DOE/EA--1156

Department of Energy
Finding of No Significant Impact

Effluent Reduction
Los Alamos National Laboratory
Los Alamos, New Mexico

U. S. Department of Energy
Los Alamos Area Office
528 35th Street
Los Alamos, NM 87544

DEPARTMENT OF ENERGY
FINDING OF NO SIGNIFICANT IMPACT

EFFLUENT REDUCTION
LOS ALAMOS NATIONAL LABORATORY

EFFLUENT REDUCTION FINAL ENVIRONMENTAL ASSESSMENT: The Environmental Assessment (EA) for Effluent Reduction (DOE/EA-1156) (attached) briefly provides sufficient evidence and analysis to determine that a finding of no significant impact is appropriate for this action. The EA documents the evidence and analysis in the following chapters: 1. Purpose and Need for Agency Action; 2. Description of Alternatives; 3. Affected Environment and Environmental Consequences; 4. Abnormal Events; 5. Agencies and Persons Consulted; and 6. Permits Required.

PREDECISIONAL DRAFT REVIEW & COMMENT: On July 15, 1996, the Department of Energy (DOE) invited review and comment on the predecisional EA from the State of New Mexico and four American Indian Tribes: Cochiti, Jemez, Santa Clara and San Ildefonso (sometimes referred to as the four accord pueblos because each tribe has entered into an accord with the DOE). In addition, DOE made the predecisional draft EA available to Los Alamos County and the general public at the same time it was provided to the State of New Mexico and the four accord pueblos by placing it in the DOE Public Reading Rooms within the Los Alamos National Laboratory Outreach Center and Reading Room in Los Alamos, and the TVI-Main Campus Library in Albuquerque. Also, local stakeholder groups were notified of the availability of the predecisional draft on July 15, 1996.

Comments were received from the U.S. Fish and Wildlife Service; the State of New Mexico Environment Department; and the New Mexico Law Center commenting on behalf of the Pueblo of San Ildefonso. These comments were addressed in the Final EA, and individual responses to the comments were sent to the respondents.

FOR FURTHER INFORMATION CONTACT: For further information on this proposal, this Finding Of No Significant Impact (FONSI), or the DOE's National Environmental Policy Act (NEPA) review program concerning proposals at LANL, please contact:

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Copies of this FONSI (with the Environmental Assessment attached) will be made available for public review at the Los Alamos National Laboratory Outreach Center and Reading Room, 1450 Central Avenue, Suite 101, Los Alamos, New Mexico, 87544 at (505) 665-2127 or (800) 543-2342. Copies will also be made available in the DOE Public Reading Room, located in the TVI-Main Campus Library, 525 Buena Vista SE, Albuquerque, New Mexico, 87106 at (505) 224-3000.

FINDING: The United States Department of Energy (DOE) finds that there would be no significant impact from proceeding with its proposal to eliminate industrial effluent from 27 outfalls at LANL. DOE makes this Finding of No Significant Impact pursuant to the National Environmental Policy Act of 1969 [42 U.S.C. 4321 et seq.], the Council on Environmental

Quality (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act [40 CFR 1500] and the DOE National Environmental Policy Act *Implementing Procedures* [10 CFR 1021]. Based on the EA that analyzes the potential environmental effects that would be expected to occur if the DOE were to eliminate the industrial effluent from 27 LANL outfalls, the proposed action does not constitute a major federal action that would significantly affect the human environment within the meaning of NEPA. Therefore, no environmental impact statement is required for this proposal.

Signed in Los Alamos, New Mexico this 18th day of September, 1996.

G. Thomas Todd
Area Manager
Los Alamos Area Office

DOE/EA-1156

ENVIRONMENTAL ASSESSMENT

FOR

EFFLUENT REDUCTION

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

Date Prepared: September 11, 1996
Prepared for: U.S. Department of Energy, Los Alamos Area Office

EXECUTIVE SUMMARY

The Department of Energy (DOE) proposes to eliminate industrial effluent from 27 outfalls at Los Alamos National Laboratory (LANL). These proposed measures are needed to comply with directives issued by the Environmental Protection Agency (EPA) to DOE and the University of California (UC) requiring proper characterization of wastestreams and compliance with the discharge limitations specified in LANL's National Pollutant Discharge Elimination System (NPDES) permit. These limitations are established to restore and maintain the chemical, physical, and biological integrity of the nation's waters.

The Proposed Action includes both simple and extensive plumbing modifications, which would result in the elimination of industrial effluent being released to the environment through 27 outfalls. The industrial effluent currently going to about half of the 27 outfalls under consideration would be rerouted to LANL's sanitary sewer system. Industrial effluent from other outfalls would be eliminated by replacing once-through cooling water systems with recirculation systems, or, in a few instances, operational changes would result in no generation of industrial effluent. After the industrial effluents have been discontinued, the affected outfalls would be removed from the NPDES Permit. The pipes from the source building or structure to the discharge point for the outfalls may be plugged, or excavated and removed. Other outfalls would remain intact and would continue to discharge stormwater. The No Action alternative, which would maintain the status quo for LANL's outfalls, was also analyzed. An alternative in which industrial effluent would be treated at the source facilities was considered but dismissed from further analysis because it would not reasonably meet the DOE's purpose for action, and its potential environmental effects were bounded by the analysis of the Proposed Action and the No Action alternatives.

One of the primary environmental effects of the Proposed Action would be an increase in compliance with LANL's NPDES permit limitations. In addition, the Proposed Action would generate solid waste and possibly a small amount of Resource Conservation and Recovery Act (RCRA) regulated hazardous waste requiring disposal. There would be additional environmental effects on the wetlands associated with the outfalls and on the fauna that drink the water or use the areas near the outfalls. The wetlands would revert to a more natural pre-LANL condition and the number of acres of wetland at LANL would decrease. There would be a localized decline in the number of individuals of water-dependent small mammal and aquatic invertebrate species and localized decrease in biodiversity. The daily and seasonal movements of large mammals would change gradually over a period of years as alternate water sources and suitable habitat are utilized. The elimination of effluent at the outfalls would have a slight beneficial effect in that there would likely be diminished mobilization and transport of any existing contaminants below the outfalls.

Under the No Action alternative, no waste would be generated but exceedances of NPDES Permit limitations may continue. Fines and penalties may be levied by regulators and DOE may require some operations to cease until the industrial effluent is compliant with the conditions of the NPDES Permit. Under the No Action alternative, industrial effluent would continue to maintain existing wetlands and fauna would continue to use the wetlands and the effluent as they do now.

Three abnormal events that could occur during the implementation of Proposed Action were identified as having a high risk or carrying the possibility of death for the worker. The first abnormal event identified was a construction accident in which the soil shifts and materials or equipment fall on a worker leading

to disability or severe injury to the worker. The second abnormal event identified was a worker contacting a high voltage line. And the third abnormal event identified was the possibility of piling excavated material too high or too close to the excavated area causing death when it collapses onto a worker. In all three instances, the use of appropriate construction and design measures would greatly reduce the likelihood of these abnormal events occurring.

The cumulative effects of the Proposed Action and actions of a similar nature at LANL include several overall beneficial effects: there would be an increase in compliance with NPDES Permit limitations and an overall reduction in the mobilization and transportation of existing contaminants where outfalls are eliminated. Although the total acreage of wetland vegetation at LANL would be reduced from about 50 acres to about 37 acres, the four remaining LANL outfalls would sustain three wetlands. Cumulatively, from LANL actions already planned (that could eliminate up to 5 acres of wetlands) together with the Proposed Action (potentially eliminating up to 8 acres of wetlands), at least 13 acres of wetlands at LANL could be lost. Some portion of these wetlands may persist in situations where natural sources of water (such as stormwater runoff or springs) are sufficient to maintain wetland species. Wetland areas at LANL that are not dependent on industrial effluents and wetlands in areas adjacent to LANL would be expected to remain. The southwestern part of LANL, which is heavily used by elk and deer, is the location for some outfalls associated with the Proposed Action and for about 15 outfalls with high explosives effluent that are scheduled to close in 1997. The effects of eliminating water sources in this area would not be known for two to three years.

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1.0 PURPOSE AND NEED FOR AGENCY ACTION

1.1 BACKGROUND

The Los Alamos National Laboratory (LANL), located in Los Alamos, New Mexico, was established in 1943 with a single-focused national defense mission. After the end of World War II, LANL was designated as a permanent facility and its mission was expanded to incorporate a wide variety of new mission assignments given to the Department of Energy (DOE) or its predecessor agencies. Several thousand buildings and other structures have been constructed over the past 53 years in support of these diverse missions at the 111-km^2 (43-mi^2) LANL site. Many facilities discharge industrial wastewater directly to the environment. The amounts of wastewater discharged vary (from hundreds to thousands of gallons [gal] per week), as do the different types of generating sources. Wastewater outfalls at LANL are permitted by the U. S. Environmental Protection Agency (EPA), Region 6, for discharge as point sources under Section 402 (a) (1) of the Clean Water Act (CWA), 33 U.S.C. 1251 et seq., which specifies the National Pollutant Discharge Elimination System (NPDES) Permit process. LANL's NPDES Permit (Permit No. NM0028355), contains discharge limitations that are established to restore and maintain the chemical, physical, and biological integrity of the nation's waters for a variety of uses. Between January 1991 and March 1996, industrial effluents from the outfalls in the Proposed Action exceeded the discharge limitations for these effluent parameters 47 times.

In November of 1991, the EPA, Region 6, and DOE entered into a Federal Facilities Compliance Agreement (FFCA) (Docket No. 91-1328) that mandates DOE compliance with the conditions of the NPDES Permit. The FFCA also requires compliance with New Mexico Water Quality Control Commission's Standards for Interstate and Intrastate Streams established in the New Mexico Water Quality Act, and specifies dates when certain corrective actions should be completed by DOE. Concurrent with the 1991 FFCA, EPA issued an Administrative Order (AO) (Docket No. VI-91-1329) to the University of California (UC), as the managing and operating contractor of LANL, also requiring compliance with the NPDES Permit.

The FFCA and AO requirements resulted in the establishment of a Waste Stream Characterization Project at LANL. This project conducted extensive building-by-building studies of drain systems and identified corrections that were needed. The corrective actions identified include administrative permit modifications; labeling of pipes; plugging of floor drains; modifying, removing, or replacing piping; rerouting or connecting discharges to the sanitary wastewater treatment system; and installing recirculation systems within facilities.

Subsequent to completion of the characterization of drain systems and identification of corrective actions in late 1993, the Waste Stream Correction Program (WSCP) was initiated to implement the measures identified. In June 1994, the EPA issued an AO (Docket No. VI- 94-1242) to allow UC to complete the corrective actions identified as a result of the previous AO. The current date for completion of corrective actions is September 30, 1996.

During the period from 1991 to 1993, regulatory standards for industrial effluent produced at several of the LANL facilities continued to be exceeded. As a consequence of these continued violations, EPA issued another AO (Docket No. VI-94-1051) to UC in 1994 citing repeated violations of the discharge limitations of its NPDES Permit. This AO mandated that UC take action to eliminate and prevent recurrence of the violations and that a formal plan to correct violations be presented both in writing and

orally before a panel of EPA management. The plan submitted to the EPA in August 1994 augments the corrective actions that would be conducted under the WSCP with additional measures based on best management practices necessary to eliminate industrial effluents. In some cases, the best method identified for preventing recurrent exceedances at certain outfalls would be to eliminate those outfalls, for example, by rerouting their industrial effluent to an appropriate centralized treatment system or by installing a recirculation system at the source. EPA accepted the plan submitted by the DOE and UC, which has now been formalized into an Outfall Reduction Program (ORP) at LANL.

The vast majority of the total number of corrective actions under the combined WSCP and ORP would not change the outfall effluent volume or are associated with source activities or events that currently generate very low volume, sporadic, or intermittent wastewater effluent volumes. These types of actions were determined to be categorically excluded from the need to prepare either an Environmental Assessment or an Environmental Impact Statement under the National Environmental Policy Act (LAN 96-024, January 22, 1996), and implementation has subsequently been started at numerous facilities throughout LANL, with about 70 percent of the 7,600 corrective actions now completed. The remaining small number of the total identified corrective actions are associated with outfalls that support small wetland areas at LANL. Since 1943, various LANL outfalls have discharged adequate volumes of industrial effluent on a regular enough basis that, given appropriate topographical and soil features, small wetlands have developed near the outfalls or along the length of the receiving stream channels. Some of the outfalls have been eliminated within the last five years through various programs or projects; currently about 28 wetlands remain at various locations at LANL that have been created and are supported primarily by LANL effluents. Man-made or created wetlands are generally protected by the same environmental laws, statutes, regulations, and orders as naturally occurring wetlands (e.g., 10 CFR 1022). These remaining corrective actions associated with outfall-supported wetlands are the subject of this National Environmental Policy Act (NEPA) analysis.

1.2 PURPOSE AND NEED

DOE must consider any action it undertakes in terms of its potential effects to the environment. Actions taken under the WSCP and the ORP that affect wetlands may generate individual or cumulative effects on the environment at LANL. These potential effects may be adverse, causing the loss of wetlands and any dependent wildlife due to a reduction or elimination of supporting water supply. Conversely, the potential effects may be beneficial, ensuring that only environmentally benign wastewater enters the ecosystem.

The purpose for DOE action is to reduce the possibility that LANL activities could produce wastewater discharges into the ecosystem, specifically to wetlands, ground water and stream channels, that fail to meet its NPDES Permit conditions. This action is needed to comply with Section 402 of the CWA, to meet EPA-imposed deadlines for action, and to help ensure that DOE meets its responsibilities for stewardship of the natural resources at LANL and surrounding environs.

1.3 ENVIRONMENTAL ASSESSMENT METHODOLOGY

The National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.), requires DOE to consider the environmental consequences of proposed actions before decisions are made. In complying with NEPA, DOE follows the Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508)

and DOE's own NEPA implementing procedures (10 CFR 1021). The purpose of this Environmental Assessment (EA) is to provide the DOE with sufficient evidence and analysis to determine whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI). This EA also serves as the Floodplain/Wetlands Environmental Review, as required by DOE's *Compliance with Floodplain/Wetlands Environmental Review Requirements* (10 CFR 1022). This assessment of potential effects is based on conservative assumptions that, in some cases may overestimate the environmental effects.

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2.0 DESCRIPTION OF ALTERNATIVES

The Proposed Action analyzed in this EA is a set of actions proposed to take place at numerous facilities across LANL. Chapter 2 includes a description of the Proposed Action in general terms. It also describes the No Action Alternative that would maintain the LANL status quo. Another alternative, to pre-treat effluent at the source facilities, is presented in this chapter but dismissed from further analysis. More details about the Proposed Action for each outfall and a full description of each outfall's associated wetland can be found in Appendix A.

2.1 PROPOSED ACTION

2.1.1 Current Wastewater Management at LANL

LANL has three wastewater treatment facilities: Sanitary Waste Water Systems Consolidation (SWSC) plant, the Radioactive Liquid Waste Treatment Facility (RLWTF), and the High Explosives Wastewater Treatment Facility (HEWTF). Industrial effluent that does not go through these centralized treatment facilities is discharged to the environment through outfalls.

There are currently 88 outfalls at LANL covered by NPDES Permit NM0028355. In the NPDES Permit, these outfalls are grouped by category according to effluent source type. Each outfall is designated by the appropriate category code plus a three-digit identifying number. The outfall categories relevant to the Proposed Action are: 02A (boiler blowdown and neutralized demineralizer regeneration brine); 03A (treated cooling water blowdown, evaporative coolers, chillers, condensers and air washer blowdown); 04A (non-contact [once-through] cooling water); and 06A (photo processing rinse water). The NPDES Permit contains discharge limitations for each category of outfall based on physical and chemical characteristics of each wastewater type. Any effluent discharging to a watercourse must also meet the New Mexico Water Quality Control Commission's Standards for Interstate and Intrastate Streams which are promulgated by New Mexico's Environmental Improvement Board and established in the New Mexico Water Quality Act (74-6-1 to 74-6-4, 7-6-6 to 74-6-13 NMSA 1978). The current designated uses include livestock watering and wildlife habitat. The number of LANL outfalls in use at any given time changes as individual projects, such as research and development projects, are started and completed at various LANL locations.

2.1.2 Proposed Action

The Proposed Action is to eliminate industrial effluent from 27 LANL outfalls. The actions needed to accomplish this would vary from outfall to outfall and would include a variety of plumbing activities and some interior and exterior (outside) excavation. The simplest activities involve plugging floor drains, (that is, pouring cement into drains), removing sinks, replacing valves, and installing collars (donut-shaped metal disks) around existing floor drains. Other more involved actions include replacing evaporative cooling units with mechanical refrigeration units and installing sump pump units. Once-through cooling water systems would be replaced by recirculation systems. Recirculation systems are typically purchased from a vendor and require some additional piping connections to hook up to existing water inlets and outlets. In addition, installation of some piping, heat exchangers, and pumps may be required. Modifying or installing recirculation systems may require interior wall or floor penetrations.

Any penetration has the potential to contact hidden hazards, such as electrical lines. Any activities requiring wall or floor penetrations would receive a preliminary hazard analysis that would specify worker safety measures, such as personal protective equipment and training. No new building construction would be part of the Proposed Action.

The most invasive activity in the Proposed Action would be re-routing wastewater to the sanitary sewer system. This activity would include excavating indoors and outdoors in order to lay new pipe to connect the industrial wastewater to SWSC. Since the sources of industrial effluent are in developed areas, the existing sanitary sewer system is already close to the industrial wastewater piping for most outfalls; the maximum length of excavation for re-routing to SWSC would be 30 m (100 ft). The maximum width of excavated trenches for re-routing would be 3.0 m (10 ft). Trenches would typically be 2 m (6 ft) deep. Connection of industrial drains to SWSC may require wall penetrations as discussed above. To protect worker health and safety, all plumbing and excavation activities would be conducted according to LANL Standard Operating Procedures (SOPs) and Special Work Permits (SWPs) and with the use of appropriate monitoring and personnel protective measures. In all cases involving outside construction work, Best Management Practices (BMPs) would be employed to reduce the potential for adverse environmental effects. BMPs would include dust suppression measures and standard erosion control practices. Exterior construction activities may require site revegetation and restoration of the area to its original contours. Soil disturbance would be kept to an absolute minimum, and all disturbed areas would be replanted with an appropriate native seed mix once work is completed. Other BMPs may be developed specific to situations as they arise, such as measures to protect special status plant and animal species (for example, BMPs may require that exterior work be conducted outside of the breeding seasons for particular bird species if they are found to be breeding or rearing young within 0.4 km (0.25 mi) of the work site over the implementation period of the Proposed Action).

The Proposed Action would reroute industrial effluent from about 14 outfalls to SWSC. The maximum volume of effluent added to SWSC would be approximately 100,000 liters (L) (27,000 gal) each day, or taking into account seasonal variations, approximately 35,000,000 L (9,000,000 gal) per year. Supporting details for individual outfalls for which preliminary planning has been completed are given in Appendix A. As the preliminary and final design phase is completed for each outfall, further details would be refined.

After the industrial effluents have been discontinued, the affected outfall would be removed from the NPDES Permit. Piping from the source building or structure to the outfall discharge point may remain in place and continue to discharge stormwater. In some cases, the piping from the source building or structure to the outfall discharge point may be left in place and capped so that it cannot be used or, in some cases, the piping may be removed. If piping to the outfall discharge point is to be removed, excavation would be required. No excavations would be planned for areas where known cultural resources could be affected. However, any clearing or excavation activity has the potential to encounter previously buried materials. If buried material or remains of cultural significance are encountered during construction, activities would cease until their significance was determined. Standard dust suppression methods would be used to minimize the generation of dust.

Some excavation activities may occur within or in the vicinity of a LANL Environmental Restoration (ER) Solid Waste Management Unit (SWMU) or Potential Release Site (PRS). To ensure the protection of the workers, all activities at these sites would be performed in accordance with requirements set forth

in "Hazardous Waste Operations and Emergency Response" (29 CFR 1910.120). LANL's ER Project staff would review activities in the Proposed Action that involve a SWMU or PRS and would stipulate procedures for working within that site area.

No construction would be conducted within a floodplain or in a wetland. Some activities that are part of the Proposed Action may require work to be performed near a wetland, however. For these activities, appropriately engineered BMPs for each site would be constructed and maintained to ensure that no loose soil enters the wetland. These BMPs may include the use of hay bales, plywood or synthetic sedimentation fences with appropriate supports installed to contain excavated soil. After the activity is completed, mounds of loose soil would be removed from the area. The site would be restored to its natural contours and reseeded with an appropriate seed mix to stabilize the site.

The Proposed Action would include transportation of construction materials such as piping, valves, collars, and recirculation systems to LANL buildings and structures. Waste generated by the Proposed Action would be transported to the appropriate disposal facility. The amount of piping waste generated would vary from outfall to outfall, with a maximum amount for the action at any one outfall being about 150 m (500 ft) of 6 in. diameter pipe. Other waste may include discarded evaporative coolers, sinks, valves, and plumbing hardware. Activities necessary to eliminate industrial effluent could generate up to 270 m^3 (9,500 ft^3) of piping, plumbing equipment, soil, asphalt, concrete, and other cover material. Plumbing components and excavated materials would be disposed of as solid waste[1] at the Los Alamos County Landfill. If piping from the source facility to the outfall discharge point is removed for the nine outfalls whose effluent has only an industrial component (no stormwater), then additional waste would be generated. Most of the pipes would be solid waste. This solid waste (1,300 m^3, 46,000 ft^3) would be disposed of at the Los Alamos County Landfill. Based on ER sampling of areas near outfalls, it is possible that a few of the pipes may be characterized as Resource Conservation and Recovery Act (RCRA) hazardous waste. If these pipes are excavated and removed, then the Proposed Action would generate approximately 3 m^3 (100 ft^3) of RCRA-regulated hazardous waste that would be transported to Technical Area (TA)-54, Area L, for management; ultimate disposal would follow at a permitted off-site disposal facility. All transportation would be carried out according to LANL SOPs and Department of Transportation regulations. About 150 trips would be required to transport construction materials to the work site and solid waste to the appropriate disposal facility. An additional two trips may be required to transport the RCRA-regulated hazardous waste to management and disposal facilities.

Industrial effluents from the outfalls listed in Table 2-1 would be eliminated by the Proposed Action. The table also shows the building or structure that is the source of each outfall's effluent. The Proposed Action would occur at TAs-3, 8, 15, 16, 21, 33, 35, 43, 46, 48, 53, and 55. Figure 2-1 shows the location of LANL within New Mexico and Figure 2-2 shows LANL TAs and the location of the 27 outfalls included in the Proposed Action.

The elimination of industrial effluent from the outfall areas under the Proposed Action would occur gradually over a period of about three years beginning in Fall 1996 with outfalls in the WSCP. The one exception to this schedule is for Outfall Number (No.) 11. This outfall receives cooling water from at least three cooling towers at TA-53 and would receive effluent from cooling towers associated with the

[1]"Solid waste" refers to its regulatory definition under Municipal SWDA, [20 NMAC 9.1]

Low Energy Demonstration Accelerator (LEDA). The effluent from Outfall No. 11 would increase stepwise over the next five to seven years as different phases of LEDA come into operation (DOE 1995a). All industrial effluent from Outfall No. 11 would be eliminated within a year or two after the LEDA project ended. Four outfalls, which serve the RLWTF (EPA No. 051051), the TA-3 Steam Power Plant (EPA No. 01A001), the HEWTF (EPA No. 05A055), and the SWSC plant (EPA No. 13S), would continue to discharge rerouted industrial effluents from these facilities. These four outfalls are Nos. 28, 29, 30, and 31, respectively, shown in Figure 2-2.

2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, outfalls listed in Table 2-1 would continue to discharge industrial effluent at approximately the current rate and at the current locations. Under this alternative, NPDES Permit exceedances may continue to occur. There is a possibility that the regulators would levy fines and penalties against UC and DOE as a result of the violation of Administrative Orders. DOE may close some LANL operations until industrial effluent is compliant with the conditions of the NPDES Permit. This alternative does not meet the purpose and need but is used as a baseline for the current condition of LANL's effluent and associated wetlands.

2.3 ALTERNATIVE CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

A single alternative was considered but eliminated from further analysis because it did not meet the underlying need for DOE action. This alternative consisted of pre-treating wastewater at its source. Individual treatment systems, e. g., settling tanks or ion exchange equipment, could be installed at the source facility for the outfalls in the Proposed Action (Table 2-1). This alternative may improve regulatory compliance at LANL but it would not completely eliminate the potential for noncompliance with the NPDES limitations. The alternative of constructing individual treatment systems that duplicate the processes of the existing centralized facility (SWSC) would cost much more than the Proposed Action. Additionally, there would be a greater likelihood of system failure, operator error, and mechanical problems leading to recurrent violation of the NPDES Permit. The likely environmental affects of such an alternative would be bounded by the analysis presented for the Proposed Action and the No Action Alternative. For these reasons, this alternative was not considered to be reasonable and is not analyzed further.

Table 2-1. Outfalls in the Proposed Action

OUTFALL NO. FOR THIS EA	EPA OUTFALL NO.	EFFLUENT SOURCE (TA-BUILDING/ STRUCTURE)
1	02A007	16-540
2	03A021	3-29
3	03A022	3-127
4	03A028	15-185, 202
5	03A034	21-166
6	03A038	33-114
7	03A040	43-1
8	03A042	46-1
9	03A045	48-1
10	03A047	53-60
11	03A113[a]	53-293, 294, 365, 1032
12	03A148	3-1499
13	03A181	55-6
14	04A016	48-1
15	04A083	16-202
16	04A094	3-170
17	04A115	8-70
18	04A127	35-213
19	04A153	48-1
20	04A157	16-460
21	06A073	16-222
22	06A074	8-22
23	06A075	8-21
24	06A123	15-183
25	06A132	35-87
26	None	3-1698
27	None	3-22

[a] Outfall No. 11, which would be used by the Low Energy Demonstration Accelerator (LEDA) project, was originally believed to have no associated wetland (DOE 1996). However, subsequent investigations identified a small wetland (0.032 acre).

