and Soils

Significance Criteria. Impacts associated with geologic features would be considered significant if:

- The facilities were located within 200 feet of faults which have had displacement within Holocene time. RCRA regulations [40 CFR 264.18(a)] establish that "facilities where treatment, storage, or disposal of hazardous waste will be conducted must not be located within 61 meters (200 feet) of a fault which has had displacement in Holocene time." The regulations define a fault as being "a fracture along which rocks on one side have been displaced with respect to those on the other side." Displacement is "the relative movement of any two sides of a fault measured in any direction." Holocene "is defined as the most recent epoch of the Quaternary period, extending from the end of the Pleistocene to the present," or within the last 10,000 years.

- Unique geologic features or outcrops were disturbed.

- Project activities or facilities interfered with or prevented the recovery of known mineral resources.

- Important paleontological resources were disturbed without appropriate scientific data recovery.

Impacts to soils would be considered significant if:

- Highly erosive soils on moderate to steep slopes or in dune areas were disturbed and could not be stabilized to predisturbance conditions within five years with the implementation of proposed rehabilitation and federal stipulations for erosion control and revegetation.

- In the event of a spill, soil productivity could not be returned to predisturbance levels following cleanup and completion of applicable rehabilitation techniques.

Construction. The U.S. EPA [40 CFR 264.18(a)] has set forth standards regarding seismic considerations for the location of hazardous waste facilities. Tooele County, Utah is listed as one of the political jurisdictions in which compliance with the seismic standard must be demonstrated. To be in compliance with the standard, 40 CFR 270.14 states that an applicant for a hazardous waste facility must document from published geologic sources or data from field investigations that:

1. no Holocene faults are within 3,000 feet of the facility; or

2. if Holocene faults occur within 3,000 feet, no faults pass within 200 feet of the portions of the facility where treatment, storage, or disposal of hazardous waste will take place.

Although northwest Utah is a seismically active area, faulting is not a significant impact concerning construction, operation, or closure at the Clive site because Holocene faults are approximately 20 miles from the proposed facility (Barnhard and Dodge 1988). However, since the identification of fault scarps is subject to interpretation (as discussed in Section 3.2.2) and because of the seismic standard, the State of Utah as RCRA lead would determine if the presence or absence of Holocene faults in the vicinity of the site must be verified through a geologic investigation, according to 40 CFR 270.14.11.

The seismic design standard only addresses the distance of a facility from Holocene faults. A major factor affecting facility design is the potential for soil liquefaction induced from a seismic event. A study of the liquefaction potential at the Vitro tailings site (2 miles east of the Clive alternative), indicated that based on site geology and depth to the water table, "significant" soil liquefaction from a maximum credible earthquake (6.3 to 7.1) is not likely at the Vitro site (DOE 1984).

Recent mapping of the soil liquefaction potential in the State of Utah indicates there is a low potential for severe soil liquefaction in the vicinity of the three alternatives (Mabey and Youd 1989). Ground movements of 5 inches or less could be expected to occur with a 90 percent probability of not being exceeded in 50 years. Many buildings can survive ground displacements of from 2 to 4 inches with little damage, although the amount of damage can vary based on the type of construction (Youd and Perkins 1987). Because of variations in subsurface conditions, a site-specific geotechnical investigation should be conducted to determine the soil liquefaction potential, and the facility must be built to withstand ground accelerations based on the maximum credible earthquake and soil liquefaction susceptibility.

The extraction of gravel would be necessary for project construction. Because of the increased demand on existing gravel resources, new sources might have to be developed and roads built to transport the material. Section 2 in T.2S, R.12W has been identified as a potential source of sand and gravel for the Clive site. No active or pending mining claims or mineral leases are located on the site. Construction on the site would not result in destruction or disturbance of unique geological features or paleontological resources.

Impacts to soils resulting from construction activities would not be significant with the application of mechanical erosion control and revegetation techniques recommended by local agencies [i.e., BLM and Soil Conservation Service (SCS)]. Short-term impacts would include accelerated soil erosion and decreased productivity from vegetation removal, compaction, and horizon mixing. Soil loss from wind erosion could occur in areas of fine surface textures and dunal areas. Horizon mixing could create revegetation problems by bringing the more saline and alkaline material from the subsoils and substratum to the seedbed surface.

Soil limitations for the Clive site would not significantly affect facility construction. Engineering design would include construction specifics to account for these limitations.

Operation. Seismic hazards would not affect operation of the facility, and no impacts to important geological or paleontological resources would occur.

Contamination of soils could occur in the event of a spill during the transport of hazardous and toxic materials to the processing facility. Impacts to soils would not be significant since: (1) the contaminated soils would be removed and disposed of, and (2) the spill area would be rehabilitated as outlined in USPCI's Spill Contingency Plan. Transportation routes would avoid agricultural areas,the most sensitive areas to spill impacts, where possible. Air emissions modeling (Section 4.2.1) indicates that soils would not be impacted significantly by stack emissions.

Closure. No impacts to geological or soil resources would result from closure activities.

Significant Impact Summary. The proposed Clive alternative would have no significant impacts to geological resources because: 1) active faults would be more than 3,000 feet from the facility, and 2) no mining claims, mineral resources, or paleontological resources would be affected. The proposed Clive site would have no significant impacts on soil resources because the Spill Contingency Plan would provide for cleanup and rehabilitation of contaminated areas in the event of a spill.

4.2.3 Water Resources

Significance Criteria. Impacts to surface water would be considered significant if:

- The quantity and quality of discharges from streams were modified by accidental contamination (e.g., chemical spills) to the extent that water used by established users (e.g., public water supplies and irrigation) was measurably reduced; aquatic habitats supported reduced fish populations; or the water quality was in violation of state water quality criteria.

- The quality of lake or reservoir waters was modified by accidental contamination (e.g., chemical spills) to the extent that water used by established users (e.g., drinking water supplies, recreational uses) was measurably reduced; aquatic habitats supported reduced fish populations; or the water quality was in violation of state water quality criteria because of the introduction of contaminants.

- Construction of any permanent above-ground facilities occurred within the 100-year floodplain (consistent with Executive Order 11988).

Impacts to groundwater would be significant if:

- Increased groundwater pumping and usage by the facility seriously impaired existing water rights.
- The quality of groundwater was modified by accidental contamination (e.g., chemical spills) to the extent that water used by established users (e.g., stock watering, domestic users) was measurably reduced.

Construction. No drainages are in the vicinity of the Clive site. The site does not lie in a 100-year floodplain. Since there is no surface water in the area, facility construction would not disturb any surface water. There would be no handling of hazardous waste at this stage, and therefore there would be no risk of contaminating existing water supplies. No impacts to surface water are anticipated during the construction phase.

USPCI has not decided yet on a location for the necessary water supply well(s) for the proposed project. It is anticipated that water would be obtained for the Clive site from a location in the Cedar Mountains. For the purposes of this discussion it is assumed that the water supply well would be located in the foothills of the Cedar Mountains, outside the Cedar Mountains Wilderness Study Area (WSA). Potable water, if available from this well, would be used at an estimated rate of 40 gallons per day (gpd) per person during construction. For 211 construction workers, 3,544,800 gallons would be used during the 14-month construction period. If potable water was not available from the well(s), water would be trucked in.

Operation. Potential sources of contamination include leaks in tanks and pipes, and spills occurring in off-loading areas and along transportation routes. On-site leaks and spills are addressed below.

- Tank systems - Tanks will be properly inspected by a Registered Professional Engineer or qualified installation inspector prior to unloading. All installation will be closely monitored to ensure appropriate procedures are followed. All tanks and ancillary systems will be tested and any leaks found will be properly repaired prior to placing the tank into operation. All tanks will be provided with secondary containment systems, designed, installed, and operated to prevent any migration of wastes of accumulated liquid to the environment. Any released material will be routed to a sump. Accumulated liquids in the sump will be removed and treated according to permit requirements.

- Piping systems - All ancillary equipment such as the piping systems, will be located within the tank systems secondary containment areas. All piping will be above ground and inspected daily for leaks or damage.

- On-site Spills - Areas at the facility that would be likely to experience spills such as tanker truck or rail car off-loading areas will be within the tank system secondary containment area and therefore lined with concrete. Spills would be routed to a sump and treated as leakages discussed above. In the event of an on-site spill, USPCI's plant personnel and the hazardous materials emergency response team based at the facility would be available for immediate cleanup. Contaminants would not have the opportunity to penetrate deep into the soil surface before cleanup was completed. Therefore, the risk to groundwater from an on-site spill is extremely low.

Off-site spills resulting from a truck accident would pose a greater threat to surface water. Various probabilities for spills at surface water resources (e.g., rivers, lakes, wetlands) are presented below.

		Area of Exposure (miles of roadway at risk)		
		1	2	4
Traffic Volume (trucks per day)	1.0	.0013	.0026	.0053
	3.0	.0039	.0079	.0158
	5.0	.0066	.0131	.0263

These probabilities are applicable to water resources (or other sensitive areas) occurring anywhere along the transportation corridors. Based on the formula: area of exposure x trucks/day x 365 days/year x 30 years project life x spill frequency (0.12/million VMT) = number of spills in an area over the life of the project. The number of spills over the life of the project at a specific location ranges from about .0013 to .0263 or one spill every 23,077 years to one spill every 1,141 years. This is felt to be minimal exposure of any given water resource.

As shown above, the probability of a spill of hazardous wastes into any water supply reservoir as a result of a truck accident is extremely remote. However, if such a spill were to occur, the effects of the spill would depend on a large number of factors, such as the volume of waste spilled, the toxicity of the waste, the solubility of the waste, the specific gravity of the waste, the breakdown of the waste in water, etc. Following a spill, the State Highway Patrol would coordinate the spill response, USPCI would dispatch their spill response teams to the location, and spill containment and cleanup procedures appropriate for the type of material spilled would be implemented. Water quality samples would be taken to determine if state drinking water quality criteria were exceeded for any parameters related to the spill. If criteria were exceeded, steps would be taken to prevent introduction of contaminated water into the municipal water supply system. The water could not be used for domestic supply until it met state criteria; the length of time required could be several days to several weeks. USPCI would be responsible for cleaning up the spill, ensuring that the water is properly tested, and working with the affected water utility to provide alternative sources of water, if required.

The Great Salt Lake is located approximately 39 miles east of the proposed Clive site. Approximately 7 miles of I-80 lie within 0.5 mile of the Great Salt Lake. Assuming a probability of 0.00000012 spills per mile over the 30-year life of the project (see Section 4.2.5), approximately 0.03 spills would be expected along this stretch of I-80 during the project life. One spill every 1,000 years is calculated for this area which would be considered minimal. If a spill were to occur along the stretch of I-80 within 0.5 mile of the Great Salt Lake, spill response coordination would be the responsibility of the State Highway Patrol, and USPCI would be responsible for any cleanup.

A small stretch of road (3 to 4 miles) travels along the southern shore of the Great Salt Lake from Saltair Resort to Silver Sands Beach. If a toxic materials spill were to occur along this stretch of road, it is possible that the beach as well as the lake itself could be contaminated. The stretch of I-80 running from Black Rock Beach east to Bermester is separated from the lake by the Union Pacific Railroad causeway. A spill along this section would most likely be contained between the highway and the railroad berm until cleanup crews arrived. Such a spill would not be expected to affect the Great Salt Lake.

TABLE 4-7

REPORTED HIGHWAY AND RAILROAD INCIDENTS INVOLVING HAZARDOUS WASTES AND HAZARDOUS MATERIALS IN THE UNITED STATES, UTAH, AND NEVADA 1984 - 1988

	United States		Utah		Nevada	
	Hazardous Waste[1] Incidents	Hazardous Materials[2] Incidents (Including Hazardous Wastes)	Hazardous Waste Incidents	Hazardous Materials Incidents (Including Hazardous Wastes)	Hazardous Waste Incidents	Hazardous Materials Incidents (Including Hazardous Wastes)
Highway						
1988	148	4,761	2	41	3	34
1987	104	4,849	0	60	0	23
1986	97	4,551	0	50	0	11
1985	95	4,703	1	37	2	13
1984	89	4,460	0	42	1	8
Total	533	23,324	3	230	6	89
Average	106.6/yr	4,664.8/yr	0.6/yr	46/yr	1.2/yr	17.8/yr
Railroad						
1988	6	1,008	0	5	0	2
1987	13	894	0	20	0	3
1986	7	847	0	2	0	7
1985	2	837	0	3	0	2
1984	6	991	0	3	0	2
Total	34	4,577	0	33	0	16
Average	6.8/yr	915.4/yr	0/yr	6.6/yr	0/yr	3.2/yr

Source: Gainie 1989.

[1] Hazardous waste (as defined in 49 CFR Ch. 1 Section 171.8) means any material that is subject to the hazardous waste manifest requirements of the EPA specified in 40 CFR Part 262 or would be subject to these requirements absent an interim authorization to a state under 40 CFR Part 123, Subpart F.

[2] Hazardous material (as defined in 49 CFR Ch. 1 Section 171.8) means a substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated.

Rail traffic is anticipated to arrive at the USPCI facility from the east and west; therefore, a rail car spill into the Great Salt Lake is a possibility. However, given the low number of hazardous material rail spills in Utah (see Table 4-7), this is expected to be a remote possibility. Air emissions predicted by modeling efforts (Section 4.2.1) indicate that the Great Salt Lake would not be impacted significantly by stack emissions from the facility.

The Utah State Engineer has no records of existing water supply wells in the area of the Cedar Mountains where USPCI would locate its well. Thus, the proposed well development would not be expected to result in any significant impacts to the groundwater aquifer or other groundwater users in this area. Potable water requirements during facility operation would be 40 gpd per worker. With approximately 111 employees at the site, USPCI would require approximately 4,440 gallons of potable water per day. If the proposed well could not provide potable water, water would be trucked in. The process water supply would be pumped at 250 to 300 gpm for industrial purposes. The planned well requires approval by the State Engineer. In so approving the well(s), the State Engineer would evaluate impacts to existing water rights. Assuming the proposed well(s) are approved by the State Engineer, there should be no impact to existing water rights in the area.

There would be no slag piles on the site; therefore, there would be no threat of contamination leaching into the subsurface and monitoring wells would not be required at this site. Slag would be transported to the EPA-approved Grassy Mountain landfill. The contaminants of concern in the slag would primarily be heavy metals. Proper disposal in an EPA-approved landfill combined with the fact that metals are not very mobile in the environment should ensure that slag generated by the facility would not significantly impact any groundwater sources.

Spills along a roadway or from rail cars may reach the soil beside the road or tracks. PCB's tend to adsorb tightly to soil particles and be relatively immobile in soil (EPA 1980). Organics would not adsorb to soils readily but would be more likely to migrate downward. The clays, sands, and gravels in the subsurface would not prevent downward migration of organics.

Depth to water close to the Clive site is approximately 20 to 30 feet. Spills along the access road could reach soil beside the pavement and begin to penetrate the subsurface. It is estimated that approximately 0.05 spill could occur along the access road leading to the Clive site during the life of the project. This represents one spill every 600 years and is a low probability. The probability of a spill pertaining to the depth of groundwater would depend upon soil type, climate, evapotranspiration, soil moisture, and permeability of the soil. If a spill of organics did occur, contaminants could reach the groundwater in this area. this would be a significant impact. Rapid cleanup response times (see Section 4.2.10) should minimize the contamination that occurs. As in the case of the Clive site, In lowland areas, depth to water in the valley fill aquifer is reported to range from 20 to 100 feet below surface (Gates 1984). Areas along the transportation routes may also have shallow water tables (less than 50 feet). These shallow aquifers have the potential to be contaminated by an organic chemical spill. The probability of a spill penetrating to groundwater would depend upon soil type, climate, evapotranspiration, soil moisture, and permeability of the soil at the spill site. Rapid cleanup response times (see Section 4.2.10) should minimize the depth reached by any contaminants.

Closure. The dismantling of the facility and any cleanup of the soils, if necessary, conducted during closure would not impact water resources.

Significant Impact Summary. The only potential significant impact to groundwater resources would be if a spill of toxic organics occurred in an area of shallow groundwater (50 feet or less) and the organics penetrated to the depth of groundwater, contaminating the water source. The Clive Alternative would have no other significant impacts on water resources.

4.2.4 Biological Resources

Significance Criteria. Impacts to biological resources would be considered significant if:

- Following restoration of disturbed areas, inadequate vegetative ground cover could not control soil erosion at preconstruction levels.

- Vegetational species composition and cover following restoration were inadequate to support post-disturbance land uses such as grazing, agriculture, and wildlife habitat.

- Wildlife habitat, plant species, or plant communities considered to be rare, unique, or sensitive by federal or state agencies were lost due to construction, a spill of hazardous wastes, or toxic emissions.

- Known critical ranges for important wildlife game species (fawning grounds or concentration areas) were affected during the season of use or during critical periods.

- Federal threatened or endangered, state threatened or endangered, or federal candidate species were adversely affected by the proposed project.

- A spill of toxic materials occurred in the Great Salt Lake or surface streams.

Construction. Construction procedures for the proposed project would include vegetation removal for site clearance and up to a 50-foot right-of-way (ROW) for linear facilities. Some vegetation would be completely destroyed by clearing, and other plants may be damaged but survive. Construction of the facility, the utilities, access roads, and rail spur to the Clive site would affect only the desert shrub/saltbush vegetation community. Facility construction would clear a total of 45 acres; sand and gravel extraction would disturb approximately 40 acres; and ROWs construction would remove approximately 40.9 acres for the utilities; 17.6 acres for the new and upgraded access roads; and 2.1 acres for the railroad spur. This disturbance would total 146 acres.

Restoration of disturbed areas following construction would be in accordance with the best management procedures recommended by the BLM (see Appendix A). Re-established ground cover and erosion control techniques would be utilized to prevent soil erosion from occurring at a rate greater than that found at preconstruction levels. Thus, impacts to post-disturbance land uses would be minimal. No federal or state-listed threatened, endangered, or special status plant species are known to occur within the Clive area or along the proposed utility ROWs (BLM 1983 and 1988; Snyder 1989).

Construction of the facility and project ROWs would result in the displacement or death of smaller, less mobile wildlife species onsite or within the ROW. Small mammals and reptiles would be more subject to mortality from construction than other groups, but impacts would be minor on a regional basis. Many of the affected species, especially small mammals, have high reproductive potential, are common in surrounding habitats, and would, therefore, be minimally impacted. Larger mammals, birds, and some reptiles would be able to avoid the construction area; therefore, impacts to these animals should be minimal. Some species of ground-nesting birds (e.g., horned larks, sparrows) would be precluded from nesting in the ROWs until restoration is completed; facility construction would remove habitat potentially utilized by these ground-nesting species. However, these species are common in surrounding areas and would be minimally impacted. Larger mammals such as pronghorn, bobcat, kit fox, and coyote, which may forage or travel through the habitats affected by the facility or crossed by the ROWs, would avoid the disturbance during construction, but should return to these areas following restoration and would be excluded from the facility by on-site fencing. Loss of pronghorn habitat and traffic effects on pronghorn individuals would not be significant due to the minimal amount of area affected and the scattered individuals within the Clive area.

Acreages disturbed for the life of the project within the proposed ROWs and on the facility site would be unavailable for wildlife utilization. The cleared ROWs, may temporarily provide a barrier to normal movement patterns and fragment habitat in previously undisturbed areas. However, this is not expected to be a significant impact following ROW restoration; wildlife species should re-invade the ROWs following restoration and the natural revegetation process.

The federally-listed endangered bald eagle or American peregrine falcon, in addition to other raptors foraging over affected habitats, should not be adversely affected by construction activities. Construction activities should not affect the special status Swainson's hawk, ferruginous hawk, or other raptor species, since nesting raptors have not been identified within 0.5 mile of the facility site (Nelson 1989). The state sensitive kit fox may be temporarily displaced due to construction activities.

Operation. A toxic spill during the transport of hazardous materials could destroy vegetation and result in the loss of wildlife habitat. It is estimated that 90 percent of these spills would occur along the Interstate highway system, releasing hazardous substances predominantly along the highway and adjacent ROW. Impacts to vegetation, wildlife, or wildlife habitat are unlikely to be significant on a regional basis, because most spills would be small and localized.