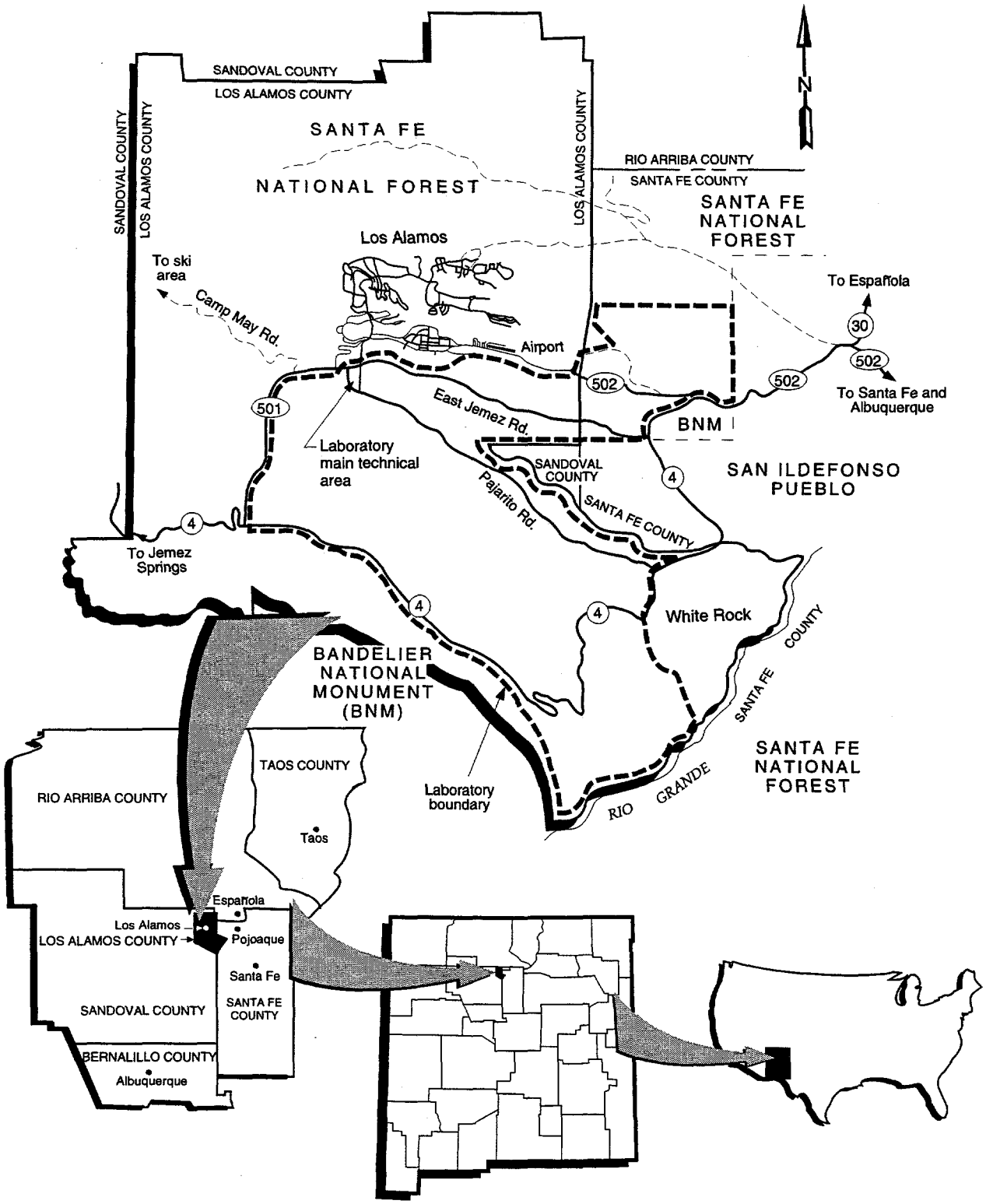

Figure 2-1. Location of Los Alamos National Laboratory

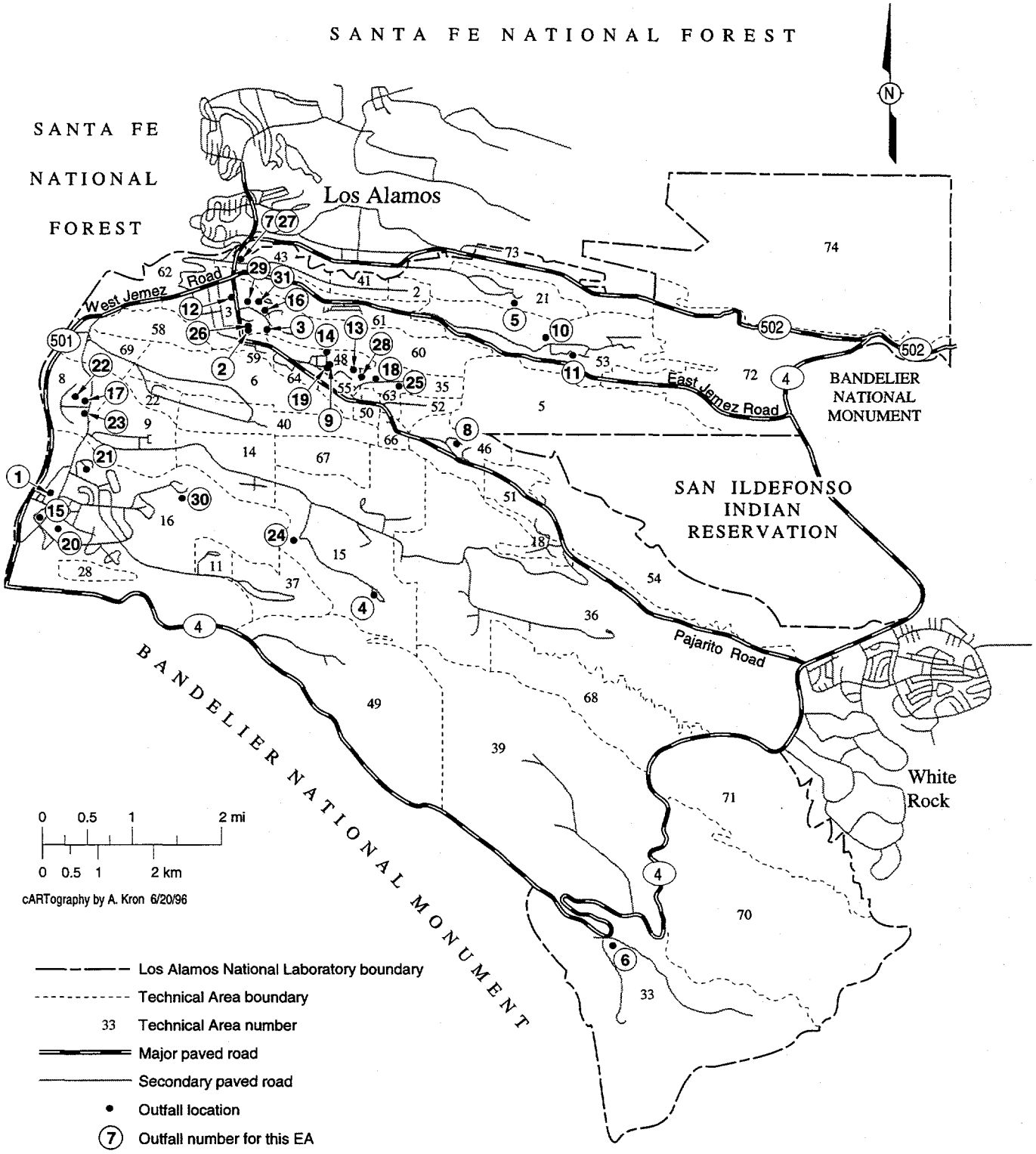

Figure 2-2. Locations of outfalls within LANL technical areas.

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3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Chapter 3 describes the environment at LANL and the consequences of the Proposed Action and No Action alternatives to LANL's natural resources. It also presents an assessment of the cumulative effects of the Proposed Action and No Action alternatives, taking into account past and future closures of LANL outfalls with associated wetlands.

3.1 GENERAL SETTING

LANL and the associated communities of Los Alamos and White Rock are situated in Los Alamos County in north-central New Mexico as shown in Figure 2-1. Detailed descriptions of LANL's physical and socioeconomic environment, its climate, meteorology, hydrology, cultural resources, waste management, floodplains, wetlands, and threatened and endangered species are presented in the 1979 Final EIS for Los Alamos Scientific Laboratory Site (DOE 1979) and the Environmental Surveillance Reports (Environmental Surveillance Group 1978, 1988, 1989, and Environmental Protection Group (EPG) 1990, 1992, 1993, 1994, 1995).

The 111-km^2 (43-mi^2) LANL site is located on the Pajarito Plateau, which lies on the eastern flank of the Jemez Mountains and consists of a series of finger-like mesas separated by deep southeast-trending canyons cut by intermittent streams. In the LANL region, the east edge of the Pajarito Plateau descends to the Rio Grande. The Rio Grande flows in a southwesterly direction along the easternmost boundary of LANL. Most LANL industrial developments are confined to the mesa tops. The mesa tops range in elevation from a maximum of 2,400 m (7,800 ft) along the western boundary to about 1,900 m (6,200 ft) at their eastern terminus above the Rio Grande. The canyons within LANL boundaries can be as deep as 300 m (1,000 ft) below the mesa top. LANL is divided into TAs that are used for administration and support function buildings, experimental and research areas, waste disposal areas, roads, and utility rights-of-way. However, these uses account for only a small part of the total land area for LANL, with the remainder reserved as buffer zones and potential places for future development (EPG 1995). These buffer zones are generally forested or meadow areas.

Most of the mesas in the Los Alamos area are formed from Bandelier Tuff, which includes ash fall, ash fall pumice, and rhyolite tuff. The tuff, ranging from nonwelded to welded, is more than 300 m (1,000 ft) thick in the western part of the plateau and thins to about 80 m (260 ft) eastward above the Rio Grande. It was deposited as a result of major eruptions in the Jemez Mountains about 1.2 to 1.6 million years ago. The tuff overlaps onto the Tschicoma Formation, which consists of older volcanics that form the Jemez Mountains. The tuff is underlain by the conglomerate of the Puye Formation in the central and eastern edge along the Rio Grande. Chino Mesa basalts interfinger with the conglomerate along the river. These formations overlay the sediments of the Santa Fe Group, which extend across the Rio Grande Valley and are more than 1,000 m (3,300 ft) thick (EPG 1995).

LANL has a semiarid, temperate mountain climate. The average high temperature in July from 1961 through 1990 was 81° F (27° C), and the average high temperature in January was 40° F (4° C). The average low temperature in July from 1961 through 1990 was 55° F (13° C) and the average low temperature in January was 17° F (-8° C). Day-to-night temperature fluctuations average 23° F (13° C),

a result of LANL's high elevation and a dry, clear atmosphere, which allows high insolation during the day and rapid radiative losses at night (EPG 1995).

The average annual precipitation is 48 cm (18.7 in.). Approximately 36 percent of the annual precipitation normally occurs during July and August. Lightning, hail, and thunderstorms frequently occur during this period. Runoff from these thundershowers flows through the various canyons, supplementing ground water in shallow alluvium. Winter precipitation falls primarily as snow with accumulations of about 150 cm (59 in.) (EPG 1995).

Figure 3-1 shows precipitation data collected at LANL for the period 1950 through 1995. The lowest precipitation received during this period was in 1956, which was 17 cm (6.8 in.) The highest precipitation received during this period was in 1952, which was 73.2 cm (29.3 in.). The past five years have been normal rainfall years, but 1996 is currently in a drought situation. As of May 31, 1996, rainfall is off 49 percent of normal expectations. Average normal precipitation through May should be about 13 cm (5.06 in.), while LANL has only received about 6.3 cm (2.5 in.). Neither the Proposed Action nor the No Action alternatives would affect the stormwater contribution to the canyons.

The outfalls listed in Table 2-1 that are the subject of the Proposed Action discharge into several canyons. Figure 3-2 shows the location of the outfalls with respect to related canyons. More detailed maps of the affected environment near each outfall, including the associated wetland, topography, springs, and National Wetlands Inventory (NWI) wetlands are in Appendix A.

3.2 ISSUES CONSIDERED

Table 3-1 is a synopsis of the cultural and natural resource issues considered in this analysis. If an issue has no applicability to the Proposed Action and No Action alternatives, the reasoning is stated briefly in the table and the issue is not included in further discussion. The remainder of Chapter 3 is a discussion of those potential environmental issues that may be affected directly or indirectly by the Proposed Action and No Action alternatives.

3.3 SOILS AND SEDIMENT

Several distinct soils have developed in Los Alamos County as the result of interactions between the bedrock, topography, and local climate. Approximately 95 percent of the mineral components of the soils in the county are derived from Bandelier Tuff, volcanic rocks of the Tschicoma and Puye Formations, basaltic rocks of the Chino Mesa Formation, and remnants of the El Cajete pumice (Nyhan, et al. 1978). The slopes between the mesa top and canyon bottoms often consist of steep rock outcrops and patches of shallow, undeveloped colluvial soils. South-facing canyon walls are steep and usually have little or no soil material or vegetation. In contrast, the north-facing walls generally have areas of very shallow, dark-colored soils containing higher amounts of organic matter and are more heavily vegetated. Wetland soils are typically characterized by high contents of organic material. These "hydric" soils form under conditions of saturation, flooding, or ponding, which develop anaerobic conditions in the upper horizon(s). Most of the LANL wetland soils have been hydrated too recently to have developed into classic hydric soils.

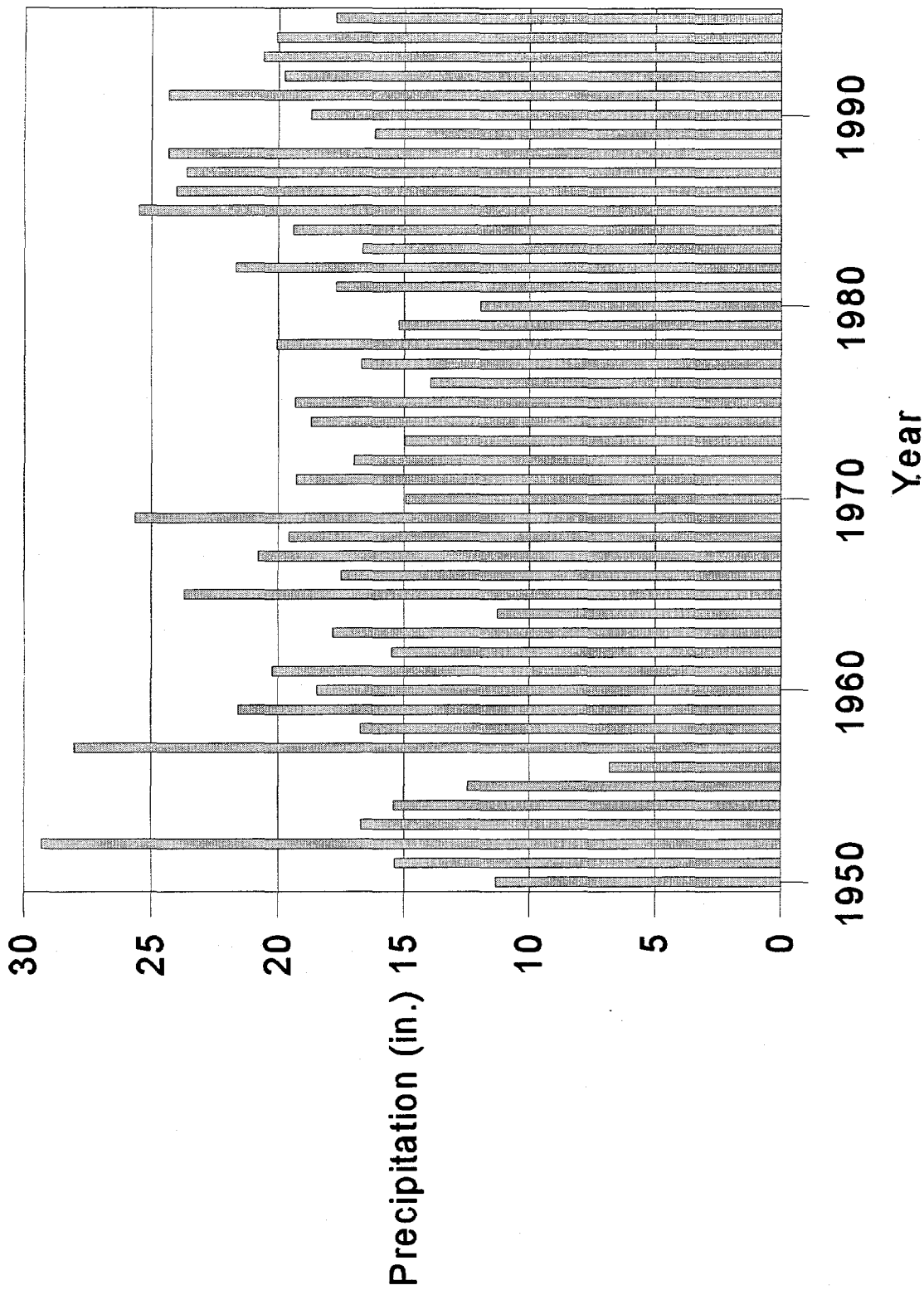

Figure 3-1. Historical Precipitation at Los Alamos National Laboratory

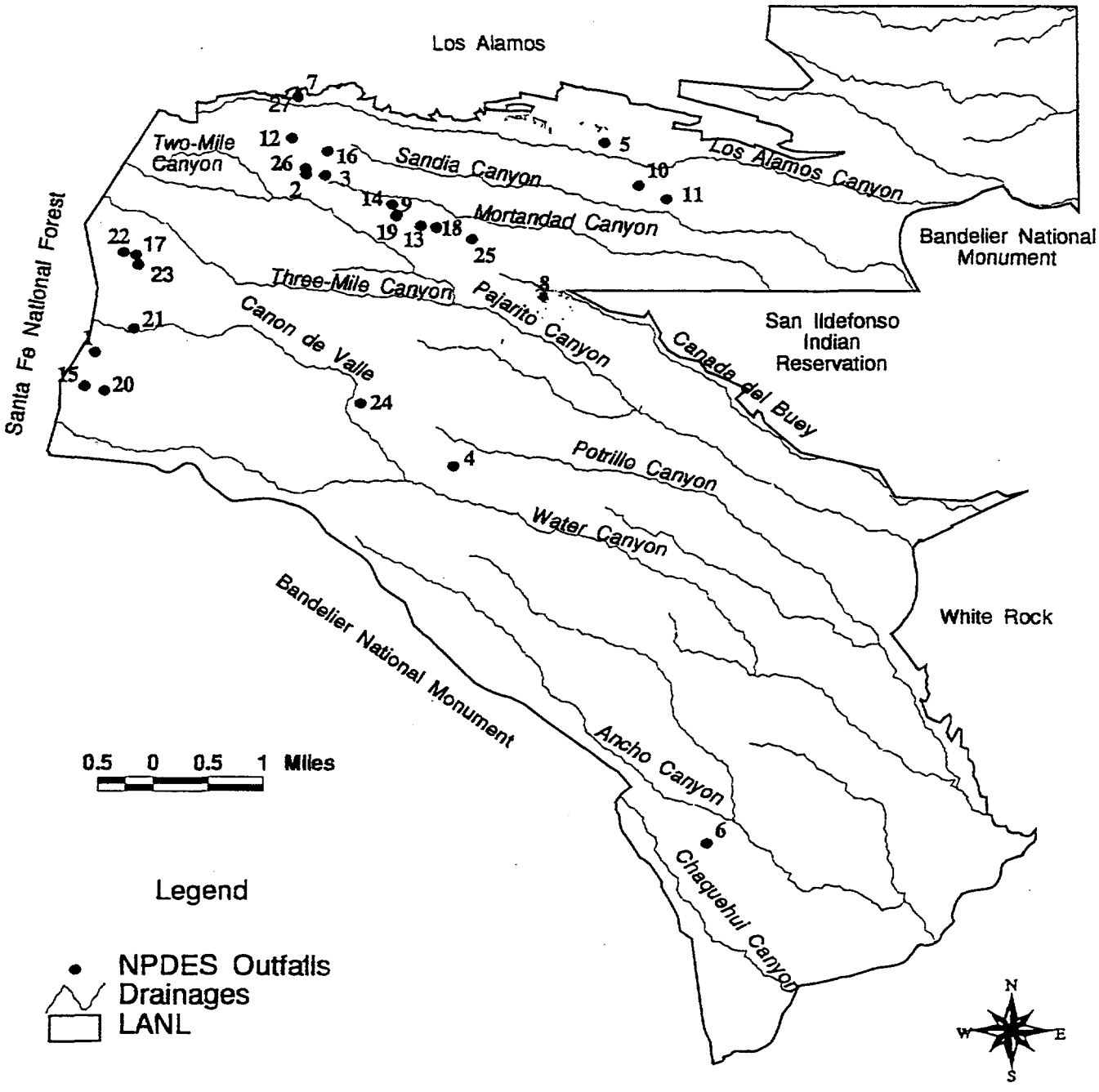

Figure 3-2. Locations of Outfalls with Respect to Canyons

Table 3-1. Potential Environmental Issues

POTENTIAL ISSUE	APPLICABILITY	DESCRIBED IN SECTION
Soils and sediment		3.3
Environmental restoration	Discussed as part of Soils and sediment section	3.3
Water quality		3.4
Hydrology		3.5
Flora and fauna		3.6
Floodplains/Wetlands		3.7
Aesthetics		3.8
Waste management		3.9
Transportation		3.10
Human health		3.11
Environmental justice		3.12
Air	NA[1] - no air emissions	
Seismology	NA -no construction of buildings	
Cultural resources	NA - none affected by Proposed Action	
Threatened and Endangered Species	NA - U. S. Fish & Wildlife list as applied to Los Alamos and discussion of analysis is given in Appendix B; no effects to critical habitat or protected species	
Wild horses and burros	NA - none present at LANL	
Coral reefs and tundra	NA - none present at LANL	
Prime farmland	NA - none present at LANL	
Wild and scenic rivers	NA - none present at LANL or bordering LANL	
Socioeconomics	NA - work would be done by existing LANL workforce; no creation or reduction of permanent jobs	
Land use	NA - no change in land use	
Other natural resources (timber, range, minerals)	NA - no available timber, range, or mineral resources at LANL	

[1]NA - not applicable

Regional and site-specific sediments are formed and transported in the stream channels of the Pajarito Plateau canyons. The majority of these sediments are composed of variable proportions of plateau soils and coarse-to-fine organic materials. Plateau sediments are formed and transported primarily by natural surface runoff from spring snowmelt and summer thunderstorms. During the spring, snowmelt typically

moves small amounts of sediments short distances over long periods of time (days). In contrast, the summer thunderstorm runoffs move large amounts of sediments over short periods of time (hours). These factors affect potential releases, location, and transportation of contaminants present in the environment (LANL 1992a, b). Of the 27 outfalls that are associated with the Proposed Action, 14 outfalls would continue to discharge stormwater.

Many LANL areas that have received effluent from outfalls over the years of LANL's operation have been classified as SWMUs or PRSs by the LANL ER Project due to historical effluents that were not as strictly regulated as they are today. When the ER Project performs a RCRA Facility Investigation (RFI), soil samples are taken from SWMUs and PRSs and may be analyzed for high explosives, metals, carcinogenic compounds, radionuclides, or volatile organic compounds, depending on what is known of the history of the site. The RFI report includes a recommendation to the EPA about whether to remediate each SWMU and PRS or to take no further action. EPA acceptance of this recommendation must be concurred with by the New Mexico Environment Department (NMED) in their role of oversight agency. At least 22 areas associated with outfalls in the Proposed Action (Table 2-1) have been identified as SWMUs or PRSs, and 11 of these areas have been sampled and the samples analyzed as part of a Phase I RFI. Silver was found in the area of Outfall No. 21 at levels that may cause human health concerns, and the ER Project will recommend to the EPA that this site be remediated in Spring 1997 as either a Voluntary Corrective Action or as an Expedited Clean-up (LANL 1996a). If the EPA accepts this recommendation the cleanup would occur in 1997 using the specified method. If the EPA does not accept the recommendation, cleanup would be delayed until the ER Project and EPA agree on a method and schedule. One outfall area (No. 18) has been recommended for further investigation (LANL 1996b) and 15 outfall areas (Nos. 4, 5, 8, 9, 10, 11, 13, 14, 17, 19, 20, 22, 23, 24, 25) have been recommended for no further action. LANL and the NMED Surface Water Quality Bureau are discussing the need for monitoring soil and water at these sites to protect surface and ground water quality. The remaining outfall areas are either not SWMUs, or they have not been sampled, or their status is unknown. The LANL ER Project employs BMPs on an on-going basis to prevent the migration of contaminants from SWMUs and PRSs.

Polychlorinated biphenyls (PCBs) have been found in SWMU 3-056(c) located near the head of Sandia Canyon. Sandia Wetland was sampled and PCBs were found at concentrations of 1 to 3 ppm. No sampling has been conducted downstream from the wetland to determine the concentration of contaminants, if any. More extensive characterization is scheduled for 1997-1998. This SWMU has been remediated by soil removal to PCB concentrations of 10 ppm. The ER Project plans to stabilize the site with an engineered cover. Runoff water would be monitored for contaminant concentrations, and if these concentrations remain below NMED-specified concentrations, no further cleanup would be performed. If concentrations exceed NMED-specified concentrations, additional cleanup would be performed. As an interim measure, stormwater run-on and run-off control features have already been put in place.

The SWSC plant at TA-46 currently processes an average of about 980,000 L (260,000 gal) of effluent each day. The water is treated and then discharged to a holding pond at TA-46. After the treated effluent leaves the pond, it is pumped to a re-use tank at TA-3. Some of the water in the re-use tank is used as make-up water in the Steam Power Plant (TA-3, Building 22). Treated effluent that is not used for make-up water is discharged to Sandia Canyon downstream from SWMU 3-056(c) and directly into Sandia Wetland. The fraction of treated effluent that is used by the Steam Power Plant varies seasonally. The Proposed Action would re-route approximately 100,000 L (27,000 gal) of effluent to SWSC each

day, which is about 10% of the volume processed by SWSC each day. Therefore, the volume of treated effluent discharged to Sandia Canyon may increase under the Proposed Action by up to 10%, with the absolute volume varying seasonally. This additional discharge to Sandia Canyon may increase the mobilization and transport of existing contaminants in Sandia Canyon but the extent of this effect is unknown at this time.

Under the Proposed Action, transport of any existing contaminants in the soil near some of the outfalls would decrease if industrial effluent to outfalls is reduced or eliminated. However, data does not exist to determine how much contamination, if any, currently reaches wetlands associated with LANL outfalls connected to the Proposed Action due to industrial effluent transport, or how much contamination may be transported further downstream from the wetland areas. At some outfalls, stormwater discharge would still be present and stormwater could continue to transport any existing contaminants.

As already stated, all outside construction work would follow standard erosion control practices to decrease the potential for transport of soil from construction sites, especially into streams and drainages. BMPs for soil containment may include use of straw bales and sedimentation fences. Exterior construction activities may require site revegetation and restoration of the area to its original contours. Soil disturbance would be kept to an absolute minimum, and all disturbed areas would be replanted with an appropriate native seed mix once work is completed. The LANL Biology Team would assess and develop site specific BMPs for any sites where uncertainty exists regarding necessary restoration and reseeding practices. All outside construction activities would adhere to the following BMPs:

- restrict off-road travel that may disturb vegetation and cause erosion,
- minimize disturbance to vegetation and the soil surface which could alter the water flow and/or widen channels,
- minimize disturbances along the drainages and steeper slopes which could produce or initiate erosion, and
- avoid unnecessary disturbance (such as the use of unpaved or unimproved parking and equipment storage areas, and off-road travel) to stream bank or areas adjacent to wetlands and their associated vegetation.

Under the No Action alternative, existing contaminants would continue to be transported by effluent from outfalls at the same rate they are currently moving and the area of contamination would increase. This would make ER Program remediation activities more difficult and more costly than under the Proposed Action.

3.4 WATER QUALITY

The water quality of the effluent discharged by the permitted outfalls at LANL is regulated by the CWA and must meet discharge limitations set forth in LANL's NPDES Permit. Each category of outfall has its own set of discharge limitations. Table 3-2 lists these effluent parameters for the categories of outfalls that are associated with the Proposed Action. Between January 1991 and March 1996, industrial effluent from the outfalls associated with the Proposed Action exceeded the discharge limitation for these effluent parameters 47 times. Of that number, there were eight exceedances of the phosphorus limitation, three exceedances of the cyanide limitation, and three exceedances of the total arsenic

limitation. The remainder of the exceedances were for pH, total suspended solids, foam, and free chlorine. The individual exceedances are stated in Appendix A.

Table 3-2. Effluent Parameters and Discharge Limitations from 1994 NPDES Permit

CATEGORY	TYPE OF EFFLUENT	EFFLUENT PARAMETERS	DISCHARGE LIMITATIONS Daily Average	DISCHARGE LIMITATIONS Daily Maximum
02A	Boiler blowdown and neutralized demineralizer regeneration brine	pH	6.0–9.0 su	9.0 su
		TSS[1]	30 mg/L	100 mg/L
		Total Iron	10 mg/L	40 mg/L
		Total Copper	1.0 mg/L	1.0 mg/L
		Total Phosphorus	20 mg/L	40 mg/L
		Sulfite (as SO_3)	35 mg/L	70 mg/L
		Total Chromium	1.0 mg/L	1.0 mg/L
		WQS[2]	*	*
03A	Cooling tower blowdown, evaporative coolers, chillers, condensers and air washer blowdown	pH	6.0–9.0 su	9.0 su
		TSS	30 mg/L	100 mg/L
		Free Available Chlorine	0.2 mg/L	0.5 mg/L
		Total Phosphorus	20 mg/L	40 mg/L
		Total Arsenic	0.04 mg/L	0.04 mg/L
		WQS	*	*
04A	Noncontact cooling water,	pH	6.0–9.0 su	9.0 su
		Total Residual Chlorine	Report (mg/L)	Report (mg/L)
		WQS	*	*
06A	Photo rinse water	pH	6.0-9.0 su	9.0 su
		Total Silver	0.5 mg/L	1.0 mg/L
		WQS	*	*

1 Total Suspended Solids

2 Water Quality Standards

The pH shall not be less than 6.0 standard units (su) nor greater than 9.0 su.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

* The following daily average and daily maximum WQS effluent limits apply (the two limitations are the same):

Total Aluminum	5.0 mg/L	Total Mercury	0.01 mg/L
Total Arsenic	0.04 mg/L	Total Selenium	0.05 mg/L
Total Boron	5.0 mg/L	Total Vanadium	0.10 mg/L
Total Cadmium	0.2 mg/L	Total Zinc	95.4 mg/L
Total Chromium	5.1 mg/L	Radium 226+228	30.0 pCi/L
Total Cobalt	1.0 mg/L	Tritium	3,000,000 pCi/L
Total Copper	1.6 mg/L		
Total Lead	0.4 mg/L		

Under the Proposed Action, these exceedances would no longer be likely to occur because the industrial effluent would be eliminated from the outfalls. Under the No Action alternative, the exceedances are likely to continue.

LANL has a general stormwater permit (NMR00A384). The permit specifies the development of stormwater pollution prevention plans for regulated activities at sites such as RCRA-permitted Treatment, Storage, and Disposal (TSD) facilities, which includes SWMUs; landfills; and steam electric power generating plants. The plans contain site-specific BMPs and may contain monitoring plans to prevent degradation of water quality.

3.5 HYDROLOGY

Water occurs in the LANL area as surface water, shallow ground water in alluvial fill, intermediate perched ground water, and deep ground water in the regional aquifer. The canyon systems at LANL receive water from snowmelt, rainfall runoff from headwater areas, stormwater runoff from LANL facilities, and industrial effluent through LANL outfalls. Some canyons may also be fed by springs. These springs may have precipitation or industrial effluent that has emerged downstream or downslope from the outfalls as their sources. There has been no systematic study of water resources at LANL and the exact contribution of these sources to any given stretch of a drainage is difficult to determine. Figures A-3 through A-7 in Appendix A show the locations of LANL outfalls associated with the Proposed Action in relation to the canyons and springs in the LANL area. The major canyons that contain perennial reaches inside LANL are Pajarito, Water, Ancho, and Chaquehui Canyons (LANL 1993). All canyons can have ephemeral reaches due to stormwater, snowmelt, and springs.

Eleven drainage areas, with a total area of 212 km^2 (82 mi^2), pass through the eastern boundary of LANL. Runoff from heavy thunderstorms and heavy snowmelt reaches the Rio Grande several times a year from some drainages. Los Alamos, Pajarito, and Water Canyons have drainage areas greater than 26 km^2 (10 mi^2). Pueblo Canyon has 21 km^2 (8 mi^2), and all others have less than 13 km^2 (5 mi^2). Theoretical maximum flood peaks range from 0.7 m^3/s (24 ft^3/s) for a 2-year recurrence to 19 m^3/s (686 ft^3/s) for a 50-year recurrence (LANL 1993).

The rate at which water discharges from the outfalls listed in Table 2-1 varies from 0.5 gallons per minute (gpm) (at Outfall No. 4) to 27 gpm (at Outfall No. 13) during the time effluent is discharging. Most of the industrial effluent generating activities for outfalls in outfall categories 03A, 04A, and 06A create effluent intermittently or seasonally, making it difficult to calculate accurate outfall effluent volume. In general, generation flows are not metered at the facilities. Outfall flows have been estimated based on measurements by LANL employees during monitoring or surveying. Effluent from the outfalls affected by the Proposed Action may or may not reach major canyons. Only one outfall that is part of the Proposed Action, Outfall No. 20 near Water Canyon, creates a surface flow length extending greater than 0.8 km (0.5 mi) (Foxx and Blea-Edeskuty 1995). Effluent wastewater sinks beneath the ground surface or is lost to evapotranspiration without leaving the LANL-site boundary under non-storm conditions. Neither the Proposed Action nor the No Action alternative would alter the hydrologic flow in the affected canyons due to the small flow of effluent at each outfall (McLin 1996).

Fourteen of the outfalls associated with the Proposed Action (Nos. 1, 2, 3, 5, 6, 7, 8, 9, 12, 15, 17, 18, 19, 25) receive stormwater in addition to the industrial wastewater component. The volume of water supplied by stormwater is unknown. Under the Proposed Action, the industrial component of the

effluent at each outfall would be eliminated, but the full stormwater component would continue to discharge through the outfall. Under the No Action alternative, both stormwater and industrial effluent would continue to be discharged.

3.6 FLORA AND FAUNA

3.6.1 Flora

Within LANL boundaries five broad vegetation classes occur. Lower elevations are dominated by a juniper (*Juniperus monosperma* [Engelm.] Sarg.) overstory with a mixed shrub understory. Lower and mid elevations lack dominant tree overstory and are vegetated by shrubs, grasses, and herbaceous plants. From elevations of 1,830 m (6,000 ft) to approximately 2,130 m (7,000 ft), the dominant plant community is widely spaced piñon pine (*Pinus edulis* Engelm.) and juniper trees. This woodland community is common on mesa tops with a grass understory of blue grama (*Bouteloua gracilis* [Willd. Ex Kunth] Lag. Ex Griffths), little bluestem (*Schizachyrium scoparium* [Nash] Mich X.), and galleta (*Hilaria jamesii* [Torr.] Benth.). The ponderosa pine (*Pinus ponderosa* P. & C. Lawson) community is common at elevations between 2,130 m and 2,440 m (7,000 ft and 8,000 ft) and the tree can be found in pure stands. At lower elevations it usually occurs along canyon floors and north-facing slopes, and at higher elevations, may be found intermixed in the mixed conifer community. The mixed conifer community is found at higher elevations in dense stands with little understory vegetation. Dominant trees in this community include spruce (*Picea engelmanii* Parry Ex Engelm.), white fir (*Abies concolor* [Gord. & Glend.] Lindl. Ex Hildebr.), and Douglas-fir (*Pseudotsuga menziesii* [Mirbel] Franco).

The wetlands associated with the outfalls in Table 2-1 are distinct, small ecosystems embedded in the broader ecosystems outlined in the preceding paragraph. Most of these are linear riparian wetlands ranging in size from 0.001 acre (6 m^2) to 4.424 acre (17,906 m^2). The presence of outfall effluent has allowed the growth of certain types of riparian vegetation. The Corps of Engineers (U.S. Army Corps of Engineers 1987) uses five categories of plants when determining the status of wetland vegetation:

- obligate wetland plants (OBL) – plants that almost always (estimated probability 99 percent) occur in wetlands under natural conditions,
- facultative wetland plants (FACW) – plants that usually occur (estimated probability 67 percent to 99 percent) in wetlands,
- facultative plants (FAC) – plants with a similar likelihood (estimated probability 33 percent to 67 percent) of occurring in both wetlands and nonwetlands,
- facultative upland plants (FACU) – plants that occur sometimes (estimated probability 1 percent to 33 percent) in wetlands, and
- obligate upland plants (UPL) – plants that occur rarely (estimated probability 1 percent) in wetlands.

LANL biologists have performed surveys of all the LANL wetland areas associated with outfalls included in Table 2-1. A survey of plants found within the area of wetland vegetation was conducted, and any plant having a cover of greater than 10 percent was recorded. Table 3-3 lists each outfall in this survey along with the dominant plants (any having at least 20 percent cover) found in each outfall's associated wetland area. Most of the wetlands surveyed below outfalls have vegetation characteristic of natural riparian areas that receive sporadic flow. The primary wetland plants in these areas were cattails (*Typha latifolia* L.), rushes (*Juncus* spp.), redtop (*Agrostis alba* auct. non L.), and willow (*Salix* spp.).

Table 3-3. Dominant Understory Plants in Wetlands Associated with Outfalls

		PRIMARY PLANTS		
OUTFALL NO. FOR THIS EA	EPA OUTFALL NO.	PERCENT COVER	SCIENTIFIC NAME	COMMON NAME AND CORPS OF ENGINEERS CATEGORY*
1	02A007 - Western Portion	60 20	*Elymus elymoides* (Raf.) Swezey syn. *Sitanion hystrix* *Agrostis alba* auct. non L.	Bottlebrush squirreltail (UPL) Redtop (FACW)
1	02A007 - Eastern Portion	40 30	*Juncus balticus* Willd. *Agrostis alba* auct. non L.	Wire rush (OBL) Redtop (FACW)
2	03A021	50 30	*Agrostis alba* auct. non L. *Typha latifolia* L.	Redtop (FACW) Cattail (OBL)
3	03A022	60 20	*Typha latifolia* L. *Agrostis alba* auct. non L.	Cattail (OBL) Redtop (FACW)
4	03A028	80	*Poa fendleriana* (Steud.) Vasey	Muttongrass (UPL)
5	03A034	65 35	*Agrostis alba* auct. non L. *Typha latifolia* L.	Redtop (FACW) Cattail (OBL)
6	03A038	90	*Agrostis alba* auct. non L.	Redtop (FACW)
7	03A040	70	*Bromus* spp.	Brome
8	03A042	70 20	*Agrostis alba* auct. non L. *Phleum pratensis* L.	Redtop (FACW) Timothy (FACU)
9	03A045	50 30	*Typha latifolia* L. *Agrostis alba* auct. non L.	Cattail (OBL) Redtop (FACW)
10	03A047	40 35 20	*Typha latifolia* L. *Carex* sp. *Agrostis alba* auct. non L.	Cattail (OBL) Sedge Redtop (FACW)
11	03A113	80	*Dactylis glomerata* L.	Orchard grass (FACU)
12	03A148	80 20	*Bromus* sp. *Agrostis alba* auct. non L.	Brome Redtop (FACW)
13	03A181	60 25	*Typha latifolia* L. *Juncus* sp.	Cattail (OBL) Rush
14	04A016	50 25	*Juncus* sp. *Typha latifolia* L.	Rush Cattail (OBL)
15	04A083	70 20	*Agrostis alba* auct. non L. *Bromus anomalus* Rupr. ex Fourn	Redtop (FACW) Nodding brome (UPL)

Table 3-3. Dominant Understory Plants in Wetlands Associated with Outfalls (con't)

		PRIMARY PLANTS		
OUTFALL NO. FOR THIS EA	EPA OUTFALL NO.	PERCENT COVER	SCIENTIFIC NAME	COMMON NAME AND CORPS OF ENGINEERS CATEGORY
16	04A094	60 25	*Typha latifolia* L. *Juncus* sp.	Cattail (OBL) Rush
17	04A115	55 35	*Sporobolus* sp. *Juncus* sp.	Dropseed Rush
18	04A127	85	*Salix irrorata* Anderss.	Blue-stem willow (FACW)
19	04A153	50 30	*Tyhpa latifolia* L. *Agrostis alba* auct. non L.	Cattail (OBL) Redtop (FACW)
20	04A157	70	*Agrostis alba* auct. non L.	Redtop (FACW)
21	06A073	90	*Poa fenderliana* (Steud.) Vasey	Muttongrass (UPL)
22	06A074	60 35	*Agrostis alba* auct. non L. *Sporobolus* sp.	Redtop (FACW) Dropseed
23	06A075	60 30	*Typha latifolia* L. *Agrostis alba* auct. non L.	Cattail (OBL) Redtop (FACW)
24	06A123	95	*Poa fendleriana* (Steud.) Vasey	Muttongrass (UPL)
25	06A132 - Overstory	80	*Salix exigua* Nutt.	Coyote willow (OBL)
25	06A132 - Understory	75	*Agrostis alba* auct. non L.	Redtop (FACW)
26	None	50 30	*Agrostis alba* auct. non L. *Typha latifolia* L.	Redtop (FACW) Cattail (OBL)
27	None	70	*Bromus* sp.	Brome

*Codes for Corps of Engineers Categories

OBL = obligate wetland plants
FACW = facultative wetland plants
FAC = facultative plants
FACU = facultative upland plants
UPL = obligate upland plants

Many wetlands associated with outfalls have other water sources that have contributed to the establishment and maintenance of the wetlands. Diverted runoff and snowmelt is piped to discharge through some outfalls, while natural drainages channel runoff and snowmelt from nearby structures and topographic features to the wetlands. A recent report on the condition of LANL's wetlands concluded that riparian vegetation would probably persist indefinitely in some of the outfall areas augmented by other sources of water should the effluent discharges be eliminated (Newling 1995). With increasingly reduced water, OBL species would be expected to die-off and be replaced first, followed by FACW species, then FAC species, and finally the FACU species until only UPL species remain. The extent of plant replacement depends on the amount of water available from other sources and the degree of establishment of the present vegetation. Deep-rooted wetland plants would be expected to persist in a drying environment longer than those with shallow roots. The expected level of vegetational replacement (low, medium, or high) under the Proposed Action is based on the presence or absence of other water sources contributing to the wetlands, and the water requirements of current vegetation within the wetlands (Table 3-4). Under the Proposed Action, some outfalls (Nos. 2, 8, 11, 18, 24, and 25) would continue to have the same plant species in about the same proportions as they do now. Other outfalls (Nos. 1, 7, 12, 15, 17, 20, 21, 22, 26, and 27) would experience a moderate amount of replacement of current species by species that require less water. The wetlands at 11 outfalls (Nos. 3, 4, 5, 6, 9, 10, 13, 14, 16, 19, and 23) would undergo a more pronounced change in character, with a high degree of replacement of current species by other UPL species requiring less water. Appendix A contains an assessment of the expected level of wetland vegetational replacement for each outfall affected by the Proposed Action that considers the presence of other water sources.

Plants are capable of uptaking, using, and storing various chemicals and metals. The affinity for particular chemicals and metals and extent of uptake, use and storage varies with the species, environmental parameters, and seasons of the year. This capability may effectively trap and immobilize environmental contaminants within plant tissues. Wetland plants receive most (95 to 99 percent) of their nutrients from the soil they are rooted in, rather than from overlying surface waters (Johnston 1993). Studies (Shutes 1993) of heavy metal uptake by cattail and rush (*Juncus effusus* L.) demonstrate a decreasing affinity for heavy metals from roots, to rhyzomes, to leaf tissue with leaves being the least used site for heavy metal storage. Highest concentrations of heavy metals were in the underlying sediment. Metals, as in the case of nutrients, appear to be locked into the underground plant parts and are released to sediment when the plant decomposes. Under the Proposed Action, it is expected that as some wetlands shrink or dry up, most heavy metal contaminants would continue to be contained in the soil with some uptake continuing by replacement, non-OBL vegetation. The exact levels of uptake would be dependent on replacement species. Decay of dead wetland plants may gradually release dilute quantities of contaminants back to the environment as the decay process takes place. There has always existed a degree of fluctuation in the size of wetlands due to operational variations within LANL that affect the types and amount of effluent, and the timing of effluent release. The replacement of wetland plants with other non-OBL species, and the decay of wetland plants over time, is different for the Proposed Action than for the No Action Alternative only in the likelihood of occurrence at particular outfall areas and the permanence of the event. Given the size of individual wetlands associated with outfalls affected by the Proposed Action, and the known contamination with silver at a single outfall area, it is unlikely that any of these wetlands function to uptake and store large quantities of heavy-metals from the environment. Nine additional outfall areas remain to be sampled; if it is reasonable to estimate that a similar proportion of these outfall areas will have environmental contamination as have those areas already sampled, then about one additional outfall area is likely to exhibit contamination. The difference between the Proposed Action and the No Action alternative due to environmental contaminant uptake and storage by wetland plants is likely to be minimal to nonexistent.

Table 3-4. Additional Water Contributors to Wetlands Associated with Outfalls and Expected Level of Wetlands Vegetational Replacement

OUTFALL NO. FOR THIS EA	EPA OUTFALL NO.	DIVERTED RUNOFF AND SNOWMELT Y=Yes N=No	NATURAL DRAINAGE Y=Yes N=No	EXPECTED LEVEL OF WETLANDS VEGETATIONAL REPLACEMENT
1	02A007	Y	Y	Medium
2	03A021	Y	Y	Low
3	03A022	Y	Y	High
4	03A028	N	Y	High
5	03A034	Y	N	High
6	03A038	Y	Y	High
7	03A040	Y	Y	Medium
8	03A042	Y	Y	Low
9	03A045	Y	Y	High
10	03A047	N	Y	High
11	03A113	N	Y	Low
12	03A148	Y	N	Medium
13	03A181	N	Y	High
14	04A016	N	Y	High
15	04A083	Y	Y	Medium
16	04A094	N	N	High
17	04A115	Y	Y	Medium
18	04A127	Y	Y	Low
19	04A153	Y	Y	High
20	04A157	N	Y	Medium
21	06A073	N	N	Medium
22	06A074	N	Y	Medium
23	06A075	N	Y	High
24	06A123	N	N	Low
25	06A132	Y	Y	Low
26	None	Y	Y	Medium
27	None	N	Y	Medium

Releases of industrial effluent that exceeds NPDES permit limitations, (for example with high pH, low pH, or high chlorine concentration), could result in short-term or long-term damage to flora communities. There have been no systematic studies at LANL to correlate specific NPDES Permit exceedances at the site with plant damage. Under the Proposed Action there would be a reduced opportunity for damage to flora at LANL due to the elimination of industrial effluents from the 27 involved outfalls.

Under the Proposed Action, BMPs for outside construction activities may require reseeding and matting to ensure adequate seed germination, especially if vegetation loss increases erosion potential. A mixture of native grasses, herbaceous plants, or other plants appropriate to the landscaping in the construction area would be used for revegetation. Additional measures would be followed to protect vegetation in all construction areas:

- unnecessary disturbance (such as the use of unpaved parking areas, equipment storage areas, and off-road travel) within vegetation surrounding worksites would be avoided during the actual construction and travel to construction sites,
- existing ponds and stream channels, and associated riparian wetland vegetation would be avoided and no action would take place within these areas,
- disturbance to vegetation along canyon slopes and especially within established drainages would be avoided,
- the LANL Biology Team would be notified prior to any construction activities that would affect more than 0.1 acre (4,356 ft^2) of land, and
- all tree removals involving trunks with a diameter at breast height greater than 20 cm (8 inches) would require approval by the LANL Biology Team before the tree could be felled to avoid unnecessary habitat changes.

Under the No Action alternative, the vegetation would not be expected to change from a wetland community to an upland community. Seasonal and annual variations would be expected to continue. There would continue to be opportunities for damage to floral communities because discharges of industrial effluents would continue at all of the 27 involved outfalls.

3.6.2 Fauna

Undeveloped areas within LANL provide habitat for a diversity of terrestrial wildlife. The five vegetative zones at LANL provide habitat for correspondingly diverse groups of animals. In 1991, LANL biologists surveyed the areas near 133 of LANL's 140 NPDES-permitted outfalls for evidence of wildlife (Foxx and Blea-Edeskuty 1995). All surveyed areas were rated according to three categories of wildlife use:

- probable use–wildlife probably use the areas near these outfalls,
- potential use–wildlife could use areas near these outfalls, and
- no significant use–little or no evidence of wildlife use of areas near these outfalls.

Table 3-5 is a list of the usage for the areas near the outfalls that are part of the Proposed Action as described in the 1991 study plus a number of usage updates observed by LANL personnel since then. Mule deer (*Odocolieus hemionus*) and elk (*Cervus elaphus nelsoni*) left the most commonly encountered animal sign during the 1991 study. Deer sign was found at 11 outfalls and elk sign at 11 outfalls. Other animal sign[2] commonly encountered was from squirrels (*Spermophilus* sp.), raccoons (*Procyon lotar*), coyotes (*Canis latrans*), and rabbits (*Sylvilagus* sp.). Other animals may have been present, but they may not have left obvious sign.

Trapping studies performed by LANL biologists indicate that nocturnal small mammals utilize areas near outfalls at least as much as naturally wet areas. The number of species, percent capture rate, and species diversity of small mammals is directly related to the volume of water at a given outfall (Raymer and Biggs 1994).

Mule deer and elk are the most important and prevalent big game species at LANL, which has historically been utilized by wintering elk. Studies of mule deer movements at LANL between 1975 and 1978 indicated that deer tended to concentrate in the southern and southwestern portions of LANL year-round. Because of their year-round occupancy, deer would be expected to use LANL property for breeding, fawning, bedding, watering, and foraging.

Elk were reintroduced into the Jemez area between 1948 and 1965 after being eradicated around the turn of the century. From a base of 86 animals, the Jemez elk herds have increased to approximately 1,800–2,000 individuals. Studies of elk distribution in the Jemez area between 1977 and 1979 showed that most elk use was to the west and southwest of LANL, and there was some evidence of use in the central part of LANL where human activity was minimal (White 1981). Recent observations (1991-1993) by LANL biologists suggest that elk have spread north and northeast of the previous use areas and have now extended their range into the central areas of LANL. Elk are now using LANL on a year-round basis (Fresquez, et al. 1996). Factors responsible for an increase in the size of local elk herds probably include the lack of predators, the lack of hunting pressure at LANL and at Bandelier National Monument, and the creation of 15,000 acres of winter range as a result of the 1977 nearby La Mesa fire and subsequent reseeding. Winter forage is generally the principal limiting factor in the elk population growth (White and Lissoway 1980) and the expansion of winter range has probably contributed to increased numbers of elk at LANL.

Studies of elk in the Rocky Mountain region (Christensen et al. 1993, Grover and Thompson 1985, Frank and McNaughton 1992) indicate that availability of water for drinking and for temperature regulation (especially in summer) is a critical factor in elk distribution. Elk in the Rocky Mountains tend to prefer areas within 0.5–0.8 km (0.33–0.5 mi) of permanent water (Ward and Toweill 1982). Beyond 0.8 km (0.5 mi), elk activity drops significantly. In mid-summer, 80 percent of elk activity occurs within 0.40 km (0.25 mi) of permanent water. Lactating elk cows also have a seasonal dependence on water. Deer distributions also show a relationship to the location of water sources, with animals generally being located within 2 km (1.25 mi) of permanent water. Deer at LANL that were tracked in the late 1970s had average home ranges of 13.7 km^2 (5.3 mi^2) (Eberhardt and White 1979).

[2]Animal sign could include visual observance of animals, animal feces, animal tracks, bedding, or browsed plants.

Table 3-5. Wildlife Usage of Areas Near Outfalls

OUTFALL NO. FOR THIS EA	USE CATEGORY	DEER/ELK	OBSERVED CHANGES IN USAGE SINCE 1991 SURVEYS
1	Probable use	Deer and elk	—
2	Potential use	Deer and elk	—
3	Probable use	Deer and elk	—
4	Potential use	Elk	Probable use
5	Potential use	Neither	—
6	No significant use	Neither	—
7	Potential use	Neither	—
8	Potential use	Neither	—
9	Potential use	Neither	—
10	Potential use	Deer	—
11	Potential use	Neither	—
12	No significant use	Neither	—
13	Potential use	Deer and elk	Probable use
14	No significant use	Neither	Probable use, elk
15	Potential use	Deer	Elk
16	Potential use	Neither	—
17	Potential use	Elk	—
18	Potential use	Neither	—
19	Potential use	Neither	—
20	Probable use	Deer and elk	—
21	Probable use	Deer	—
22	Probable use	Elk	—
23	Probable use	Deer and elk	—
24	Potential use	Deer and elk	—
25	No significant use	Neither	—
26	Potential use	Deer and elk	—
27	No significant use	Neither	—

LANL biologists are currently studying elk movements at LANL using special global positioning system (GPS) radio collars that report the location of collared elk every 23 hours. The location data is analyzed by overlaying it on maps in a computer with selected ecological features. In the first three months of the study, over 600 locational data points have been collected. Preliminary data suggests that there is a concentration of collared animals around the TA-16 Steam Plant (Outfall No. 1). This area is receiving, at least seasonally, high use. It also suggests that Pajarito Wetlands showed seasonally high use. At this point, this data suggests that more open and accessible water sources are receiving greater use by elk.

Implementing the Proposed Action may cause localized displacement of deer and elk in Mortandad Canyon (away from Outfalls No. 2, 3, 8, 9, 13, 14, 18, 19, and 26) and the southwest portion of LANL (away from Outfalls No. 1, 15, 20, and 21). Consultations with New Mexico Game and Fish personnel indicate that elk in the Jemez Mountains can travel long distances to water sources. Since large- and medium-sized mammals can travel to other water sources, their daily and seasonal movement patterns may change slightly. This potential consequence is discussed in connection with other outfalls and wetlands in Section 3.14, Cumulative Effects. A number of individual members of small mammal species with limited ranges may die under the Proposed Action; however, since none of the species are associated solely with wetlands, no species are expected to disappear from LANL. The Proposed Action would also result in localized die-off of aquatic invertebrates and possibly some populations of small mammals and amphibians. There have been no studies that correlate NPDES Permit exceedances with adverse effects to fauna. Under the Proposed Action there would be no opportunities for adverse effects to fauna because of discharges of industrial effluents.

The No Action alternative would have no observed effect on fauna. Small mammals, large mammals, and macroinvertebrates would remain at their current locations with no increase or decrease in population size. Under this alternative, there would continue to be opportunities for adverse effects to fauna because of discharges of industrial effluents.

3.7 FLOODPLAINS/WETLANDS

3.7.1 Floodplains

The Proposed Action would include activities in or near the buildings and structures in Table 2-1. None of these structures is located within a 50-year or 100-year floodplain (McLin 1992, McLin 1996), and no outdoor construction activities would take place in such a floodplain. No new buildings would be built as part of the Proposed Action.

3.7.2 Wetlands

Wetlands are usually described in terms of hydrology, vegetation, and soils. The Corps of Engineers defines wetlands as, "Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions," (U.S. Army Corps of Engineers 1987). The formation of wetlands is a function of water volume and flow duration, channel profile, soils, vegetation, and geology. Since 1943, various LANL outfalls have discharged adequate volumes of industrial water on a regular enough basis that, given appropriate topographical and soil

features, small wetlands have developed near the outfalls or along the length of the receiving stream channels. In some cases no direct or indirect link can be visually established between an outfall and a nearby wetland. Discharged water may sink beneath the surface to emerge some distance downstream, or it may evaporate before reaching a suitable area. Discharged water may also flow through rocky channels or subsurface alluvium without creating wetland conditions.

Wetlands located below the outfalls associated with the Proposed Action vary greatly in size (Table 3-6), ranging from 0.001 acre (6 m^2) to 4.424 acre (17,906 m^2). These areas were determined by surveying the vegetated and open water areas. In many cases, industrial effluent is supplemented by runoff and snowmelt from nearby parking lots, buildings, and natural drainages. The relative contribution of these sources is difficult to establish, especially where outfall discharges are sporadic. Yearly and monthly precipitation variability (discussed in 3.1, General Setting) influence the size of wetlands. During dry years the wetlands may shrink and if there is a succession of wet years, the wetlands may expand or acquire a different mix of species.

LANL wetlands were not formally studied until 1990. In 1990, a NWI survey described and identified wetlands at LANL using high-altitude aerial photography. The NWI method employs a hierarchical classification system based solely on aerial photography that may not detect small wetlands or those in deep canyons. The survey determined that no perennial streams traversed LANL property, although several perennial stream reaches were identified. Wetlands within LANL boundaries fell primarily into two classifications: palustrine and riverine. Palustrine wetlands (ponds and marshes) have been identified in Sandia, Pajarito, Los Alamos, and Pueblo Canyons, as well as smaller ones in other parts of the Laboratory (Figures A-3 through Figure A-7). None of the four large canyon palustrine wetlands would be expected to be affected by the Proposed Action, although some of the smaller ones may be. Beds of ephemeral and intermittent streams that traverse LANL were classified as temporarily flooded riverine wetlands. None of the temporarily flooded riverine wetlands would be expected to be affected by the Proposed Action. No construction activities included in the Proposed Action would occur within a wetland.

The total acreage of wetlands associated with outfalls connected to the Proposed Action is 8.603 acres (34,818 m^2). Under the Proposed Action, some wetlands would diminish in size and gradually acquire a greater percentage of upland vegetation. None of the proposed outdoor construction activities would take place within defined boundaries of a wetland area. Under the No Action alternative, wetlands would remain in their current condition subject to industrial wastewater generation fluctuations and seasonal and long-term climatic variations.

3.8 AESTHETICS

LANL has five vegetative zones as described in Section 3.6.1, Flora, and the existing wetland vegetation adds additional diversity to the landscape in the small areas near the outfalls in the Proposed Action. These wetlands are visible primarily to LANL employees because the wetlands are not close to public roads. One consequence of eliminating industrial effluent under the Proposed Action would be a gradual transition from wetland vegetation to a greater fraction of upland vegetation. The subtle changes in localized vegetation diversity may be perceived as undesirable by some people.

Under the No Action alternative, wetlands associated with outfalls in the Proposed Action would continue to contribute to the visual diversity in the areas near the outfalls.

Table 3-6. Size of Wetlands

OUTFALL NO. FOR THIS EA	EPA OUTFALL NO.	DISCHARGES TO WHICH CANYON	SIZE OF ASSOCIATED WETLAND (acres)	SIZE[d] OF ASSOCIATED WETLAND (m^2 [ft^2])
1	02A007	Cañon de Valle	4.424	17,906 (192,749)
2	03A021	Mortandad	0.059[a]	237 (2,557)
3	03A022	Mortandad	0.115[a]	465 (5,001)
4	03A028	Water	0.011[a]	45 (480)
5	03A034	Los Alamos	0.010[a]	41 (442)
6	03A038	Chaquehui	0.004[a]	18 (196)
7	03A040	Los Alamos	0.030[b]	122 (1,309)
8	03A042	Mortandad	0.001	6 (63)
9	03A045	Mortandad	0.289[c]	1,169 (12,584)
10	03A047	Los Alamos	0.074[a]	299 (3,221)
11	03A113	Sandia	0.032	128 (1,376)
12	03A148	Sandia	0.003[a]	12 (134)
13	03A181	Mortandad	0.915	3,704 (39,876)
14	04A016	Mortandad	1.262	5,108 (54,991)
15	04A083	Water	0.363[a]	1,470 (15,822)
16	04A094	Sandia	0.031[a]	124 (1,340)
17	04A115	Three-Mile	0.090[a]	364 (3,920)
18	04A127	Mortandad	0.044	177 (1,910)
19	04A153	Mortandad	0.289[c]	1,169 (12,584)
20	04A157	Water	0.365	1,478 (15,907)
21	06A073	Cañon de Valle	0.025[a]	101 (1,086)
22	06A074	Three-Mile	0.023[a]	94 (1,010)
23	06A075	Three-Mile	0.191[a]	773 (8,325)
24	06A123	Cañon de Valle	0.040[a]	162 (1,745)
25	06A132	Cañada del Buey	0.143	577 (6,212)
26	None	Mortandad	0.059[a]	238 (2,557)
27	None	Los Alamos	0.030[b]	122 (1,309)
TOTALS			8.603	34,818 (374,813)

[a]Flow may not reach the canyon floor

[b] Outfalls 7 and 27 discharge into the same wetland area

[c]Outfalls 9 and 19 discharge into the same wetland area

[d]Wetland areas were calculated in ft^2, acre and m^2 conversions have been rounded off

3.9 WASTE MANAGEMENT

LANL has established waste management procedures to be in compliance with all applicable laws and regulations for collecting, storing, processing, and disposing of solid waste. LANL's solid waste is disposed of in the Los Alamos County Landfill at an average of about 23,910 m^3 (844,370 ft^3) per year (DOE 1996). Plumbing and construction activities to eliminate effluent under the Proposed Action would generate about 270 m^3 (9,500 ft^3) of solid waste over a period of three years, or an estimated 90 m^3 (3,200 ft^3) annually, which amounts to less than one half of one percent of the average annual volume of solid waste that LANL disposes of in the Los Alamos County Landfill. The Proposed Action may also include removing the pipe leading from the effluent source to the outfall discharge point for outfalls that receive no contribution from stormwater drains. If these pipes are removed, an additional 1,300 m^3 (46,000 ft^3) of solid waste would be generated over a period of three years, an average of 430 m^3 (15,000 ft^3) per year. The nature of this solid waste would be pipes and some of the excavated soil, asphalt, and cover material. Most of this waste would go to the Los Alamos County Landfill and would amount to approximately two percent of the average annual volume of solid waste that LANL disposes of in the Los Alamos County Landfill.