Hazardous spills from a trucking accident would be significant if a spill occurred in the proximity of surface water resources, potentially affecting aquatic plant or animal species. The level of impact to aquatic resources in terms of duration and length of stream reach affected would depend upon the size of the spill, time of year, physical characteristics of the water source, cleanup and control techniques, and susceptibility of the dominant or important aquatic organisms to the material spilled. Approximately 29 miles of I-80 occur adjacent to the Great Salt Lake, where a toxic spill of hazardous materials could potentially affect biological resources, such as adjacent vegetation, water birds, and foraging raptors. An estimated 0.11 spill would occur along this 29-mile stretch of I-80 for the 30-year life of the project, or 1 spill every 273 years. The low spill frequency combined with USPCI's emergency response and cleanup capabilities would prevent impacts to sensitive plants or animals; therefore, no significant impacts are expected to biological resources near the Great Salt Lake area.

Although there is a low probability of occurrence (1.3×10^{-4} spills per mile for any given year), a spill entering a spring or surface water stream adjacent to the Timpie Springs Waterfowl Management Area (WMA) could result in a significant impact to the peregrine falcon. Hazardous substances potentially entering the aquatic ecosystem could contaminate the peregrine's primary food source. However, an estimated 0.008 spill of toxic materials would occur along this 2-mile area adjacent to the Timpie Springs WMA over the 30-year life of the project, or 1 spill every 3,750 years. It is unlikely that this series of events would occur due to the low spill frequency combined with the limited area that would potentially be affected. Therefore, no significant impacts to the peregrine in the Timpie Springs WMA are expected. Potential spills along I-80 should not affect federal or state-listed raptor species occurring in the area, since rapid response and spill containment would prevent exposure of sensitive species.

No significant impacts would be expected to result from spills occurring from a rail accident. Impacts to vegetation or wildlife habitat are unlikely to be significant because spills would be localized, and rapid emergency response and spill containment along the railroad ROW would prevent exposure to sensitive wildlife species potentially found within the area. An estimated 42 rail cars per week would arrive at the Clive site. However, the potential for a rail spill into the Great Salt Lake is expected to be remote (see Sections 4.2.3 and 4.2.5).

Calculated maximum concentrations for toxic contaminants from the proposed Clive facility are listed in Table 4-5 of Section 4.2.1, Air Quality. Sensitive receptor sites were established at three locations for biological resources: 1) North Skunk Ridge Well for a primary watering source for the Puddle Valley Antelope Herd; 2) Pronghorn Fawning Area; and 3) Timpie Springs WMA (see Map 4-1 in Section 4.6.1). At these receptors, concentrations of the contaminants fall within acceptable levels, and sensitive wildlife species are not expected to be directly affected. No data are available on the long-term (greater than 30 years) exposure of these contaminants on wildlife or on the potential contaminant bioaccumulation in wildlife species. However, based on the deposition calculation prepared for the air quality analysis, impacts are not anticipated to be significant at these low levels.

The 9.1 and 3.1 miles of upgraded and new transmission lines, respectively, proposed for the Clive Alternative would incorporate raptor-proof design to eliminate the potential for raptor electrocution. Therefore, no significant impacts to raptor species from the power lines are anticipated.

Closure. Upon closure of the facility, reclamation of the site would be completed within 180 days. Revegetation would be slow due to the arid climate. Following restoration, wildlife species should migrate back into the disturbed area, utilizing the habitat as before.

Significant Impact Summary. The proposed Clive Alternative would have no significant impacts on biological resources.

4.2.5 Transportation

Significance Criteria. Significance criteria for transportation were developed by the project team based on professional judgment and experience preparing previous EISs, where transportation and traffic issues were a concern. Impacts to transportation would be considered significant if:

- Truck or rail accidents in the States of Utah or Nevada resulting in the spill of hazardous materials (including hazardous wastes) increased by more than 2 percent over existing levels.

- Traffic volume during construction or operation from trucks and employee vehicles on I-80 increased so that the roadway volume-to-capacity relationship results in the traffic operating Level of Service falling below a stable flow condition represented by Level of Service C.

- The traffic volume generated by the project on I-80 results in a change in Level of Service, indicating a corresponding increase in accident frequency.

- The projected roadway impacts required upgrading of roadway facilities and capital expenditure to mitigate vehicle flow and/or safety deficiencies that are beyond the fiscal capabilities of the responsible agency.

- The addition of project-generated auto and truck demand accelerated the deterioration and related maintenance costs of area roadways beyond those scheduled by the responsible agency.

- The rail/highway at-grade crossing leading to the facility site generated more than three train/vehicle accidents during the life of the project.

The major issues raised concerning the transportation system are potential accidents and impacts of increased truck traffic on existing roadway capacity. In order to address these issues, an understanding of the traffic generated by the proposed facility is required. These traffic demands are described below, followed by a discussion of the transportation system and safety implications.

Construction. Traffic flow for the I-80 roadway segment near the facility was analyzed based on geometric conditions, traffic volumes, and the type of traffic control used. The quality of traffic flow is expressed by the average speed (measured in miles per hour) and the ratio of actual traffic volume to the maximum roadway capacity. This ratio is commonly referred to as the volume to capacity (V/C) ratio.

The V/C ratio can be used as an indicator of traffic flow during both the construction and operation phases of the facility. An estimate of roadway capacity in vehicles per hour (vph) was obtained by multiplying the number of lanes by 2,000. Therefore, the capacity of I-80 in the vicinity of the Clive site would be approximately 4,000 vph. The total peak construction workforce is expected to be 211 workers. Assuming a conservative vehicle occupancy rate of 1.0 persons per vehicle, an additional 211 vehicles would be arriving or departing during the peak traffic hours. This assumption is considered to be very conservative. Construction workers, in particular, often average two or more occupants per vehicle, especially if long travel distances are involved. Existing traffic volumes for this section of I-80 are approximately 239 vph; therefore, the V/C for the construction phase of the project is about 11.3 percent. This represents Level of Service A. Given the low estimate for the V/C ratio, no significant impacts on the operation of or accident frequency on I-80 are expected during the construction phase of the project.

Operation. The proposed USPCI incinerator is expected to draw waste from areas within an 800-mile radius. Approximately 70 percent of this waste would be from the West Coast, 20 percent from Utah, and 10 percent from Colorado, Idaho, and Wyoming. It is estimated that 56 truck and 42 rail deliveries per week would occur once the facility reaches full operation. Traffic increases during operation would result from truck deliveries and employees arriving and departing. Truck deliveries would be approximately one per hour. Employment at the proposed facility would be approximately 111 persons. The V/C is, therefore, calculated to be about 8.8 percent. This represents Level of Service A. Given the low estimate for the V/C ratio, no significant impacts on the operation of or accident frequency on I-80 are expected during the operation phase of the project.

An accident analysis was performed for the Clive site based on the information available on the sources of the waste, the number of truck deliveries required, and an estimate of the number of vehicle miles traveled (VMT) per year. A rate of accidents resulting in spills of 0.12 accidents per million VMT was used based on actual operating statistics compiled by USPCI. Using an accident rate of 0.12 and an estimate of 272,000 VMT per year within Utah, the number of potential accidents resulting in spills in Utah over the life of the facility (30 years) would be 0.98 or one spill every 30.6 years. This averages out to be 0.03 potential accidents per year resulting in spills. The average number of reported exposures to hazardous materials (including wastes) resulting from truck accidents in the State of Utah for the years 1984 to 1988 was 46 per year (Gainie 1989) (see Table 4-7). Consequently, 0.03 potential accidents per year represents a 0.07 percent potential increase over existing levels and does not constitute a significant impact.

Using the same accident rate of 0.12 accidents per million VMT and an estimate of 730,000 VMT per year within Nevada, the number of potential accidents resulting in spills in Nevada over the 30-year life of the facility would be 2.6 or one spill every 11.5 years. This averages out to be 0.09 potential accidents per year resulting in spills. The average number of reported exposures to hazardous materials (including wastes) resulting from truck accidents in the State of Nevada for the years 1984 to 1988 was 17.8 per year (Gainie 1989) (Table 4-7). Consequently, 0.09 potential accidents per year represents a 0.51 percent potential increase over existing levels and does not constitute a significant impact.

Transportation routes would pass through two cities in Utah which are representative of large and small cities that could be affected by a spill. Approximately 21 miles of Interstate highway route pass through the Salt Lake City urban area. An estimated 0.08 spill would occur in this area during the life of the project (1 spill every 375 years). Approximately 3 miles of Interstate highway route passes through the Wendover urban area. An estimated 0.02 spill would occur in this area during the life of the project (1 spill every 1,500 years).

In all areas over the life of the project, a total of 7 accidents resulting in spills are projected, or 1 spill every 4.3 years. This is based on an average haul distance of 650 miles as follows: 8 truck deliveries per day x 365 days per year x 650-mile haul distance x 0.00000012 spills per mile x 30 years = 6.8 spills. A spill could occur anywhere along a haul route.

Based on the calculations presented above, only 1 of the projected 7 spills during the life of the project is expected to take place in Utah. It is very difficult to predict the haul routes taken and the expected number of trucks per day on those highway segments beyond the Utah/Nevada border or Salt Lake City. If one makes the conservative assumption that the average haul distance in Nevada would be 400 miles (distance from Wendover to Reno) x 5 trucks per day, about 2.6 spills would be expected to take place in Nevada over the life of the project. The remaining 3.2 spills would take place in other states. It is impossible to predict where the spills might occur, who might own the affected property, and whether a sensitive receptor might be affected. Significant impacts would not be expected for every spill.

The fact that trucks entering the Clive site would have to cross a railroad track does increase the probability of an accident. Approximately 0.0352 accidents occur per year in Utah for each rail crossing (UDOT 1984). Therefore, over the 30-year life of the facility, the potential exists for one accident at the rail crossing. This does not constitute a significant impact. It should be noted that the 0.0352 accident rate reflects average conditions across all railroad crossings in the state. If control devices such as flashing lights or crossing gates are used, that number of potential accidents could be reduced to well below one.

There are no vehicle flow and/or safety deficiencies projected which would require upgrading of roadway facilities and capital expenditures for mitigation measures other than the commitment by USPCI to upgrade the existing access road and construct a rail spur to the site. Furthermore, the addition of project-generated auto and truck demand is expected to be minimal compared to existing levels and would not accelerate the deterioration and related maintenance costs of area roadways beyond those already scheduled by the responsible agencies. Tooele County is working with the Federal Highway Administration and the Utah DOT on the possibility of building a permanent, diamond-interchange at Clive (Urbanik 1989).

The average number of reported exposures to hazardous materials (including hazardous wastes and hazardous substances) resulting from rail accidents in the States of Utah and Nevada for the years 1984 to 1987 was 6.6 and 3.2, respectively (Gainie 1989) (see Table 4-7). USPCI will be adding 6 rail cars per day on the rail system in the State of Utah. Considering the fact that the number of trains per day on Union Pacific's tracks west of Salt Lake City decreased from 28 to 20 trains per day between 1984 and 1989, the proposed low volume of additional rail traffic is not expected to produce a significant increase in the potential for rail spills.

Significant Impact Summary

The Clive Alternative would have no significant impacts on transportation.

4.2.6 Socioeconomics

Significance Criteria. Impacts to socioeconomics would be considered significant if:

- Project-related population increases resulted in housing or service demands which could not be met by existing or currently planned facilities.
- Changes in area population were 5 percent or more in any one year.
- Changes in area employment were 5 percent or more.
- Changes in local tax base were greater than 5 percent.

Construction. Area population changes due to construction for the Clive Alternative would be minimal and of short duration. Construction is proposed to require 14 months to complete. The peak number of workers on the project would be 211, but could be considerably less depending on the scheduling of activities. Most of the construction workforce (approximately 90 percent, or 190 workers) are expected to reside in Tooele County or the greater Salt Lake City metropolitan area. The Clive site is within commuting distance from the nearby major population and employment centers including Tooele, Grantsville, Salt Lake City, and Wendover.

In 1987, an estimated 844 unemployed workers resided in Tooele County, based on a 7.5 percent annual unemployment rate. The projected 190 resident construction workers on this project, assuming that all 190 were hired from the ranks of the county's unemployed, would represent almost 23 percent of the 1987 unemployed workforce in Tooele County. However, this simple calculation does not take into consideration the much larger available workforce from the greater Salt Lake City metropolitan area, and it is probably unlikely that all 190 resident workers would be hired from Tooele County's unemployed. It is more reasonable to assume that many of those workers would already be employed by existing construction companies that would be competing for the work. It is also difficult to predict whether or not the construction skills required would be available from the pool of unemployed workers. Consequently, the impact on area employment during construction of the Clive site would certainly be positive, but only expected to be marginal and of short duration. It is unlikely that many out-of-region workers would relocate their families for the relatively brief construction period. An insignificant amount of secondary employment or population growth is expected because of the low number of out-of-region workers and the brevity of the construction period.

The Tooele County housing market currently has a surplus of homes for sale but only a moderate number of rental units (approximately 10 to 17 homes for rent based on a 10 percent vacancy rate) (Gillette 1989). In addition, there are five hotels/motels in Tooele, two motels in Grantsville, and eight hotels/motels in Wendover. No significant impacts to housing are projected during construction because of the anticipated low number of nonresident workers and the relatively short commuting distance between the Clive site and the major housing markets, particularly, Tooele, Grantsville, Wendover, and Salt Lake City.

Public facilities and services would not be significantly affected by construction of the Clive Alternative due to its low associated population growth.

Capital costs of the proposed facility are estimated to be $40 to $50 million, including land acquisition, materials, and labor. It is not possible at this time to estimate an exact dollar value; however, it is expected that many of the construction materials could be purchased within the region, including the greater Salt Lake City metropolitan area. The economic benefits would most likely be spread out between Tooele County, the Salt Lake City metropolitan area, and possibly, statewide. Consequently, the impact on the local area economy, including sales tax revenue and income, during construction of the Clive Alternative would certainly be positive, but only expected to be marginal.

Operation. Area population changes due to operation of the facility on the Clive site would be minimal. The peak number of workers in the facility would be 111. Most of the operation workforce (approximately 90 percent, or 100 employees) are expected to be residents of Tooele County or the greater Salt Lake City metropolitan area. Impacts on area employment from operation of the proposed facility would certainly be positive, but only expected to be marginal.

The Clive site is within comfortable commuting distance from the major population and employment centers in Tooele County, including Tooele, Grantsville, and Wendover. It is more likely that a resident of Salt Lake City would eventually choose to relocate closer to the proposed facility and would be looking for permanent housing in Tooele County. However, no significant impacts to housing are projected from operation of the proposed facility because of the insignificant population growth expected and the anticipated low number of nonresident workers.

Public facilities and services would not be significantly affected by operation of the proposed facility due to its low associated population growth.

The average annual operation payroll, for 111 employees, is projected to be approximately $3 million. The average monthly wage of $2,252 is approximately 19 percent higher than the 1987 average monthly non-agricultural wage for Tooele County.

The estimated $40 to $50 million valuation of the proposed facility would increase the total 1988 property valuation for Tooele County by approximately 6 to 8 percent, and would generate approximately $405,664 to $507,080 in additional property tax revenue, based on the 1988 property tax rate of 1.2677 percent for unincorporated areas. The impact on the local area economy, including total property tax revenue and average monthly non-agricultural wage for Tooele County, during operation of the proposed facility would be substantial and very positive.

USPCI proposes to incinerate approximately 130,000 tons per year of wastes. Currently there is an $8 per ton in-state commercial disposal fee for hazardous waste imposed by the State of Utah. The fee for wastes generated outside the state is $20 per ton. Tooele County currently receives 10 percent of the commercial disposal fee. Consequently, the State of Utah and Tooele County would receive approximately $2,059,000 and $228,800 in revenue, respectively, and therefore representing a beneficial impact on the state and local area economy.

There would be no significant impacts to the local area economy from costs associated with liability concerns, or facility regulation and/or monitoring during operation of the proposed facility. Liability costs would be borne by the operator of the facility, and regulation and monitoring responsibilities would be handled by the appropriate state and federal regulatory agencies (see Section 4.2.10).

Potential effects on industrial growth, property values, and quality of life due to the presence of an industrial and hazardous waste treatment facility in Tooele County would likely be minimal and would be difficult to quantify. There would also be no significant impacts on energy supplies, cattle production, or natural resource extraction from the operation of the proposed facility (see Section 4.2.1).

Closure. Closure of the facility and reclamation of the site is expected to be completed in 180 days. Impacts on socioeconomics resulting from facility closure would be similar to those of construction but of shorter duration.

Significant Impact Summary. The Clive alternative would have no significant impacts on socioeconomics. Beneficial impacts in the form of increased employment and increased property tax and sales tax revenues would be realized. In addition, the revenue generated from the hazardous waste fees would also be a beneficial impact.

4.2.7 Land Use, Grazing, Recreation, and Wilderness

Significance Criteria. Impacts to land use and recreation would be considered significant if:

- The proposed development is neither compatible nor consistent with land use plans, regulations, or controls, or hazardous waste facility siting criteria adopted by local, state, or federal agencies.

Construction. Prior to construction on the Clive site, a four-step process would be successfully completed, including: 1) consummation of a land exchange between USPCI and BLM; 2) approval from the Tooele County Planning Commission and County Commissioners for a zoning amendment; 3) a conditional use permit from the Tooele County Planning Commission and the County Commissioners; and 4) a building permit. The Clive site is within Tooele County's West Desert Hazardous Industry Area, and it would be compatible with the Tooele County Master Plan which encourages multiple and cooperative uses in this area and that each proposed development be considered on its own special merits. USPCI has already received approval from the Tooele County Planning Commission and County Commissioners for a zoning amendment and conditional use permit for the Clive site. The proposed project would also be consistent and compatible with the BLM's Proposed Pony Express Resource Management Plan, the State of Utah's Hazardous Waste Facility Siting Criteria, and Tooele County's performance standards for the storage, treatment, or disposal of hazardous wastes.

Actual construction on the Clive site would have minimal impact on land use in the area due to the small amount of land that would actually be developed, the industrial-type activity which is already occurring in the area (i.e., the Enviro-Care facility), and the abundant supply of federal land which would still be available for grazing purposes and recreation. Construction for the Clive Alternative would remove 0.0703 Animal Unit Months (AUMs) per acre from the Skull Valley grazing allotment (18,884 total AUMs/268,800 total acres). Approximately 4.9 total AUMs would be lost; 2.8 AUMs for the sand and gravel borrow site, 1.2 AUMs for new or upgraded access roads, and 0.9 AUM for the railroad spur. The total AUMs would only be affected on the developed areas (e.g., the facility site and ROWs). USPCI would explore the possibility of allowing grazing use on the portions of the acquired land that would not contain hazardous waste facilities. However, the BLM would lose approximately $______ annually in grazing revenue because the public land acquired for the Clive site would now be under private ownership.

Construction on the Clive site would have very minimal impact on recreation activity in the area due to the small amount of land that would actually be developed, and the abundant supply of federal land which would still be available for recreation. There will be no impact to the Cedar Mountains WSA or the Bonneville Salt Flats ACEC from construction on the Clive site.

Section 2 is a state-owned parcel located within the area designated by the BLM as the Knolls Special Recreation Management Area (SRMA). The use of Section 2 as a source of sand and gravel would preclude ORV use in this section during the 14-month construction period. The impact to the overall SRMA is not considered significant.

Operation. No additional impacts to land use would occur from the operation of the proposed project on the Clive site other than the minimal impacts previously described under construction activity. Air emissions predicted by modeling efforts (Section 4.2.1) indicate that grazing would not be significantly impacted by stack emissions or deposition. In addition, there would be no significant impacts from the operation of the proposed USPCI facility on the Enviro-Care facility, the West Desert Pumping Project, or the Air Force's Utah Test and Training Range.

Operational impacts to recreation activity would also be similar to those described under construction. However, approximately 7 miles of I-80 occur adjacent to public beaches of the Great Salt Lake, where a spill of hazardous materials could potentially affect recreational resources. An estimated 0.03 spill would occur along this 7-mile stretch of I-80 for the 30-year life of the project, or 1 spill every 1,000 years.

The low spill frequency combined with USPCI's emergency response and cleanup capabilities would prevent impacts to sensitive recreational resources along the Great Salt Lake.

Closure. Upon closure of the proposed facility, anticipated in 2020 or after 30 years of facility life, complete reclamation of the site is expected. Given the small amount of land that is proposed to be developed and ultimately reclaimed, there would be very minimal impact on land use and recreation in the area.

Significant Impact Summary. The Clive Alternative would have no significant impacts on land use or recreation because of the controls which would be placed on such a facility under existing and/or proposed laws and regulations, the small amount of land that is actually proposed for development, the abundant supply of federal land which would still be available for public use, and the industrial-type of activity which is already occurring in the area.

4.2.8 Visual Resources

Significance Criteria. Impacts to visual resources would be considered significant if:

- Predicted visual contrasts caused by the waste treatment project, including linear support facilities, exceed the levels allowed by the BLM's visual quality objectives for the site being considered.

Construction. Visual impacts caused by the proposed USPCI facility were analyzed using the procedures outlined in the BLM Visual Resource Contrast Rating Handbook (BLM 1986d). Visual impact significance was determined by comparing visual contrast ratings for the proposed waste treatment facilities with visual resource management (VRM) class objectives for the respective management class affected (see Table 3-10). Visual effects would build gradually through the construction period and would reach their greatest level at the operations period. Consequently, visual effects of the project are addressed in the following section.

Operation. Visual contrast analyses were conducted for key observation points on I-80 outwards to the proposed facility location. Development of the proposed waste treatment facility would not result in a significant increase in visual contrast in the Clive site area. The proposed facility would contrast with the natural visual environment, especially because of the 100-foot stack and strong geometric forms of the storage tanks. These would introduce unnatural forms and a strong vertical line into the predominantly horizontal visual character of the site. However, other project facilities would mimic the horizontal site character. This repeat of natural visual elements combined with the existing structures at the Enviro-Care facility, and the distance from the key observation points to the site (approximately 3 miles) would effectively reduce visual contrast from the proposed facility to a level that would be acceptable under VRM objectives for Class IV areas. Proposed linear facilities would also be designed to blend into the existing environment to the greatest extent possible.

The small water vapor plumes that would be visible at the incinerator facility only during very cold weather would not significantly affect the quality of the viewshed from the Cedar Mountains WSA (located approximately 9 miles east of the Clive site). The proposed stack would be about 100 feet above grade, while the proposed cooling tower would only be about 18 feet above grade. The plumes from the stack and cooling tower would be an estimated 100 to 300 feet long and would vary greatly depending on atmospheric conditions. Evaporation of any plume is expected to be very rapid under most conditions. For comparison, the proposed cooling tower would be one-tenth the size of the typical power plant cooling tower and about the same size as the cooling tower currently in use at the Amax Magnesium plant at Rowley.

Closure. Closure and effective reclamation of the project site would reduce long-term residual visual effects to a very minimal level.

Significant Impact Summary. There would be no significant visual impacts from development of the proposed USPCI facility at the Clive site.

4.2.9 Cultural Resources

Significance Criteria. Impacts to cultural resources would be considered significant if: 1) construction, operation, or closure activities caused an adverse, non-mitigable effect to a prehistoric or historic site eligible for, or listed on, the National Register of Historic Places (Ref. 36 CFR 60); 2) activities not directly related to project designs, but brought about as a result of the project (e.g., increased public access, accelerated erosion, etc.) caused such effects; or 3) any of the above activities disturbed sites of cultural or religious significance to contemporary Native Americans (Ref. American Indian Religious Freedom Act of 1978).

Construction, Operation, and Closure. Facilities construction would not affect any known cultural resources. However, because most of the direct impact area associated with the project has not been inventoried for cultural resources, the possibility exists that as-yet-unrecorded sites would be adversely affected. The probability of encountering significant cultural resources is assessed as low at the proposed Clive site and low to moderate for the associated ROW facilities. Any sand dunes or fossil shoreline should be regarded as sensitive areas for cultural resources.

Impacts of a secondary nature (e.g., those due to incresed public access) could occur during the operation of the facility. It is unlikely that additional impacts to cultural resources would occur as a result of facilities closure.

Significant Impact Summary. Significant impacts to cultural resources cannot be assessed as yet because most of the project area has not been intensively inventoried.

4.2.10 Health and Safety

Significance Criteria. Since there are no regulations upon which to base health and safety significance criteria, the criteria are based upon professional judgment and criteria used in previous EISs. Impacts associated with health and safety issues would be considered significant if:

- Increased cancer risk to closest residential population resulting from air emissions from the incinerator exceeds 10^{-5} per lifetime.
- The probability of exposures resulting from incomplete combustion of hazardous wastes would exceed values for similar, recently permitted, hazardous waste incinerators.
- Increased cancer risk to general population in Utah caused by chemical exposures resulting from spills during the transportation to or storage of hazardous waste at the facility exceeds 10^{-5} per lifetime. (EPA generally considers risk in the 10^{-5} to 10^{-6} range acceptable.)

The significance of a potential spill would depend on two primary factors: the type of waste spilled and the location of the spill. It is possible that a highly toxic material could be spilled in a remote desert area along an Interstate highway and could be cleaned up without significant effects on humans, wildlife, or water resources. Conversely, a less toxic material could be spilled in a sensitive area (e.g., town, wetland, shallow groundwater basin) with significant effects on the sensitive resource.

Construction. Since there would be no handling of hazardous waste at this stage, there would be no risk of toxic exposure.

Operation. The populations potentially at risk during the operational lifetime of the incineration facility would consist of truck drivers and railroad workers transporting hazardous waste to the facility, facility operations personnel, and residential populations near the facility or near transportation routes to the facility.

Potential risks to transportation workers would consist of exposure to toxic substances as a result of highway spills, rail spills, or contact during handling. USPCI has taken several steps to minimize the occurrences of highway and rail mishaps.

In addition to a regular maintenance regime for the trailers and tractors, trailers would be inspected for integrity, and clean-up supplies would be inventoried for each rig, each time a rig is dispatched. To minimize risk of toxic exposure to the drivers and to the public, the drivers would be trained in PCB and hazardous waste emergency spill cleanup (see Section 2.2.2). Drivers would be trained in spill cleanup techniques for wastes other than PCB-bearing materials on an "as needed" basis. Both USPCI drivers and drivers from outside companies would be required to have a driving record with no alcohol convictions, and pass a driver safety test. USPCI personnel would be responsible for unloading the hazardous materials from rail cars once they are officially received by USPCI. Sumps capable of collecting material spilled from rail cars would be installed at the facility's railroad spur.

USPCI plans to employ an estimated 111 people at the facility, with roughly 86 workers involved in the day-to-day operations with potential exposure to hazardous wastes. All USPCI personnel would receive orientation training which would include information on company policies, incineration, potential health effects of exposure to RCRA and TSCA wastes, use of communication and alarm systems, locations of emergency equipment, and abnormal situations response. Operations personnel would receive classroom lectures and hands-on equipment training. Facility personnel would be required to pass written and oral examinations. Topics covered in training would include: general discussion of hazardous waste, RCRA and TSCA regulations, overview of the USPCI facility, environmental permit requirements, safety, and emergency procedures. Refresher courses for safety training would be offered a minimum of annually and more frequently if new hires were added. First aid and safety procedures would be based on the October 1985 Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.

In conformance with federal regulations, all USPCI employees engaged in the handling of hazardous wastes would participate in a medical monitoring program. This program would consist of an initial physical examination to establish a person's baseline health profile and to verify that the employee can work in respiratory protective gear without suffering adverse effects. Followup exams would be administered annually.

Employees would experience some risk of exposure to toxic substances as a result of their day-to-day work functions involving hazardous waste; however, extensive training, dermal protection provided by special work garments (e.g., Tyvec[R] suits), and respiratory protection, should effectively minimize this risk. This premise is supported by USPCI's records for their Grassy Mountain facility which show that during roughly ____ years of operation, there has been no documented exposure of a worker.

Members of the general public potentially at the greatest risk of exposure to air emissions from the incinerator are the populations of towns closest to the facility (Grantsville - 37 miles, Tooele - 47 miles, Wendover - 47 miles, and Salt Lake City - 68 miles). Air dispersion modeling (Section 4.2.1) has shown that emissions of chlorine, PCBs, dioxins, and phosgene would fall within acceptable limits near population centers. Therefore, the impact of stack gases from the incinerator on nearby communities would not be significant.

A risk of public exposure would occur as a result of a highway spill or rail car spill during transportation of hazardous waste to the incinerator. USPCI anticipates that 90 percent of the hazardous waste materials transported by truck would be routed along the Interstate highway system. I-80 runs about 6 miles north of Grantsville and 8 miles north of Tooele; therefore, it is highly unlikely that the residents of these towns would be subject to exposure risks resulting from highway spills.

Both the Union Pacific Railroad and I-80 pass through Salt Lake City and Wendover. Appendix B presents a qualitative risk assessment for two theoretical PCB spills and one dioxin spill, with two scenarios placed in Salt Lake City and the third placed in a small western town, not necessarily located adjacent to the Interstate. While these scenarios attempt to place an upper limit on potential health effects, the likelihood of such a spill event is very remote (see Section 4.2.5).

The estimates of adverse health risks presented in the PCB Small Spill Scenario indicate that for a moderate size spill (70 gallons) cleaned up within two weeks: 1) the short-term dermal contact intake of PCBs is estimated to exceed the allowable 10-day intake derived by the EPA; 2) the short-term dermal contact with PCBs could contribute to a person's excess lifetime cancer risk (approximately five in ten thousand); and 3) the inhalation exposure to PCBs is unlikely to exceed the maximum allowable limit (see Appendix B).

The assessment of health risks presented in the PCB Large Spill Scenario indicates that for the largest spill likely from compartmentalized trucks (3,500 gallons) with an ensuing fire, cleaned up within 2 weeks: 1) the short-term dermal contact intake of PCBs is estimated to exceed the allowable 10-day intake derived by the EPA; 2) the excess cancer risk resulting from dermal exposure to PCBs is about five in ten thousand; and 3) inhalation exposure of people within 650 feet (200 meters) of the fire without respiratory protection could suffer significant health effects. Evacuation of the area around the fire could be warranted (see Appendix B).

The assessment of health risks presented in the Dioxin, Methyl Parathion, and Xylene Aromatics Small Spill Scenario indicates that for a spill of soil contaminated with dioxin and liquid containing methyl parathion and xylene aromatics cleaned up within 12 hours: 1) the estimated short-term dermal contact and oral exposure to dioxin would not significantly contribute to a person's excess lifetime cancer risk; 2) the dermal exposure to methyl parathion could cause adverse noncarcinogenic health effects, and 3) the inhalation exposure to all three constituents is unlikely to exceed the calculated maximum allowable levels (see Appendix B).

As part of an EIS for an Arizona Hazardous Waste Facility, the EPA (1983) presented an extreme hazardous waste spill scenario in which 5,000 gallons of hazardous waste spilled from an overturned truck. The EPA's results showed that a 5,000-gallon spill of either benzene or methylene chloride (two very volatile compounds) would pose an immediate health hazard to exposed persons within 100 meters (328 feet) of the spill. Levels of these toxic chemicals would fall well below the exposure limits at a distance of 500 meters (1,640 feet). Normally, officials would evacuate all areas within 0.5 mile (2,640 feet) of a volatile spill.

USPCI would provide emergency response cleanup for the incineration facility and transportation routes through trained hazardous response personnel (see Section 2.2.2, Regional Spill Response Capability). Section 3.2.10 describes local emergency response capabilities. With the addition of USPCI's emergency response team at the proposed Aragonite facility, emergency response capabilities in the region would be improved and should be adequate to respond to most situations.

Liability Issues. USPCI currently is covered by $__ million in liability insurance including public ($__ million), auto ($__ million), and pollution ($__ million). In addition, RCRA requires that as a condition of permitting, the facility must establish and maintain financial assurance in an amount adequate to complete closure according to third-party costs. USPCI has estimated in their RCRA/TSCA permit application total closure costs of $_______ and proposed _______ as the method of financial assurance. At this time, EPA and the State have not determined whether they view USPCI's closure cost estimate as adequate to meet RCRA requirements.

If, as a result of USPCI's actions, there is a catastrophic release of toxic substances which caused workers or incidental off-site populations to require medical attention, liability would rest with USPCI. As part of the contingency plan for their RCRA and TSCA permit application, USPCI would arrange for emergency medical services from the Tooele Valley Regional Medical Center and the Life Flight helicopter from the University of Utah to be available.

If a spill from a USPCI truck occurred along a transportation route as a result of an accident, and the USPCI driver was at fault, liability would rest with USPCI, and they would cover medical costs arising from the accident. If the USPCI driver were not at fault, USPCI would not incur liability. However, USPCI has indicated that they would dispatch a cleanup crew and could provide for medical attention to those requiring it, and then recover their costs through the court system. If an off-site spill occurred because of defective equipment (e.g., leaking tanker), USPCI would incur the liability.

For rail car spills, liability would revert back to either the common carrier (e.g., Union Pacific) or the generator of the waste. Generally, the common carrier would effect the cleanup, provide for any required medical attention, and recover costs from the appropriate party through the courts. USPCI would be available for cleanup on a contract basis and would not incur any liability in this case.

Closure. Closure would involve the dismantling of the facility and the cleanup of soils, if necessary, to standards set by the EPA. If soils were contaminated, closure would reduce contamination to levels that would not impact human health. Assuming closure is conducted in accordance with environmental regulations, there would be no expected adverse effects from closure.

Significant Impacts Summary. There would be no significant health and safety impacts from the construction of the proposed USPCI facility at the Clive alternative site. The only potential significant impact arising from normal operations could be the exposure of emergency response personnel and bystanders to toxic waste shortly after a spill. Quick response time and availability of trained personnel to handle such situations should minimize the impact.

4.3 Grassy Mountain Alternative

4.3.1 Air Quality

Air quality impacts during construction of the Grassy Mountain Alternative are as described for the proposed action. Air quality impacts of the proposed incinerator, should it be located at the Grassy Mountain site, are described in this section. The incinerator emissions and procedures used to assess their impact are identical to that described for the Clive site.

Table 4-8 lists the predicted maximum impacts for the criteria and toxic contaminants under study. In general, maximum impacts for the Grassy Mountain site are comparable to those predicted for the proposed Clive site. For criteria pollutants, predicted maximum concentrations are only a few percent of their respective NAAQS. Toxic contaminants are also below the acceptable concentration thresholds, ranging from up to about 15 percent of the significant impact levels.

The errors introduced by use of Salt Lake Airport data for the air quality modeling at the Grassy Mountain site are probably similar to the Clive site. Like the Clive site, the Grassy Mountain location is in a relatively broad north-south oriented valley, away from local topographic influences on winds. Here, the Salt Lake airport data should match fairly closely the expected local wind patterns.

Air quality impacts related to closure of the Skunk Ridge Alternative are as described for the proposed action.

TABLE 4-8

MAXIMUM AIR QUALITY IMPACTS FOR THE GRASSY MOUNTAIN ALTERNATIVE - USPCI SOURCE ONLY

Pollutant	Averaging Time	Predicted Maximum Concentration ($\mu g/m^3$)	Receptor Location (UTM) East	North	Elevation (ft)	NAAQS or Significance Conc. ($\mu g/m^3$)	% of Criteria
NO_2	Annual	0.29	311.753	4522.465	4,250	100	<1
SO_2	3-hour	6.0	313.860	4519.684	4,250	1,300	<1
	24-hour	1.3	314.324	4519.401	4,250	365	<1
	Annual	0.14	311.753	4522.465	4,250	80	<1
CO	1-hour	0.8	313.793	4520.800	4,250	40,000	<1
	8-hour	0.2	313.860	4519.684	4,250	10,000	<1
Particulate	24-hour	2.5	314.324	4519.401	4,250	150	2
	Annual	0.3	311.753	4522.465	4,250	50	<1
HCl	8-hour	7.9	313.860	4519.684	4,250	70	8
Chlorine	1-hour	2.8	313.793	4520.800	4,250	30	6
	8-hour	0.8	313.860	4519.684	4,250	15	4
PCB's	8-hour	0.002	313.860	4519.684	4,250	0.024	5
	Annual	$5.8x10^{-5}$	311.753	4522.465	4,250	0.002	1
Dioxins/Furans	Annual	$1.3x10^{-9}$	311.753	4522.465	4,250	$4x10^{-8}$	3
Pentachlorophenol	8-hour	0.3	313.860	4519.684	4,250	5.0	6
Beryllium	8-hour	$4.1x10^{-4}$	313.860	4519.684	4,250	0.002	15

4.3.2 Geology and Soils

Geology. The Grassy Mountain site is located more than 13 miles from the active fault zones defined by Barnhard and Dodge (1988). Therefore, seismic activity would not be a significant concern at the Grassy Mountain site. Impacts associated with the Grassy Mountain Alterntive would be similar to those discussed in Section 4.2.2 for the Clive site. The Grassy Mountain Alternative would have no significant impacts on geological features or paleontological resources.

Soils. Impacts to soils resulting from construction activities at the Grassy Mountain alternative site would be similar to those discussed in Section 4.2.2 for the Clive site, and are not considered to be significant. Erosion control and revegetation techniques, as recommended by BLM and SCS, would be instituted.

Soil limitations for the Grassy Mountain site would have to take into consideration the presence of gypsum in the Dynal soil found on the western side of the site. Gypsum can lead to subsidence problems if the soil is watered during foundation engineering activities. Engineering design would include construction specifics to account for these limitations.

4.3.3 Water Resources

Surface Water. The Grassy Mountain Alternative contains no surface water and no perennial, intermittent, or ephemeral streams occur through the area. The site does not lie in a 100-year floodplain. An incinerator located at the Grassy Mountain site would pose no threat to nearby surface water.

The Great Salt Lake is located approximately 31 miles east of the Grassy Mountain location with the Grayback Hills separating the two. Spills near the facility would not affect the Great Salt Lake. As in the case of the Clive site, the potential is minimal of a spill occurring along the 7-mile stretch of I-80 that lies within 0.5 mile of the Great

Salt Lake. In addition, air emissions predicted by modeling efforts (Section 4.2.1) indicate the Great Salt Lake would not be impacted significantly by stack emissions.

Groundwater. According to State Engineer's records, no wells are lcoated within 0.5 mile of T.1N, R.12W, SW¼, Sec. 16. USPCI has not applied for a well permit at the Grassy Mountain site. If this site were selected, however, water would probably be supplied to the site from a well(s). At the time a well permit was applied for, the State Engineer would conduct an evaluation of potential impacts from the well development.

As in the case of the Clive Alternative, spills along a roadway could reach soil beside the pavement and begin to penetrate the subsurface. Depth to water is probably 30 to 50 feet below the surface. It is unlikely that any chemical spills (PCBs or other organics) in this area would reach the water table. Areas along the transportation route with shallow water tables (less than 50 feet) would still have the potential to be contaminated by an organic chemical spill. This would be a significant impact; however, rapid cleanup response times (see Section 4.2.10) should minimize the depth reached by any contaminants.

4.3.4 Biological Resources

Construction, operation, and closure-related impacts to plant and animal species for the Grassy Mountain Alternative would be similar to those discussed in Section 4.2.4 for the Clive Alternative. Construction of the facility and the utilities, access roads, and railroad ROWs to the Grassy Mountain site would affect only the greasewood, desert shrub/saltbush vegetation types. Facility construction would remove a total of 45 acres; ROWs construction would remove approximately 60.3 acres for the utilities, 13.3 acres for upgraded and new access roads, and 50 acres for the railroad spur. Total disturbance would be approximately 169 acres.

Pronghorn concentration areas and fawning grounds would not be significantly impacted by spills or toxic emissions during facility operation due to the locations of the sensitive areas and the expected emission concentrations (Table 4-8). The Grassy Mountain Alternative would have no significant impacts on biological resources.

4.3.5 Transportation

Impacts associated with the Grassy Mountain Alternative would be the same as those discussed in Section 4.2.5 for the Clive Alternative. Construction of a rail spur to Grassy Mountain would require an overpass to cross I-80. It is assumed that a combination of construction techniques and scheduling would be implemented to limit or avoid any delays of traffic on I-80. The Grassy Mountain Alternative would have no significant impacts on transportation.

4.3.6 Socioeconomics

Impacts associated with the Grassy Mountain Alternative would be the same as those discussed in Section 4.2.6 for the Clive site. The Grassy Mountain Alternative would have no significant impacts on socioeconomics.