RCRA-regulated hazardous wastes are temporarily staged in satellite or less than 90-day storage areas at LANL. Hazardous wastes are segregated as flammable solvents, halogenated solvents, and, if necessary, into other chemical categories, according to regulatory guidance. Full, or nearly full, waste containers are removed from storage areas and taken to the TA-54, Area L waste management area in U.S. Department of Transportation-specified containers for transport; there the waste is segregated, treated, and/or packaged pending ultimate disposal off site at a RCRA-permitted commercial or DOE TSD facility. LANL generates about 150 m^3 (5,400 ft^3) of RCRA-regulated hazardous waste annually. The Proposed Action would generate up to 3 m^3 (100 ft^3) of RCRA-regulated hazardous waste over a period of three years, or about 1 m^3 (0.03 ft^3) annually, which amounts to less than one percent of the total RCRA-regulated waste managed at Area L annually.

3.10 TRANSPORTATION

Construction materials and plumbing supplies are shipped from LANL's central shipping and receiving facility at TA-3. Solid waste is transported over public-use roads from the point of generation to the Los Alamos County Landfill on East Jemez Road. RCRA-regulated waste is transported over public-use roads from the point of generation to TA-54. All waste shipments would be made in accordance with LANL's waste transportation procedures. The Proposed Action would require approximately 30 trips over a period of three years to deliver construction materials and plumbing supplies to the buildings listed in Table 2-1. Approximately 120 trips over a period of three years would be required to dispose of solid waste and another two off-site trips may be required to dispose of RCRA-regulated hazardous waste. The No Action alternative would not require transportation of either supplies or waste beyond the current requirements for routine maintenance.

3.11 HUMAN HEALTH

The Proposed Action would expose workers to risks associated with construction and plumbing activities. All work would be performed according to SOPs for each type of task. In some cases, SWPs would be required for work in secure areas or areas where radioactive or hazardous chemicals are present. Worker health would be protected by the use of administrative controls and the wearing of

personal protective equipment, as needed and as specified in SWPs (for example, helmets, safety goggles, safety boots, gloves).

3.12 ENVIRONMENTAL JUSTICE

Under Presidential Executive Order 12898, federal agencies are responsible for identifying and addressing the possibility of disproportionately adverse health and socioeconomic impacts of proposed actions on minority (all people of color, exclusive of white non-Hispanics) and low-income (household incomes less than $15,000 per year) populations. DOE is in the process of finalizing procedures for implementing the Executive Order. The manner in which environmental justice issues should be addressed in an environmental assessment is expected to be addressed in the procedures. The analysis of environmental justice in this EA is not intended to establish the direction of DOE's future procedures implementing the Executive Order.

Within an 80 km- (50 mi-) radius of LANL about 54 percent of the population is of minority status. In terms of low-income populations, 24 percent of the households have annual incomes below $15,000. Los Alamos County is approximately 14 percent minority (the percentage of non-whites, including Hispanics, defined by the US Census) and has a median family income of $60,798 (1990 US Census, in 1989 dollars). Los Alamos County, which would be most directly affected by the Proposed Action, has a higher median family income and a much lower percentage of minority residents than the four surrounding counties.

Although populations that are subject to environmental justice considerations are present within 80 km (50 mi) of LANL, activities associated with the Proposed Action would not disproportionately affect low-income, minority, or Native American populations. The Proposed Action would not have adverse consequences on air quality, water quality, availability of natural resources, or human health. Therefore, no adverse effects to environmental justice populations would be expected under the Proposed Action.

No disproportionate adverse effects on low-income, minority, or Native American populations are known to occur under the current situation with LANL's outfalls. Therefore, no disproportionate adverse effects to populations subject to environmental justice concerns are anticipated under the No Action alternative.

3.13 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Table 3-7 summarizes the environmental consequences of the Proposed Action and No Action alternative, exclusive of cumulative effects.

3.14 CUMULATIVE EFFECTS

This section considers the effects of implementing the Proposed Action and the No Action alternatives in conjunction with the effects of previous and planned actions of a similar nature (Table 3-8). In June 1991, LANL had about 140 permitted outfalls. Since then LANL has eliminated a number of outfalls, some associated with wetlands as well as others that were not associated with wetlands. The Proposed Action would close 27 outfalls and leave four outfalls, which support three wetlands. The No Action Alternative would leave 31 outfalls with associated wetlands.

Table 3-7. Comparison of Environmental Consequences

	Proposed Action	No Action
Soils and sediment	Likely diminished transport of any existing contaminants	Transport of any existing contaminants would continue
Water Quality	Decreased NPDES exceedances	No change compared to current situation
Flora	Wetland vegetation gradually replaced by species requiring less water; overall increase in upland community acreage	No change to current plant communities
Fauna	Possible changes in movement patterns of large mammals; potential die-off of individuals of small mammal and macroinvertebrate species	No change to current populations
Wetlands	Some wetlands may diminish in size and change to more upland character	No change to current wetland areas; wetlands would continue to fluctuate in size and character due to climate variability
Aesthetics	Slight decrease in visual diversity	No change to current landscape
Waste Management	270 m^3 of piping, plumbing hardware, soil, and construction debris disposed of at Los Alamos County Landfill; if pipes to outfalls removed, an additional 1,300 m^3 of pipe, soil, and cover material may be disposed of at Los Alamos County Landfill; up to 3 m^3 of RCRA-hazardous waste disposed of at permitted off-site disposal facilities	No change from current conditions
Transportation	Deliveries of material and equipment; transport of waste; approximately 152 on-site trips	No transportation required
Human Health	Occupational hazards associated with plumbing and construction activities	No change in current worker risks

As stated in Section 2.1, LANL plans to continue to discharge industrial effluent at four outfalls (EPA Nos. 051051, 01A001, 05A055, and 13S), which support three wetlands, for at least the next five to ten years. There are also 14 outfalls that are associated with public water supply wells. These outfalls would continue to discharge water on an occasional basis. In addition, Outfall No. 11 is expected to continue to discharge for five to seven years during the operation of the LEDA project. The cumulative effect of actions listed in Table 3-8, together with the Proposed Action, would be to reduce the number of outfalls to four that support three wetlands. Under the No Action Alternative, only the actions listed in Table 3-8 would occur; the 31 outfalls remaining at LANL would support about 28 wetland areas.

Soils and Sediments

Eliminating industrial effluents under the Proposed Action would reduce the mobilization and transport of contaminants that have accumulated in the soils and sediments below the outfalls that would be

Table 3-8. Past and Planned LANL Outfall Closures

Reason	No. of Outfalls	
	With Associated Wetland	Without Associated Wetlands
LANL Outfall Closures 1991-1995		
Replaced by SWSC plant	4	4
Operations ceased discharging to outfall	25	32
Closure of unpermitted outfalls	1	73
Planned Closures		
Other Wastestream Corrections	0	21
Closure of HE Wastewater Outfalls[1]	8	7

[1] DOE considered the effects of these closures in an EA for the High Explosives Wastewater Treatment Facility (DOE 1995a) and issued a Finding of No Significant Impact (FONSI) for the Proposed Action.

plugged or removed. Industrial effluent discharge from the remaining four outfalls would continue to mobilize and transport existing contaminants in Mortandad Canyon, Sandia Canyon, and Cañon de Valle. Industrial effluents, including radionuclides from the RLWTF, would continue to be discharged into Mortandad Canyon from the RLWTF, into Sandia Canyon from the TA-3 Steam Power Plant and the SWSC plant, and into Cañon de Valle from the HEWTF and would be expected to contribute to soil and sediment contamination in these canyons.

Under the No Action Alternative, industrial effluents would continue to be discharged to Cañada del Buey and Two-Mile, Three-Mile, Water, Chaquehui, and Los Alamos Canyons or their tributaries in addition to Mortandad Canyon, Sandia Canyon, and Cañon de Valle. Mobilization and transport of existing contaminants would be reduced from 1991 levels but not as much as under the Proposed Action.

Water Quality

With the initiation of the Proposed Action, the number of exceedances of NPDES permit limitations would be expected to decrease over recent levels because the number of discharge points would decrease to four. The No Action Alternative would be expected to reduce the number of outfalls and the number of exceedances over recent levels but not to the same degree as the Proposed Action because 31 outfalls would continue to discharge industrial effluents. In either case, discharge of industrial effluent would continue to be subject to the conditions of the NPDES Permit.

Flora

The cumulative effect of the past and planned actions listed in Table 3-8 and the Proposed Action would be to reduce the amount of wetland vegetation (that is, obligate and facultative wetland species) at LANL. Wetland species would be expected to persist at the three wetlands supported by the four remaining outfalls. Over a period of years, depending on the amount of water supplied by natural sources, upland species would be expected to replace some or all of the wetland plants at the outfalls that no longer discharge industrial effluents. Wetland vegetation is not used exclusively as a food source by vertebrate species and no adverse effect is expected from the replacement of wetland vegetation. The actions in Table 3-8, together with the No Action Alternative would also reduce the amount of wetland vegetation but areas of wetland vegetation would be expected to persist at all 31 remaining outfalls. In either case, areas of wetland vegetation would persist both at other LANL wetlands that are not dependent on industrial effluent and at wetlands adjacent to LANL. The remaining areas of wetland plants would be expected to fluctuate in size and in plant composition with seasonal and annual variations in climatic conditions.

Fauna

As a result of the past and planned actions listed in Table 3-8 and the Proposed Action, wildlife water sources would be eliminated at all but four outfalls by the year 2002. Some natural water sources both at LANL, such as in Water Canyon and Pajarito Canyon, and in adjacent areas, such as Frijoles Canyon at Bandelier National Monument, would remain. Elimination of water sources has been occurring since at least 1991 and would continue to occur over the next several years, gradually decreasing the availability of industrial effluent to wildlife. There would be a localized decline in the number of individuals of water-dependent small mammal and aquatic invertebrate species and localized decrease in biodiversity at the affected wetland areas; this potential effect would be most apparent where outfalls were eliminated through the Proposed Action, and less observed where stormwater would continue to be discharged through outfalls. There are no vertebrates that depend exclusively on wetland plant species for food and no adverse effects are foreseen as a consequence of replacing some wetland vegetation with a greater proportion of upland species at affected outfalls; there might be a slight beneficial effect to wildlife from the additional upland vegetation available for forage use.

The cumulative effect of the Proposed Action, either with the past and planned LANL actions in Table 3-8, on large mammals such as deer and elk would be changes in animal distribution and patterns of movement. As industrial effluent from outfalls continue to be eliminated over the next three to five years, these large mammals would adapt and utilize other available water sources such as natural runoff, springs, remaining industrial effluent, and sources adjacent to LANL such as the Rio Grande and Frijoles Canyon. Data and models do not currently exist that would allow accurate predictions about where the large mammals would move. However, if there are any measurable effects of a continuing reduction in the number of LANL outfalls there could be a local reduction in elk density at LANL, but this would not likely alter the overall pattern of elk movement, use, and numbers in the Jemez Mountains. No appreciable change in elk and deer use of contiguously located Bandelier National Monument is foreseen. There could be localized and short term increases in utilization by large mammals of particular water sources and habitat. More stabilized and defined use patterns would follow the period of adjustment. The Dome Fire of 1996, which destroyed approximately 16,000 acres of forest west of LANL, will provide a significant increase in elk and deer habitat in the Jemez Mountains for many years, which may, in part, be utilized by elk and deer from adjacent areas, including LANL.

LANL biologists did not note any major dislocations of large mammals following the startup of the SWSC plant when several outfalls were eliminated in 1992. The HE outfalls, which are scheduled to close in 1997, are located in the southwestern part of LANL in an area heavily used by elk and deer. The effects of eliminating water sources in this area would not be known for two to three years. Although LANL has already eliminated many unpermitted sources of industrial effluent and is in the process of eliminating other outfalls that are not associated with wetlands, the closures probably are not seriously affecting large mammals because many of the discharges were infrequent and of low volume.

The actions listed in Table 3-8 and the No Action Alternative would reduce wildlife water sources but not to the extent that would result from the Proposed Action. Wildlife water sources would remain at 31 industrial effluent outfalls and other natural sources. There would be local declines in biodiversity among water-dependent species such as aquatic invertebrates due to already completed and planned outfall closures but no changes in biodiversity at the outfalls that remain. Dislocations of large mammals could occur as a result of the closure of the HE outfalls but the presence of other water sources within LANL would probably provide sufficient resources so that the changes would be limited to some areas within LANL and immediately surrounding areas. In the case of implementing either the Proposed Action or the No Action Alternative, temporary concentration of deer or elk around remaining water sources could result in localized overcrowding and short-term overutilization of resources.

Wetlands

Implementation of the Proposed Action would result in possible loss of about 8.6 acres (35,000 m^2) of wetlands. Wetland acreages associated with some of the other LANL past and planned actions listed in Table 3-8 are not known but at least 5 acres (20,000 m^2) of wetland would be affected. Therefore, cumulatively at least 13.6 acres (55,000 m^2) of wetlands at LANL could be lost due to these combined actions. Since there are about 161 wetlands covering approximately 50 acres (202,000 m^2) within LANL boundaries, about 36.4 acres (147,000 m^2) or 73 percent of all wetlands would still remain available for wildlife use. Under the No Action Alternative, there would be no additional loss of wetlands above that resulting from actions in Table 3-8. In either case, some portion of these wetlands may persist in situations where natural sources of water are sufficient to maintain wetland species. In addition, the four remaining outfalls would continue to support about 9.3 acres (38,000 m^2) of wetlands, and some wetland areas at LANL, such as the Pajarito Canyon wetland (which is not dependent on industrial effluent from these outfalls) and those in off-site areas adjacent to LANL, would persist.

4.0 ABNORMAL EVENTS

Five construction accidents and seven excavation accidents were identified in the Preliminary Hazard Analysis prepared for the Proposed Action (Appendix C). Outfall No. 20 (04A157) was determined to have the greatest potential for an abnormal event. The construction accidents included soil shifting, equipment or crane dropping, the collapse of a trench, construction or excavation material falling into the construction area, and a worker falling from construction equipment. The excavation accidents included contact with a high-voltage line; excavation of soil contaminated with high explosives, heavy metals or volatile organic compounds; asphyxiation; excessive loading of excavated material, a worker falling into an excavation area; failure of base shoring; and sliding or rolling of boulders, stumps or other materials into the excavation pit. Each accident was placed in a consequence severity category and consequence likelihood (frequency) category. By combining the severity of the consequence and the likelihood of the consequence for each accident, a risk rank was obtained for the four receptors—worker, co-located worker, public, and environment. None of the accidents carried a risk to the public, co-located worker, or environment. Of the accidents identified, three had either an overall high risk ranking or carried the possibility of death for the worker.

4.1 SHIFTING SOIL

One accident identified was a construction accident in which the soil shifts and construction materials (e.g., heavy pipe) or construction equipment (e.g., grappler) fall on a worker. This accident had a likelihood of occurring once in 10 years of similar operations. The consequence to the worker could be severe injury or disability. A soil load test and verification would be performed prior to the construction activities to minimize risk of an accident.

4.2 ACCIDENTAL CONTACT WITH HIGH VOLTAGE

In this accident, a worker makes accidental contact with a high voltage line during excavation. This accident had a likelihood of occurring once in 100 years of similar operations. The consequence to the worker would be loss of life. Utility locations would be verified prior to any excavation to minimize risk of an accident.

4.3 EXCESSIVE LOADING

The third accident with a high risk rank occurs when excavated material is piled too close to the excavation site or is inadequately retained. The excavated material would bury a worker, causing loss of life. This accident is very unlikely to happen (once in 10,000 years of similar operations). Having engineering controls in place, such as keeping the excavated material a safe distance (greater than 0.6 m [2 ft]) from the site of excavation, would decrease the likelihood of this accident occurring.

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5.0 AGENCIES AND PERSONS CONSULTED

Representatives of six agencies and one Indian Pueblo were invited to an informal meeting at DOE/LAAO on June 19, 1996. Those attending the meeting were informed of the proposed DOE action and asked to comment. Below is a list of agencies invited and representatives at the meeting, if any, and a summary of their written comments.

Agency	Agency Written Response
New Mexico Department of Game & Fish 3481 Midway Place, NE Albuquerque, NM 87109 (Robert Livingston attending)	—
U.S. Department of Agriculture Santa Fe National Forest Española Ranger District P.O. Box 1346 Española, NM 87532 (Robert Remillard attending)	Does not see any problems with the Proposed Action; areas return to a more natural condition; (See Appendix D for a copy of written comments).
U. S. Department of Interior Bandelier National Monument National Park Service HCR-1, Box 1, Suite 15 Los Alamos, NM 87544 (Stephen Fettig attending)	Supports Proposed Action; views possible changes as net positive event; agrees that some decrease in downstream flow of contaminants will result (See Appendix D for a copy of written comments).
New Mexico Environment Department Oversight Bureau MS J993 Los Alamos National Laboratory P.O. Box 1663 Los Alamos, NM 87545 (Harvey Decker attending)	—
New Mexico Environment Department Water and Waste Management Division 1190 St., Francis Drive P.O. Box 26110 Santa Fe, NM 87502	—

Agency	Agency Written Response
U.S. Fish and Wildlife Service New Mexico Ecological Services Field Office 2105 Osuna Road NE Albuquerque, NM 87113	—
Pueblo of San Ildefonso Route 5, Box 315-A Santa Fe, NM 87501	—

6.0 PERMITS REQUIRED

The Proposed Action would require modifications to LANL's NPDES Permit (Permit No. NM0028355). When all the sources (except stormwater) to an outfall are eliminated, that outfall would be deleted from the Permit. A notification would also be required to EPA, Region 6, for a planned change in influent conditions to the SWSC Plant.

The Proposed Action would additionally require notification to NMED, Groundwater Quality Bureau, for anticipated changes in the quantity and quality of effluent specific to Discharge Plan-857 and Discharge Plan-1052 to discharge industrial effluent from the SWSC Plant.

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GLOSSARY

alluvial	having to do with, consisting of, or formed by material deposited by running water
AO	Administrative Order
BMP	Best Management Practice
CEQ	Council on Environmental Quality
colluvial	consisting of, or having to do with, loose material deposited at the base of a slope, mainly by gravity
CWA	Clean Water Act
DOE	Department of Energy
EA	Environmental Assessment
ESG	Environmental Surveillance Group at Los Alamos National Laboratory
EIS	Environmental Impact Statement
effluent	liquid wastewater flowing or discharged into the environment
emergent vegetation	a plant rooted in shallow water and having most of the vegetative growth above water
EPG	Environmental Protection Group at Los Alamos National Laboratory
EPA	Environmental Protection Agency
ER	Environmental Restoration
FAC	facultative plants
FACW	facultative wetland plants
FACU	facultative upland plants
FFCA	Federal Facilities Compliance Agreement
flow	volume of wastewater per unit of time
FONSI	Finding of No Significant Impact
ft	feet, a unit of length

ft^2	square feet, a unit of area
ft^3	cubic feet, a unit of volume
gal	gallons
gpm	gallons per minute
GPS	global positioning system
HEWTF	High Explosive Wastewater Treatment Facility
hydrophytic	a plant that depends on an abundant supply of moisture or that grows vegetation wholly or partly submerged in water
km	kilometer, a unit of length
km^2	square kilometer, a unit of area
L	liter, a unit of volume
LANL	Los Alamos National Laboratory
LEDA	Low Energy Demonstration Accelerator
m	meter, a unit of length
m^2	square meter, a unit of area
m^3	cubic meter, a unit of volume
macroinvertebrates	animals that have no backbone and are visible to the unaided eye (e. g., insects, worms, mollusks)
mi	mile
mg	milligram, a unit of weight
meadow	a low, moist grassland
NEPA	National Environmental Policy Act
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
No.	Number

NWI	National Wetlands Inventory
OBL	obligate wetland plants
ORP	Outfall Reduction Program
PCBs	polychlorinated biphenyls
pCi	pico Curie, a unit of radioactivity
pH	a measure of the acidity or alkalinity of a solution in terms of the relative concentration of hydrogen ions in the solution. On the pH scale, 7 is neutral, 6 to 0 is increasingly acid and 8 to 14 is increasingly alkaline
ppm	parts per million
PRS	Potential Release Site
Puye Formation	a geological layer that derives from volcanic centers in the northeastern Jemez volcanic field between about 4 and 1.7 million years ago.
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
rhyolite	a volcanic rock containing quartz and feldspar, with texture often showing the lines of flow
riparian	relating to or living or located on the bank of a watercourse, lake, or tidewater
RLWTF	Radioactive Liquid Waste Treatment Facility
SOP	Standard Operating Procedure
sp.	species
spp.	multiple species
su	standard unit, used in the scale of pH
SWMU	Solid Waste Management Unit
SWP	Special Work Permit
SWSC	Sanitary Waste Systems Consolidation, LANL's sanitary wastewater treatment facility

TAs	Technical Areas; LANL is divided into approximately 41 geographical areas called Technical Areas
TSD	Treatment, Storage, and Disposal
Tschicoma Formation	a geological layer that derives from volcanic centers in the northeastern Jemez volcanic field between about 7 and 3 million years ago
TSS	Total Suspended Solids
UC	University of California
UPL	obligate upland plants
WQS	Water Quality Standards
WSCP	Waste Stream Corrections Program

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APPENDIX A
INDIVIDUAL OUTFALLS

Assumptions and methodology for the information in this Appendix are presented in the following paragraphs.

Specific actions for outfalls in the WSCP are based on information in the Waste Stream Characterization reports and on recent updates from Santa Fe Engineering (Diamond 1996). LANL personnel involved in NPDES outfall sampling provided additional information from their personal observations in the field.

Average effluent flows are derived from estimates made by LANL personnel during regularly scheduled NPDES field sampling or from readings of continuous discharge records. All estimates were made on the amount of effluent flowing through the end of the discharge pipe. Average flows were calculated from a number of estimates taken at different seasons throughout 1995. Additional comments, such as the duration of flow, based upon field observations of past flows, are also included as an additional source of relevant narrative information.

Descriptions of each outfall and its associated wetlands were compiled from field notes taken by LANL biologists when visiting each outfall specifically for issues raised by the Proposed Action. These descriptions include information on dominant overstory vegetation of the surrounding area, sources other than the outfall that may contribute to the establishment and maintenance of riparian vegetation, and a narrative of the outfall's drainage and associated wetlands. Approximations of length, width, and depth were made by pacing off the respective distances, and these rough estimates are not definitive measurements.

The total area of riparian vegetation associated with each outfall was computed by pacing off the perimeter of each area with a hand-held Global Positioning System (GPS) instrument in the early 1990s. These areas were not determined by formal wetlands delineations, which assess vegetation, soils, and hydrology. In some cases, the GPS areas had decreased appreciably by the time that LANL biologists revisited the sites for species determination in autumn of 1995 and spring of 1996. These determinations were confined to areas of riparian vegetation and excluded adjacent areas dominated by upland species. An attempt was made to identify all riparian plants to species, but some locations were surveyed during seasons when only genus-level identifications were possible due to the absence of conclusive distinguishing characteristics.

Information on animal use of wetlands associated with outfalls was based on field observations and several published accounts. Much of the medium and large animal use information was gleaned from a report on wildlife use of outfall areas (Foxx and Blea-Edeskuty 1995). Most of the small mammal use information was taken from reports comparing outfall areas, streams, and dry canyons at LANL (Raymer and Biggs 1994). Aquatic invertebrate information was based on reports documenting wildlife use of outfalls (Foxx and Blea-Edeskuty 1995), and aquatic invertebrates in Sandia Canyon (Cross 1995a), and aquatic invertebrates in Operable Unit 1082 (Cross 1995b).

Information on exceedances of NPDES permit limits were taken from LANL records of permit exceedances. These records and reports were searched from January 1991 to March 1996 to provide

current and comprehensive information relative to water quality of discharged effluents. Table 3-2 displays which parameters are measured and the discharge limitations by outfall category. Expectations of the effects of industrial effluent eliminations at specific outfalls are based on several sources of information. Many wetlands associated with outfalls receive water from additional sources, including precipitation runoff and snowmelt from nearby roads, buildings, parking lots, and storm drains; precipitation runoff and snowmelt from natural drainage patterns; discharges from other outfalls whose effluent flows are also proposed for reduction; and perched aquifers which contribute to surface flow. Thus, elimination of an outfall's industrial effluent does not imply that its associated wetlands would consequently disappear.

Wetland vegetation is discussed in terms of which species are expected to be replaced by more drought-tolerant species once outfall discharges have ceased. Species designated as OBL or FACW have the highest water requirements and would be most significantly affected by decreased water availability. Many species designated as FAC, FACU, or UPL may persist indefinitely after industrial effluent elimination, depending upon local conditions.

Changes in wildlife use following industrial effluent elimination are more uncertain than vegetational replacements. Information on expected use patterns at each outfall is presented in terms of aquatic invertebrate and small, medium, and large mammal populations. Less data are available on specific outfall use by amphibians, reptiles, and birds.

Detailed maps of the affected environment near each outfall, including the associated wetland, contour lines, springs, and NWI wetlands are presented in Figure A-3 through Figure A-7. Figure A-1 and Figure A-2 are an index and a legend, respectively, for these maps.

Finally, best management practices (BMPs) would be strictly adhered to at all outfalls involving outside construction work. The following paragraphs discuss BMPs that would be incorporated into all exterior construction activities associated with the Proposed Action. Because these BMPs are common to several of the listed outfall areas, they are presented here rather than in individual outfall discussions.

Special Status Plant and Animal Species

Should there be any unexpected sighting of a threatened or endangered specie within 0.4 km (0.25 mi) of ongoing exterior construction work, all potentially disturbing activities would he halted until an assessment of potential effects could be completed by DOE and LANL biologists. If a determination by DOE was made that there could be an effect, consultation would be undertaken with the U.S. Fish and Wildlife Service as prescribed under Section 7 of the Endangered Species Act.