4.3.7 Land Use, Grazing, Recreation, and Wilderness

Construction, operation, and closure-related impacts for the Grassy Mountain Alternative would be the same as those discussed in Section 4.2.7 for the Clive site. Construction for the Grassy Mountain Alternative would remove 0.0370 AUMs per acre from the West Grassy Grazing Allotment (1,675 total AUMs/45,278 total acres). Approximately 2.4 AUMs total would be lost; 0.5 AUM for new or upgraded access roads, and 1.9 AUMs for the railroad spur. Total AUMs would only be affected on the developed area (e.g., the facility site and ROWs). USPCI would explore the possibility of allowing grazing on land not developed for their operations. However, the BLM would lose approximately $_____ annually in grazing revenue because the public land acquired for the Grassy Mountain site would now be under private ownership. This would minimally affect the current grazing allotment. The Grassy Mountain Alternative would have no significant impacts on land use, grazing, recreation, or wilderness.

4.3.8 Visual Resources

Impacts associated with the Grassy Mountain Alternative would be similar to those discussed in Section 4.2.8 for the Clive site. Visual contrast analyses were conducted for key observation points on I-80 outwards to the Grassy Mountain site. As described for the Clive site, the proposed facility would contrast with the natural visual environment, especially because of the 100-foot stack and strong geometric forms of the storage tanks. These would introduce unnatural forms and a strong vertical line into the predominantly horizontal visual character of the site. However, other project facilities would mimic the horizontal site character. This repeat of natural visual elements combined with the existing disturbance at the Grassy Mountain and Grayback Mountain facilities, the distance from the key observation points to the site (approximately 6 miles), and the design of linear facilities to minimize disruption would effectively reduce visual contrast from the proposed facility to a level that would be acceptable under VRM objectives for Class IV areas. The Grassy Mountain Alternative would have no significant impacts on visual resources.

4.3.9 Cultural Resources

As described for the proposed Clive site (Section 4.2.9), most of the direct impact areas associated with the project have not been inventoried for cultural resources and the possibility remains that as-yet-unrecorded sites would be adversely affected. The probability of encountering significant cultural resources is assessed as low for the Grassy Mountain site, the access road, and the rail spur, and low to moderate for the the powerline. Any sand dunes or fossil shoreline should be regarded as sensitive areas for cultural resources.

4.3.10 Health and Safety

Impacts associated with the Grassy Mountain Alternative would be similar to those discussed in Section 4.2.10 for the Clive site. Members of the general public potentially at the greatest risk of exposure are the populations of towns closest to the facility (Grantsville - 43 miles, Tooele - 53 miles, Wendover - 44 miles, and Salt Lake City - 71 miles), as well as incidental population along the transportation route. Air dispersion modeling (Section 4.2.1) has shown that emissions of chlorine, PCBs, dioxins/furans, and phosgene would fall within acceptable limits.

Therefore, the impact of stack gases from the incinerator on nearly communities is not significant. The only potential significant impact arising from normal operations could be the exposure of emergency response personnel and bystanders to toxic wastes shortly after a spill. Quick response time and availability of trained personnel to handle such situations should minimize the impact. The Grassy Mountain Alternative would have no significant impacts on health and safety arising from construction or closure.

4.4 Section 23 Alternative

4.4.1 Air Quality

Air quality impacts during construction of the Section 23 Alternative are as described for the proposed action.

Air quality impacts of the proposed incinerator, should it be located at the Section 23 site, are described in this section. The incinerator emissions and procedures used to assess their impact are identical to that described for the Clive site.

Table 4-9 lists the predicted maximum impacts for the criteria and toxic contaminants under study. In general, maximum impacts for the Section 23 site are slightly higher than those predicted for the proposed Clive site, due principally to the fact that the elevated terrain is closer to the Section 23 site. However, for criteria pollutants, predicted maximum concentrations still fall well below the respective NAAQS, at most being only a few percent of the NAAQS. The same holds true for toxic contaminants, which fall somewhere betwen 5 and 35 percent of the acceptable concentration levels established for this EIS.

The use of Salt Lake Airport data as input to the air quality modeling of the Section 23 site probably introduces some error into the analyses.

These errors may be more pronounced at Section 23 compared to other sites due to the closer proximity of the mountainous terrain. A review of the model results suggests that highest impacts occur to the southeast of the proposed site on higher terrain under the influence of the prevailing Salt Lake Airport northwest winds. It might be expected, based on terrain orientation near Section 23, that surface winds would be rotated away from

TABLE 4-9

MAXIMUM AIR QUALITY IMPACTS FOR THE SECTION 23 ALTERNATIVE - USPCI SOURCE ONLY

Pollutant	Averaging Time	Predicted Maximum Concentration ($\mu g/m^3$)	Receptor Location (UTM) East	Receptor Location (UTM) North	Elevation (ft)	NAAQS or Significance Conc. ($\mu g/m^3$)	% of Criteria
NO_2	Annual	0.5	326.944	4507.801	4,450	100	<1
SO_2	3-hour	10.9	327.480	4506.352	4,540	1,300	<1
	24-hour	2.8	326.944	4507.801	4,450	365	<1
	Annual	0.2	326.944	4507.801	4,450	80	<1
CO	1-hour	1.3	328.578	4507.450	4,470	40,000	<1
	8-hour	0.4	327.480	4506.352	4,540	10,000	<1
Particulate	24-hour	5.3	326.944	4507.801	4,450	150	4
	Annual	0.5	326.944	4507.801	4,450	50	<1
HCl	8-hour	12.8	327.480	4506.352	4,540	70	18
Chlorine	1-hour	4.7	328.578	4507.450	4,470	30	16
	8-hour	1.3	327.480	4506.352	4,540	15	9
PCB's	8-hour	0.003	327.480	4506.352	4,540	0.024	11
	Annual	$1x10^{-4}$	326.944	4507.801	4,450	0.002	5
Dioxins/Furans	Annual	$2.3x10^{-9}$	326.944	4507.801	4,450	$4x10^{-8}$	6
Pentachlorophenol	8-hour	0.4	327.480	4506.352	4,540	5.0	8
Beryllium	8-hour	$7x10^{-4}$	327.480	4506.352	4,540	0.002	35

the terrain in a more southwest-northeast orientation. Thus, it is probable that any errors introduced by use of the Salt Lake Airport data are conservative, in that the frequency of winds blowing toward worst-case receptors on elevated terrain is overstated.

4.4.2 Geology and Soils

Geology. Since the Section 23 site is 16 miles from the nearest Holocene faults in the Puddle Valley, seismic activity would not be a significant concern at the site. Impacts associated with the Section 23 Alternative would be similar to those discussed in Section 4.2.2 for the Clive site. The Section 23 Alternative would have no significant impacts on geological features or paleontological resources.

Soils. Impacts to soils resulting from construction activities at the Section 23 Alternative site would be similar to those discussed in Section 4.4.2 for the Clive site, and are not considered to be significant. Erosion control and revegetation techniques, as recommended by BLM and SCS, would be instituted.

4.4.3 Water Resources

Surface Water. No surface water occurs in the immediate vicinity of the Section 23 Alterntaive. The site does not lie in a 100-year floodplain. A facility located at the Section 23 site would not impact nearby surface water.

The Great Salt Lake is located approximately 25 miles east of the Section 23 site. Spills near the facility would not affect the Great Salt Lake. As in the case of the Clive site, the potential for a spill along the 7-mile stretch of I-80 that lies within 0.5 mile of the Great Salt Lake is minimal. In addition, air emissions predicted by modeling efforts (see Section 4.2.1) indicate the Great Salt Lake would not be significantly impacted by stack emissions.

Groundwater. Records from the State Engineer's office indicate that there are no existing wells within 0.5 mile of the Section 23 site. USPCI has not applied for a permit to drill a well at the Section 23 site. An official determination on the impacts of a well at this site or in the Cedar Mountains would have to be made by the State Engineer at the time of permit approval.

As in the case of the Clive site, spills along the access road could reach soil beside the pavement and begin to penetrate the subsurface. It is estimated that approximately 0.05 spills could occur along the access road leading to the Section 23 site during the life of the project. This represents one spill every 600 years and is a low probability.

4.4.4 Biological Resources

Construction, operation, and closure-related impacts to plant and animal species for the Section 23 Alternative would be similar to those discussed in Section 4.2.4 for the Clive Alternative. Construction of the facility and the utilities, access roads, and railroad ROWs to the Section 23 site would affect only the desert shrub/saltbush vegetation community. Facility construction would remove a total of 45 acres; ROWs construction would remove approximately 25.9 acres for the utilities, 16.8 acres for upgraded and new access roads, and 3.0 acres for the railroad spur. Total disturbance would be approximately 91 acres. See Table 4-9 for expected concentrations of toxic contaminants for the Section 23 site; no detrimental effects are anticipated from these emissions. The Section 23 Alternative would have no significant impacts on biological resources.

4.4.5 Transportation

Impacts associated with the Section 23 Alternative would be similar to those discussed in Section 4.2.5 for the Clive site. The Section 23 Alternative would have no significant impacts on transportation.

4.4.6 Socioeconomics

Impacts associated with the Section 23 Alternative would be the same as those discussed in Section 4.2.6 for the Clive Alternative. The Section 23 Alternative would have no significant impacts on socioeconomics.

4.4.7 Land Use, Grazing, Recreation, and Wilderness

Construction, operation, and closure-related impacts for the Section 23 Alternative would be the same as those discussed in Section 4.2.7 for the Clive site. Construction for the Section 23 Alternative, however, would remove 0.0718 AUMs per acre from the Skull Valley and Aragonite Grazing Allotments (20,466 total AUMs/284,850 total acres). Approximately 4.6 AUMs total would be lost; 3.2 AUMs for the facility; 1.2 AUMs for new or upgraded access roads, and 0.2 AUM for the railroad spur. The total AUMs would only be affected on the developed areas (e.g., the facility site and ROWs). USPCI would explore the possibility of allowing grazing use on land not developed for their operations. However, the BLM would lose approximately $_____ annually in grazing revenue because the entire section of land (Sections 23) would now be under private ownership. This would minimally affect the current grazing allotment. The Section 23 Alternative would have no significant impacts on land use, grazing, recreation, the Cedar Mountains WSA, or the Bonneville Salt Flats ACEC.

4.4.8 Visual Resources

Impacts associated with the Section 23 Alternative would be similar to those discussed in Section 4.2.8 for the Clive site. Visual contrast analyses were conducted for key observation points on I-80 outward to the Section 23 site. This site would be highly visible from I-80; however, development of the proposed waste treatment facility would not result in a significant increase in visual contrast. As at the Clive site, the proposed facility would contrast with the natural visual environment, especially because of the 100-foot stack and strong geometric forms of the storage tanks. These would introduce unnatural forms and a strong vertical line into the predominantly horizontal visual character of the site. However, other project facilities would mimic the horizontal site character. This repeat of natural visual elements combined with the existing tailings piles and structures at the Enviro-Care site to the west and the Aragonite mill to the east, the distance from the key observation points to the site (approximately 2 miles), and the design of linear facilities to minimize disruption would effectively reduce visual contrast from the facility to a level that would be acceptable under VRM objectives for Class IV areas. The Section 23 Alternative would have no significant impacts on visual resources.

4.4.9 Cultural Resources

As described for the Clive site (Section 4.2.9), most of the direct impact areas associated with the project have not been inventoried for cultural resources and the possibility remains that as-yet-unrecorded sites would be adversely affected. The probability of encountering significant cultural resources is assessed as low for the Section 23 site and all associated facilities. Any sand dunes or fossil shoreline should be regarded as sensitive areas for cultural resources.

4.4.10 Health and Safety

Impacts associated with the Section 23 Alternative would be similar to those discussed in Section 4.2.10 for the Clive site. Members of the general public potentially at the greatest risk of exposure are the populations of towns closest to the facility (Grantsville - 33 miles, Tooele - 43 miles, Wendover - 51 miles, and Salt Lake City - 63 miles), as well as incidental population along the transportation route. Air dispersion modeling (Section 4.2.1) has shown that emissions of chlorine, PCBs, dioxins/furans, and phosgene would fall within acceptable limits. Therefore, the impact of stack gases from the incinerator on nearby communities is not significant. The only potential significant impact arising from normal operations could be the exposure of emergency response personnel and bystanders to toxic waste shortly after a spill. Quick response time and availability of trained personnel to handle such situations should minimize the impact. The Section 23 Alternative would have no significant impacts on health and safety arising from construction or closure.

4.5 No Action Alternative

Under the No Action Alternative, BLM would not issue the ROWs nor proceed with the land exchange necessary for USPCI to develop its industrial and hazardous waste treatment facility as proposed. Without these approvals, the project would not go forward. USPCI would have the option of locating the facility on a site that did not involve public land and proceeding with the project, subject to the approval of other permitting agencies.

Should the project not go forward, there would still be a need to identify and develop safe management options for the treatment, storage, and disposal of hazardous wastes in the State of Utah. If environmentally sound hazardous waste facilities are not available to effectively manage the hazardous wastes produced by the many industries of the state (approximately 400 major generators and another 300+ small quantity generators), the state's economic activity could be hampered, and public health and the environment could be threatened by increased illegal disposal and use of outmoded disposal practices. Pursuant to the Superfund Amendments Reauthorization Act of 1986 (SARA - Title III), each state must certify by November 1989 that it has adequate capacity to dispose of its own wastes for the next 20 years. The USPCI facility would serve part of this need.

The No Action Alternative would not prohibit the transportation of hazardous materials and wastes in the state of Utah. The transportation infrastructure to serve the region has long been in place and has been a source of attracting industry. Hazardous materials are being transported which, if derailed or involved in a highway accident, become hazardous waste. Hazardous wastes are also formed as residuals from the usage of hazardous materials. Generators have estimated that 20 times more hazardous material is shipped to their plants as part of the manufacturing process than is shipped out as hazardous waste (NDCNR 1986).

4.6 Cumulative Impacts

Cumulative impacts that would result from concurrent operation of the USPCI facility, the existing Enviro-Care facility, and the proposed Aptus industrial and hazardous waste treatment facility were analyzed for the areas of air quality, water resources, transportation, and socioeconomics (see Section 2.6).

4.6.1 Air Quality

Cumulative air quality impacts between all air emission sources near the proposed USPCI incinerator were evaluated using the ISC, COMPLEX I, and WYNDVALLEY models, as described earlier. Emission sources explicitly included in this analysis were USPCI, the proposed Aptus waste incinerator at Aragonite, and the Radiation, Safety, and Nuclear operations at the Vitro tailings disposal site near Clive. Aptus emissions data were taken from a recently filed "Notice of Intent" for a construction and operation permit filed with the Utah Bureau of Air Quality (UBAQ) and Vitro emissions were provided based on the current air quality permit by UBAQ. No other emission sources were explicitly included in the cumulative analysis, owing to either their small emissions or distance from the USPCI alternate sites.

The maximum cumulative impacts for the various air pollutants studied are given in Table 4-10 for the Clive site, Table 4-11 for the Grassy Mountain site, and Table 4-12 for the Section 23 site. Predicted impacts are below the established significance criteria for all pollutants at all sites.

At the Clive site, interactive effects of gaseous criteria pollutants (SO_2, NO_x, CO) show only small impacts, at most only a few percent of the NAAQS. Particulate impacts show values at about 25 to 45 percent of the PM-10 NAAQS. This impact occurs near the Vitro tailings disposal site, and is related primarily to Vitro operations. All Vitro particulate emissions were assumed to be in the PM-10 fraction for this comparison. Air toxics impacts from the combined USPCI and Aptus operations were also shown to be within established criteria, ranging from about 15 to 50 percent of the significant impact thresholds for the various pollutants. The location of the impacts maximum for gaseous pollutants is predicted to occur along the foothills of the Cedar Mountains, along a trajectory that would allow for simultaneous impacts from USPCI and Aptus. Aptus is the dominant contributor to these impacts owing to its proximity to the worst-case impact location. Near the Clive site, where USPCI impacts are dominant, maximum combined effects are lower.

The Section 23 Alternative produces results similar to the Clive alternative, but slightly higher. The higher combined effects are due to the closer proximity of Aptus and USPCI for the Section 23 Alternative. For criteria pollutants, combined impacts are at most a few percent of the NAAQS, except for particulate which comes in at about 22 percent of the NAAQS. Like the Clive site, Vitro tailings operations make up the

TABLE 4-10

MAXIMUM AIR QUALITY IMPACTS FOR THE CLIVE ALTERNATIVE - ALL SOURCES

Pollutant	Averaging Time	Predicted Maximum Concentration ($\mu g/m^3$)	Receptor Location (UTM) East	North	Elevation (ft)	NAAQS or Significance Conc. ($\mu g/m^3$)	% of Criteria
NO_2	Annual	2.8	332.881	4510.353	4,720	100	3
SO_2	3-hour	39.5	332.523	4510.222	4,680	1,300	3
	24-hour	7.7	333.172	4510.458	4,760	365	2
	Annual	1.4	332.881	4510.353	4,720	80	2
CO	1-hour	42.9	332.881	4510.353	4,720	40,000	<1
	8-hour	11.4	333.172	4510.458	4,760	10,000	<1
Particulate	24-hour	66.1	321.450	4505.100	4,265	150	44
	Annual	13.5	321.269	4506.126	4,265	50	27
HCl	8-hour	19.2	333.172	4510.458	4,760	70	27
Chlorine	1-hour	7.5	332.881	4510.353	4,720	30	25
	8-hour	2.0	333.172	4510.458	4,760	15	13
PCB's	1-hour	.02	332.881	4510.353	4,720		
	8-hour	.004	333.172	4510.458	4,760	0.024	17
	Annual	$3x10^{-4}$	332.881	4510.353	4,720	0.002	14
Dioxins/Furans	Annual	$5x10^{-9}$	332.881	4510.353	4,720	$4x10^{-8}$	13
Pentachlorophenol	8-hour						
Beryllium	8-hour	.001	333.172	4510.353	4,720	0.002	52

Table 4-11 *Maximum Air Quality Impacts for the Grassy Mountain Alternative – All Sources*

Pollutant	Averaging Time	Predicted Max Concentration (ug/m³)	Receptor Location (UTM) East	North	Elevation (ft)	NAAQS or % of Sig. Conc. Criteria
NO_2	Annual	3.2	332.534	4509.480	4800	100
SO_2	3-hour	70.8	333.684	4510.194	4880	1,300
	24-hour	21.0	333.010	4509.205	4880	365
	Annual	1.6	332.534	4509.480	4800	80
CO	1-hour	60.8	333.497	4510.290	4840	40,000
	8-hour	24.7	333.684	4510.194	4880	10,000
Particulate	24-hour		333.010	4509.205	4880	150
	Annual		332.534	4509.480	4800	50
HCL	8-hour	41.6	333.684	4510.194	4880	70
Chlorine	1-hour	10.7	333.497	4510.290	4840	30
	8-hour	4.3	333.684	4510.194	4880	15
PCB's	1-hour	0.02	333.497	4510.290	4840	
	8-hour	0.009	333.684	4510.194	4880	0.024
	Annual	3×10^{-4}	332.534	4509.480	4800	0.002
Dioxins/Furans	Annual	9×10^{-9}	332.534	4509.480	4800	4×10^{-8}
Pentachlorophenol	8-hour	0.3	333.684	4510.194	4880	
Beryllium	8-hour	0.002	333.684	4510.194	4880	0.002

Table 4-12 Maximum Air Quality Impacts for the Section 23 Alternative - All Sources

Pollutant	Averaging Time	Predicted Max Concentration (ug/m³)	Receptor Location (UTM) East	Receptor Location (UTM) North	Elevation (ft)	NAAQS or Sig. Conc.	% of Criteria
NO_2	Annual	4.26	332.80	4510.15	4760	100	
SO_2	3-hour	62.4	333.642	4510.294	4840	1300	
	24 hour	13.7	333.228	4510.228	4800	365	
	Annual	2.1	332.803	4510.153	4760	80	
CO	1-hour	54.8	332.357	4511.271	4680	40 000	
	8-hour	21.9	333.642	4510.294	4840	10 000	
Particulate	24 hour		333.228	4510.228	4800	150	
	Annual		332.803	4510.153	4760	50	
HCL	8-hour	36.9	333.642	4510.294	4840	70	
Chlorine	1-hour	9.5	332.357	4511.271	4680	30	
	8-hour	3.8	333.642	4510.294	4840	15	
PCB's	1-hour	0.02	332.357	4511.271	4680		
	8-hour	0.008	333.642	4510.294	4840	0.024	
	Annual	4×10^{-4}	332.803	4510.153	4760	0.002	
Dioxins/Furans	Annual	7×10^{-9}	332.803	4510.153	4760	4×10^{-8}	
Pentachlorophenol	8-hour	0.4	318.530	4517.470	4697		
Beryllium	8-hour	0.002	333.642	4510.294	4840	0.002	

majority of the impact. For air toxics, predicted concentrations range from about 10 to 50 percent of the significance criteria established for this work, except for beryllium, whose predicted combined effects are right at the threshold level. However, please note that for the predicted beryllium impacts to be present, both Aptus and USPCI must be at their peak beryllium emissions and this period must be coincident with the worst-case meteorology. The joint probability of all three events occurring simultaneously is judged to be rare, so the risk from impact of high beryllium concentrations is not significant.

For Grassy Mountain, combined impacts are comparable to the Section 23 site, but higher than for the Clive site. The results of greater interaction between USPCI and Aptus under the Grassy Mountain Alternative compared to the Clive Alternative is most probably explained by the prevailing wind patterns which align Aptus and Grassy Mountain much more frequently than Aptus and Clive. Even though, combined impacts for the criteria pollutants are quite small, at 10 percent or less compared to the NAAQS. For air toxics, most impacts range between about 20 and 60 percent of the significance criteria. An exception would be for beryllium, whose impacts are predicted to be at the level of significance criteria. However, as explained above, the joint probability of the worst-case occurrence for beryllium emissions is very small; thus, the risk of high beryllium exposures is not significant.

Combined impacts of air toxics at various sensitive receptors are given for each alternative in Tables 4-13, 4-14, and 4-15. Sensitive receptors include population centers such as Salt Lake City, Tooele, Grantsville, Wendover, and Dugway as well as ecologically sensitive locations such as Fish Springs National Wildlife Refuge and the Stansbury and Cedar Mountains wilderness study areas (see Map 4-1). Impacts at all sensitive locations are far below the threshold impact levels. In addition, most sensitive receptors show little variation between the alternatives.

4.6.2 Water Resources

Operation of both the USPCI facility and the Aptus facility would increase the number of trucks hauling hazardous wastes on I-80. This would increase the probability of a spill of wastes into a sensitive

TABLE 4-13

AIR QUALITY IMPACTS AT SENSITIVE RECEPTORS: CLIVE-CONCENTRATIONS ($\mu g/m^3$) - ALL SOURCES

Location	Hydrogen Chloride	Chlorine		PCB's		Furans	Dioxins/ Pentachlorophenol	Beryllium
	8-hour	1-hour	8-hour	8-hour	Annual	Annual	8-hour	8-hour
Significance Concentration	70	30	15	0.024	0.002	$4x10^{-8}$	5	0.002
Pronghorn Fawning Area	0.8	0.3	0.1	$2x10^{-4}$	$7x10^{-6}$	$1x10^{-10}$	.01	$5x10^{-5}$
Timpie Springs	0.4	0.2	0.1	$9x10^{-5}$	$2x10^{-6}$	$4x10^{-11}$	.009	$2x10^{-5}$
Quincy Springs	0.9	0.3	0.1	$2x10^{-4}$	$1x10^{-5}$	$2x10^{-10}$	.03	$5x10^{-5}$
Knolls	0.1	0.1	0.01	$2x10^{-5}$	$7x10^{-7}$	$1x10^{-11}$	.002	$5x10^{-6}$
Aragonite Mine	10.1	1.9	1.1	.002	$8x10^{-5}$	$1x10^{-9}$	.06	$5x10^{-4}$
Marblehead Plant	1.5	0.4	0.2	$3x10^{-4}$	$7x10^{-6}$	$1x10^{-10}$	.03	$8x10^{-5}$
Stansbury Island	0.7	0.2	0.1	$2x10^{-4}$	$3x10^{-6}$	$4x10^{-11}$	.01	$4x10^{-5}$
Delle	1.0	0.5	0.1	$2x10^{-4}$	$3x10^{-6}$	$6x10^{-11}$	.02	$5x10^{-5}$
Downtown Salt Lake City	0.2	0.1	0.02	$5x10^{-5}$	$6x10^{-7}$	$1x10^{-11}$	.007	$1x10^{-5}$
Grantsville	0.6	0.3	0.1	$1x10^{-4}$	$2x10^{-6}$	$4x10^{-11}$	.02	$3x10^{-5}$
Tooelle	0.3	0.1	0.03	$6x10^{-5}$	$2x10^{-6}$	$2x10^{-11}$	.007	$2x10^{-5}$
Wendover	0.2	0.2	0.02	$5x10^{-5}$	$6x10^{-7}$	$1x10^{-11}$	.005	$1x10^{-5}$
Dugway	0.6	0.1	0.07	$1x10^{-4}$	$3x10^{-6}$	$6x10^{-11}$	.01	$3x10^{-5}$
Skull Valley Reservoir	0.5	0.1	0.05	$10x10^{-5}$	$4x10^{-6}$	$8x10^{-11}$	.02	$2x10^{-5}$
Western Salt Lake Valley	0.2	0.2	0.02	$4x10^{-5}$	$8x10^{-7}$	$2x10^{-11}$	.006	$9x10^{-6}$
Fish Spring NWR	0.2	0.1	0.02	$5x10^{-5}$	$9x10^{-7}$	$2x10^{-11}$	.004	$1x10^{-5}$
Puddle Valley Antelope	0.9	0.4	0.09	$2x10^{-4}$	$7x10^{-6}$	$1x10^{-10}$	.02	$5x10^{-5}$
North Skunk Ridge Well	0.3	0.1	0.04	$7x10^{-5}$	$5x10^{-6}$	$8x10^{-11}$	.01	$2x10^{-5}$
Aragonite Mill	5.1	2.0	0.5	.001	$1x10^{-4}$	$2x10^{-9}$	.08	$3x10^{-4}$
Cedar Mountains WSA	5.3	1.0	0.6	.001	$3x10^{-5}$	$6x10^{-10}$	.04	$3x10^{-4}$
American Salt	0.4	0.2	0.04	$8x10^{-5}$	$2x10^{-6}$	$4x10^{-11}$	.01	$2x10^{-5}$
Vitro	2.2	0.9	0.2	$4x10^{-4}$	$1x10^{-5}$	$2x10^{-10}$	.07	$1x10^{-4}$
Aptus	1.8	1.0	0.2	$4x10^{-4}$	$7x10^{-6}$	$1x10^{-10}$	.06	$10x10^{-5}$
Amax Ponds	1.1	0.6	0.1	$2x10^{-4}$	$2x10^{-5}$	$4x10^{-10}$	.04	$6x10^{-5}$
Saltaire	0.2	0.2	0.02	$4x10^{-5}$	$8x10^{-7}$	$1x10^{-11}$	.005	$1x10^{-5}$
Stansburg WSA	1.0	0.1	0.1	$2x10^{-4}$	$2x10^{-6}$	$4x10^{-11}$	.02	$6x10^{-5}$
Grassy Mountain Landfill	0.8	0.5	0.1	$2x10^{-4}$	$2x10^{-5}$	$4x10^{-10}$	.03	$4x10^{-5}$
Stansbury Park	0.5	0.2	0.1	$1x10^{-4}$	$1x10^{-6}$	$2x10^{-11}$	.01	$3x10^{-5}$
Sol-Acre Ponds	0.5	0.3	0.1	$1x10^{-4}$	$2x10^{-6}$	$4x10^{-11}$	.01	$3x10^{-5}$
I-80 View Pt. W. Bnd	3.6	1.0	0.4	$8x10^{-4}$	$1x10^{-4}$	$2x10^{-9}$	.05	$2x10^{-4}$
I-80 View Pt. E. Bnd	2.9	0.8	0.3	$6x10^{-4}$	$8x10^{-5}$	$1x10^{-9}$	.05	$2x10^{-4}$
Interstate 80	2.4	1.1	0.35	$5x10^{-4}$	$5x10^{-5}$	$1x10^{-9}$	.08	$1x10^{-4}$

Table 4-14 Air Quality Impacts at Sensitive Receptors: Grassy Mountain - Concentration ($\mu g/m^3$) - All Sources

Location		Hydrogen Chloride	Chlorine		PCB'S			Dioxins/Furans	Pentachlorophenol	Beryllium
		8-hour	1-hour	8-hour	1-hour	8-hour	Annual	Annual	8-hour	8-hour
Pronghorn Fawning Area	C	0.8	0.2	0.08	5×10^{-4}	2×10^{-4}	7×10^{-6}	8×10^{-11}	0.01	4×10^{-5}
Timpie Springs	I	0.7	0.2	0.07	5×10^{-4}	1×10^{-4}	2×10^{-6}	2×10^{-12}	0.02	4×10^{-5}
Quincy Springs	C	0.9	0.3	0.09	5×10^{-4}	2×10^{-4}	1×10^{-5}	1×10^{-10}	0.03	5×10^{-5}
Knolls	I	0.07	0.05	0.007	1×10^{-4}	1×10^{-5}	7×10^{-7}	6×10^{-12}	0.002	4×10^{-6}
Aragonite Mine	C	1.0	2.0	1.1	.004	.002	8×10^{-5}	1×10^{-9}	0.07	6×10^{-4}
Marblehead Plant	C	0.8	0.3	0.08	6×10^{-4}	2×10^{-4}	7×10^{-6}	8×10^{-11}	0.009	4×10^{-5}
Stansbury Island	C	0.5	0.1	0.05	2×10^{-4}	1×10^{-4}	2×10^{-6}	2×10^{-11}	0.005	3×10^{-5}
Delle	I	0.7	0.5	0.07	.001	1×10^{-4}	3×10^{-6}	2×10^{-11}	0.02	4×10^{-5}
Dntn Salt Lake City	I	0.2	0.1	0.02	2×10^{-4}	4×10^{-5}	7×10^{-7}	4×10^{-12}	0.006	1×10^{-5}
Grantsville	I	0.5	0.3	0.06	6×10^{-4}	1×10^{-4}	2×10^{-6}	2×10^{-11}	0.01	3×10^{-5}
Tooele	C	0.3	0.09	0.03	2×10^{-4}	7×10^{-5}	2×10^{-6}	2×10^{-11}	0.006	2×10^{-5}
Wendover	I	0.3	0.2	0.03	4×10^{-4}	6×10^{-5}	5×10^{-7}	4×10^{-12}	0.008	2×10^{-5}
Dugway	C	0.5	0.1	0.05	2×10^{-4}	1×10^{-4}	3×10^{-6}	2×10^{-11}	0.009	3×10^{-5}
Skull Valley Resv.	C	0.5	0.1	0.05	2×10^{-4}	1×10^{-4}	4×10^{-6}	4×10^{-11}	0.009	3×10^{-5}
Wstrn Slt Lk Valley	I	0.4	0.1	0.04	3×10^{-4}	7×10^{-5}	8×10^{-7}	6×10^{-12}	0.009	2×10^{-5}
Fish Spring NWR	I	0.2	0.1	0.02	2×10^{-4}	3×10^{-5}	9×10^{-7}	6×10^{-12}	0.004	8×10^{-6}
Puddle Valley Antlp	I	1.1	0.6	0.1	.001	2×10^{-4}	6×10^{-6}	6×10^{-11}	0.03	6×10^{-5}
Nrth Skull Rdg Well	C	0.7	0.1	0.07	3×10^{-4}	1×10^{-4}	5×10^{-6}	4×10^{-11}	0.02	3×10^{-5}
Aragonite Mill	C	5.1	2.0	0.5	.004	1×10^{-3}	1×10^{-4}	9×10^{-8}	0.04	3×10^{-4}
Cedar Mtns WSA	C	5.6	1.1	0.6	.002	1×10^{-3}	3×10^{-5}	4×10^{-10}	0.05	3×10^{-4}
American Salt	I	0.6	0.1	0.06	3×10^{-4}	1×10^{-4}	2×10^{-6}	1×10^{-11}	0.01	3×10^{-5}
Vitro	I	1.6	0.6	0.2	.001	3×10^{-4}	9×10^{-6}	1×10^{-11}	0.05	5×10^{-5}
Aptus	C	1.1	0.2	0.1	5×10^{-4}	2×10^{-4}	5×10^{-6}	2×10^{-12}	0.04	6×10^{-5}
Amax Ponds	I	0.9	0.5	0.1	.001	2×10^{-4}	6×10^{-6}	2×10^{-11}	0.03	5×10^{-5}
Salt-aire	I	0.2	0.2	0.02	3×10^{-4}	5×10^{-5}	9×10^{-7}	8×10^{-12}	0.008	1×10^{-5}
Stansbury WSA	C	0.8	0.1	0.08	3×10^{-4}	2×10^{-4}	2×10^{-6}	2×10^{-11}	0.008	4×10^{-5}
Grassy Mnt Landfill	I	1.0	0.8	0.1	.002	2×10^{-4}	3×10^{-6}	6×10^{-11}	0.03	5×10^{-5}
Stansbury Park	I	0.5	0.2	0.05	4×10^{-4}	1×10^{-4}	1×10^{-6}	8×10^{-12}	0.008	5×10^{-5}
Sol-aire Ponds	I	0.4	0.3	0.04	6×10^{-4}	9×10^{-5}	2×10^{-6}	2×10^{-11}	0.01	2×10^{-5}
I-80 View Pt. W Bnd	C	3.6	1.0	0.4	.002	8×10^{-4}	1×10^{-4}	7×10^{-9}	0.03	2×10^{-4}
I-80 View Pt. E Bnd	C	2.3	0.8	0.3	.002	6×10^{-4}	8×10^{-5}	1×10^{-9}	0.04	2×10^{-4}
Interstate 80		1.4	0.7	0.1	.001	3×10^{-4}	1×10^{-5}	2×10^{11}	0.04	7×10^{5}

Table 4-15 Air Quality Impacts at Sensitive Receptors: Section 23 - Concentration (ug/m³) - All Sources

	Hydrogen Chloride	Chlorine		PCB's			Dioxins/Furans	Pentachlorophenol	Beryllium
Location	8-hour	1-hour	8-hour	1-hour	8-hour	Annual	Annual	8-hour	8-hour
Pronghorn Fawning Area	0.1	0.4	0.1	8×10^{-4}	2×10^{-4}	8×10^{-6}	8×10^{-11}	0.01	5×10^{-5}
Timpie Springs	0.5	0.4	0.05	8×10^{-4}	1×10^{-4}	2×10^{-6}	2×10^{-11}	0.01	3×10^{-5}
Quincy Springs	0.08	0.3	0.08	5×10^{-4}	2×10^{-4}	1×10^{-5}	8×10^{-11}	0.01	4×10^{-5}
Knolls	0.1	0.07	0.01	1×10^{-4}	3×10^{-5}	7×10^{-7}	6×10^{-12}	0.004	7×10^{-6}
Aragonite Mine	10.6	1.9	1.1	0.004	0.002	8×10^{-5}	1×10^{-9}	0.09	6×10^{-4}
Marblehead Plant	1.4	0.4	0.1	9×10^{-4}	3×10^{-4}	8×10^{-6}	8×10^{-11}	0.03	8×10^{-5}
Stansbury Island	0.8	0.2	0.08	3×10^{-4}	2×10^{-4}	3×10^{-6}	2×10^{-11}	0.01	4×10^{-5}
Delle	1.1	0.5	0.1	0.001	2×10^{-4}	4×10^{-6}	4×10^{-11}	0.02	6×10^{-5}
Dntn Slt Lk City	0.2	0.2	0.02	3×10^{-4}	5×10^{-5}	7×10^{-7}	6×10^{-12}	0.005	1×10^{-5}
Grantsville	0.4	0.3	0.04	6×10^{-4}	8×10^{-5}	2×10^{-6}	2×10^{-11}	0.01	2×10^{-5}
Tooele	0.3	0.1	0.03	2×10^{-4}	6×10^{-5}	2×10^{-6}	2×10^{-11}	0.006	2×10^{-5}
Wendover	0.3	0.2	0.03	4×10^{-4}	5×10^{-5}	6×10^{-7}	4×10^{-12}	0.007	1×10^{-5}
Dugway	0.6	0.1	0.06	2×10^{-4}	1×10^{-4}	3×10^{-6}	2×10^{-11}	0.01	3×10^{-5}
Skull Valley Resv.	0.9	0.1	0.10	3×10^{-4}	2×10^{-4}	5×10^{-6}	4×10^{-11}	0.02	5×10^{-5}
Wstrn Slt Lk Valley	0.2	0.2	0.02	4×10^{-4}	5×10^{-5}	9×10^{-7}	6×10^{-12}	0.005	1×10^{-5}
Fish Spring NWR	0.4	0.1	0.04	3×10^{-4}	8×10^{-5}	9×10^{-7}	6×10^{-12}	0.009	2×10^{-5}
Puddle Valley Antlp	0.9	0.4	0.09	8×10^{-4}	2×10^{-4}	7×10^{-6}	6×10^{-11}	0.02	5×10^{-5}
Nrth Sknk Rdg Well	1.2	0.6	0.1	0.001	3×10^{-4}	7×10^{-6}	4×10^{-11}	0.04	6×10^{-5}
Aragonite Mill	5.1	2.0	0.5	0.004	0.001	1×10^{-4}	2×10^{-9}	0.1	3×10^{-4}
Cedar Mts WSA	5.6	1.0	0.6	0.002	0.001	3×10^{-5}	4×10^{-10}	0.08	3×10^{-4}
American Salt	0.4	0.2	0.04	5×10^{-4}	8×10^{-5}	2×10^{-6}	2×10^{-11}	0.009	2×10^{-5}
Vitro	0.8	0.6	0.08	0.001	2×10^{-4}	4×10^{-6}	1×10^{-11}	0.03	4×10^{-5}
Aptus	5.3	1.1	0.5	0.002	0.001	2×10^{-5}	8×10^{-12}	0.02	3×10^{-4}
Amax Ponds	0.6	0.4	0.06	8×10^{-4}	1×10^{-4}	4×10^{-6}	2×10^{-11}	0.02	3×10^{-5}
Saltaire	0.3	0.2	0.03	4×10^{-4}	7×10^{-5}	9×10^{-7}	8×10^{-12}	0.009	2×10^{-5}
Stansbury WSA	1.2	0.2	0.1	3×10^{-4}	2×10^{-4}	3×10^{-6}	2×10^{-11}	0.02	6×10^{-5}
Grassy Mnt Landfill	1.1	0.5	0.1	10×10^{-4}	2×10^{-4}	2×10^{-5}	6×10^{-11}	0.03	6×10^{-5}
Stansbury Park	0.8	0.2	0.08	4×10^{-4}	2×10^{-4}	1×10^{-6}	8×10^{-12}	0.02	4×10^{-5}
Sol-aire Ponds	0.6	0.3	0.06	6×10^{-4}	1×10^{-4}	3×10^{-6}	2×10^{-10}	0.01	3×10^{-5}
I-80 View Pt WBnd	3.8	1.1	0.4	0.002	8×10^{-4}	2×10^{-4}	2×10^{-8}	0.1	2×10^{-4}
I-80 View Pt EBnd	3.4	0.8	0.3	0.002	7×10^{-4}	9×10^{-5}	1×10^{-9}	0.1	2×10^{-4}
Interstate 80	4.1	2.5	0.4	0.005	8×10^{-4}	7×10^{-5}	2×10^{-9}	0.1	2×10^{-4}

surface water resource in the event of an accident. The matrix below presents the cumulative number of spills for both the USPCI and Aptus projects using each project's trucking volume and spill frequency. Even with both facilities in operation, the potential number of spills at a single sensitive resource over the 30-year life of the projects would range between 0.003 and 0.079 depending on the length of resource exposed (1 to 4 miles, respectively). This is felt to be a minimal risk to surface waters.