Vegetation

Under the Proposed Action, outside construction activities may require reseeding and matting to ensure adequate seed germination, especially if vegetation loss increases erosion potential. A mixture of grasses and herbaceous plants would be used for revegetation. Additional measures would be followed to protect vegetation in all construction areas:

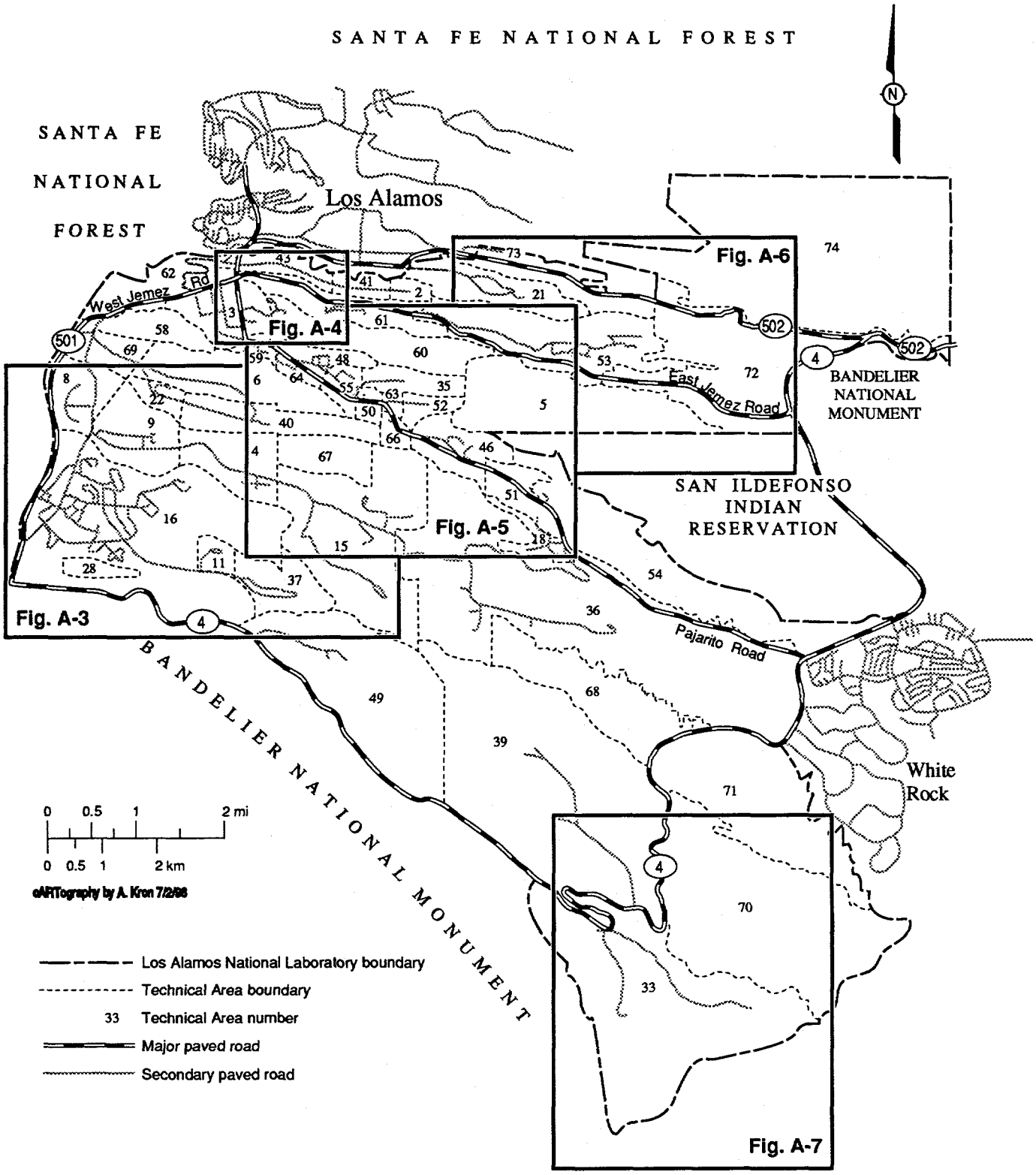

Figure A-1. Index to detailed outfall maps.

LEGEND

Building or structure with associated outfall

33-114 Building/structure number

Outfall

(15) Outfall number in this report

Major paved road

Secondary paved road

Unimproved road

Elevation contour (feet)

Laboratory boundary

Intermittent stream

Spring

Wetland areas:

Wetlands associated with LANL outfalls:

Primarily linear wetland (note: no NWI designators)

Area wetland

Primarily local wetland in vicinity of outfall

Wetlands identified by National Wetland Inventory:

Primarily linear wetland (see designators below)

Area wetland (see designators below)

Primarily upland, man-made wetland

National Wetland Inventory designators:

PSS1A	Palustrine, shrub-scrub, broadleaf deciduous, temporarily flooded
PUSCh	Palustrine, unconsolidated shore, seasonally flooded, diked/empounded
R4SBA	Riverine, intermittant, streambed, temporarily flooded
R4SBH	Riverine, intermittant, streambed, permanently flooded
R4SBJ	Riverine, intermittant, streambed, intermittently flooded
R4SBKC	Riverine, intermittant, streambed, artificially and seasonally flooded
R2USA	Riverine, lower perennial, unconsolidated shore, temporarily flooded
R2USC	Riverine, lower perennial, unconsolidated shore, seasonally flooded
R2UBH	Riverine, lower perennial, unconsolidated bottom, permanently flooded
PEM1KF	Palustrine, emergent, persistent, artifically and semipermanently flooded
PEM1KFx	Palustrine, emergent, persistent, artifically and semipermanently flooded, excavated
PFO1A	Palustrine, forested, broad-leaved deciduous, temporarily flooded
PUBKHx	Palustrine, unconsolidated bottom, artificially and permanently flooded, excavated

Figure A-2. Legend for detailed outfall maps.

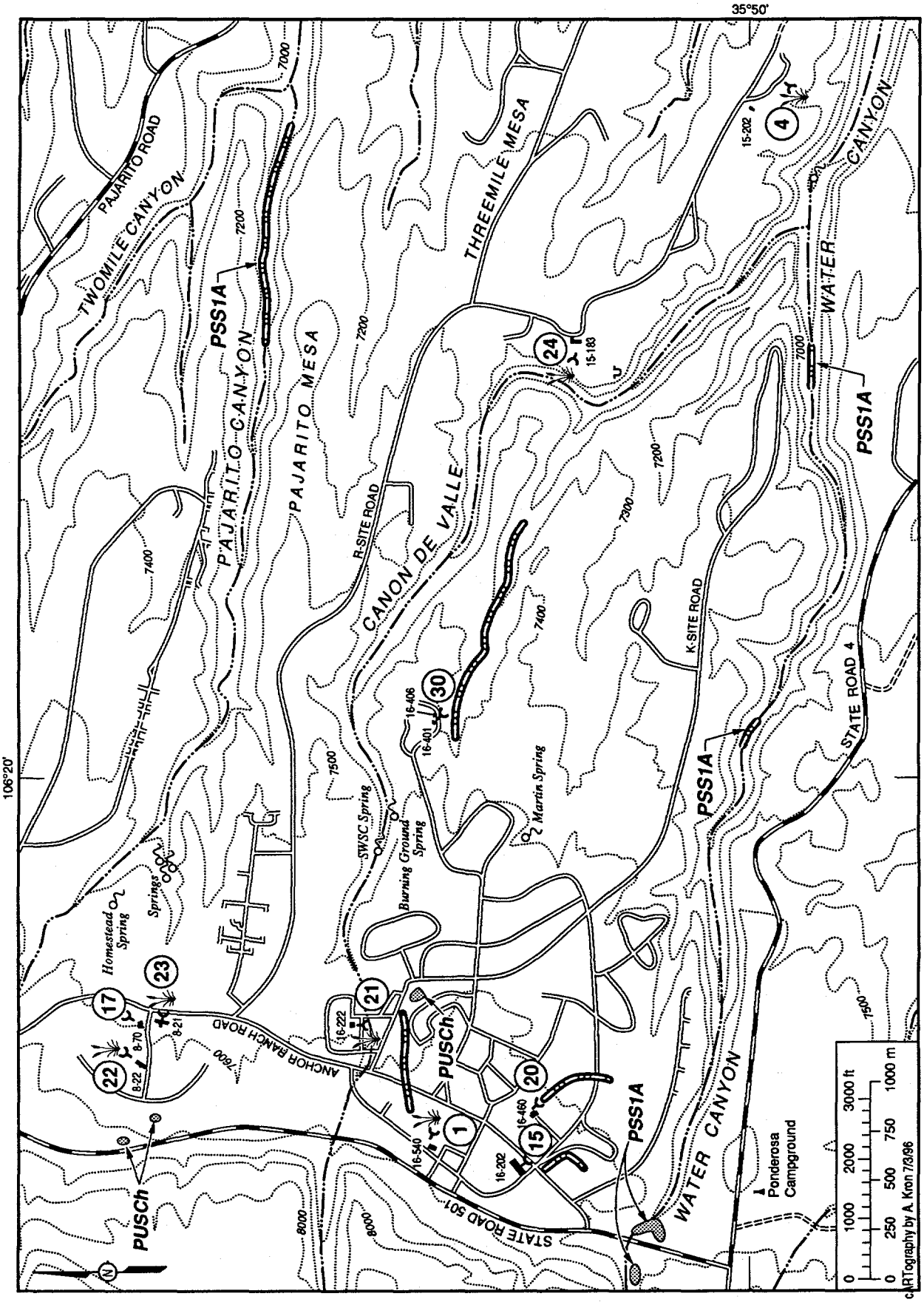

Figure A-3. Detailed map showing locations of outfalls 1, 4, 15, 17, 20, 21, 22, 23, 24, and 30.

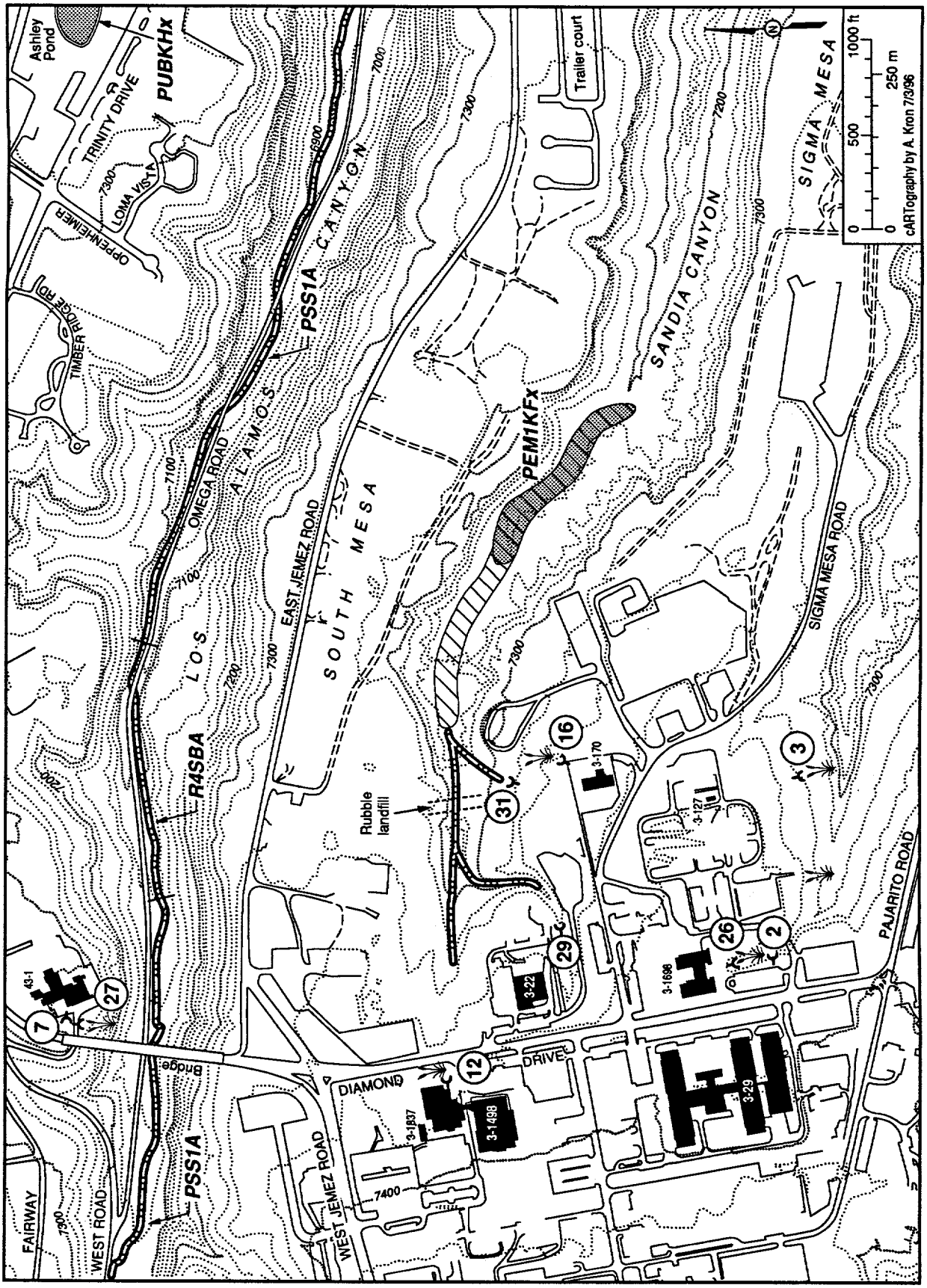

Figure A-4. Detailed map showing locations of outfalls 2, 3, 7, 12, 16, 26, 27, 29, and 31.

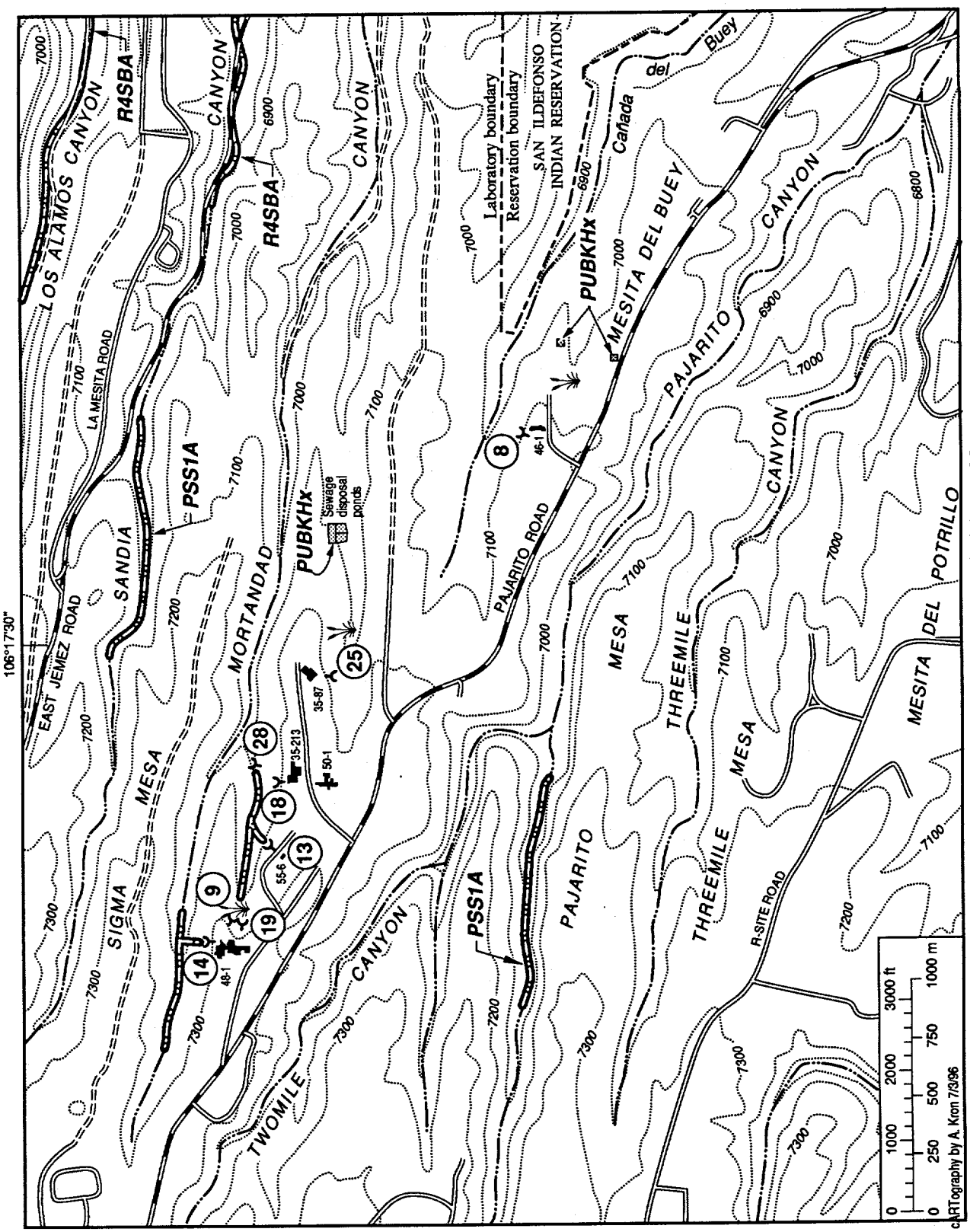

Figure A-5. Detailed map showing locations of outfalls 8, 9, 13, 14, 18, 19, 25, and 28.

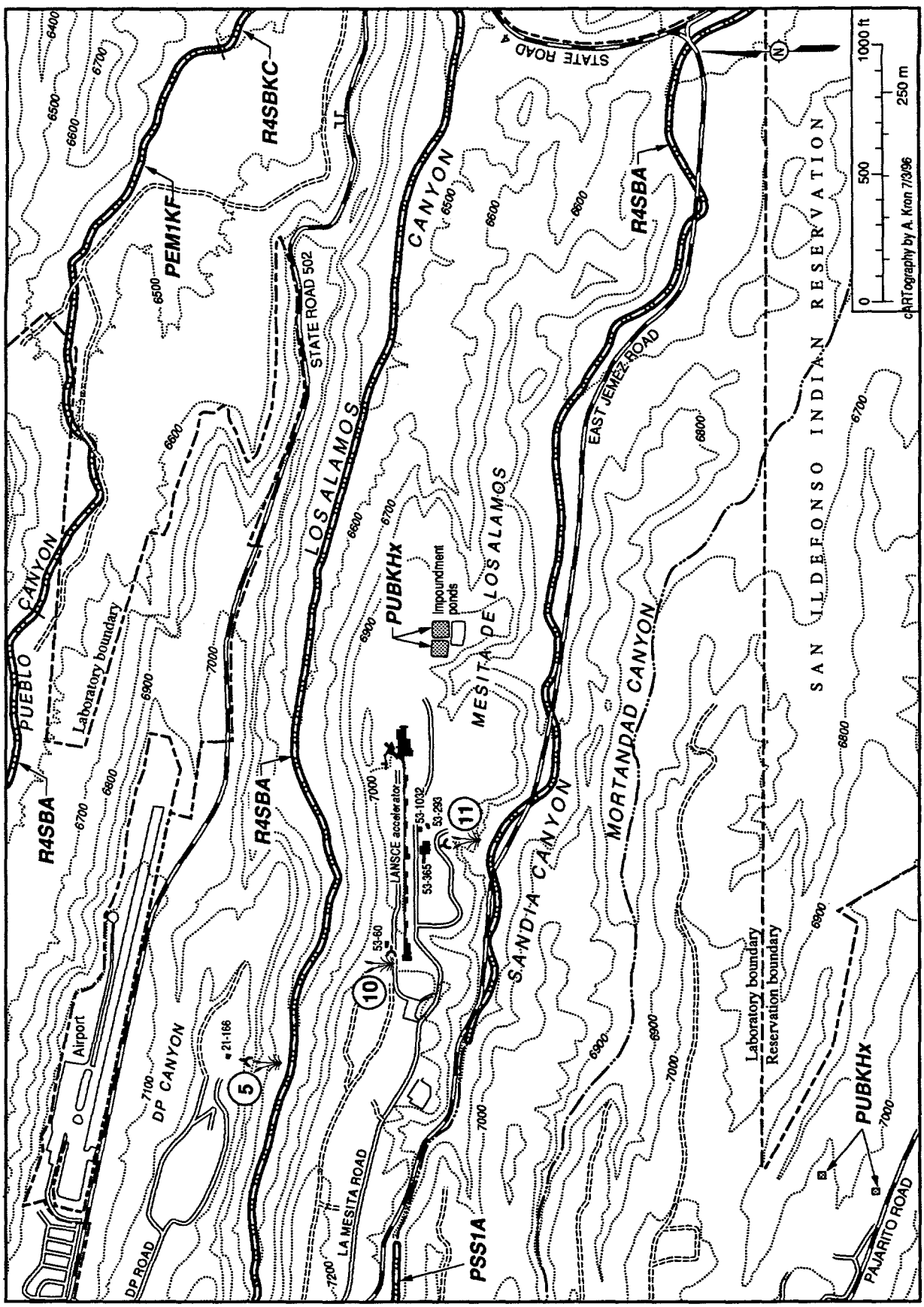

Figure A-6. Detailed map showing locations of outfalls 6, 10, and 11.

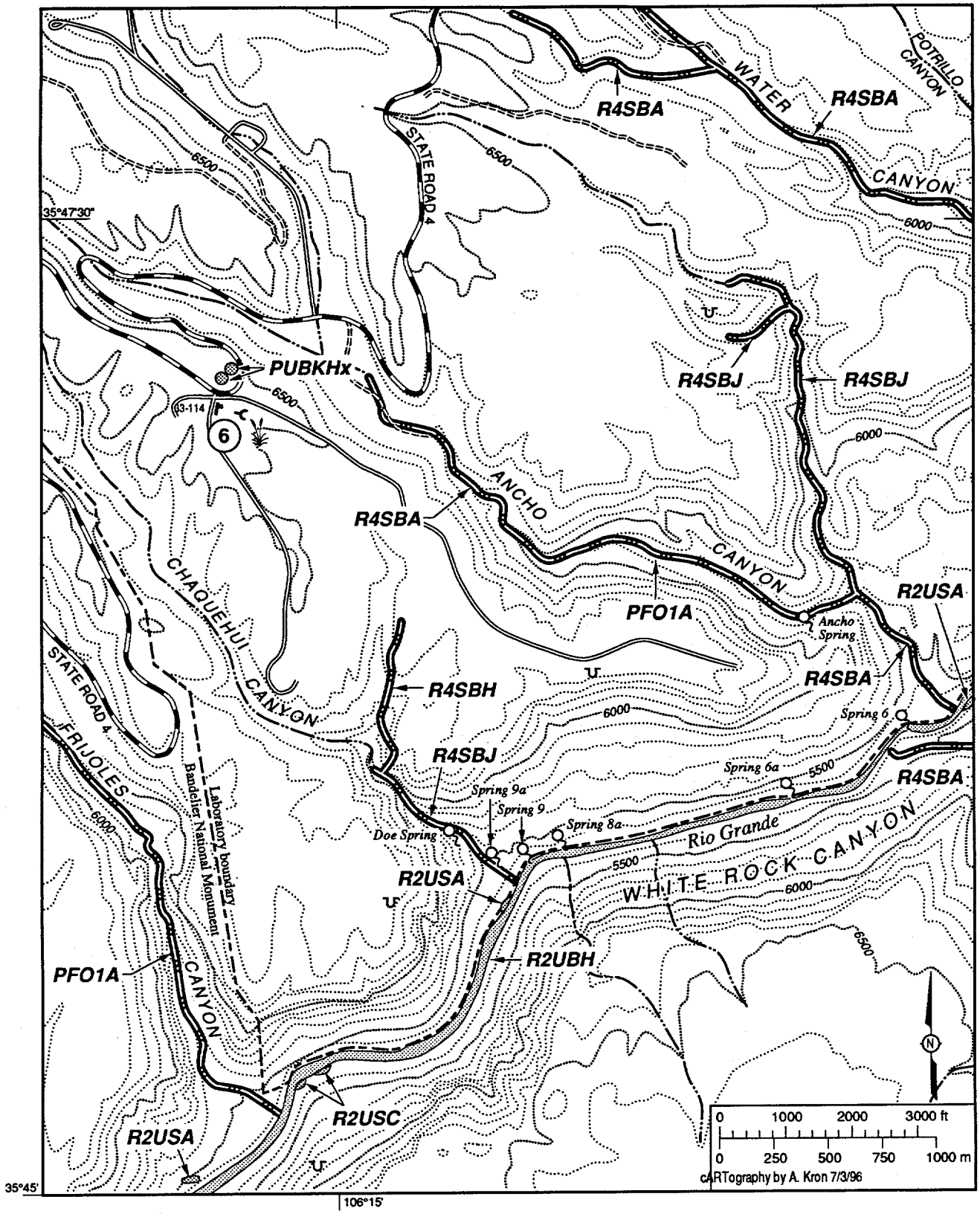

Figure A-7. Detailed map showing location of outfall 6.

- existing ponds and stream channels and associated riparian wetland vegetation would be avoided and no action would take place within these areas,
- disturbance to vegetation along canyon slopes and especially within established drainages would be avoided,
- the LANL Biology Team would be notified prior to any construction activities that would affect more than 0.1 acre (4,356 ft^2) of land, and
- all tree removals involving trunks with a diameter at breast height greater than 20 cm (8 inches) would require approval by the LANL Biology Team before the tree could be felled to avoid unnecessary habitat changes.

Wetlands and Floodplains

No construction activities included in the Proposed Action would occur within a wetland. Vehicles and heavy equipment would not be driven through a wetland area. If any uncertainty exists regarding the extent of a wetland area, the LANL Biology Team would make a site visit for the purpose of flagging the wetland area.

Erosion Controls

All outside construction work would follow standard erosion control practices to decrease the potential for transport of soil from construction sites, especially into streams and drainages. BMPs for soil containment may include use of straw bales and sedimentation fences. Exterior construction activities may require site re-vegetation and restoration of the area to its original contours. Soil disturbance would be kept to an absolute minimum, and all disturbed areas would be replanted with an appropriate seed mix once work is completed. The LANL Biology Team would assess and develop site-specific BMPs for any sites where uncertainty exists regarding necessary restoration and reseeding practices. All outside construction activities would adhere to the following BMPs:

- restrict off-road travel that may disturb vegetation and cause erosion,
- minimize disturbance to vegetation and the soil surface which could alter the water flow and/or widen channels,
- minimize disturbance along the drainages and steeper slopes which could produce or initiate erosion, and
- avoid unnecessary disturbance (such as the use of unpaved or unimproved parking and equipment storage areas, and off-road travel) to stream banks or areas adjacent to wetlands and their associated vegetation.

INDIVIDUAL OUTFALL DISCUSSIONS

OUTFALL No. 1, EPA 02A007

Specific Action

The S-Site Steam Plant, TA-16, Building 540, discharges heated boiler blowdown and steam condensate through Outfall 02A007 (Figure A-3). A roof drain also discharges through this outfall. While the Steam Plant is operating, its wastewater is treated before discharge with commercial chemicals to prevent corrosion and scaling and to remove dissolved oxygen. The Steam Plant is being replaced with smaller distributed (satellite) steam plants. When the replacement plants become operational in late 1996, the centralized Steam Plant will cease operations and the permitted industrial effluent from this outfall could be eliminated. In the interim, water flow sufficient to support the existing wetland will be maintained with potable water. The Proposed Action would discontinue this potable water flow.

Current Condition

Outfall 02A007 has a consistent flow of 5–6 gallons per minute (gpm), with an average flow of 20 gpm. The upper drainage is a winding stream channel, which is 0.9 m (3 ft) deep. The stream runs through a small Gambel oak (*Quercus gambelii* Nutt.) grove and then a large open meadow. Below the oak, the drainage is deeply channelized (1.2 m or 4 ft) with many raw areas on the sides that support upland vegetation including several members of the Cruciferae family (mustards), blue grama grass (*Bouteloua gracilis* [Willd. ex Kunth] Lag. ex Griffiths), and false tarragon (*Artemisia dracunulus* L.) . The effluent pools in the meadow area and has a muddy substrate west of Anchor Ranch Road.

To the east of Anchor Ranch Road, the drainage passes through an open meadow surrounded by ponderosa pine (*Pinus ponderosa* P. & C. Lawson). The stream runs through the meadow for 200 m (650 ft) and spreads out to form a swamp, 18 m (60 ft) at its maximum width. An additional 45 m (150 ft) of stream channel is more channelized and is shaded by ponderosa pine.

The total area of riparian vegetation associated with Outfall 02A007 is about 4.400 acres (17,907 m^2). The riparian area below the outfall was split for convenience into western and eastern sections with Anchor Ranch Road as the dividing line. In 1995, the riparian vegetation in the western portion consisted of 60 percent bottlebrush squirreltail (*Elymus elymoides* [Raf.] Swezey syn. *Sitanion hystrix*), 20 percent redtop (*Agrostis alba* auct. non L.), 10 percent Canada wild rye (*Elymus canadensis* L.), and 10 percent a combination of other grasses and a species of aster. The riparian vegetation in the eastern portion consisted of 40 percent wire rush (*Juncus balticus* Willd.), 30 percent redtop, 15 percent Kentucky bluegrass (*Poa pratensis* L.), 10 percent barnyard grass (*Echinochloa crus-galli* L. Beauv.), and 5 percent a combination of other grasses.

Elk (*Cervus elaphus nelsoni*), mule deer (*Odocoileus hemionus*), black bear (*Ursus americanus*), and gophers (*Thomomys talpoides*) or their sign (tracks, scat, fur, and/or bedding) have been previously seen near the outfall. A fence on the west side of Anchor Ranch Road restricts elk movements. The eastern meadow has been heavily used for elk bedding. Aquatic invertebrate sampling conducted here collected

only two genera, both fly larvae. This lack of resident invertebrates is possibly due to the heated water and/or the chemical variability of the discharged water (see Table A-1).

Since January of 1991, Outfall 02A007 has exceeded the limits of its NPDES permit numerous times during regularly scheduled inspections (Table A-1). These exceedances and the high temperature of the released water suggest that discharges from this outfall are of questionable quality for wildlife watering usage.

Table A-1. NPDES Permit Exceedances at Outfall 02A007.