		Area of Exposure (miles of roadway at risk)		
		1	2	4
Traffic Volume (trucks per day)	2.0	0.0035	0.0070	0.0141
	6.0	0.0105	0.0210	0.0421
	11.0	0.0197	0.0394	0.0789

Cumulative impact analysis for groundwater focused on the combined process water demands at the USPCI Clive site or the USPCI Section 23 site (assumed to use the same well location in the Cedar Mountains) and the Aptus site at Aragonite in terms of effects on the aquifer and existing wells in the area. USPCI and Aptus have estimated their process water usage needs at approximately 300 gpm and 200 gpm, respectively. Aptus has already drilled a well, and USPCI would need to drill a well. A well permit is required from the State Engineer. In granting approval for such a permit, the State Engineer will evaluate potential cumulative impacts resulting from the USPCI water supply well on the existing Aptus well. If there could be cumulative impacts on the existing well or the aquifer, the State Engineer would not approve USPCI's proposed well location. Thus, no cumulative impacts are anticipated to the groundwater resources.

4.6.3 Transportation

Cumulative impacts to transportation would be related primarily to an increase in the number of trucks and rail cars, and an increase in the number of spills of hazardous materials (including hazardous wastes) from trucks and trains transporting materials to both the Aptus and USPCI incinerators, and radioactive material to the Enviro-Care facility. For the purpose of this cumulative impact assessment, it was assumed that 5 rail cars per week make deliveries to the Enviro-Care facility (no truck deliveries). (Terry Catlin [BLM] to confirm).

According to the proposed plans of operation for the USPCI and Aptus incinerators, there will be a total of 17 truck deliveries per day (8 trucks per day for USPCI versus 9 for Aptus). Consequently, using the spill frequencies calculated for USPCI and Aptus, in all areas over the life of the projects, a total of 19.6 accidents resulting in spills are projected. The number of these total potential accidents resulting in spills in Utah over the life of the facility would be 2.77 or one spill every 10.8 years. This averages out to be 0.09 potential accidents per year resulting in spills in Utah. The average number of exposures to hazardous materials (including hazardous wastes) resulting from truck accidents in the State of Utah for the years 1984 to 1988 was 46 per year (Table 4-7). Consequently, 0.09 potential accidents per year represents 0.2 percent potential increase over existing levels and does not exceed the 2 percent significance criteria used in this EIS.

The number of potential accidents resulting in spills in the State of Nevada over the life of the facility would be 7.9 or one spill every 3.8 years. This averages out to be 0.3 potential accidents per year resulting in spills in Utah. The average number of reported exposures to hazardous materials (including wastes) resulting from truck accidents in Nevada for the years 1984 to 1988 was 17.8 per year (Gainie 1989) (Table 4-7). Consequently, 0.3 potential accidents per year represents a 1.7 percent potential increase over existing levels and does not exceed the 2 percent significance criteria used in this EIS.

The cumulative impact to traffic flow and roadway deterioration on I-80 is not expected to be significant based on the proposed low volume of additional truck traffic.

It is estimated that there will be a total of 49 rail cars per week added to Union Pacific's tracks west of Salt Lake City (42 rail cars per week for USPCI; 2 for Aptus; and 5 for Enviro-Care). Considering the fact that the number of trains per day on these tracks decreased from 28 to 20 per day between 1984 and 1988, the additional volume projected for these three projects is not expected to be significant. In addition, the average number of reported exposures to hazardous materials (including hazardous wastes) resulting from rail accidents in the State of Utah for the years 1984 to 1988 was 6.6 per year (Table 4-7). The proposed low volume of additional rail traffic is not expected to produce a significant increase in the potential for rail spills.

4.6.4 Socioeconomics

The cumulative impact analysis for socioeconomics focused on five areas of concern: housing; public facilities and services; population; employment; and local tax base. Cumulative impacts to housing, public facilities and services, and population are expected to be minimal and not significant assuming that most of the workforce (90 percent) is expected to be residents of Tooele County or the greater Salt Lake City metropolitan area and within comfortable commuting distance of the three project sites.

The following two assumptions were made in determining the cumulative impact to area employment: 1) Enviro-Care employs approximately 20 people (Terry Catlin [BLM] to confirm); and 2) approximately 90 percent of the workforce is expected to reside in Tooele County or the greater Salt Lake City metropolitan area. The projected 278 total resident construction workers on all three projects would represent almost 33 percent of the 1987 unemployed workforce and/or almost 76 percent of the 1987 employed construction workforce in Tooele County. In addition, the projected 189 total resident operation workers on all three projects would represent approximately 22.4 percent of the 1987 unemployed workforce and/or approximately 105.6 percent of the 1987 employed transportation, communication, and public utilities workforce in Tooele County. Thus, the cumulative impact to employment would be significant, both during construction and operation. This would be a positive impact to the area's employment.

The cumulative impact to the local tax base would be significant based on the total asset value of the USPCI and Aptus facilities at $50 million and $25 million, respectively. The estimated $75 million combined valuation of the proposed facilities would increase the total 1988 property valuation for Tooele County by approximately 12 percent, and would generate approximately $760,620 in additional property tax revenue, based on the 1988 property tax rate of 1.2677 percent for unincorporated areas. Total property valuation and property tax revenue from the Enviro-Care facility is expected to be minimal compared to the total for the USPCI and Aptus facilities and would not add significantly to the cumulative impact.

4.7 Mitigation Measures

The following mitigation measures have been developed to mitigate the significant adverse impacts that have been identified in Sections 4.2, 4.3, and 4.4. Mitigation measures will be specific requirements of USPCI as part of their ROWs grants. The measures will be enforced by a BLM Authorized Officer. For each mitigation measure presented below, the measure is outlined and its effectiveness is assessed. Not all mitigation measures will be completely effective in reducing potential significant impacts below the significance threshold. This will result in unavoidable adverse impacts that are discussed in Section 4.8. All measures would be applied to any of the three site alternatives analyzed in this document except where noted otherwise. In addition to the mitigation measures contained in this Draft EIS, the BLM will attach standard and special ROW stipulations to its ROW grant. These stipulations will contain generic measures that are applied to all ROWs as well as site-specific measures whose need may be identified at the time the ROW centerline is surveyed. The required surveys for cultural resources, for example, may identify the need for site-specific stipulations. As noted in several of the following measures, the BLM Federal Authorized Officer will direct the detailed implementation of certain mitigation measures.

Measure 1: Water Resources. In the event of a spill of organic contaminants in a shallow groundwater area penetrating to the depth of and contaminating the groundwater, alternatives for remediation will be evaluated and implemented. Methods could include a waste recovery pumping system or a recovery system coupled with a water treatment system. These could consist of pumping of the waste and/or contaminated groundwater;

followed by treatment systems such as physical separation of the water, air stripping, or carbon filtration; and finally reinjection of the treated water back into the aquifer.

Effectiveness. This measure will ensure that groundwater resources are not significantly affected by a spill of organic wastes.

Measure 2: Cultural Resources. Potential adverse impacts to cultural resources will be mitigated in the following manner. Prior to construction, an intensive Class III (100 percent) cultural resource survey will be conducted on all affected federal land that has not previously been surveyed. Survey on non-federal lands will be conducted as specified by the Authorized Officer after consultation with the State Historic Preservation Officer (SHPO). During the survey, information will be gathered on all newly discovered and previously recorded archaeological sites to determine their potential eligibility to the National Register of Historic Places. Limited testing of some sites may be necessary in order to determine their eligibility. Following the survey, an inventory report will be prepared and submitted to the BLM Authorized Officer for review and comment. The report will contain the results of the inventory, and all sites will be evaluated for potential eligibility to the National Register. The report will include a proposed mitigation plan for all sites that are considered to be potentially eligible for inclusion on the National Register. The mitigation plan may include avoidance of sites, data collection, site-specific control of access and construction, monitoring recommendations, and salvage excavation.

Based on the above mitigation plan, the Authorized Officer will submit a treatment plan to the SHPO and to the Advisory Council on Historic Preservation. Following the consultation period, the treatment plan will be implemented. All field work must be completed before construction can begin in a given area. Monitoring will be implemented during construction where required by the treatment plan. Any sites located during construction or as the result of monitoring will be evaluated and a treatment plan will be developed as needed.

Effectiveness: The cultural resources treatment plan will ensure that the data which help determine a resource's significance will not be destroyed or lost and the effects of construction and operation on cultural resources are fully considered as required by law. While implementation of the treatment plan will avoid most significant impacts to cultural resources, it may not be possible to mitigate all impacts.

Additional Mitigation Measures

The mitigation measures presented in the preceding section were developed in response to specific significant impacts that were identified earlier in this chapter. To supplement these measures, additional mitigation measures not linked to significant impacts were also developed. These measures would further reduce the overall impacts of the project and are presented below.

Measure A: Biological Resources. A site-specific Construction, Operation, and Management (COM) Plan, which describes specific construction and restoration techniques and establishes guidelines in sensitive biological areas, will be developed by USPCI and approved by the BLM prior to construction initiation.

Effectiveness. This measure will minimize impacts to vegetation and wildlife resources.

Measure B: Visual Resources. Facility structures will be painted with non-reflective paint of compatible earthtone colors.

Effectiveness. This measure will reduce the visual contrast of the proposed structures.

4.8 Unavoidable Adverse Impacts

Implementation of USPCI's standard operating procedures and the mitigation measures identified in Section 4.7 would eliminate most significant impacts that could result from the proposed project or alternatives. The unavoidable adverse impact that would remain applies to all alternatives. Significant impacts could potentially occur to emergency response personnel, bystanders, sensitive biological resources, and water resources in the event of a spill along a transportation route.

4.9 Relationship Between the Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Short-term is defined as the construction period for the project plus one year for ROW rehabilitation. Long-term is defined as the remaining life of the project through closure and reclamation. Short-term disturbances of the existing environment would be necessary to construct and operate the incineration facility. Incineration of the hazardous wastes would be beneficial in the long term, as would increased employment and revenues in the area. The possibility of accidental spills would exist for the life of the project.

4.10 Irreversible/Irretrievable Commitment of Resources

An irreversible commitment of a resource is one that cannot be changed once it occurs; an irretrievable commitment means that the resource cannot be recovered or reused. The only irreversible/ irretrievable commitment of resources that might result from the proposed project would be the disturbance of cultural resource sites which could result in the permanent loss of data.

4.11 Energy Consumption

Since the alternatives to the Proposed Action differ primarily in the location of the incinerator sites, there would be very little difference in the energy requirements of the three alternatives. Due to its greater distance from I-80 and the Union Pacific mainline, the Grassy Mountain Alternative would require slightly more energy for construction and operation than the other two alternatives, primarily for transportation. The following operational information would apply to all three alternatives. It should be noted that this information represents very rough estimates of annual energy consumption for plant operations. Electricity usage would be approximately 3,000 KWH per day, and approximately 914,000 gallons of #2 diesel fuel would be consumed annually.

CONSULTATION AND COORDINATION

5.0

5.0 CONSULTATION AND COORDINATION

Public Involvement

In the course of preparation of the Draft Environmental Impact Statement (EIS) for the USPCI Clive Incineration Facility, the Bureau of Land Management (BLM) has communicated with and received input from many federal, state, and local agencies; elected representatives; environmental and citizens groups; industries; and individuals. Many of these people participated in the public scoping meetings that were held in Salt Lake City and Tooele, Utah.

Although BLM-administered public lands are involved, the major issues of air, water, wildlife, and public health and safety most directly involve the Environmental Protection Agency (EPA) and state and county government levels. Consequently, it was essential that studies and documents prepared by BLM in compliance with the National Environmental Policy Act (NEPA), be jointly managed with the EPA, State of Utah, and Tooele County government to ensure that the responsibilities and concerns of all involved were correctly represented. It was necessary that a steering committee be established for input and guidance of the effort by field level federal and state agency representatives and Tooele County agencies and officials.

The steering committee is composed of a representative from each federal, state, and county entity which has a specific authorizing action in conjunction with the proposed project within the study area boundaries of north-central Tooele County. The function of the steering committee is advisory in nature and acts as a forum of ideas and concerns to provide guidance to the BLM, EPA, State, and Tooele County officials. The committee provides an avenue of communication and coordination between each of the concerned and involved governmental entities, assists in identifying issues and sharing data sources and analysis in support of the EIS effort, and reviews related applications for the proposed project and other documents as necessary. The steering committee reviewed or will review the Preliminary Draft, Draft, Preliminary Final, and Final EISs and subsequently provides comments to the BLM. BLM as the lead federal agency for NEPA compliance has the following basic responsibilities:

1) preparation of the EIS to comply with the requirements of NEPA, the Council of Environmental Quality (CEQ) regulations, and departmental requirements; and 2) to the extent practical and allowed by departmental requirements, prepare the EIS to meet the needs of state and county governmental entities who have major authorizing actions so as to avoid duplication of effort.

The scoping document was mailed to approximately 430 interested individuals, groups, and agencies, and was also distributed to attendees at the public scoping meetings. Subsequent to the meetings, 12 comment letters were submitted to the BLM. Six of the written comments were from private individuals, and the remainder were from agencies and groups. BLM's mailing list, updated with the results from scoping, will be used to distribute this Draft EIS. The following agencies, groups, and individuals have provided input during the preparation of the Draft EIS or requested during scoping to receive a copy of the EIS.

Federal Agencies

Department of Agriculture
- Soil Conservation Service

Department of Defense
- Hill Air Force Base

Department of Interior
- Bureau of Land Management
- Bureau of Mines
    - Geological Survey
- Fish and Wildlife Service

Department of Transportation
- Information Assistance Office

Environmental Protection Agency
- EIS Review Office
- Emergency Policy Branch

State of Utah Agencies

Bureau of Air Quality

Department of Community and Economic Development
- Division of State History

Department of Health
- Bureau of Solid and Hazardous Waste

Department of Natural Resources and Energy
- Division of State Lands and Forestry
- Division of Water Rights
- Division of Wildlife Resources

Department of Transportation
- Planning Office

Utah National Guard
Utah State Engineer
Utah State Geological and Mineral Survey
Utah State Job Service
- Labor Market Information Services Division

Utah State Tax Commission
Utah Statewide Planning Office

County Agencies

Tooele County
- Auditor's Office
- Development Services

Tooele County School District

Elected Officials

Representative Beverly J. White

Organizations

Brigham Young University
- Department of Civil Engineering

Humane Society of Utah
The Wilderness Society
Tooele County Board of Realtors
Tooele County Wildlife Federation
University of Utah
- Bureau of Economic Research and Development
- Department of Chemical Engineering
- Department of Geology and Geophysics

Utah Earthquake Information Center
Utah Native Plant Society

Industries

Amax Magnesium Co.
American Salt Co.
Aptus
Exxon Company, U.S.A.
Morton Salt Co.
Questar Pipeline Company
Union Pacific Railroad

Individuals

___ Ora Bridges
Mr. Graham R. Curtis
Mr. Joseph Hawker
Mr. Jon B. Hoogenboom
Mr. Peter Hovingh
___ Clair L. Huff
Mr. Merlin Kingston
Mr. Ton A. Netelbeek
Mr. Albert S. Paskett
Mr. Robert G. Pruitt, III
Dr. Jay G. Roundy
Mr. Gerald Stocks
Mr. Harry E. Wilson
Mr. Ken Wyatt

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GLOSSARY

Acre-foot	The volume of water required to cover 1 acre to a depth of 1 foot, hence 43,560 cubic feet.
Afterburner chamber	Chamber where waste materials are processed following kiln incineration or for liquid wastes that do not require kiln conditions for incineration.
Alluvial	Pertaining to the deposit of sedimentary material by running water.
Alluvial fan	A fan-shaped deposit formed by a stream either where it issues from a narrow mountain valley onto a plain or broad valley, or where a tributary stream joins a main stream.
Baghouse	Remaining solids from the quench tower are filtered out of the gas stream and reduced by removal equipment.
Block-faulted	A geological type of faulting in which fault blocks are displaced at different orientations and elevations.
Btu	A unit of heat energy equal to the heat needed to raise the temperature of 1 pound of air-free water from 60°F to 61°F at a constant pressure of 1 standard atmosphere.
Carbon absorber	Activated carbon as a sorbent for removing contaminants by being placed into contact with the substance to be treated, allowing the contaminated materials to separate and be collected.
Criteria pollutants	A pollutant with a National Ambient Air Quality standard, such as particulate matter, SO_2, NO_2, O_3, CO, and Pb.
Dip line	Placed within tanks of flammable materials to eliminate any spark from free-fall of a liquid.
Electrostatic particulate remover	Removal of particles from a gas by charging the particles inductively with an electric field and attracting them to highly charged collector plates.
Evaporite	Deposits remaining due to evaporation of water.
Evapotranspiration	Discharge of water from the earth's surface to the atmosphere by evaporation from lakes,

streams, and soil surfaces and by transpiration from plants.

Finger print	Initial sampling of waste materials at the facility entrance to determine if the materials meet the manifest requirements.
Flyash	Fine noncombustible particulates carried in the gas stream from the combustion of hazardous materials in the incinerator.
Gas cleaning train	The removal of pollutants or contaminants from gases following incineration.
Gas stream	The flow of gases produced from the incineration process.
Generator	Producers of industrial or hazardous wastes.
Hack site	A feeding site for future release of captive-hatched bird species to introduce individuals and encourage subsequent nesting in native habitat areas.
Hydrostatic pressure testing	The test of strength and leak-resistance of a tank or pipe by internal pressurization with a test liquid.
Induced draft fan	A mechanical draft produced by stream fans for the flow of gases through the incinerator.
Kiln	The chamber utilized for the incineration of hazardous materials.
Leachate	The fluid stream which issues from a cell of solid materials and which contains water, dissolved solids, and decomposition products of the solids.
Marino bag	A bag utilized for containment of soil and debris, measuring 1 cubic yard and made of Tyvek® material.
Nitrogen blanket	Used to surround tanks of flammable materials to prevent ignition or reactions.
Overpack	An 85-gallon drum used to enclose a 55-gallon drum that has potential leakage.
Particulates	See total suspended particulates.
pH	A measure of acidity; equal to the negative logarithm of the hydrogen ion concentration.

Pneumatic conveyors	A conveyor which transports dry, free-flowing, granular material by means of a high-velocity airstream or by pressure of a vacuum generated by air compression.
Quench tower	An area where a neutralized scrubbing solution cools the hot gases and dries dissolved solids to form dry crystalline solids.
Refractory	A material of high melting point.
Rubblized	To break into rough, broken pieces or rubble.
Siliceous	Describing a rock containing abundant silica.
Slag	A product resulting from the interaction of flux and impurities during the incineration process.
Slagging rotary kiln	Rotating incineration chamber designed to release an average of 80 million Btu/hour for waste material destruction.
Sludge	Semisolid waste from a chemical process.
Slurry	A free-flowing pumpable suspension of fine solid material in liquid.
Soda ash	The commercial grade of sodium carbonate used in the spray tower neutralization tank to maintain close pH control.
Spray dryer	A machine for drying an atomized mist by direct contact with hot gases.
Sump	A pit or tank which receives and temporarily stores drainage at the lowest point of a circulating or draining system.
Total suspended particulates	Fine solid particles which remain individually dispersed in gases and stack emissions.
Trial burn	As required under RCRA and TSCA to demonstrate the incineration efficiency of waste materials at different temperatures; the performance test which establishes the operating conditions and parameters that appear in the final TSCA approval/RCRA permit.
Tyvek^{R} suit	Protective clothing worn to prevent contamination from hazardous materials.

Water bars	Erosion technique used on roads to minimize topsoil erosion.
Wet scrubber	For removal of adid mists/aerosols from process gas streams.