Date of exceedance	Parameter exceeded	Amount measured	Permit limit
01/12/93	pH	9.2 su	6.0–9.0 su
01/12/93	TSS	270 mg/L	100 mg/L
030/1/93	TSS	441 mg/L	100 mg/L
03/09/93	TSS	526 mg/L	100 mg/L
03/17/93	TSS	416 mg/L	100 mg/L
02/03/92	pH	9.3 su	6.0–9.0 su
04/07/92	pH	9.3 su	6.0–9.0 su
04/07/92	pH	9.4 su	6.0–9.0 su
12/18/92	TSS	128 mg/L	100 mg/L
03/06/91	Foam	> trace	N/A
03/06/91	Foam	> trace	N/A
08/03/91	Floating Solids	> trace	N/A
09/05/91	Phosphorus	115 mg/L	40 mg/L
09/16/91	Phosphorus	62 mg/L	40 mg/L
10/08/91	TSS	464 mg/L	100
10/08/91	Phosphorus	384 mg/L	40 mg/L
10/16/91	TSS	1694 mg/L	100 mg/L
11/06/91	pH	9.8 su	6.0-9.0 su
11/13/91	TSS	451 mg/L	100 mg/L

Environmental Consequences of Proposed Action

Discharges from Outfall 02A007 flow along a stream channel then through a lower meadow that are both natural drainages. These areas receive precipitation runoff, snowmelt, and runoff from the surrounding landscape, nearby buildings, and parking lots. Stormwater runoff from roof drains also discharges through the outfall. These additional water sources would continue to provide some moisture to the established riparian vegetation, especially in the lower portions of the drainage. In the western portion, the bottlebrush squirreltail and Canada wild rye would be expected to persist, while the redtop may die-off and be replaced by more drought-resistant vegetation. In the eastern portion, some of the wire rush and redtop may be replaced, but patches of these and the other vegetation present would be expected to persist despite the reduction in available moisture. Wildlife watering usage and bedding would be expected to decline with the decrease in available surface water, and this might result in the displacement of resident elk.

OUTFALL No. 2, EPA 03A021

Specific Action

Outfall 03A021 is permitted for several large air washers (blowdown) located in mechanical rooms in the Chemistry and Metallurgy Research building, TA-3, Building 29 (Figure A-4). The outfall receives this permitted industrial effluent plus stormwater from five roof drains and numerous de minimus flows from illicit connections. The WSCP identified a need to separate the air washer effluent from the stormwater. The proposed action is to eliminate the de minimus flows (500–1,000 gallons per year) by rerouting them to sanitary drains within the building. The sanitary drains would then move the effluent to the SWSC Plant. The sampling point for the outfall may need to be moved upstream of the stormwater. The waste generated by the Proposed Action would be about 46 m (150 ft) of 3/4 in. to 1 ½-in. copper and/or PVC pipe.

Current Condition

Outfall 03A021 receives air washer blowdown in a highly developed area. Its discharge is seasonal (5–7 of the warmest months) and intermittent, averaging only 1gpm. The outfall pipe also carries diverted stormwater and discharges 1.8 m (6 ft) above a 6-m- (20-ft-) deep sandy ravine. A stormwater culvert also discharges into this drainage, as does Outfall No. 26 located at the head of the ravine. The wetland vegetation previously existing below the point of discharge was eliminated during construction of the Sigma Road bridge.

Outfall 03A021 occurs in an area of ponderosa pine, oak (*Quercus* sp.), and some Douglas-fir (*Pseudotsuga menziesii* [(Mirbel] Franco), but no overstory vegetation grows in this section of the ravine. The drainage substrate consists of sand and gravel, and no riparian vegetation occurs in the sandy ravine below Outfall 03A021, near the culvert under a bridge, or in the trenched section to the east of the culvert. The lower drainage area turns eastward and is surrounded by tall ponderosa pines. A patch of cattails (*Typha latifolia* L.) persists where the grades flatten and other runoff drainages converge. The drainage passes through a second culvert under a dirt road and the riparian vegetation continues along a narrow stream channel for an additional 38 m (125 ft).

The total area of riparian vegetation associated with Outfall 03A021 is about 0.059 acre (237 m^2). In 1995, the riparian vegetation consisted of 50 percent redtop, 30 percent cattail, 10 percent bluegrass (*Poa* sp.), 5 percent Wood's rose (*Rosa woodsii* Lindl.), and 5 percent a combination of other grasses.

Elk and mule deer or their sign have previously been sighted near the wetland. Aquatic invertebrates have previously been noted in the wetland.

Since January 1991, Outfall 03A021 has exceeded its NPDES permit limits twice during regularly scheduled inspections, both occurring on 21 August 1991: a pH of 5.4 su was recorded (permit limit 6.0–9.0 su) and greater than a trace amount of foam was noted.

Environmental Consequences of Proposed Action

Stormwater runoff is piped to discharge at the outfall's point of discharge, but the low discharge rates from Outfall 03A021 are insufficient to support the lower wetland area. An upstream stormwater drain and natural drainages appear to be more significant contributors to the wetland. A cattail die-off and replacement by more drought-tolerant species may already be occurring, and would be expected to continue if Outfall 03A021 industrial effluent discharges are eliminated. Wildlife in the area likely find their drinking water at more reliable sources, and industrial effluent elimination at this outfall would probably not displace many resident animals.

OUTFALL No. 3, EPA 03A022

Specific Action

Outfall 03A022 is permitted to discharge cooling water from TA-3, Building 127, a cooling tower that services the Sigma Building (TA-3, Building 66). Figure A-4 shows where Outfall 03A022 is in relation to the other outfalls in the Proposed Action in TA-3 and the natural environment. The Proposed Action is to replace the current system with a mechanical refrigeration unit or a recirculation system. The waste generated would be less than 10 m^3 (350 ft^3) of piping, plumbing hardware, and construction rubble.

Current Condition

Outfall 03A022 receives treated cooling water and has a fairly consistent discharge of approximately 8 gpm. The outfall also receives stormwater from nine roof drains located on the south wing of TA-3, Building 66. The discharged water flows into a natural drainage in an area of ponderosa pine with several Russian olive (*Elaeagnus angustifolia* L.) growing beside the small stream. This channel runs for 23 m (75 ft), passes through a culvert underneath a dirt road, and continues for an additional 46 m (150 ft). It ends in a precipitous 9-m (30-ft) drop-off leading to a steep section of Mortandad Canyon but may resurface somewhere downstream in the canyon.

The total area of riparian vegetation associated with Outfall 03A022 is about 0.11 acre (465 m^2). In 1995, the riparian vegetation below this outfall consisted of 60 percent cattail, 20 percent redtop, 10 percent wire rush, 5 percent coyote willow (*Salix exigua* Nutt.), and 5 percent a combination of other grasses and herbaceous plants. Elk, mule deer, and squirrels or their sign have been previously seen near the outfall.

Since January of 1991, Outfall 03A022 has exceeded the limits of its NPDES permit three times: twice on March 16, 1991, for total suspended solids (2,072 mg/L and 818 mg/L measured when permit allowed a maximum of 100 mg/L) and on October 19, 1993, for free chlorine (0.55 mg/L measured when permit allowed a maximum of 0.50 mg/L).

Environmental Consequences of Proposed Action

The stream channel below Outfall 03A022 is supplemented by stormwater runoff from buildings above the point of discharge, and it follows a natural drainage, which receives precipitation runoff from the

hillside. Stormwater runoff is also piped to discharge at the outfall's point of discharge. Some of the riparian vegetation, especially trees and other deep-rooted plants, would be expected to persist if the outfall's industrial effluent discharges are eliminated. The cattails, redtop, and wire rush would probably die out and be replaced with upland grasses and herbaceous plants. Wildlife watering usage would be expected to decline with the elimination of year-round available surface water.

OUTFALL No. 4, EPA 03A028

Specific Action

Blowdown water from the cooling tower at TA-15, Building 202, goes to a basement floor drain (BFD17) in the same building and from there to Outfall 03A028 (Figure A-3). There is a hand washing sink in the basement and several other floor drains that also connect to this outfall. The Proposed Action is to remove the sink and plug all other floor drains other than BFD17. In addition, BFD17 would be modified to exclude floor washings. The waste generated by the Proposed Action would be approximately 24 m (80 ft) of 3/4-in. to 1-1/2-in. copper and/or PVC pipe.

Current Condition

Outfall 03A028 receives treated cooling water intermittently, averaging 15–20 gpm. In the early 1990s, more substantial discharges maintained a much larger cattail area, which has declined with reductions in flow.

The surrounding area supports an overstory of ponderosa pine and one-seed juniper (*Juniperus monosperma* [Engelm.] Sarg.). A 0.9-m (3-ft) wide drainage channel below the outfall has been trenched to 0.5 m-(1.5 ft-) deep for 15 m (50 ft) and is bordered by grasses and several types of herbaceous plants. The drainage extends for 107 m (352 ft) before entering an unvegetated, rocky section leading into Cañon de Valle. The upper channel flows through an area of bare soil, and small berms have been placed along this portion of the channel.

The total area of riparian vegetation is about 0.011 acre (45 m^2). In 1996, the riparian vegetation consisted of 80 percent muttongrass (*Poa fendleriana* [Steud.] Vasey), 10 percent an unknown grass, and 10 percent a combination of cattail, nodding brome (*Bromus anomalus* Rupr. ex. Fourn), Canada wild rye, thistle (*Circium* sp.), western wheatgrass (*Elymus smithii* [Rydb.] Gould, syn. *Agropyron* Rydb.) rush. (*Juncus* sp), and an unknown herbaceous plant.

Elk appear to heavily utilize the vicinity of Outfall 03A028. Since January of 1991, Outfall 03A028 has exceeded its NPDES permit limits three times during regularly scheduled inspections. All three exceedances were for arsenic (permit limit 0.04 mg/L): 0.28 mg/L on November 29, 1994, and 0.07 mg/L on December 15, 1994. In addition, the daily average limit (0.04 mg/L) was exceeded for the monitoring period of November 1, 1994, through January 1, 1995, with an arsenic concentration of 0.12 mg/L.

Environmental Consequences of Proposed Action

Industrial effluent discharges are currently supplemented by precipitation and snowmelt runoff. Higher effluent discharges once supported a cattail marsh along the drainage, but this has been replaced by more drought-tolerant vegetation. This die-off and replacement would be expected to continue if industrial effluent discharges to Outfall 03A028 are eliminated. Elk heavily use the outfall area, but other animals have not been sighted in the immediate vicinity.

OUTFALL No. 5, EPA 03A034

Specific Action

Outfall 03A034 is permitted for air washer blowdown at TA-21, Building 166 (Figure A-6), but the air washer may have been removed in recent years. The outfall receives effluent from four floor drains, one area drain, and one sump pump. The Proposed Action is to eliminate the known nonpermitted sources and locate any other sources that may be contributing to the observable flow from this outfall. Rerouting the nonpermitted sources to the sanitary sewer system would require outdoor excavation of an area about 3.0 m x 6.1 m (10 ft x 20 ft) to a depth of 1.8 m (6 ft). One exterior wall penetration would be required. The waste generated by the Proposed Action would be about 21 m (70 ft) of 1 ½-in. diameter pipe and up to 10 m^3 (350 ft^3) of soil and construction debris.

Current Condition

Outfall 03A034 has a continuous flow averaging 0.5 gpm. This continuous flow is probably not from the air washer because that discharge should be seasonal and intermittent. Flows due to the air washer may be as high as 10–20 gpm, but last for only a few minutes at a time.

The surrounding overstory consists of scattered oak, one-seed juniper, and piñon pine (*Pinus edulis* Engelm.). Outfall 03A034 discharges on a fairly open slope near the northern rim of Los Alamos Canyon. A 7-m^2- (80-ft^2-) wide clump of redtop and cattails is supported directly below the point of discharge, and riparian vegetation continues for another 6 m (20 ft) to the edge of a precipitous drop-off into the canyon. Two tamarisk (*Tamarix pentandra* Pallas) and two Russian olive trees grow below the drop-off, and these possibly established themselves during periods of greater water availability. A nearby mature peach (*Prunus persica*) tree was probably deliberately planted, and the other exotic trees may have been planted as well.

The total area of riparian vegetation associated with Outfall 03A034 is about 0.010 acre (41 m^2). The riparian understory vegetation consists of 65 percent redtop and 35 percent cattail.

The immediate vicinity of Outfall 03A034 receives little wildlife usage, probably due to the narrowness of the strip of land between the steep canyon rim and a chain-link fence surrounding TA-21. The lack of cover and presence of a dirt road paralleling the fence would also make the area unattractive to large animals.

Since January 1991, Outfall 03A034 has exceeded its NPDES permit limits only once during regularly scheduled inspections: on June 17, 1993, free chlorine was measured at 0.52 mg/L (permit limit 0.5 mg/L).

Environmental Consequences of Proposed Action

Stormwater runoff is piped to discharge at the outfall's point of discharge, but only small amounts enter the drainage due to direct precipitation. Elimination of Outfall 03A034's industrial effluent discharges would probably cause the small area of riparian understory to die-off and be replaced by upland vegetation. This area does not appear to have been used as a source of water by large animals, and no significant animal displacements would be expected to result from eliminating industrial effluent at the outfall.

OUTFALL No. 6, EPA 03A038

Specific Action

Outfall 03A038 is permitted for the blowdown from a single, small air washer in the basement of TA-33, Building 114 (Figure A-7). The blowdown discharges to one of two basement floor drains which connect to an existing sump pump. The sump pump discharges the accumulated industrial effluent to the permitted outfall via the building storm drainage system. Several unpermitted sources also discharge to the basement floor drains feeding the sump pump. The Proposed Action is to repipe the basement sump pump from the permitted outfall to the sanitary sewer line, rerouting industrial effluent of less than 50 gallons per day. The air washer may be replaced with a mechanical refrigeration device to eliminate the treated cooling water discharge. The Proposed Action would generate solid waste of about 3 m (10 ft) of 1-in.-diameter cast iron pipe.

Current Condition

Outfall 03A038 receives treated cooling water intermittently and seasonally (5–7 months), averaging 11 gpm. The outfall discharges in an area of rabbitbrush (*Chrysothamnus nauseosus* [Pallas ex Pursh] Britt.) and mountain mahogany (*Cercocarpus montanus* Raf.), with some one-seed juniper and piñon pine. The drainage is a poorly defined channel with an upper clump of dead cattails and sickly redtop. The 18-m-(60-ft) long channel is lined with grasses and expands to a maximum width of 4.5 m (15 ft) near the end of the drainage. The entire drainage is within a fenced enclosure.

The total area of riparian vegetation associated with Outfall 03A038 is about 0.004 acre (18 m^2). In 1996, this riparian vegetation consisted of 90 percent redtop and 10 percent a combination of cattails, Kentucky bluegrass, bottlebrush squirreltail, thicket creeper (*Parthenocissus vitacea* [Kerner] Fritsch), and mullein (*Verbascum thapsus* L.).

Coyote (*Canis latrans*) and rabbit (*Sylvilagus* sp.) have been sighted near the wetlands associated with Outfall 03A038.

Outfall 03A038 has never exceeded its NPDES permit limits during regularly scheduled inspections.

Environmental Consequences of Proposed Action

Although stormwater is piped to discharge at the Outfall 03A038's point of discharge, riparian vegetation below the outfall has declined in recent years, probably due to a lack of available water. If industrial effluent discharges are eliminated, the redtop would continue to be replaced by more drought-resistant species. Industrial effluent elimination would probably only minimally affect medium and large mammals because fences surround the entire wetlands, greatly restricting animal access.

OUTFALL No. 7, EPA 03A040

Specific Action

Although Outfall 03A040 is permitted for treated cooling water (03A), the industrial effluent source at this time is once-through cooling water (04A) from six lasers at TA-43, Building 1 (Figure A-4). This building has an existing recirculation system and the Proposed Action is to tie-in the laser cooling water to this recirculation system by installing a new heat exchanger, a new circulation pump, and new copper pipe. If all six lasers are running at once (a rare event), the wastewater flow can be as much as 36 gpm. The waste generated by the Proposed Action would be about 46 m (150 ft) of ½ in.-3/4 in. copper and/or rubber tubing.

Current Condition

Outfall 03A040 receives noncontact cooling water from laser operations. The sporadic flows occur only when lasers are in use and average 5 gpm. The only nearby trees are Siberian elm (*Ulmus pumila* L.) and ponderosa pine. A narrow trench carries runoff water for 17 m (55 ft) towards the outfall drainage. The small outfall channel runs for 9 m (30 ft) before being joined by a steam condensate discharge (Outfall No. 29) at a culvert passing under a paved road. The lower stream channel runs for 17 m (55 ft) before dropping into Los Alamos Canyon at an angle of about 40°. This section of the drainage once received intermittent flows from Outfall 03A180 whose industrial effluent is currently discharged to the sanitary system.

The total area of riparian vegetation associated with Outfall 03A040 is about 0.030 acre (122 m^2). In 1995, the riparian vegetation below this outfall consisted of 70 percent brome (*Bromus* sp.), 15 percent redtop, 10 percent Canada wild rye, and 5 percent fringed brome (*Bromus ciliatus* L.). Garter snake (*Thamnophis elegans*) and raccoon (*Procyon lotor*) sign have previously been sighted in this drainage, but no sightings or sign of large mammals have been recorded from this wetland.

Since January 1991, Outfall 03A040 has never exceeded its NPDES permit limits during regularly scheduled inspections.

Environmental Consequences of Proposed Action

Smooth brome is an upland grass, and this species (if correctly identified) should persist along the drainage once industrial effluent discharges at Outfall 03A040 are eliminated. The redtop may die-off and be replaced by more drought-tolerant species, but the other vegetation would probably remain in

place. Stormwater runoff may be sufficient to maintain the entire vegetation community indefinitely, and stormwater runoff is also piped to discharge at the outfall's point of discharge. Animals do not appear to rely on Outfall 03A040 for drinking water, and local wildlife would probably not be significantly affected by elimination of the outfall's industrial effluent discharges.

OUTFALL No. 8, EPA 03A042

Specific Action

Outfall 03A042 receives treated cooling water from TA-46, Building 1 (Figure A-5). The Proposed Action would include actions to reroute any sources. If the volume of blowdown is small enough, effluent would be rerouted to the sanitary sewer system. Otherwise, the cooling tower would be replaced with a mechanical refrigeration unit or a recirculation system. The waste generated by the Proposed Action would be less than 10 m^3 (350 ft^3) of piping, plumbing hardware, and construction rubble.

Current Condition

Outfall 03A042 has an average flow of 10 gpm. The industrial effluent is discharged directly into a rocky drainage on the south rim of Mortandad Canyon in an area of oak, one-seed juniper, mountain mahogany, and several small ponderosa pine. Flows go sub-surface in the initial steep section, and the upper stream channel supports no riparian vegetation. After 46 m (150 ft), the drainage levels and passes through an open grassy area with a maximum width of 6 m (20 ft). The drainage then crosses a dirt road before spreading over bare rock 27 m (90 ft) from the main stream channel in the center of Mortandad Canyon.

The total area of riparian vegetation associated with Outfall 03A042 is about 0.001 acre (6 m^2). In 1996, the riparian vegetation consisted of 70 percent redtop, 20 percent timothy (*Phleum pratensis* L.), and 10 percent a combination of big bluestem (*Andropogon gerardii* Vitman), bluegrass, cattail, western wheatgrass, and coyote willow.

Elk, raccoons, squirrels, and rabbits or their sign have previously been sighted within this section of Mortandad Canyon. Aquatic invertebrate larva have been noted within the Outfall 03A042 drainage.

Since January 1991, Outfall 03A042 has never exceeded its NPDES permit limits during regularly scheduled inspections.

Environmental Consequences of Proposed Action

In addition to industrial effluent, the drainage of Outfall 03A042 carries precipitation runoff and snowmelt. Stormwater runoff is also piped to the outfall's point of discharge. These sources of moisture may provide enough water to maintain the riparian vegetation indefinitely. Elimination of Outfall 03A042's industrial effluent may cause some shifts in the populations of large, medium, and small mammals. If alternative water sources are unavailable, local populations of small mammals near the outfall's drainage may die-off.

OUTFALL No. 9, EPA 03A045

Specific Action

Outfall 03A045 is permitted for the blowdown discharge from a cooling tower at TA-48, Building 1 (Figure A-5). The outfall also receives effluent from cup drains, equipment drains, floor drains, a floor sink, a sink drain, and 26 roof drains. The cooling tower blowdown flows to a floor drain (BFS1). Additional effluent may come from an air washer blowdown. At one time this outfall also received noncontact cooling wastewater used to cool a magnet, which was a substantial contribution to the industrial effluent volume. The Proposed Action for this outfall is to reroute the cooling tower, air washer, and de minimus effluent to the sanitary sewer system, a volume of 630 gallons per day. The waste generated by the Proposed Action would be 6.1 m (20 ft) of 1 ½- in. galvanized pipe and about 9.1 m (30 ft) of ½-in. to 1-in. copper pipe.

Current Condition

Outfall 03A045 receives treated cooling water and stormwater runoff from upslope buildings and parking lots. The outfall currently has an average flow of 2 gpm, but it once carried continuous cooling water discharges that significantly contributed to the development of its associated wetland. Discharges from the outfall merge with those of Outfall 04A153 to support a thick cattail marsh, and most of the water appears to emanate from 04A153. The margins of the wetland contain scattered ponderosa pine and several dead pine occur in the center of the marsh. The vague channel runs for 30 m (100 ft) before ending in a short (6-m or 20-ft) precipitous drop-off leading to Mortandad Canyon. The marsh area is 30 m (100 ft) at its maximum width, which occurs near the drop-off. Riparian vegetation formerly occurred downstream of the drop-off when Outfall 03A045 maintained a continuous industrial effluent discharge.

The total area of riparian vegetation associated with Outfall 03A045 is about 0.289 acre (1,169 m^2). In 1995, this vegetation consisted of 50 percent cattail, 30 percent redtop, 10 percent inland rush (*Juncus interior* Wieg.), and 10 percent a combination of Canada wild rye, mullein little bluestem (*Andropogon scoparius* (Nash) A. S. Hitchc, fescue (*Festuca* sp.), and sedge (*Carex* sp.).

Chipmunks (*Eutamias* sp.) and squirrels have been previously sighted near Outfall 03A045.
Since January 1991, Outfall 03A045 has exceeded its NPDES permit eight times (Table A-2) during regularly scheduled inspections.

Table A-2. NPDES Permit Exceedances at Outfall 03A045.

Date of exceedance	Parameter exceeded	Amount measured	Permit limit
7/24/95	Free Cl_2	9.2 mg/L	0.5 mg/L (Max)
Average from 5/1/95 –7/31/95	Free Cl_2	4.6 mg/L	0.2 (Avg.)
10/18/94	pH	9.3 su	6.0–9.0 su
11/8/94	pH	9.5 su	6.0–9.0 su
11/15/94	pH	9.1 su	6.0–9.0 su
06/30/93	Free Cl_2	0.53 mg/L	0.5 mg/L
08/12/92	Phosphorus	5.8 mg/L	5.0 mg/L
12/23/92	Free Cl_2	0.56 mg/L	0.5 mg/L

Environmental Consequences of Proposed Action

Coupled with the previous elimination of cooling water, discontinuation of the flows to outfalls 03A045 and 04A153 would probably have a serious effect on the downstream riparian vegetation, even though stormwater runoff is also piped to discharge at the outfall's point of discharge. The two predominant riparian plant species (cattail and redtop) in the associated wetland are classified as OBL or FACW and would likely die-off and be replaced by more drought-resistant vegetation if the outfalls' industrial effluent discharges are eliminated. This area has not been significantly utilized by wildlife, and industrial effluent eliminations would probably have minimal effects on large species of mammals.

OUTFALL No. 10, EPA 03A047

Specific Action

Outfall 03A047 is permitted for the industrial effluent from TA-53, Structure 60, the smallest of the three cooling towers that service the Los Alamos Neutron Science Center linear accelerator (Figure A-6). The Proposed Action is to replace the cooling tower with a mechanical refrigeration unit or recirculation system. The waste generated would be less than 10 m^3 (350 ft^3) of piping, plumbing hardware, and construction rubble.

Current Condition

Outfall 03A047 receives treated cooling water seasonally (5–7 months during the hotter months). This intermittent flow averages 17 gpm. The outfall occurs in an area of mature piñon pine and one-seed juniper. The drainage below Outfall 03A047 is 1.5 m (5 ft) wide and follows a paved road for 18 m (60 ft) before entering a north-trending trench with a width of 0.6 m (2 ft) cut into the underlying tuff. This trench runs for 33.5 m (110 ft), passes through a 7.5-m (25-ft) culvert under a dirt road, continues for another 17 m (55 ft), finally ending at the southern rim of Los Alamos Canyon.

The total area of riparian vegetation associated with Outfall 03A047 is about 0.074 acre (299 m^2), virtually all of it occurring within and along the first 18 m (60 ft). The trench contains only isolated

clumps of grasses where soil has eroded onto the rocky substrate. In 1996, the riparian vegetation consisted of 40 percent cattail, 35 percent sedge (*Carex* sp.), 20 percent redtop, and 5 percent pine dropseed (*Blepharoneuron tricholepis* [Torr.] Nash) and possibly another grass.

Mule deer or their sign have previously been sighted in the area, as have lizards. Red-winged blackbirds (*Agelaius phoeniceus*) have been observed in the marsh. Outfall 03A047 occurs in a highly developed area and is probably not used extensively by wildlife.

Since January 1991, Outfall 03A047 has exceeded its NPDES permit limits 5 times (Table A-3) during regularly scheduled inspections.

Table A-3. NPDES Exceedances at Outfall 03A047.

Date of exceedance	Parameter exceeded	Amount measured	Permit limit
11/9/94	Free Cl_2	0.6 mg/L	0.5 mg/L
Average for 11/1/94 – 1/31/95	Free Cl_2	0.3 mg/L	0.2 mg/L (avg)
8/19/92	Phosphorus	6.4 mg/L	5.0 mg/L
9/14/92	Phosphorus	6.2 mg/L	5.0 mg/L
2/28/91	Phosphorus	7.26 mg/L	5.0 mg/L

Environmental Consequences of Proposed Action

Much of the riparian vegetation associated with Outfall 03A047 would be expected to die-off and be replaced by upland species if the outfall's industrial effluent discharges are eliminated. The drainage would continue to receive some runoff water, but probably not enough to support cattails or sedges. This drainage may occasionally provide drinking water for mule deer.

OUTFALL No. 11, EPA 03A113

Specific Action

Outfall 03A113 receives cooling water from at least three cooling towers at TA-53 (Figure A-6). The cooling tower TA-53, Structure 293, services operations in Building 18. The cooling tower TA-53, Structure 294, services operations in Building 19. The cooling tower TA-53, Structure 1032, is for operations at TA-53, Building 365. This outfall will also receive the effluent from cooling towers associated with the LEDA, which is scheduled to phase in operations over a period of about five to seven years and cease operations after that. The Proposed Action is to replace the cooling towers that remain after the LEDA Project is over with mechanical refrigeration units or recirculation systems. The waste generated would be less than 10 m^3 (350 ft^3) of piping, plumbing hardware, and construction rubble. The outfall pipe may be removed, requiring excavation of about 180 m^2 (1,900 ft^2) to a depth of about 1.8 m (6 ft). If the pipe is removed, the additional waste generated would be about 100 m^3 (3,500 ft^3) of soil, asphalt, and other cover material.

Current Condition

Outfall 03A113 discharges treated cooling water from several towers in a nearly continuous, but varied flow. Based on NPDES samples, the average flow is 8 gpm. The effluent pipe discharges into a trench with a length of 7.5 m (25 ft) cut into the tuff with several small (diameter at breast height less than 10 cm or 4 in.) cottonwoods (*Populus* sp.) growing alongside. The drainage follows several paths down an open hillside for 14 m (45 ft), with a large willow (*Salix* sp.) growing near the top of the hill. The steep-sided ravine has scattered piñon pine, one-seed juniper, oak, and mockorange *(Philadelphus microphyllus* Gray). A natural channel carries the effluent discharges and runoff for 30.5 m (100 ft) to a 6 m (20 f t) drop-off into a side channel of Sandia Canyon. A splash pool has formed at the bottom of the drop-off, but little riparian vegetation exists below it. The drainage tapers off in a sandy wash on the north side of East Jemez Road before reaching the main stream channel of Sandia Canyon.

The total area of riparian vegetation associated with Outfall 03A113 is about 0.032 acre (128 m^2). In 1996, the riparian vegetation consisted of 80 percent orchardgrass (*Dactylis glomerata* L.), and 20 percent a combination of bluegrass, Canada wild rye, and timothy.

Raccoons and a weasel (*Mustela* sp.) or their sign have been previously sighted near or within the riparian area. Most of the drainage is too steep, inaccessible, and exposed to be utilized by larger mammals.

Since January 1991, Outfall 03A113 has exceeded its NPDES permit limits only once during regularly scheduled inspections: total suspended solids were measured at 210 mg/L (permit limit of 100 mg/L) on March 25, 1993.

Environmental Consequences of Proposed Action

The drainage that Outfall 03A113 discharges into receives stormwater runoff and snowmelt from several large buildings, paved areas, and parking lots located above it. The LEDA program plans to greatly increase cooling tower discharges to this outfall, but these discharges will ultimately be eliminated at a future date. Without the additional water from industrial effluent discharges, some of the grasses may be gradually replaced by more drought-tolerant species. The drainage may be utilized by medium-sized animals as a source of drinking water, and these animals may be displaced if Outfall 03A113 is turned off.

OUTFALL No. 12, EPA 03A148

Specific Action

Outfall 03A148 receives cooling tower blowdown associated with TA-3, Building 1498, the Laboratory Data Communications Center (Figure A-4). The cooling tower may be Structure 1837, although conflicting information on this is available from different sources. The Proposed Action is to reroute the blowdown to SWSC. This may require excavation of an area up to 40 m^2 (430 ft^2) to a depth of 1.9 m (6 ft). The waste generated by the Proposed Action would be less than 10 m^3 (350 ft^3) of piping, plumbing hardware, and construction rubble.

Current Condition

Outfall 03A148 receives treated cooling water and has an intermittent average flow of 12 gpm. This outfall occurs to the west of Diamond Drive within a highly developed area. Ponderosa pine is the dominant tree, but the surrounding landscape has been greatly modified by the construction of LANL buildings, parking lots, and roads. The discharge channel is 12 m (40 ft) long and has been lined with cobbles until it enters a culvert under Diamond Drive. The drainage also receives runoff from a stormwater pipe that discharges near the culvert. The channel is routed through another culvert to the east of Diamond Drive, but no riparian vegetation occurs on this side of the roadway. Discharges from Outfall 03A148 and diverted runoff may eventually reach the head of Sandia Canyon after going subsurface.

The total area of riparian vegetation associated with Outfall 03A148 is about 0.003 acre (12 m^2). In 1996, the riparian vegetation consisted of 80 percent brome and 20 percent redtop.

Chain-link fences surround the immediate vicinity of Outfall 03A148, and it is unlikely that animals, other than birds, utilize the drainage as a source of drinking water.

Since January 1991, Outfall 03A148 has exceeded its NPDES permit limits only once during regularly scheduled inspections: phosphorus was measured at 7.7 mg/L (permit limit 5.0 mg/L) on November 19, 1992.

Environmental Consequences of Proposed Action

Although stormwater runoff is piped to discharge at the outfall's point of discharge, Outfall 03A148 discharges are insignificant when compared to other water sources that contribute to the Sandia Wetland. Elimination of industrial effluent discharges may cause the small band of grasses along the upper channel to die-off and be replaced with more drought-tolerant species. Animals would not be significantly affected by industrial effluent elimination because the area is unutilized due to surrounding security fences, road traffic, and urbanization.

OUTFALL No. 13, EPA 03A181

Specific Action

Outfall 03A181 is permitted for cooling water and receives industrial effluent from TA-55 (Plutonium Facility), Building 6, a cooling tower (Figure A-5). The Proposed Action is to reroute the blowdown to SWSC if the volume is small enough. If the volume is too large to be sent to SWSC, the cooling tower would be replaced with a mechanical refrigeration unit or a recirculation system. The waste generated by the Proposed Action would be less than 10 m^3 (350 ft^3) of piping, plumbing hardware, and construction rubble. The outfall pipe may be removed, requiring excavation of about 180 m^2 (1,900 ft^2) to a depth of about 1.8 m (6 ft). If the pipe is removed, the additional waste generated would be about 100 m^3 (3,500 ft^3) of soil, asphalt, and other cover material.

Current Condition

Outfall 03A181 receives treated cooling water intermittently and frequently, averaging 27 gpm. Several drainages occur behind Building 6 at TA-55 (plutonium facilities building) and may contribute to the riparian vegetation below the outfall. Effluent from Outfall 03A181 is discharged through a large culvert and then flows 3.5 m (12 ft) across a paved road; 7.5 m (25 ft) across bedrock with small clumps of hydrophytic vegetation; and through a 7.5 m (25 ft) area of clumped grasses and a single Russian olive before entering a ditch. This steep-sided ditch is 2.5 m (8 ft) deep at its maximum and runs for 16.5 m (55 ft), ending at a 18-m (60-ft) drop-off into Mortandad Canyon, where the water goes subsurface.

The drainage continues down the southern slope of Mortandad Canyon with little vegetation in the channel. The overstory consists of large Douglas-fir, mature ponderosa pine, and small Gambel oak. Once the canyon bottom is reached, the drainage rapidly expands to a 26-m (85-ft) wide grassy expanse where it merges with the stream channel in the center of Mortandad Canyon. The stream channel supports a narrow, but thick, growth of cattails intermixed with scattered clumps of blue-stem willow (*Salix irrorata* Anderss.) and patches of rush and redtop along its sides. This vegetative community extends for 142 m (467 ft) below and 151.5 m (497 ft) above the confluence with Outfall 03A181's drainage.

The total area of riparian vegetation associated with Outfall 03A181 is about 0.777 acre (3,700 m^2). In 1996, the riparian vegetation consisted of 60 percent cattail, 25 percent rush, 10 percent redtop and 5 percent a combination of muttongrass, western wheatgrass, nodding brome, and poverty brome (*Bromus sterilis* L.).

Elk, mule deer, and birds or their sign have been previously sighted near the riparian area associated with Outfall 03A181. Long-tailed vole (*Microtus longicaudus*), Mexican woodrat (*Neotoma mexicana*), brush mouse (*Peromyscus boylei*), and deer mouse (*Peromyscus maniculatus*) have been captured in this area during small mammal trapping sessions.

Since January 1991, Outfall 03A181 has never exceeded its NPDES permit limits during regularly scheduled inspections.

Environmental Consequences of Proposed Action

Elimination of industrial effluent discharges through Outfall 03A181 may have significant effects on plants and animals in the area, especially if all effluent discharges within Mortandad Canyon are eliminated. Many of the riparian plants, including cattails and rushes, would be expected to die-off and be replaced by more drought-tolerant upland species. Medium and large mammals may be able to find alternative watering sources, but small-mammal populations would be expected to relocate within the canyon or die-off.

OUTFALL No. 14, EPA 04A016

Specific Action

Outfall 04A016 is permitted for once-through cooling water from TA-48, Building 1 (Figure A-5). The building has an existing recirculating cooling system and a once-through magnet cooling loop. The Proposed Action includes connecting the magnet cooling water to the existing recirculating water loop, disconnecting the once-through cooling loop, and capping the drain to the outfall. Waste generated by the Proposed Action would be about 30 m (100 ft) of 1-in. copper pipe.

Current Condition

Outfall 04A016 discharges noncontact cooling water in a continuous flow, which averages 12 gpm. The point of discharge occurs near the southern rim of Mortandad Canyon in an area of ponderosa pine and Douglas-fir . A natural drainage carries the water down a relatively steep slope for 36.5 m (120 ft) and then flattens out in the canyon bottom. After another 27.5 m (90 ft), this side drainage joins the stream channel in the center of Mortandad Canyon.

The total area of riparian vegetation associated with Outfall 04A016 is about 1.200 acres (5,108 m^2). Most of this vegetation occurs along the main canyon stream channel, both above and below the confluence with the outfall drainage. Discontinuous clumps of cattails and willow less than 4 ft (1.2 m) tall grow along the channel that is bordered by rushes and grasses. In 1996, the riparian vegetation consisted of 50 percent rush, 25 percent cattail, 15 percent coyote willow, 5 percent redtop, and 5 percent other grasses.

Elk, raccoons, squirrels, and rabbits (*Sylvilagus* sp.) or their sign have previously been sighted within this section of Mortandad Canyon. Some outfalls in the area have discharged contaminated water in the past and would be considered attractive nuisances to wildlife. Long-tailed vole, Mexican woodrat, brush mouse, and deer mouse have been captured in this area during small mammal trapping sessions.

Since January 1991, Outfall 04A016 has never exceeded its NPDES permit limits during regularly scheduled inspections.

Environmental Consequences of Proposed Action

Industrial effluent discharges from TA-48, in the same general vicinity of Mortandad Canyon as Outfall 04A016, have been eliminated, including those from Outfalls 04A126, 04A131, 04A137, and 04A152. The riparian vegetation associated with the main channel established itself and has occupied its current distribution during times of greatly increased water availability. Elimination of this outfall's industrial effluent discharges would probably accelerate the die-off and replacement of the remaining riparian community with more drought-resistant species. However, runoff and snowmelt from the upper watershed would be expected to maintain pockets of riparian vegetation within Mortandad Canyon. Large and medium mammals would be displaced by industrial effluent elimination at Outfall 04A016 and local communities of small mammals may die-off if they could not find alternative sources of water.

OUTFALL No.15, EPA 04A083

Specific Action

The original flow to Outfall 04A083 was from once-through cooling systems for a piece of welding equipment and some vacuum pumps at TA-16, Building 202 (Figure A-3). The vacuum pumps cooling system may have been eliminated and the welder is only used sporadically so the industrial effluent is supplemented by the potable water supply to the welder (flow about 0.5 gpm) in order to maintain the wetland. The outfall also receives effluent from sinks, floor drains, a sump pump, a water fountain, and 16 roof drains. The Proposed Action is to cease flow of the potable water, install an above floor sump pump unit, and reroute the de minimus flows (2–10 gallons per day) to the sanitary sewer system. One interior concrete wall penetration at ceiling level would be required. The waste generated by the Proposed Action would be 6.1 m (20 ft) of 1-in. PVC pipe.

Current Condition

The permitted water source at Outfall 04A038 has not discharged for the last 2 or 3 years, but another source (presumed to be a steam condensate leak) supplied continuous water until approximately August 1995. Currently, an alternate continuous source of potable water is provided at the rate of less than 1 gpm.

The entire drainage has been trenched and is completely filled with vegetation. The first 15 m (50 ft) below Outfall 04A083's point of discharge supports a thick stand of cattails. The channel continues for another 15 m (50 ft) between two fences and then beside a paved road for approximately 61 m (200 ft). A stand of cattails grows along the road for 23 m (75 ft). Another trench to the south runs approximately 79 m (260 ft) with intermixed redtop and smooth brome growing in the channel. The two trenches meet at a culvert under a paved road.

The total area of riparian vegetation associated with Outfall 04A083 is about 0.360 acre (1,470 m^2). In 1995, the riparian vegetation consisted of 70 percent redtop, 20 percent nodding brome, 5 percent cattail, and 5 percent a combination of timothy, coyote willow, inland rush, Canada wild rye, bluebunch wheatgrass (*Agropyron spicatum* Pursh), and sedge.

Mice and mule deer or their sign have been previously sighted near the wetland associated with Outfall 04A083. A resident elk herd occurs in the general vicinity, but these animals are usually found on the other side of a chain-link fence, which discourages elk from using the outfall discharges as a source of water. Potential wildlife watering usage is also limited by the nearness of the drainage to paved roads and a corresponding lack of cover.

Since January 1991, Outfall 04A083 has never exceeded its NPDES permit levels during regularly scheduled inspections.

Environmental Consequences of Proposed Action

Outfall 04A083 discharges into a low area that receives runoff and snowmelt from natural features and nearby buildings, roads, and parking lots. Stormwater runoff is also piped to discharge at the outfall's point of discharge. These additional water sources are expected to provide some moisture to the established riparian vegetation, especially in the upper grassy area. Under these conditions, the redtop (FACW) and nodding brome (UPL) may persist indefinitely. This area does not appear to have been a significant wildlife watering usage area, and industrial effluent elimination would probably not significantly displace wildlife.

OUTFALL No. 16, EPA 04A094

Specific Action

Outfall 04A094 receives industrial effluent from TA-3, Building 170 (Figure A-4). Sources of the industrial effluent are reverse osmosis equipment backflush and once-through cooling water from a compressor. The Proposed Action is to install a recirculating cooling loop, which may require one interior wall penetration. The waste generated by the Proposed Action would be less than 30 m (100 ft) of 1 ½-in. diameter pipe.

Current Condition

Outfall 04A094 receives noncontact cooling water in a continuous flow, which averages 1 gpm. The outfall occurs within a highly disturbed area of rabbitbrush (*Chrysothamnus nauseosus* [Pallas ex Pursh] Britt.) and scattered Russian olive. The drainage is a 9-m (30-ft) long stream channel filled with cattails before combining with a larger channel that carries runoff from the south. The larger stream channel was previously supported by effluent discharges from an outfall located upstream that has been eliminated. The combined drainage extends for 9 m (30 ft) and then enters an unvegetated trench cut into the tuff.

The total area of riparian vegetation associated with Outfall 04A094 was measured at about 0.030 acre (124 m^2), but has decreased recently due to decreased water. In 1996, the riparian vegetation consisted of 60 percent cattail, 25 percent rush, and 15 percent sedge.

In the past, aquatic invertebrates were noted within the outfall drainage. Elk have recently increased in nearby Sandia Canyon, and their sign (scat and browsed Russian olives) are found in the general vicinity.

Since January 1991, Outfall 04A094 has never exceeded its NPDES permit limits during regularly scheduled inspections.

Environmental Consequences of Proposed Action

Elimination of industrial effluent discharges at Outfall 04A094 would cause most, if not all, of the associated riparian vegetation to die-off and be replaced with upland species. Industrial effluent elimination would probably have minimal effects on local wildlife. Although elk are found in the general area, they do not appear to use the outfall drainage as a source of drinking water.

OUTFALL No. 17, 04A115

Specific Action

Outfall 04A115 is permitted to receive once-through cooling water from TA-8, Building 70 (Figure A-3). The Proposed Action is to replace the once-through cooling water system with a recirculation system, which may require interior wall penetrations. The waste generated by the Proposed Action would be less than 10 m^3 (350 ft^3) of piping, plumbing hardware, and construction rubble.

Current Condition

Outfall 04A115 receives once-through cooling water. A small stand of coyote willow (4.5 m or 15 ft tall) grows near the discharge pipe, which is 4.5 m (15 ft) south of a larger channel. The wetland associated with Outfall 04A115 extends upstream at the outfall for 52 m (170 ft). Several grasses and hydrophytic vegetation occur at the intersection with the larger channel that receives effluent discharges from outfall 06A074 as well as precipitation runoff and snowmelt. Clumps of rush grow along the drainage, and the riparian vegetation is 7.5 m (25 ft) wide at its maximum. Another drainage joins the channel at a culvert under Anchor Ranch Road, 36.5 m (120 ft) downstream. The narrow (0.3-m- or 1-ft-wide) channel continues for an additional 122 m (440 ft) to the east of Anchor Ranch Road, with a margin of grasses and rushes bordering it. The riparian vegetation ends in a small canyon with a substrate of rock and sand 7.5 m (25 ft) below a firebreak.

The total area of riparian vegetation associated with Outfall 04A115 is .087 acres (353 m^2). In 1996, this vegetation consisted of 55 percent dropseed (*Sporobolus* sp.), 35 percent rush, 5 percent fescue, and 5 percent a combination of dandelion (*Taraxacum officinale* G. H. Weber *ex* Wiggens), heartleaf bittercress (*Cardamine cordifolia* Gray), thistle, cattail, poison ivy (*Toxicodendron radicans* [L.] Kuntze, syn. *Rhus radicans*), mountain muhly (*Muhlenbergia montana* [Nutt.] A.S. Hitchc.), coyote willow, and meadow rue (*Thalictrum fendleri* Engelm. ex Gray).

Abundant elk sign has been observed near Outfall 04A115. Bear scat and aquatic invertebrates have also been observed.

Since January 1991, Outfall 04A115 has not exceeded its NPDES permit limits during regularly scheduled inspections.

Environmental Consequences of Proposed Action

Outfall 04A115 carries stormwater runoff from roof drains and receives runoff and snowmelt from several smaller contributory channels. Elimination of industrial effluent flows may cause the die-off of riparian vegetation and replacement by more drought resistant species. The outfall may be used as a wildlife watering source, and resident animals may need to relocate to other reliable water sources located in the general vicinity.

OUTFALL No. 18, EPA 04A127

Specific Action

There are four stormwater drains that discharge stormwater from the roof through Outfall 04A127, which is permitted to receive once-through cooling water from TA-35, Building 213, the Target Fabrication Building (Figure A-5). One of these drains also receives overflow discharge from the cooling tower on the east side of the roof of the building. The building also has a closed-loop system that may discharge at times through this outfall. No external construction activities would be conducted at this outfall. A recirculation system may be installed under the Proposed Action or the effluent may be rerouted to the SWSC Plant. The waste generated would be about 10 m^3 (350 ft^3) of piping, plumbing hardware, and construction debris.

Current Condition

Outfall 04A127 receives treated cooling water in an intermittent flow, which averages 12 gpm. The discharge pipe is apparently buried in sediments beneath a large blue-stem willow whose litter excludes understory plants below it. A patch of smaller sickly willows occurs immediately to the west of the drainage. Outfall 04A127 occurs in an area of Douglas-fir, Gambel oak, and ponderosa pine. Discharges flow 7.5 m (25 ft) toward the southern canyon rim and then over a precipitous 6-m (20-ft) drop-off into Mortandad Canyon. The poorly defined drainage passes over moss-covered rocks and through a patch of cliffbush (*Jamesia americana* Torr. & Grey) for 24 m (80 ft). A 4.5-m- (15-ft-) long patch of blue-stem willow occur above and along a dirt road through the canyon. The drainage dwindles out in an unvegetated 0.3-m- (1-ft) wide channel cut along the road's south side, but large flows would eventually reach a stream in the center of Mortandad Canyon.

The total area of riparian vegetation associated with Outfall 04A127 is 0.040 acre (177 m^2). In 1996, this vegetation consisted of 85 percent blue-stem willow, 10 percent muttongrass, and 5 percent a combination of cattail, dropseed, and several immature grasses.

Lizards and squirrels have been seen near the point of discharge, but medium and large mammals do not appear to use it as a water source.

Since January 1991, Outfall 04A127 has not exceeded its NPDES permit limits during regularly scheduled inspections, but it did exceed the New Mexico stream standard of 1 ppm of chlorine on April 19, 1996.

Environmental Consequences of Proposed Action

Outfall 04A127 carries both industrial effluent and stormwater runoff. Elimination of the industrial effluent flows may cause the upper willows and cattails to die-off and be replaced by more drought tolerant upland vegetation. The lower stand of willows may persist due to the topography, which funnels diverted and natural runoff to them. The outfall does not appear to be used as a wildlife watering source, and resident animals would probably not be directly significantly affected by industrial effluent

elimination. However, industrial effluent eliminations at other outfalls discharging into Mortandad Canyon would be expected to change watering patterns throughout the canyon.

OUTFALL No. 19, EPA 04A153

Specific Action

Outfall 04A153 was originally permitted for a boiler condensate feed tank discharge to a basement floor drain (BFS18) at TA-48, Building 1 (Figure A-5). At one time the outfall also received discharge from a small roof-mounted cooling tower. The cooling tower was disconnected and abandoned in place several years ago. Five roof drains discharge through Outfall 04A153. The Proposed Action includes rerouting the treated boiler condensate (200 gallons per day) to the sanitary sewer system and plugging floor drain BFD18. The waste generated by the Proposed Action would be 4.6 m (15 ft) of 1 ½-in. black steel pipe. Stormwater from the roof drains would continue to be discharged through the outfall.

Current Condition

Outfall 04A153 has a continuous flow, averaging 6 gpm. After 24 m (80 ft), the discharge merges with those of Outfall 03A045 to support a thick cattail marsh, but most of the water appears to originate from 04A153. The margins of the wetland contain ponderosa pine, and several dead pine occur in the center of the marsh. The marsh area occupies 30.5 m (100 ft) at its maximum width near two precipitous 6-m (20-ft) drop-offs into Mortandad Canyon.

The total area of riparian vegetation associated with Outfall 04A153 is about 0.290 acre (1,169 m^2). In 1995, this vegetation consisted of 50 percent cattail, 30 percent redtop, 10 percent inland rush, and 10 percent a combination Canada wild rye, mullein, little bluestem, Thurber fescue, and sedge.

Mule deer, red-winged blackbirds, chipmunks , and squirrels have been previously sighted near Outfall 04A153.

Since January 1991, Outfall 04A153 has never exceeded any NPDES permit level during regularly scheduled inspections.

Environmental Consequences of Proposed Action

Coupled with the previous elimination of cooling water in the area, discontinuation of industrial effluent flows to Outfalls 03A045 and 04A153 would seriously affect the downstream riparian vegetation, even though stormwater is piped to discharge at the outfall's point of discharge. The two predominant riparian plant species (cattail and redtop) in the associated wetlands are classified as obligate or facultative wet species and would likely die-off and be replaced by more drought-resistant vegetation if the outfalls' industrial effluent discharges are eliminated. This area has not been significantly utilized by wildlife and industrial effluent eliminations would probably have minimal effects on large species.

OUTFALL No. 20, EPA 04A157

Specific Action

Outfall 04A157 is permitted for once-through cooling water from a vacuum pump in TA-16, Building 460 (Figure A-3). The outfall also currently receives discharge from various floor drains. The outlet pipe for 04A157 is not far from the outlet pipe for 05A072, which also receives industrial effluent from Building 460. Outfall 05A072 has not discharged industrial effluent for a few years. There is also a third outlet pipe in the same area as 04A157 and 05A072. The Proposed Action would connect the three pipes that are near each other into a common line and route the industrial effluent (100–200 gallons per day) to a nearby sanitary sewer manhole. All work would occur outside the building. Exterior excavation in a SWMU (SWMU No. 16-026[v]) may be required. The SWMU has been sampled and is being recommended for no further action. The excavation site, at the southeast part of Building 460, would be approximately 74 m^2 (800 ft^2) at an approximate depth of 1.8 m (6 ft) in a previously disturbed area. The rerouting would require up to 12 m (40 ft) of 4-in. cast iron or PVC pipe and up to 24 m (80 ft) of 6-in. cast iron or PVC pipe. The existing pipes would not be removed. The waste generated by the Proposed Action would be up to 60 m^3 (2,200 ft^3) of soil and other cover material.

Current Condition

Outfall 04A157 receives noncontact cooling water, but it combines with HE wastewater effluent from Outfall 05A072 at the point of discharge. (Outfall 05A072 has not discharged for the last 2 or 3 years, and its flow was sporadic prior to that.) The discharges have cut a meandering stream channel about 0.5 m (1.5 ft) deep and 1.2 m (4 ft) wide. Cattails dominate the upper shaded area, while grasses predominate in a lower open meadow. Scattered clumps of ponderosa pine occur in all sections. The channel has a sandy substrate with raw areas on its sides, and it may have been trenched at one time.

The total area of riparian vegetation associated with Outfall 04A157 is about 0.370 acre (1,477 m^2). In 1995, the riparian vegetation below this outfall consisted of 70 percent redtop, 10 percent timothy, 10 percent cattail, 5 percent inland bluegrass (*Poa interior* Rydb.), and 5 percent a combination of barnyard grass and Rocky Mountain sedge (*Carex occidentalis* Bailey).

The lower meadow is heavily used year-round by a herd of resident elk. Elk, mule deer, coyote, gophers, and squirrels have been sighted near the wetland. Deer mouse and long-tailed vole have been captured during small mammal trapping sessions in the area. Twelve taxa of aquatic insects have been collected within the wetlands area, but all of the taxa were stress-tolerant varieties.

Since January 1991, Outfall 04A157 has never exceeded its NPDES permit levels during regularly scheduled inspections.

Environmental Consequences of Proposed Action

Outfall 04A157 is the major contributor to the wetland area below it, although drainage from the open meadow contributes storm runoff and snowmelt. Elimination of industrial effluent at Outfall 04A157 would be expected to result in the die-off and replacement of some redtop and all cattails currently found

near the drainage channel. The removal of a reliable water source for elk and other resident mammals may significantly affect the habits of these animals. Populations of small mammals may not be able to find alternative sources of water and die-off.

OUTFALL No. 21, EPA 06A073

Specific Action

Outfall 06A073 is permitted for photo rinse water from TA-16, Building 222 (Figure A-3). The Proposed Action is to reroute industrial effluent from one sink drain and eight floor drains to SWSC. Hooking up to the existing sanitary sewer pipe would require excavation of an area of less than 75 m^2 (800 ft^2) to a depth of 1.8 m (6 ft). The waste generated by the Proposed Action would be less than 60 m^3 (2,200 ft^3) of piping, plumbing hardware, and construction rubble. The outfall pipe may be removed, requiring excavation of about 120 m^2 (1,900 ft^2) to a depth of about 1.8 m (6 ft). If the pipe is removed, the additional waste generated would be about 72 m^3 (2,500 ft^3) of soil, asphalt, and other cover material.

Current Condition

Outfall 06A073 receives photographic rinse water, averaging 2 gpm. Surrounding overstory vegetation consists of mature ponderosa pine and some Gambel oak. The upper drainage supports a swathe of grasses to 1.8 m (6 ft) wide, but this rapidly narrows downslope. The channel is 26 m (86 ft) long and becomes 0.5 m (1.5 ft) deep and 0.9 m (3 ft) wide at its lower end.

The total area of riparian vegetation associated with Outfall 06A073 is 0.025 acre (101 m^2), although almost all vegetation is comprised of upland species. In 1996, the riparian vegetation consisted of 90 percent muttongrass, 5 percent an unknown herbaceous plant, and 5 percent a combination of thistle and rush.

Mule deer, aquatic invertebrates, and a single chorus frog (*Pseudacris triseriata*) have been seen in or near the outfall's drainage.

Since January 1991, Outfall 06A073 has never exceeded its NPDES permit limits during regularly scheduled inspections.

Environmental Consequences of Proposed Action

Outfall 06A073 receives no stormwater diversions, and the landscape does not funnel much precipitation or snowmelt runoff into the drainage. The area below the outfall has developed only a small amount of vegetation characteristic of wetlands (i.e., rush), but that vegetation present would probably die back if industrial effluents are eliminated. Mule deer use the shaded drainage area and would probably have to find alternative water sources once the outfall is eliminated.

OUTFALL No. 22, EPA No. 06A074

Specific Action

Outfall 06A074 is permitted for photo rinse water, which originates from three photo processing areas in two rooms at TA-8, Building 22 (Figure A-3). The Proposed Action is to reroute an existing single 4-in. PVC waste line (at ceiling level) to an existing duplex sump pump in the basement. Effluent from the sump pump (200–300 gallons per day) would enter the sanitary sewer system. No wall penetrations would be required. The waste generated by the Proposed Action would be about 4.6 m (15 ft) of 4-in. PVC pipe.

Current Condition

Outfall 06A074 receives photographic rinse water, and its average flow is 4 gpm. The frequency and duration of discharges are dependent on photo processing operations. The discharge pipe is currently within a grove of small Gambels oak with surrounding ponderosa pine, but an upper trench area that supports a 1 m- (3-ft-) wide ribbon of riparian grasses was included in the vegetation survey. The channel has been trenched to 0.6 m (2 ft) deep and 1 m (3 ft) wide for 7.5 m (25 ft). The total length of the drainage is 26 m (85 ft). Drainage further downstream receives effluent from Outfall 04A115.

The total area of riparian vegetation associated with Outfall 06A074 is about 0.020 acre (94 m^2). In 1995, the riparian vegetation consisted of 60 percent redtop, 35 percent dropseed, 10 percent muttongrass, and 5 percent a combination of mountain muhly, pine dropseed, Arizona three-awn (*Aristida arizonica* Vasey), and Wood's rose.

Elk or their sign have been previously sighted near the outfall and appear to heavily use the area. Aquatic insects, including damselfly adults and mosquito larvae, have been seen in or near the drainage.

Since January 1991, Outfall 06A074 has exceeded its NPDES permit limits only once during regularly scheduled inspections: on October 6, 1993, cyanide in the water was measured at 0.35 mg/L when the permit was 0.2 mg/L.

Environmental Consequences of Proposed Action

The trench above the current point of discharge may channel runoff from a small building and parking area to the drainage. Elimination of industrial effluent discharges from this outfall may result in the die-off and replacement of riparian vegetation by upland species. Elk cross the area on well-used game trails and bed in an adjacent meadow. Outfall elimination could cause them to relocate to other areas with reliable drinking water.

OUTFALL No. 23, EPA 06A075

Specific Action

Outfall 06A075 was permitted for photo rinse wastewater at TA-8, Building 21 (Figure A-3), but the photo lab operations at this building have been stopped, and the laboratory has been remodeled for use as office space. The Proposed Action is to disconnect the sources to a cup drain and then plug the cup drain. The waste generated by the Proposed Action would be 12 m (40 ft) of 3/4-in. to 1-in. pipe.

Current Condition

The discharges from Outfall 06A075 flow to the east of Anchor Ranch Road. A thick band of cattails grow in the channel for 40 m (130 ft). Several small Gambel oak and ponderosa pine grow near the stream, which ends in an open meadow.

The total area of riparian vegetation associated with Outfall 06A075 is about 0.191 acre (774 m^2). In 1996, the riparian vegetation consisted of 60 percent cattail, 30 percent redtop, and 10 percent a combination of Canada wild rye, Junegrass *(Koeleria macrantha* [Ledeb.] J. A. Schultes, syn. *Koeleria macrantha* [Ledeb.] J. A. Schultes), Wood's rose, and tall wheatgrass (*Elymus elongata* [Host] Runemark, syn. *Elymus elongatus*, *Agropyron elongatus*).

Mule deer, squirrels, and coyote or their sign have been previously sighted near the wetlands area. The vicinity supports numerous resident elk, which are frequently sighted near the drainage below Outfall 06A075.