ABBREVIATIONS AND ACRONYMS

AADT	annual average daily traffic
ACGIH	American Conference of Governmental Industrial Hygienists
AMAX	Amax Magnesium Corporation
API	American Petroleum Institute
ARAR	applicable or relevant and appropriate requirements
ATV	All Terrain Vehicle
AUM	Animal Unit Month
BACT	Best Available Control Technology
BLM	Bureau of Land Management
BP	before present
Btu	British thermal unit
CBO	Congressional Budget Office
CERCLA	Comprehensive Environmental Response, Comprehension, and Liability Act
Cl_2	chlorine
cm^2	square centimeters
CO	carbon monoxide
COM Plan	Construction, Operation, and Management Plan
DOT	Department of Transportation
DRE	destruction removal efficiency
dscf	dry standard cubic foot
EIS	environmental impact statement
EPA	Environmental Protection Agency
FLPMA	Federal Land Policy and Management Act
FRP	fiber-reinforced plastic
ft^3/sec	cubic feet per second
ft	feet
gpd	gallons per day
gpm	gallons per minute
HCl	hydrogen chloride
HSWA	Hazardous and Solid Waste Act
I-80	Interstate 80
ISC	Industrial Source Complex
kg	kilogram
kV	kilovolts
lb/hr	pounds per hour
m^3	cubic meter
MCL	Maximum Contaminant Level
MFP	Management Framework Plan
mg/l	milligrams per liter
MM	million
NAAQS	National Ambient Air Quality Standards
NDCNR	Nevada Department of Conservation and Natural Resources
NEI	National Electric, Inc.
NEPA	National Environmental Policy Act
NIOSH	National Institute of Occupational Safety and Health
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NOAEL	No Observed Adverse Effect Level
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System

NWS	National Weather Service
ORV	off-road vehicle
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PIC	product of incomplete combustion
POHC	principal organic hazardous constituents
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
psi	pounds per square inch
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RSD	Risk Specific Dose
ROW	right-of-way
RSD	risk specific dose
SARA-Title III	Superfund Amendment and Reauthorization Act - Title III
SCS	Soil Conservation Service
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
STEL	short-term exposure limit
TAD	Tooele Army Depot
TCDD-2,3,7,8	tetrachlorodibenzodioxin
TLV	threshold limit value
TSCA	Toxic Substance Control Act
TSP	total suspended particulate
UDWR	Utah Division of Wildlife Resources
$\mu g/m^3$	micrograms per cubic meter
UHWMR	Utah Hazardous Waste Management Regulation
UIC	Underground Injection Control
U.S.	United States
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USFWS	U.S. Fish and Wildlife Service
USPCI	U.S. Pollution Control, Inc.
V/C	volume to capacity ratio
VMT	vehicle miles traveled
vph	vehicles per hour
VRI	Visual Resource Inventory
VRM	Visual Resource Management
WCF	waste characterization form
wg	water gage
WMA	Wildlife Management Area
WSA	Wilderness Study Area

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APPENDIX A

RESTORATION REQUIREMENTS

APPENDIX A

RESTORATION REQUIREMENTS

The following measures outline the procedures that would be used for right-of-way (ROW) restoration following construction. A site-specific Construction, Operation, and Management (COM) Plan would be developed by USPCI and approved by the Bureau of Land Management (BLM) prior to construction initiation. The COM Plan would address appropriate reclamation procedures for various locations along the project ROW, describe specific construction and restoration techniques, and establish guidelines to minimize impacts to vegetation or wildlife resources. In areas of minimal vegetative potential, specific guidelines may be waived at the discretion of the BLM Authorized Officer.

Restoration Goal

Restoration and revegetation of sites with more than 5 percent vegetal cover would be implemented to meet the following objectives:

1. Stabilize the disturbed areas to minimize soil erosion and off-site sedimentation

2. Return the disturbed areas to a pre-disturbance condition.

Site Clearing

All construction would be executed to minimize the cumulative area of disturbance, thereby reducing the total area impacted and that which would require revegetating. All woody vegetation cleared along the ROWs would be piled to the side of the ROW for later use in site preparation.

Topsoil Removal, Handling, and Storage

The surface soil material would be stripped to a minimum depth of 8 inches both from the disturbed areas during construction and from disturbed areas that would be used throughout the life of the project. The topsoil would be deposited in an area separate from all construction activities and labeled to distinguish it from other deposited earthen materials. Unsuitable materials such as large cobbles and rocks that occur in the stripped topsoil would be separated from the topsoil and backfilled into excavated areas or disposed of in other areas approved by the BLM Authorized Officer. Some disturbed areas may not contain adequate topsoil quantities for successful restoration; consequently, also at the direction of the BLM Authorized Officer, additional topsoil would be removed from areas with excess topsoil and transported to areas with deficient quantities to increase restoration potential.

Trenching, Overburden Removal, Storage, and Replacement

Materials excavated from the pipeline trench would be deposited separately from the topsoil within the ROW. Following placement of the pipeline in the trench, the trench would be backfilled. All disturbed portions of the ROW would then be regraded to meet the configuration of the adjacent undisturbed land.

Runoff and Erosion Control

The applicant would attempt to minimize disturbance to natural drainage channels. No significant drainage channels or floodplains would be crossed; however, when crossing minor drainage channels, construction and restoration activities would be implemented in such a way as to maintain the hydraulic integrity of the channel. The natural gas pipeline would be buried to a minimum depth of 4 feet below the present bottom of all drainage channels. Surface runoff and erosion would be controlled onsite during and after construction so that a minimum of off-site sedimentation occurs. Runoff control measures such as water bars would be placed on regraded slopes, in general, and specifically along the disturbed ROW to control and minimize runoff across and down the disturbed areas. The following waterbar spacing guide (Table A-1) would be utilized in determining the spacing of such structures, and the need for additional waterbars would be determined by the BLM Authorized Officer. The waterbars would be constructed such that diverted water would be directed and discharged onto undisturbed areas. The waterbars would be constructed with gradients of approximately one percent, but no greater than two percent perpendicular to slope.

The time between site clearing and construction and the initiation of restoration procedures would be minimized to reduce the amount of soil loss due to erosion. Similarly, the time and the distance the natural gas pipeline trench is open would be minimized to reduce the opportunity of

TABLE A-1

WATERBAR SPACING GUIDELINE

(SPECIFIC GUIDELINES TO BE DETERMINED

BY THE BLM AUTHORIZED OFFICER)

Slope (%)	Spacing (ft)
5	150
10	100
20	50
30	40
40	30
50	20
60	15
70	10

significant in-trench water flow in response to a precipitation event or snowmelt. In the event the trench must be open for a great down-slope distance, ditch plugs, which would consist of small earthen dams within the trench, would be used to divert water out of the trench. The need for and application of the plugs would be decided by the BLM Authorized Officer. These structures would minimize the potential for significant concentrations of flow within the trench. Such structures may also serve to facilitate the movement of livestock and wildlife across the trench.

Topsoil Replacement and Seedbed Preparation

Disturbed areas that would subsequently receive topsoil would be ripped using subsoilers. The stockpiled topsoil would then be deposited evenly over the disturbed area to be restored. The re-distributed topsoil would be scarified by disking on the contour if possible to reduce compaction and increase infiltration capacity. Where applicable, the previously piled vegetation would be spread over the cleared ROW and disked into the topsoil. All topsoil removal, excavation, construction, backfilling, topsoil replacement, and seedbed preparation would be accomplished contemporaneously.

Seeding

The seed mix presented in Table A-2, or an equivalent mixture depending on seed availability and approval by the BLM Authorized Officer, would be applied using a rangeland drill or a deep furrowing seeder on the contour. The drill would cover seeds with approximately 0.5 inch but not greater than 1 inch of soil. A weighted roller would be pulled behind the seeder to surround the seed with a firm seed bed. The seed mix is designed to provide successful revegetation on all soils within the mixed desert shrub and grassland communities. Seed mixtures for the pinyon-juniper community would be determined by the BLM Authorized Officer. On steep slopes or on soils with a high coarse fragment content, seed broadcasting may be required. In such cases the seed mix would be applied at 2.5 times that shown in Table A-2. The broadcast seed would be applied using a rotary spreader mounted on a tractor and covered with soil by pulling a flexible cultipacker or a chain behind the tractor. The seed

TABLE A-2

PRESCRIBED SEED MIXTURE FOR RESTORATION OF DISTURBED RIGHTS-OF-WAY[1]

Species	Cultivar or Variety	Seed Application Rate (PLS lbs/ac)[2]
Grasses		
Hicrest wheatgrass		3.0
Thickspike wheatgrass	Critana	2.5
Bottlebrush squirreltail		1.5
Mammoth wildrye	Volga	1.5
Sand dropseed		0.25
Forbs		
Gooseberry-leaf globemallow		0.5
Yellow sweetclover	Madrid	0.5
Shrubs		
Fourwing saltbush		1.0
Prostrate summercypress		0.5
Fringed sagebrush		0.02
	TOTAL	11.27

Alternate Species[3]	Cultivar or Variety	Replacement
Grasses		
Crested wheatgrass	Ephraim	Hicrest wheatgrass
Alkali sacaton		Any grass
Galleta	Viva	Any grass
Russian wildrye	Vinall	Mammoth wildrye
Forbs		
Desert marigold		Gooseberry leaf globemallow
White evening primrose		Same as above
Shrubs		
Budsage		Fringed sage
Shadscale		Fourwing saltbush
Mat saltbush		Fourwing saltbush

TABLE A-2 (CONTINUED)

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[1] Seed mix based on objectives previously listed, species adaptation to the site conditions of the project, usefulness of species for site stabilization and livestock and wildlife use, species success in revegetation efforts, and current seed availability and cost.

[2] Application rates are for drilled seed. If seed broadcasting is required, these rates would be increased by a factor of 2.5.
PLS=pure live seed.

[3] Species that would be used to replace the prescribed species in the event that they are not commercially available in suitable quantities or are too expensive. The substitution will be at the discretion of the BLM Authorized Officer.

mix would be planted in late October or early November. Seeding may be required for three consecutive years following disturbance, depending upon the success of reseeding.

Mulching

Native certified weed-free hay would be applied to the disturbed areas after seeding at a rate of 2 tons per acre. The hay would be crimped into the soil surface using a serrated disk crimper.

Monitoring and Maintenance

A monitoring plan would be initiated to evaluate restoration success. Any significant problems encountered during monitoring would be immediately mitigated under the direction of the BLM Authorized Officer, including revegetation failure, noxious weed invasion, or erosion.

APPENDIX B

SPILL SCENARIOS AND HEALTH EFFECTS

APPENDIX B

SPILL SCENARIOS AND HEALTH EFFECTS

B1.0 Introduction

The following discussion is a health risk assessment prepared for the USPCI Clive incinerator proposal. The risk assessment is largely qualitative and examines the risks from three possible spill scenarios caused by highway accidents involving trucks transporting hazardous wastes to the proposed facility. Two scenarios examine the potential risks from a small and a large spill of polychlorinated biphenyls (PCBs). The third scenario examines risks from a spill of soil contaminated with dioxin and a liquid containing methyl parathion and xylene range aromatics. The scenarios are presented in more detail in the following sections. The assessment investigates two types of potential adverse health effects, one acute and the other chronic, that might be caused by such spills. The potential for subchronic effects is investigated by comparing estimated intakes with allowable intakes developed by the Environmental Protection Agency (EPA 1986). Since PCBs and dioxin are suspected human carcinogens, a person's excess lifetime cancer risk was chosen as the chronic adverse health effect to be investigated. Sections B2.0, B3.0, and B4.0 of Appendix B investigate the adverse health risks from the first scenario, the second scenario, and the third scenario, respectively. The presentation of each scenario begins by introducing the characteristics of the spill, then presents the potential human receptors and the exposure pathways through which they could come into contact with the spilled materials, followed by an evaluation of the potential health risks posed by such exposures, and concludes with a discussion of the significance of the potential risks and their expected duration. Section B5.0 summarizes the findings.

B2.0 PCB Small Spill Scenario

Introduction

This scenario examines risks from a 70-gallon spill of PCBs occurring within the city limits of Salt Lake City. The specific assumptions are detailed below.

- A flatbed truck transporting electrical transformers containing Askarel dielectric fluid (70 percent PCBs) (Erickson 1986) is in an accident with another vehicle and a transformer is broken open. Seventy gallons of PCB fluid are lost from the transformer and passing cars roll through the liquid and spread it 0.25 mile down the highway.

- The spill occurs within the city limits of Salt Lake City, Utah.

- The driver of the truck is trained in PCB emergency response cleanup and begins cleanup activities immediately.

- Cleanup equipment in the truck includes: absorbent materials, shovels, and protective clothing.

- A Hazardous Materials (Haz Mat) emergency response team arrives onsite within 6 minutes.

- Cleanup including all testing, excavating, and soil replacement is complete within 2 weeks.

- The probability of any spill in Salt Lake city during the life of the project is estimated at 0.08 or 1 spill every 375 years (see Section 4.2.5).

Human Receptors

Dermal Exposure. The people who may accidentally contact liquid PCBs are: the truck driver, cleanup workers, bystanders, and nearby residents. Because the truck driver and cleanup workers are expected to be wearing protective clothing during the cleanup, their skin should not come into contact with the spilled PCBs. Since the spill has occurred on an interstate highway, to which access is assumed to be restricted because of fencing and traffic, nearby residents and bystanders should also not have any dermal exposure. Nevertheless, it is always possible that some of the personnel cleaning up the spill or motorists who have stopped and stepped outside of their cars may contact the spilled PCB for a brief period of time. Because of this possibility, the potential for such people to develop adverse health effects due to dermal contact will be assessed.

The risk assessment assumes that the exposed people are adults and that only their hands come into contact with spilled PCBs. The surface area of an adult's hands is assumed to be 1,000 square centimeters (cm^2) and is taken from Anderson et al. (1985). PCBs are expected to reside on a person's hands for 1 hour before they are removed by washing or wiping. Webster et al. (1983) indicates a 56 percent absorption of PCBs following 16 days of exposure. Certain adjustments must be made for the 1-hour exposure period used in this scenario. It is assumed that an exposed person's hands would be washed with soap and water or a suitable solvent within 1 hour of exposure. (Simple water washing would not be effective.) Even with immediate washing, the Webster study showed that not all PCBs would be removed. Based on Webster's results, an assumption can be made that for concentrated PCB fluids (60 to 70 percent PCB), washing would remove 80 percent of the PCBs leaving 20 percent to be absorbed. Assuming 56 percent absorption of the remaining PCBs, about 11 percent of the PCBs in the initial exposure would be absorbed. This risk assessment assumes that the PCB fluid would have a density of 1,600 mg/cm^3 and the layer of PCB fluid on skin would be 0.0018 cm thick (EPA 1984). Therefore, there would be 2.88 mg of fluid per square centimeter of skin.

The amount of PCB absorbed is a function of the area of exposed skin, the amount of PCBs on the skin, and the rate of absorption. The absorbed dose in units of milligrams of PCB per kilogram of body weight assumes a 70 kilogram (kg) adult and is calculated as follows:

$$\text{Dose (mg/kg)} = 1{,}000\ (\text{cm}^2/\text{person}) \times 2.88\ (\text{mg fluid/cm}^2) \times 0.7\ (\text{percent PCBs in fluid}) \times 0.11\ (\text{percent absorbed}) \times 1/70\ (\text{person/kg}) = 3.2\ \text{mg PCB/kg}.$$

To estimate the lifetime daily dose requires that the number of such spills that a person could be exposed to be estimated. This risk assessment assumes that people would be exposed to such a PCB spill only once in their lifetime. Thus, the one-time intake can be averaged over a lifetime of 70 years. This is done by dividing the intake by 365 days in a year and by 70 years in a lifetime. The resulting average lifetime daily dose of PCBs is 1.24×10^{-4} mg/kg/day.

<u>Inhalation Exposure</u>. Several people, including the truck driver, members of the Haz Mat team, bystanders, and drivers and passengers of cars may inhale volatilized PCBs. Because the response to the spill is expected to be rapid, the duration of the exposure should be short. Further, PCBs have very low vapor pressures and little evaporation would be expected to occur before the spill was covered with an absorbent that is assumed to reduce the rate of emission to negligible levels. The risk

assessment does not estimate the concentration of PCBs in air above the site; however, air concentrations that would be protective of short term effects, i.e., do not cause an exceedance of the 10-day allowable intake developed by the EPA (10 $\mu g/kg/day$; EPA 1986) and not cause more than a one in 100,000 ($1x10^{-5}$) excess lifetime cancer risk, were back calculated using standard risk assessment assumptions.

Thus, the maximum allowable level in air such that the 10-day acceptable intake is not exceeded is calculated as follows:

Air Concentration micrograms per cubic meter ($\mu g/m^3$) = 10 ($\mu g/kg/day$) x 70 (kg/person) x 1/.83 ($person/day/m^3$)* = 843 μg PCB/m^3.

*This is the estimated volume of air that a person would breathe in 1 hour.

The maximum allowable level of PCBs in air such that a one in 100,000 excess cancer risk is not exceeded is calculated as follows:

Air Concentration ($\mu g/m^3$) = 1×10^{-5} x 1/4.34 (mg/kg/day)* x 70 (kg/person) x 1/.83 ($person/day/m^3$) x 1,000 ($\mu g/mg$) x 365 (day/day) x 70 (year/year) = 4.965 μg PCB/m^3.

*This is the cancer potency estimate for PCBs.

Risk Evaluation. Although people are unlikely to contact the spilled PCBs with their hands, the potential exposure was assessed using conservative exposure assumptions. The resulting short-term daily intake of about 3,200 $\mu g/kg$ exceeds the 10-day allowable intake of 10 $\mu g/kg/day$ (100 $\mu g/kg$ total) derived by the EPA (1986). This indicates a potential short-term hazard could occur.

The short-term dermal contact with spilled PCBs could contribute to a person's excess lifetime cancer risk. The increased risk can be assessed by multiplying the estimated lifetime daily dose of 1.24×10^{-4} (mg/kg/day) by the potency estimate (4.34 day/kg/mg). The resulting excess cancer risk is 5.4×10^{-4}, or about five in ten thousand.

The risk from inhalation exposure was not quantified, but based on the analysis conducted, it seems unlikely that PCB concentrations above the spill would exceed the maximum allowable limit of 843 μg PCB/m^3.

Significance of Health Risks. The estimates of adverse health risks presented above indicate that a significant health risk could exist. The reader should note that the values generated are estimates and that they likely overestimate the actual risks. For example, it is unlikely that emergency response personnel or motorists would have a full 1,000 cm^2 of skin covered with PCB fluid. Further, the cancer potency estimate used is an upper 95 percent bound. The actual risk from dermal exposure likely would be lower.

B3.0 PCB Large Spill Scenario

Introduction

This scenario examines risks from a spill of 3,500 gallons of PCB-bearing liquid that is followed by a fire in a small town in the western United States. The more important assumptions are presented below.

- A tanker truck holding 7,000 gallons of PCB-bearing liquids (60 percent PCBs) is struck by a gasoline powered vehicle. The tank is ruptured, releasing one half of the load (3,500 gallons). The gasoline powered vehicle catches fire and the resulting fire burns some of the spilled PCBs.

- The location of the spill is within the town limits of a small town in the western United States, along the transportation route.

- The driver of the tanker truck is badly injured and cannot help in the incident.

- The highway patrol is the first responder and contacts the emergency response team. The local fire department is dispatched and puts the fire out within 30 minutes. The hazardous material response team arrives onsite within 3 hours.

- Cleanup including all testing, excavating, and soil replacement is completed within 2 weeks.

- The probability of any spill within a small town during the life of the project is estimated at 0.02 or 1 spill every 1,500 years (see Section 4.2.5). The probability of a spill and an ensuing fire is expected to be at least 10 to 100 times lower.

Human Receptors

Dermal Exposures. The people who may accidentally contact liquid PCBs are the highway patrol, firefighters, cleanup workers, bystanders, and nearby residents. Because the tank truck driver is assumed to be injured in the accident, he or she is also assumed to be unable to assist in the cleanup and thus would not contact the spilled material. Since the spill occurred in a small town, access to the area may not ordinarily be restricted, making dermal contact for local residents a possibility. The highway patrol and the fire department would arrive within 30 minutes, so access to the area would be restricted at this time. This scenario assumes that only the hands come in contact with the spilled material, that the amount of PCB liquid on the skin is 2.88 mg per cm^2, and that 11 percent of the PCB on the skin is absorbed.

The amount absorbed is a function of the area of exposed skin, the amount of PCBs on the skin, and the rate of absorption. The absorbed dose in units of milligrams PCB per kilogram of body weight is calculated as follows:

Dose (mg/kg) = 1,000 (cm^2/person) x 2.88 (mg liquid /cm^2) x 0.6 (percent PCBs in liquid) x 0.11 (percent absorbed) x 1/70 (person/kg) = 2.7 mg/kg.

The one-time intake can be averaged over a lifetime of 70 years. This is done by dividing the intake by 365 days in a year and by 70 years in a lifetime. The resulting average lifetime dose of PCBs is 1.06×10^{-4} mg/kg/day.

Inhalation Exposure. Several people, including the truck driver, the highway patrol, firefighters, cleanup workers, bystanders, nearby residents, and drivers and passengers of cars could inhale volatilized PCBs. PCBs have a very low vapor pressure, but some may be volatilized by the ensuing fire. This risk assessment does not estimate the concentration of PCBs above the site; however, air concentrations of PCBs could be high enough to cause severe lung irritation and require hospitilization. The need for evacuation and appropriate distances to protect the public's health are discussed in the following paragraphs.

Because some of the PCB-containing liquid burns when the gasoline powered vehicle catches on fire, combustion products may also be inhaled. The PCB-containing liquid is assumed to be transformer fluid, and askarel dielectric fluids can contain 30 to 40 percent trichlorobenzenes (Erickson 1986). It has been shown that PCBs form polychlorinated dibenzofurans

(PCDFs), and that chlorobenzenes form both PCDFs and polychlorinted dibenzodioxins (PCDDs) when pyrolyzed. The optimum temperature range for the formation of PCDFs from PCBs is reported to be 600°C. Yields of PCDFs as high as 10 percent of the amount of PCBs decomposed were observed under laboratory conditions. EPA-sponsored studies of the incomplete combustion of chlorinated benzenes indicate that PCDFs, and to a lesser extent PCDDs, are formed via the incomplete combustion of trichlorobenzene dielectric fluid that does not contain PCBs.

The likelihood of producing PCDFs and PCDDs, as well as the potential yields are difficult to predict because the exact fire conditions could be so variable. When the gasoline powered vehicle catches on fire, the fire is assumed to be above the ground. Some gasoline may spill, catch fire, and contact the PCB liquid. The amount of spilled gasoline is assumed to be small relative to the volume of PCB liquid spilled (3,500 gallons). If the gasoline powered vehicle is a car, about 20 gallons of gasoline could spill. This could spill over a large area, contacting a large volume of PCB liquid; or only some of it could contact the PCB liquid, while the remainder spills elsewhere. Once the gasoline is burned up, the PCBs would not support combustion (Aroclor 1254 does not have a flashpoint); therefore, the fire would be expected to go out. The heat generated by the gasoline fire and the amount of the produced heat that goes toward heating the PCBs are thus difficult to predict.

It is possible that some of the PCB liquid may be heated to 550°C to 600°C so that some PCDFs and PCDDs may form; but more than likely, most of the PCB liquid would not be in this temperature range, so that only a small amount would be converted to PCDFs and PCDDs. It is not known what isomers of PCDFs and PCDDs would be formed; so therefore, it is even more difficult to assess the health risk posed due to the range of toxicities of the various isomers. Chlorine (Cl_2) and hydrogen chloride (HCl) could be generated as byproducts of PCDFs formation, but because very few PCDFs are expected to be produced, there should not be enough Cl_2 or HCl generated to cause a significant health risk. HCl is also an ultimate degradation product of PCBs when they are completely decomposed by pyrolysis, but this is not expected to occur to a great extent, because the fire would probably not be hot enough (typical high temperature incineration of PCBs is performed at 1,200°C).

Composite soot samples taken from the Binghamton State Office Building following an indoor PCB transformer fire indicated the presence of 7,200 parts per million (ppm) PCBs, 231 ppm 2,3,7,8-TCDF, and 2.9 ppm 2,3,7,8-TCDD. The EPA expects that outdoor PCB transformer fires to result in lower human exposures to PCBs and oxidation products than transformer fires in or near buildings. Any smoke or soot that is produced in an outdoor transformer fire is expected to be more widely dispersed in the environment thus lowering exposure concentrations. EPA feels that "...at a distance of 200 meters (650 feet) from a fire, inhalation exposure would be expected to be relatively low" (Federal Register 1985).

In this scenario, the heat generated from the fire would be dissipated into the environment and not just used to heat the PCB liquid. The gasoline fire on the ground, where the PCB liquid is assumed to be, should be extinguished once the gasoline is burned, and the amount of gasoline relative to the amount of PCB liquid is small. There should not be a large amount of PCB liquid that is heated to 550°C to 600°C, thus there should be very little PCDDs, PCDFs, HCl, or Cl_2 formed. Nevertheless, if emergency response personnel or bystanders were to breathe the smoke and soot being produced by the fire, they could experience short-term health effects that could require medical attention, including hospitalization. In order to prevent such effects, the Haz Mat team would wear respirators; however, the first people on the scene may not be so equipped. Therefore, people within 650 feet of the fire, at a minimum and 1,000 feet for a greater level of safety, should be evacuated until the fire is extinguished and the designated spill site authority has determined that it is safe to return to the area.

Once the accident and fire have been controlled, cleanup would be started. Wipe samples would be taken from surfaces of buildings where soot could have been deposited. If PCB or combustion product concentrations are above allowable levels, the surface would have to be decontaminated. It could be possible that some buildings would have to remain unoccupied until cleanup had been completed, assumed to require 2 weeks in this scenario.

The maximum allowable level of PCBs in air such that a one in 100,000 excess lifetime cancer risk is not exceeded is calculated as follows:

Air concentration ($\mu g/m^3$) = $1 \times 10^{-5} \times 1/4.34$ (mg/kg/day) x
70(kg/person) x 1/.42
(person/day/m^3)*
x 1,000 (μg/mg) x 365 (day/day)
x 70 (year/year) = 9,811 μg PCB/m^3

*This is the estimated volume of air that a person would breathe in the 30 minutes the fire is assumed to last.

Groundwater Ingestion Exposure. In this spill scenario, part of the 3,500 gallons of spilled PCB fluid would probably reach soil beside the pavement and begin to penetrate the ground. It is very unlikely, however, that any PCBs would reach groundwater. PCBs tend to adsorb tightly to soil particles and be relatively immobile in soil (EPA 1980). Since the spill is assumed to be contained and cleaned up in 2 weeks, PCBs should not have penetrated more than a few inches into soil. Complete cleanup and no impact to groundwater would be virtually assured.

Risk Evaluation

The short-term dermal contact with the spilled PCBs could contribute to a person's excess lifetime cancer risk. The increased risk can be assessed by multiplying the estimated lifetime daily dose of 1.06×10^{-4} (mg/kg/day) by the potency estimate (4.34 day/kg/mg). The resulting excess cancer risk is 4.6×10^{-4} or about five in ten thousand. The estimated short-term daily intake of 2,700 μg PCBs/kg exceeds the allowable 10-day intake (EPA 1986) of 10 μg/kg/day (100 μg/kg total). Inhalation risks cannot be evaluated quantitatively but given the ensuing fire, short-term effects on the health of emergency reponse personnel and bystanders could be significant. No groundwater risks are anticipated since groundwater should not be impacted.

Significance of Risks. The estimate of adverse health risks presented above indicates that a significant health risk could exist. The risk estimate likely represents an upper limit, because exposure and potency assumptions were conservative (as discussed in Section B2.0). The risk of acute health effects from inhalation exposure to PCBs and combustion products is probably more important than long term risk from dermal exposure. The analysis conducted indicates that the risk could be significant within 650 feet of the fire.

B4.0 Dioxin, Methyl Parathion, and Xylenes Small Spill Scenario

Introduction

This scenario examines the potential risks posed by a spill of soil contaminated with dioxin and liquid containing methyl parathion and xylene range aromatics. The specific assumptions are detailed below.

- A flatbed truck transporting drums containing various hazardous wastes runs off the road because of a tire blowout. Several drums fall from the truck to the roadside next to the highway. Five drums rupture and spill their contents: 4 drums of dioxin-laden soils containing 2 parts per billion (ppb) dioxin, and 1 drum of liquid containing 45.6 percent methyl parathion and 49.4 percent xylene range aromatics (typical application concentration).

- The location of the spill is within the city limits of Salt Lake City, Utah.

- The driver is trained in appropriate emergency response cleanup and begins cleanup activities immediately.

- Cleanup equipment in the truck includes: absorbent materials, shovels, and protective clothing.

- A Haz Mat emergency response team arrives on site within 6 minutes.

- The cleanup is complete within 12 hours.

- The probability of any spill in Salt Lake City during the life of the project is estimated at 0.08 or 1 spill every 375 years (see Section 4.2.5).

Human Receptors

Dermal Exposure. The people who may accidently have dermal contact with the dioxin, methyl parathion, and xylenes are: the truck driver, cleanup workers, bystanders, and nearby residents. Because the truck driver and cleanup workers are expected to be wearing protective clothing during the cleanup, their skin should not come in contact with the spilled material. Since the spill occurred on an interstate highway, to which access is assumed to be restricted because of fencing and traffic, nearby residents and bystanders should also not have any dermal exposure. Nevertheless, it is always possible that the truck driver or cleanup personnel may contact the spilled material while removing contaminated protective clothing. In addition, motorists who have stopped and stepped outside of their cars may contact the spilled material briefly. Because of these possibilities, the potential for such people to develop adverse health effects due to dermal exposure will be assessed.

The scenario assumes that exposed individuals are adults and that only their hands contact the spilled materials. This material is assumed to reside on a person's hand for 1 hour before it is removed by washing or wiping. Risk assessments typically assume that 0.5 mg of soil adhere to a 1 cm^2 of skin (Lepow et al. 1975), and this will be the predicted amount of dioxin-laden soil assumed to be in contact with an exposed individual's hands. Dermal absorption of dioxin that has been adsorbed onto soil has been shown to be 0.05 percent of the applied dose, after 24 hours of contact. Bioavailability of adsorbed dioxin appears to decrease with the length of time it is adsorbed onto soil particles (Poiger and Schallter 1980). To be conservative, 0.05 percent dermal absorption of dioxin adsorbed onto soil will be used in this risk assessment, although contact in the scenario is assumed to last only 1 hour. This risk assessment assumes that the layer of methyl parathion/xylenes liquid is half as thick as a layer of PCB fluid and has a density of 900 mg/cm^3. Therefore, 0.8 mg of liquid per cm^2 of skin is the assumed weight for the exposure scenario.

EPA's IRIS file on methyl parathion does not address dermal absorption. Feldman and Naibach (1974) have shown that 9.7 percent of the dermally applied dose of parathion to the ventral forearm of humans, was excreted in the urine within 120 hours after application (the data were corrected for incomplete urinary excretion with factors obtained in a simultaneous intravenous experiment). This risk assessment will assume 10 percent dermal absorption of methyl parathion because it is chemically similar to parathion.

Dermal absorption data for xylenes could not be found, and this route of exposure was not considered by the EPA in the Health Effects Assessment for Xylene (EPA 1984), or in the Drinking Water Health Advisory for Xylenes (EPA 1987a). This may be because of its high volatility. Possibly, the small amount of xylene on the exposed hand could volatize rapidly, thus preventing any significant dermal penetration. In this risk assessment, dermal absorption of xylene will not be considered.

The amount of absorbed dioxin or methyl parathion is a function of the area of exposed skin, the amount of contaminant on the skin, and the rate of absorption. The dermally absorbed dose of dioxin is calculated as follows:

$$\text{Dose (mg/kg)} = 1{,}000\ (\text{cm}^2/\text{person}) \times 1 \times 10^{-9}\ (\text{mg dioxin/cm}^2) \times 0.0005\ (\text{percent absorbed}) \times 1/70\ (\text{person/kg}) = 7.143 \times 10^{-12}\ \text{mg dioxin/kg.}$$

The dermally absorbed dose of methyl parathion is calculated as follows:

$$\text{Dose (mg/kg)} = 1{,}000\ (\text{cm}^2/\text{person}) \times 0.8\ (\text{mg liquid/cm}^2) \times 0.456\ (\text{percent methyl parathion in liquid}) \times 0.1\ (\text{percent absorbed}) \times 1/70\ (\text{person/kg}) = 0.52\ \text{mg methyl parathion/kg.}$$

No good data are available on the acute dermal toxicity of methyl parathion to humans; however, the dermal LD_{50} for rats is 20 mg/kg (Martin 1968). While the dermally absorbed dose is not expected to cause death, it could cause adverse health effects which might require hospitilization.

The one-time intake of dioxin and methyl parathion can be averaged over a lifetime of 70 years. This is done by dividing the dose (mg/kg) by 365 days in a year, and by 70 years in a lifetime. The resulting average lifetime daily doses are 2.8×10^{-16} mg dioxin/kg/day, and 2.0×10^{-5} mg methyl parathion/kg/day.

Inhalation Exposure. Several people, including the truck driver, cleanup workers, bystanders, and drivers and passengers of cars may inhale volatized dioxin, methyl parathion, and xylene. Because the response to the spill is expected to be rapid, the duration of exposure should be short. Further dioxin and methyl parathion have very low vapor pressures, and thus little evaporation would be expected to occur before the spill was covered with an absorbent, assumed to reduce the rate of emission to negligible levels. This risk assessment does not estimate the concentration of contaminants in the air above the site. However, air concentrations that would be protective of short-term effects, and not be associated with more than a one in 100,000 (1×10^{-5}) excess lifetime cancer risk, were back calculated using standard risk assessment assumptions.

Thus, the maximum allowable levels in air such that 1-day allowable intakes are not exceeded are calculated as follows:

xylene air concentration ($\mu g/m^3$) = 1,300,000 ($\mu g/m^3$) ÷ 10* = 130,000 μg xylenes/m^3

*1,300,000 $\mu g/m^3$ is the No Observed Adverse Effect Levels (NOAEL) used by the EPA in determining a 1-day drinking water health advisory (EPA 1987b) for xylenes. Since the data were from a 1-hour exposure experiment conducted on human subjects, an uncertainty factor of 10 was used.

dioxin air concentration ($\mu g/m^3$) = 0.0001* (μg/kg/day) x 70 (kg/person) x 1/20 (person/day/m^3) x 24 (hour/day/1 hour/day)** = 8.4×10^{-3} μg dioxin/m^3

*The oral NOAEL used in calculating a 1-day drinking water health advisory (EPA 1987) was 0.1 μg/kg/day, a safety factor of 1,000 was used to give a 1-day allowable intake of 0.0001 μg/kg/day. No inhalation data were presented in either the Health Effects Assessment document (EPA 1984) or the Health Advisory (EPA 1987b) for dioxin.

**TA conversion factor used to account for the 1-hour exposure time.

methyl parathion air concentration ($\mu g/m^3$) = 0.25* (μg/kg/day) x 70 (kg/person) x 1/20 (person/day/m^3) x 24 (hr/day/1 hr/day) = 21 $\mu g/m^3$

*The oral Reference Dose (RfD) (EPA IRIS 3/31/87) (No inhalation RfD was available.)

The maximum allowable level of dioxin in air such that a 1×10^{-5} excess cancer risk is not exceeded is calculated as follows:

air concentration ($\mu g/m^3$) associated with a 1×10^{-5} cancer risk = 1×10^{-5} x 1/1.56×10^5 $(mg/kg/day)^{-1}$* x 70 (kg/person) x 1/20 (person/day/m^3) x 1,000 (μg/mg) x 365 (day/day) x 70 (year/year) = 5.73×10^{-3} $\mu g/m^3$

*1.56×10^5 $(mg/kg/day)^{-1}$ is the EPA's cancer potency factor for dioxin.

Oral Exposure. Children in the area where contaminated soil may have been carried by the wind, may ingest some of the dioxin-laden soil. It is assumed that a minimum amount of dioxin-laden soil would be carried away from the site by the wind due to the rapid response to the spill. What might be transported via the wind is presumed to have been widely dispersed. It is assumed that no soil contaminated by the spilled methyl parathion/xylenes liquid would be wind-blown, since only one drum spilled and it would be contained almost immediately. Assuming dilution of the wind-blown soil by a factor of 1,000 and a soil ingestion rate of 100 mg/day (Clausing et al. 1987), the following dose is calculated:

$$\text{Dose mg/kg} = 100\ (\text{mg soil/child}) \times 2 \times 10^{-6}\ (\text{ng dioxin/mg soil}) \times (1\ \text{mg}/1{,}000\ \text{ng}) \times 1/20\ (\text{child/kg}) = 1.0 \times 10^{-8}\ \text{mg dioxin/kg/day}$$

The estimated lifetime daily dose due to ingestion of dioxin-laden soil, assuming only 1 such exposure per lifetime, would be equal to 3.9×10^{-13} mg dioxin/kg/day.

Groundwater Ingestion Exposure. It is unlikely that groundwater in the area would become contaminated by the spill. The dioxin is adsorbed onto exogenous soil (i.e., soil contained in the drum). This soil would be cleaned up quickly, and therefore, should not pose a threat to groundwater. The liquid that spilled also should not pose a threat to the groundwater, because only one drum spilled, the spill occurred on a highway, and the spill was contained and cleaned up rapidly. If any liquid spilled onto the soil adjacent to the highway, it is assumed that the contaminated soil would be removed quickly during cleanup.

Risk Evaluation

The short-term dermal contact with the dioxin-laden soil would not significantly contribute to a person's excess lifetime cancer risk. This was determined by multiplying the estimated lifetime daily dose of dioxin (due to dermal exposure) of 2.8×10^{-16} mg/kg/day by the cancer potency factor of 1.56×10^{5} $(\text{mg/kg/day})^{-1}$ (EPA 1986). The resulting excess cancer risk is 4.37×10^{-11}. The short-term oral exposure to the dioxin-laden soil is also not expected to contribute to an excess lifetime cancer risk. The increased risk, based on an oral lifetime daily dose of 3.9×10^{-13} mg/kg/day and multiplied by a cancer potency factor of 1.56×10^{5} $(mg/kg/day)^{-1}$, is equal to 6.08×10^{-8}, or much less than one in 100,000.

The dermal exposure to the methyl parathion could cause acute adverse noncarcinogenic health effects. Although there are no long-term dermal health standards against which to compare the predicted dermal doses, the EPA has established an oral RfD of 2.5×10^{-4} mg/kg/day. The estimated lifetime daily dose of 2.0×10^{-5} mg methyl parathion/kg/day is well below the oral RfD, which is a conservative value to use for comparison, since dermal absorption is not expected to be as great as oral absorption.

The risk from inhalation exposure was not quantified; however it seems unlikely that dioxin, methyl parathion, or xylenes concentrations in the air would exceed the previously calculated maximum allowable levels of 8.3×10^{-3} μg dioxin/m^3, 21 μg methyl parathion/m^3, and 130,000 μg xylenes/m^3, especially considering the very low vapor pressures of dioxin and methyl parathion and the rapid containment and cleanup of the spill.

Significance of Risks. The estimates of adverse health risk presented above indicate that a significant health risk probably does not exist for dioxin or xylene but could exist for methyl parathion. The reader should note that the values generated are conservative estimates and are likely greater than actual risks. The estimates are more representative of an upper limit. For example, it is unlikely that a person's skin would remain in contact with the spilled material for 1 full hour. Bystanders probably would not experience dermal contact, as access to the area would be restricted during the cleanup. If they were exposed, they would be expected to wipe off their hands soon thereafter. The cleanup crew, who would be wearing protective clothing, respirators, and face shields, would most likely cleanse their skin immediately if they did come in direct contact with the spilled material.

B5.0 Conclusions

The risk evaluation presented above is largely qualitative. It has identified people who may be exposed to the hazardous waste spills. Further, the scenarios have used highly carcinogenic or toxic materials in an attempt to identify any potential health threats that may be posed by the spill of a wide range of wastes. It is important to remember that the estimated values are likely to represent an upper limit for potential health risks and not an actual level of risk. The estimated risks are also based upon conservative exposure assumptions that are surrounded by a great deal of uncertainty. The analysis should be viewed as a screening tool that serves to identify any major sources of health risk. The areas of concern that were identfied are the potential for dermal exposures to PCBs and methyl parathion and inhalation exposure to combustion products from a spill followed by a fire. The spill response team should ensure that exposed people cleanse their skin immediately after they have contacted a spilled waste. In the event of a fire following a spill, persons within the area of concern (650 feet for the scenario) should be evacuated until the designated spill site authority has determined that it is safe to reenter the area.

The current risk evaluation has also not attempted to place the estimated health risks into context. For example, in the second larger spill scenario, the gasoline-powered vehicle is assumed to catch fire. This risk assessment did not compare the excess lifetime risk of cancer caused by the fire and PCB release to the probably much greater risk to health posed by the potential explosion of the gasoline tank or the fire itself.

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