Since January 1991, Outfall 06A075 has never exceeded its NPDES permit limits during regularly scheduled inspections.

Environmental Consequences of Proposed Action

Elimination of industrial effluent discharges through Outfall 06A075 would probably trigger the partial or complete replacement of cattails and redtop by upland species. The other grasses within the riparian area are upland species and should persist if industrial effluent discharges at this outfall are eliminated. The resident elk population may be displaced by shutting off the outfall because the associated wetland is a frequently used area.

OUTFALL No. 24, EPA 06A123

Specific Action

Outfall 06A123 is permitted for photo rinse water from TA-15, Building 183, where X-ray images from PHERMEX (Pulse High Energy Radiation Machine Emitting X-Rays) are processed. The Proposed Action is to remove two sinks. Effluent from a floor drain, an eye wash, and three sinks would be rerouted to SWSC by hooking up to the existing sanitary sewer system internal to the building, or a

recirculation system would be installed within the building. If a recirculation system is installed, waste generated by the system would be containerized and trucked to the SWSC for treatment and disposal.

Current Condition

Outfall 06A123 receives photographic rinse water, averaging 3 gpm. The surrounding overstory consists of ponderosa pine and small Gambel oak. The drainage used to be a well-defined channel supporting cattail, but construction activities during 1996 filled the channel with loose fill, eliminating the cattails. The drainage currently runs for only 9 m (30 ft) with a narrow surrounding band of grass. Water stagnates in several pools within a construction area and no longer reaches the rim of Cañon de Valle.

The total area of riparian vegetation associated with Outfall 06A123 was 162 m^2 (0.040 acre) before construction activity and tree cutting eliminated most of it. In 1996, the remaining riparian vegetation consisted of 95 percent muttongrass and 5 percent cattails. Elk, mule deer, and coyote or their sign have been previously sighted in the area.

Since January 1991, Outfall 06A123 has exceeded its NPDES permit limits once during regularly scheduled inspections: on March 15, 1994, cyanide was measured at 0.37 mg/L when the permit limit was 0.2 mg/L.

Environmental Consequences of Proposed Action

Construction activities and tree cutting have recently altered or destroyed most of the wetland formerly associated with Outfall 06A123. Elimination of industrial effluent discharges would probably cause some of the remaining grasses to die-off. The future extent of large mammal usage in the highly disturbed area (two new buildings near the point of discharge are undergoing construction) is unknown, but the present drainage does not provide a good watering source.

OUTFALL No. 25, EPA 06A132

Specific Action

Outfall 06A132 is permitted for photo rinse water from TA-35, Building 87 (Figure A-5). The photo lab is located in a portion of the building added on to the original structure. Three floor drains and three sink drains were tied into an existing storm drain line at the time of construction. Currently, photo rinsing operations generate approximately 4–6 gpm of rinse water during the normal 8:00 a.m. to 5:00 p.m. day. The Proposed Action is to make a floor cut of 1.9 m^2 (20 ft^2) and excavate about 0.9 m (3 ft) deep inside the building and install modifications that would decrease the amount of industrial effluent. The waste line from the photo lab would be disconnected from the storm drain and reconnected to an adjacent sewer line. The Proposed Action would generate 3 m (10 ft) of 4-in. cast iron pipe.

Current Condition

Outfall 06A132 receives photographic rinse water, and the frequency and duration of discharges are dependent on photo processing operations. The average flow through the outfall is 6 gpm. Outfall

06A132 discharges onto a steep slope onto bare rock, broken asphalt, and discarded concrete barriers. The surrounding area has an overstory of wavyleaf oak (*Quercus undulata* Torr.), piñon pine, and ponderosa pine. The drainage runs downslope 40.5 m (140 ft) with scattered riparian grasses growing along the channel. Once it reaches the floor of Mortandad Canyon, the channel continues for an additional 15 m (50 ft) beneath ponderosa pine and some Russian olive. The riparian vegetation ends 15 m (50 ft) before the confluence with the main channel in the center of Mortandad Canyon.

The total area of riparian vegetation associated with Outfall 06A132 is about 577 m^2 (0.140 acre). In 1996, the riparian understory consisted of 65 percent muttongrass, 25 percent brome grass, 5 percent redtop, and 5 percent a combination of fescue and thistle.

A porcupine (*Erethizon dorsatum*) was seen in a nearby ponderosa pine during the 1996 vegetation survey, but few wildlife or their sign have been previously sighted near Outfall 06A132, probably due to the surrounding rugged terrain.

Since January 1991, Outfall 06A132 has exceeded its NPDES permit limits only once during regularly scheduled inspections: on December 21, 1992, cyanide was measured at 0.46 mg/L when the permit level was 0.2 mg/L (this may have been a false positive analytical test result).

Environmental Consequences of Proposed Action

Elimination of industrial effluent discharges through Outfall 06A132 would probably not significantly affect either local riparian plants or large animals. Stormwater runoff is also piped to discharge at the outfall's point of discharge and the natural drainage collects runoff from the surrounding hillside. The outfall supports only discontinuous patches of riparian grasses and the well-established Russian olives in the lower drainage. Discharges from Outfall 06A132 do not appear to be used by many medium or large animals for drinking water, although the lower area would seemingly provide a good source.

OUTFALL No. 26 (unpermitted)

Specific Action

Outfall No. 26 was observed to be discharging effluent but it is unpermitted. The source is unknown. The Proposed Action is to identify the source of the effluent and design corrective actions. Exterior construction would not exceed the maximum trench size noted for the Proposed Action in Chapter 2 of the EA. Industrial effluent would likely be rerouted to the SWSC Plant.

Current Condition

Outfall No. 26 discharges through a large pipe at the head of a ravine east of Diamond Drive. The source and average flow of these discharges are unknown. The ravine has an overstory of ponderosa pine and small Gambel oak. The drainage below the outfall supports a 0.9-m (3-ft) swathe of grasses for 29 m (75 ft) until flows from a large stormwater drain merge with the industrial effluent drainage. The normally dry channel has been cut to 1.2 m (4 ft) deep and has a substrate of sand and small rocks. The drainage continues for another 26 m (85 ft) as the grassy area widens to 1.5 m (5 ft) and the ravine deepens to 6 m (20 ft). All vegetation in the bottom of the ravine abruptly ends at a rocky area located 20 m (65 ft) up-canyon from Outfall 03A021.

In 1996, the riparian vegetation consisted of 85 percent brome grass, and 15 percent a combination of muttongrass, orchardgrass, western white clematis (*Clematis ligusticifolia* Nutt.), thistle, sedge, and bottlebrush squirreltail.

Environmental Consequences of Proposed Action

The drainage below Outfall No. 26 receives stormwater discharges, natural runoff, and snowmelt. A true wetlands area has not developed in the upper ravine, and these additional water sources may maintain the present vegetation, at least temporarily. Animals do not appear to use the ravine for watering, probably due to its steep sides and the surrounding developments.

OUTFALL No. 27 (unpermitted)

Specific Action

Outfall No. 27 is industrial effluent coming from a malfunctioning valve in the steam transmission line to TA-43, Building 1, the Health Research Laboratory (Figure A-4). The steam comes from the Steam Power Plant, Building 22, in TA-3. The effluent is leaking into the environment near a road and parking lost west of TA-43, Building 1. The proposed action is to turn off the steam, excavate near the leak, replace the valve [approximate diameter 0.05 m (2 in.)], and replace the excavated dirt in the trench and resume operations with the steam flowing through the pipe. The excavation area would be about 2 m (7 ft) x 2 m (7 ft) to a depth of 2 m (7 ft). The waste generated by the Proposed Action would be the old valve plus about 4 m^3 (140 ft^3) of soil, which would be disposed of at the Los Alamos County Landfill.

Current Condition

Outfall No. 27 receives steam condensate discharges flowing at less than 10 gpm. The only nearby trees are Siberian elm and ponderosa pine. Discharges join a small channel created by Outfall 03A040 and diverted runoff at a culvert passing under a paved road. The lower stream channel runs for 17 m (55 ft) before dropping into Los Alamos Canyon at an angle of about 40 degrees. This section of the drainage once received intermittent flows from Outfall 03A180 whose effluent is currently discharged to the sanitary system.

The total area of riparian vegetation associated with Outfall 03A040 is about 0.030 acre (118 m^2). In 1995, the riparian vegetation below this outfall consisted of 70 percent brome grass, 15 percent redtop, 10 percent Canada wild rye, and 5 percent fringed brome. A garter snake and raccoon sign have previously been sighted in this drainage, but no sightings or sign of large mammals have been recorded from this wetland.

Environmental Consequences of Proposed Action

The redtop may die-off and be replaced by more drought-tolerant species, but the other vegetation would probably remain in place. Stormwater runoff may be sufficient to maintain the entire vegetation community indefinitely, and stormwater runoff is also piped to discharge at the Outfall 03A040's point of discharge. Animals do not appear to rely on the drainage for drinking water, and local wildlife would probably not be significantly affected by elimination of the outfall's industrial effluent discharges.

Appendix B. Federally Threatened and Endangered Species List for Los Alamos County, August 1996 (U.S. Fish and Wildlife Service).

Table B-1

Common Name	Scientific Name	Status*	Habitat Description	Potential Effects of Effluent Elimination
Black-footed ferret	*Mustela nigripes*	E	Prairies, usually in prairie dog towns.	None.
American peregrine falcon	*Falco peregrinus anatum*	E	Ponderosa and piñon; nests in cliffs and rock outcrops on cliffs, known to breed locally.	None.
Arctic peregrine falcon	*Falco peregrinus tundruius*	T (S/A)	Nests in Alaska and northern Canada, migrates along coasts to southern U.S. and Mexico	None.
Bald Eagle	*Haliaeetus leucocephalus*	T	Riparian areas, wetlands, and open water for wintering and migrating eagles.	None.
Mexican spotted owl	*Strix occidentalis lucida*	T w/CH	Mixed conifer in uneven-aged and multi-storied forests with closed canopies, mountains and canyons; known to breed locally.	None.
Southwestern willow flycatcher	*Empidonax traillii extimus*	E w/PCH	Nesting habitat includes shrubs and trees in willow thickets, shrubby mountain meadows, and deciduous woodlands along streams, lakes, and bogs.	None.
Whooping crane	*Grus americana*	E	Nests in Canada, winters along Rio Grande where it roosts near water.	None.

* Status Index

E	=	Endangered
E w/PCH		Endangered with Proposed Critical Habitat
T	=	Threatened
T w/CH	=	Threated with Critical Habitat

Five species classified as federal threatened or endangered species by the Endangered Species Act utilize LANL lands to fulfill part of their overall habitat requirements (see Table B-1). Of these five species, only one is known to currently nest and reproduce within the LANL boundary. The Mexican spotted owl has nested and successfully reared young over the last two breeding seasons.

A detailed assessment of potential effects to threatened and endangered species for all outfalls affected by the Proposed Action was performed by LANL biologists (Cross 1996). All outfall areas were considered for the habitat requirements of each listed species. Specie occurrence in the LANL area and use of the general outfall and wetlands areas, as well as an evaluation of direct, indirect, and cumulative effects were included in the detailed assessment. The finding for each species was that there would be no effect because of the absence of both specie sightings and suitable potential habitat. Construction designs at several outfalls were modified to prevent any potential for effect to listed species.

Should there be any unexpected sighting of a threatened or endangered specie within 0.4 km (0.25 mi) of ongoing exterior construction work, all potentially disturbing activities would he halted until an assessment of potential effects could be completed by DOE and LANL biologists. If a determination by DOE was made that there could be an effect, consultation would be undertaken with the U.S. Fish and Wildlife Service as prescribed under Section 7 of the Endangered Species Act.

APPENDIX C
PRELIMINARY HAZARD ANALYSIS

An overview of the methodology used is presented in Section 1. The process of a Preliminary Hazard Analysis (PHA) is presented in Section 2, and a review of the EFFLUENT REDUCTION PHA is presented in Section 3.

1.0 Overview

A PHA is a systematic approach for identifying the hazards associated with a process and assessing the risk of those hazards qualitatively. The methodology is recognized by various Federal agencies, the chemical and nuclear industry, and professional organizations. A PHA is performed to answer three questions.

- What can happen?
- How likely is it?
- What is the damage?

A PHA can be conducted during a number of phases: research and development, conceptual design, initial operations, detailed engineering, or modification of a process. It is preferable to perform a PHA during the early stages of the conceptual design or research and development phase because risk reduction measures can be implemented cost-effectively at that stage.
A PHA is a formal, systematic, and in-depth method for assessing the entire set of possible accident scenarios for a given facility. Frequency estimates of occurrence for all scenarios are assessed along with estimates of the damage level. Credit is taken for any existing protective features for reducing the likelihood of occurrence of each accident scenario. Each accident scenario is assigned a "risk rank" based on the estimates of the frequency of occurrence and the damage level. The entire set of accident scenarios then can be sorted by the severity of the risk rank.

Those accident scenarios identified by the PHA to be of relatively high risk can be studied in more detail or be subjected to a quantitative analysis. The results of the PHA can be used to develop or modify guidelines and policies for the process operations.

Reasons for performing a PHA include the following:

- identifying hazards associated with a project or facility operation,
- providing a qualitative ranking of hazardous situations for identifying potential process upgrades, and
- providing input for the facility Environmental Assessment (EA) or Safety Analysis Report (SAR).

Many questions that arise during the PHA process can be resolved by gathering information related to the topic of the PHA. This includes a process description, hazard studies on similar processes, and incident histories and other empirical information. This is supplemented by expert judgment throughout the PHA.

A thorough understanding of basic process information is necessary, and the materials involved in any step of the process must be identified. In addition, data are required for appropriate process parameters, such as pressure, temperature, and chemical reactions, given the state of the process. Major equipment,

safety-related equipment, and component interfaces must be noted. Knowledge of the operating environments (e.g., earthquakes, winds, flooding, and transportation systems) provides insight into potential hazards and guidance on how to reduce the risk. Existing or draft procedures relating to operation, maintenance, inspection, and emergencies also are required. A facility layout places the process in the context of other processes and the external surroundings.

A recording medium must be established to evaluate hazard scenarios systematically. Computer generated word processing tables is the method used in this analysis. Use of a handwritten log is also acceptable.

2.0 The PHA Process

There are four principal steps to be followed in performing a PHA.

1. Identify Processes/Equipment to be Analyzed The facilities, processes, and equipment analyzed in a PHA are identified based on (1) a review of written descriptions of the facilities, (2) a review of design documents, and (3) a review of process flow diagrams of the facility. The facility is then organized into systems or processes in order to facilitate the hazard analysis process.

2. Examine Each Process for Possible Hazards and Assess Effects A PHA focuses on identifying accident scenarios by asking the fundamental question "What can go wrong?" For each process, a predefined set of possible hazards is reviewed for applicability, a sample of which is shown in Table 1. For example, the question "What if there is a spill?" is considered for each process where applicable. If it is determined that the spill does create a problem, then the problem is assessed in terms of its consequences, causes, and expected frequency of occurrence. The frequency is estimated using several databases for equipment and human failure or, in some instances, expert judgment. The consequences are estimated from representative calculations performed for postulated accident scenarios.

3. Assign Hazard Severity Category, Frequency, and Risk Ranking (R-F-C) For those accident scenarios deemed by the PHA analyst to pose a potential problem in terms of consequences, causes, and/or expected frequency of occurrence, a qualitative assessment of risk is performed based on best judgment and predefined criteria. Tables 2 and 3 present a summary of the criteria used to select frequency rankings and consequence-severity for those hazard scenarios considered to have a significant consequence or frequency. The risk-ranking matrix used to assign a qualitative risk measure to each significant accident scenario is based on these severity and frequency rankings and is shown in Table 4 .

The key attributes of a scenario are the following:

- System or Process Description
- Hazard Type
- Cause/Initiating Event (the cause of the hazard scenario)
- Consequences (the specific consequences of the given scenario, including the severity of the consequences for the public, co-located worker, facility worker, and environment)
- Protective Features (mitigation currently available)
- Action/Resolution (recommendations to reduce the risk of the scenario)
- R (the risk rank of the scenario as determined using Table 4)
- C (the consequence of the scenario for each receptor as determined using Table 3)

- F (the frequency of the scenario as determined using Table 2)

Table 1 - POTENTIAL HAZARD SOURCES

Hazard Sources	Examples
Electric Sources	High-Voltage and Current Sources Transformers Batteries Static Electricity
Motion Sources	Shears, Sharp Edges, Pinch Points, Machinery Vehicles/Forklifts and Trucks Mass in Motion
Gravity-Mass Sources	Falling Falling Objects Lifting Tripping, Slipping Earthquakes
Pressure Sources	Chemical Reactions Noise Confined Gases Extreme Wind
Chemical Sources	Corrosive Materials Flammable Materials Toxic Materials Reactive Materials Carcinogenic Materials Oxygen Deficiency
Heat Sources	Electrical Plasma Torch Natural Gas Friction
Cold Sources	Cryogenic Materials Ice, Snow Wind, Rain
Radiant Sources	Radioactive Materials Ionizing Radiation RF Fields Infrared Sources Ultraviolet Plasma Beam Chemical Reactions

4. Review Risk Rankings and Recommend Possible Mitigation Actions The final risk rankings determine which further actions, if any, should be taken to mitigate or eliminate selected scenarios. The accident scenarios with a risk ranking of 1 or 2 are reviewed using the Risk Decision Criteria in Table 5 to identify if immediate or near-term mitigation actions are warranted. Accident scenarios with lower risk rankings also are reviewed, and recommendations are made for possible risk reduction wherever appropriate. As part of the PHA, estimates of the consequence severity, likelihood, and risk can be

assigned given that the recommended actions are implemented.

After all of the accident scenarios are identified, the results are organized into a summary table (Table 6). Each ranking parameter provides a unique perspective on how hazards affect the process being studied. These results are the basis for determining if a more detailed, quantitative risk assessment of one or more accident scenarios is required to better assess the risk of possible on-site or off-site consequences associated with selected hazard scenarios.

3.0 Effluent Reduction Hazard Analysis

Preparation

Documentation referenced in preparation for the EFFLUENT REDUCTION PHA included the Effluent Reduction Excavation Review Record, Waste Streams Corrective Actions Project material, and the Excavation/Soil Disturbance permit.

The activities selected to be reviewed encompass those activities that would be performed in the Effluent Reduction Project that pose a risk to the public, workers, and environment because of accidents involving facility hazards. The following processes/operations were reviewed during the course of the PHA preparation:

- Construction Activities
- Excavation Activities

Table 2 - Consequence Likelihood Categories

I (1 to 0.1)	**Normal Operations:** Frequency as often as once in 10 operating years or at least once in 10 similar facilities operated for one year.
II (0.1 to .01)	**Anticipated Events:** Frequency between 1 in 10 years and 1 in 100 years or at least once in 100 similar operating facilities operated for one year.
III (10E-02 to 10E-04)	**Unlikely:** Frequency between 1 in 100 years and 1 in 10,000 years or at least once in 10,000 similar facilities operated for one year.
IV (10E-04 to 10 E-06)	**Very Unlikely:** Frequency between 1 in 10,000 years and once in 1 million years or at least once in a million similar facilities operated for 1 year.
V	**Improbable:** Frequency of less than once in a million years.

Table 3 - Consequence Severity Categories - Maximum Possible Consequence

Category	Public	Co-located Worker	Worker	Environment
A	Immediate health effects.	Immediate health effects.	Loss of life.	Substantial offsite contamination
B	Long-term health effects.	Long-term health effects.	Severe injury or disability.	Substantial contamination of originating facility/activity, minor onsite contamination. No offsite contamination.
C	Irritation or discomfort, but no permanent health effects.	Irritation or discomfort, but no permanent health effects.	Lost-time injury but no disability.	Minor or no contamination of originating facility/activity. No offsite contamination.
D	No substantial offsite release.	No substantial offsite release.	Minor or no injury and no disability.	Minor or no contamination of originating facility/activity. No offsite contamination.
E	No effect	No effect	No effect	No effect

Offsite: Public, private, or Indian lands that are not part of Laboratory property.
Onsite: Laboratory property but not necessarily the originating technical area.
Facility: Originating technical area of the laboratory.

Table 4 - RISK RANKING MATRIX

Severity of Consequence	Risk Ranking Matrix for Public and Onsite Workers: Likelihood of Consequences				
	I	II	III	IV	V
A	1	1	2	2	3
B	1	2	2	3	4
C	2	2	3	4	4
D	3	4	4	4	NH
E	NH	NH	NH	NH	NH

NH: Not a Hazard

Severity of Consequence	Risk Ranking Matrix for Workers and Environment: Likelihood of Consequences				
	I	II	III	IV	V
A	1	1	2	3	3
B	1	2	3	3	4
C	2	3	3	4	4
D	3	4	4	4	NH
E	NH	NH	NH	NH	NH

Table 5 - Mitigation Recommendations for Risk Rank Levels

Risk Rank	Recommendation
1	**Unacceptable:** Should be mitigated to risk rank 3 or lower within a reasonable time period.
2	**Undesirable:** Should be mitigated to risk rank 3 or lower within a reasonable time period.
3	**Acceptable with Controls:** Verify that procedures, controls, and safeguards are in place.
4	**Acceptable as is:** No action is necessary
5	**Not a Hazard**

Table 6 - Summary Of Effluent Reduction Hazards And Impacts With Risk Ranks

Hazard	Scenario	Impact On Public (Risk Rank)	Impact On Co-Located Worker (Risk Rank)	Impact On Worker (Risk Rank)	Impact On Environment (Risk Rank)	Highest Consequence
Gravity-Mass	Soil shifts, construction materials/equipment falls into excavated area	No	No	Yes (2)	No	Potential severe worker injury from falling equipment or materials
Electrical - High voltage	Accidental contact with high voltage line during excavation	No	No	Yes (2)	No	Potential worker injury/death
Chemical	Excavation location in an area of known/suspected oxygen deficiency or gaseous conditions	No	No	Yes (3)	No	Potential asphyxiation or exposure of personnel to chemicals
Motion	Mobile equipment, crane or hoist drops load into construction area	No	No	Yes (3)	No	Potential severe worker injury from falling equipment or materials

TABLE 7 - PRELIMINARY HAZARD ANALYSIS TABLES

SYSTEM OR PROCESS DESCRIPTION	HAZARD TYPE	CAUSE/ INITIATING EVENT	CONSEQUENCES (Public, Co-located worker, Worker, Environment)	PROTECTIVE FEATURES	ACTION/ RESOLUTION	R-C-F Public Co-located Worker Worker Environment
Construction Activities	Gravity-mass	Soil shifts, construction materials/equipment falls into excavated area	Potential severe worker injury from falling equipment or materials (E,E,B,E)	Safety inspections and proper shoring of excavated area	Soil load test and verification prior to construction activities	NH (II E) NH (II E) 2 II B NH (II E)
Construction Activities	Motion	Mobile equipment, crane or hoist drops load into construction area	Potential severe worker injury from falling equipment or materials (E,E,B,E)	Administrative control of loads over personnel in the excavation	Ensure substantial overhead protection for workers	NH (III E) NH (III E) 3 III B NH (III E)
Construction Activities	Gravity-mass	Trench collapses due to failure of shoring	Potential severe injury to construction workers(E,E,B,E)	Proper trench shoring; daily on-site inspections	None	NH (III E) NH (III E) 3 III B NH (III E)
Construction Activities	Gravity-mass	Construction or excavated material falls into construction area	Potential serious worker injury from falling objects (E,E,B,E)	Proper storing and retaining of excavated material	None	NH (III E) NH (III E) 3 III B NH (III E)
Construction Activities	Gravity-mass	Fall from construction equipment	Potential injury to construction worker (E,E,C,E)	Properly trained personnel; OSHA inspections	None	NH (II E) NH (II E) 3 II C NH (II E)
SYSTEM OR PROCESS DESCRIPTION	HAZARD TYPE	CAUSE/ INITIATING EVENT	CONSEQUENCES (Public, Co-located worker, Worker, Environment)	PROTECTIVE FEATURES	ACTION/ RESOLUTION	R-C-F Public Co-located Worker Worker Environment

SYSTEM OR PROCESS DESCRIPTION	HAZARD TYPE	CAUSE/ INITIATING EVENT	CONSEQUENCES (Public, Co-located worker, Worker, Environment)	PROTECTIVE FEATURES	ACTION/ RESOLUTION	R-C-F Public Co-located Worker Worker Environment
Excavation	Electrical - High Voltage	Accidental contact with high voltage line during excavation	Potential serious injury/death of construction worker (E,E,A,E)	Pre-construction utility survey ; training; excavation permit; site staking for utilities	Proper verification of utility location prior to any excavation	NH (III E) NH (III E) 2 III A NH (III E)
Excavation	Chemical - Oxygen deficiency/gaseous conditions	Excavation location in an area of known/suspected oxygen deficiency or gaseous conditions	Potential asphyxiation or exposure of personnel to chemicals (E,E,C,E)	Air monitoring of the excavation prior to each shift; readily available emergency rescue equipment	Provide ventilation if necessary to improve conditions	NH (III E) NH (III E) 3 III C NH (III E)
Excavation	Gravity-Mass	Excessive loading of excavated material	Potential death/severe injury to worker (E,E,A,E)	Proper storing and retaining of excavated material	None	NH (IV E) NH (IV E) 3 IV A NH (IV E)
Excavation	Gravity-Mass	Worker/employee falls into the excavation	Potential injury to worker (E,E,D,E)	Barricade/mark excavation to prevent workers/others from falling into them	None	NH (III E) NH (III E) 4 III D NH (III E)
Excavation	Gravity-Mass	Failure of base shoring and/or supporting systems	Potential severe injury to worker (E,E,B,E)	Proper design of shoring; competent person inspects/approves shoring, sloping and supporting systems daily	None	NH (IV E) NH (IV E) 3 IV B NH (IV E)

Excavation	Gravity-Mass	Boulders, stumps or other materials slide or roll into the excavation pit	Potential injury to worker from debris (E,E,D,E)	Removal of boulders, stumps or other materials that may slide or roll into the excavation	None	NH (IV E) NH (IV E) 4 IV D NH (IV E)

APPENDIX D

Agency Responses

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United States Department of the Interior
NATIONAL PARK SERVICE
BANDELIER NATIONAL MONUMENT
HCR 1, BOX 1, SUITE 15
LOS ALAMOS, NEW MEXICO 87544-9701
(505) 672-3861

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

L7619 (BAND-RM/WB,
industrial waste effluent reduction,
NEPA with other agency)

August 20, 1996

Elizabeth Withers
NEPA Compliance Officer
Los Alamos Area Office
528 35th Street
Los Alamos, NM 87544

Re: Effluent Reduction Project Environmental Assessment (EA)

Dear Ms. Withers:

This letter is to support the DOE effort at Los Alamos National Laboratory to end or decrease effluent discharge from 27 outfalls. We understand that rerouting of waste streams will resulting in some increased discharge from the Sanitary Waste Water Treatment Facility in Sandia Canyon, and that some of the anthropogenic plant associations near the 27 outfalls will likely diminish or change character. We view these changes as a net positive event.

We agree with the DOE view that the action will result in some decrease in downstream flow of contaminants. In addition, we anticipate that wildlife species will be only slight impacted. Specifically, any measurable impact is likely to include a small decrease in elk density. Lower elk densities would be desirable considering that high elk numbers contribute to soil erosion and the associated contaminant transport. Elk movements may be changed by your Effluent Reduction Project in some locations, but these changes should not be a problem for visitors or operations at Bandelier.

Thank you for soliciting our comments.

Sincerely,

Roy Weaver
Superintendent

NATIONAL PARK SERVICE
1916 - 1991

United States Department of Agriculture | Forest Service | Española Ranger District Los Alamos Office | 475 20th St. #B. Los Alamos, NM 87544

Caring for the Land and Serving People

Date: June 19, 1996

Subject: LANL EFFLUENT REDUCTION PROJECT

To: Elizabeth R. Withers
Department Of Energy
Albuquerque Operations Office
Los Alamos, New Mexico 87544

This letter is in regards to the recent meeting and site tour held at the Department of Energy Los Alamos Area Office on June 19, 1996 concerning the LANL Effluent Reduction Project. As I mentioned during the meeting I do not foresee any problems with the proposed actions. The actions appear to be very minor and should reduce potential water quality impacts. As was mentioned at the meeting, the eventual loss of these small wetland areas will result in a reduction of some industrial sources of surface water which is now available for wildlife use. It appears the long term result of the reduction of these sources of water will be the areas returning to a more natural condition.

Another subject I brought up concerned the Water Canyon Water Line. The water line begins on National Forest lands in Water Canyon. As I mentioned at the meeting, if the Department of Energy no longer has a need for this water system we should discuss the decommissioning of the line and returning of the water to the natural stream channel in Water Canyon. This would provide a very good natural water source for wildlife and improve the riparian habitat along the drainage. Resolution of this issue would probably be more appropriate during discussions concerning the transfer of the Water System to the County.

I have no further comments or concerns, but look forward to reviewing the Preliminarily Environmental Assessment document.

Sincerely,

Robert D. Remillard
Los Alamos Area Office