3.6.2 Environmental Consequences

3.6.2.1 Proposed Action

Under the Proposed Action, all surface disturbance associated with the ancillary support facilities (including the transportation and utility corridor), road and utility relocations, and mine area development would occur on or within the Calvert Bluff Formation. No physical disturbance would occur on or within the underlying Simsboro or Hooper Formations.

Construction of the ancillary support facilities and road and utility relocations could impact near-surface paleontological resources, if present. Development of the mine area would pose a higher potential for impact to these resources, due to the extent and depth of the proposed physical disturbance. As a result, implementation of the Proposed Action would result in a direct impact to paleontological resources, if present, that are associated with the Calvert Bluff Formation within the areas of proposed disturbance. This impact would result in the loss of context and, as a result, the loss of scientific information and educational value associated with the resource. However, due to the prevalence of paleontological resources associated with the Calvert Bluff Formation throughout the region, these effects are considered to be minor.

Potential indirect impacts to paleontological resources could include erosional effects as a result of runoff or mine water discharge. However, based on the proposed surface water control system and implementation of erosion control measures as discussed in Section 2.5, Proposed Action, the potential for impact is considered to be low. As discussed in Geology and Mineral Resources under Section 3.1.2.1, dewatering and depressurization pumpage at the Three Oaks Mine is not anticipated to cause subsidence. Therefore, there would be no indirect impact to paleontological resources as a result of these activities.

If the four uncontrolled parcels in the eastern and southern portions of the proposed mine disturbance area and the one uncontrolled property at the southern end of the transportation/utility corridor cannot be obtained by Alcoa, the modification in the disturbance area to accommodate these parcels, as described on page 2-21 of the Final EIS, would eliminate mine-related disturbance within the uncontrolled parcels. Correspondingly, the disturbance area along the southeastern boundary of the mine area would be extended and the transportation/utility corridor realigned. These changes in the disturbance area would not change the impact conclusions for paleontological resources as identified in Section 3.6.2 of the Draft EIS.

3.6.2.2 No Action Alternative

Under the No Action Alternative, ground-disturbing activities associated with the Three Oaks Mine would not occur. As a result, any paleontological resources associated with the Calvert Bluff Formation in the proposed disturbance area would not be affected by mining activity. However, some of these resources may be affected by natural impacts (i.e., erosion).

3.6.2.3 Alternative Mine Plan

Under the Alternative Mine Plan, potential mine-related impacts to paleontological resources as a result of surface disturbance, water level change, and water discharge would be the same as described for the Proposed Action (see Section 3.6.2.1 of the Draft EIS).

From 1999 to 2001, TAS conducted surveys for both Alcoa and CPS. For these surveys, approximately 12,500 acres were investigated, with 180 archaeological sites discovered (66 prehistoric, 108 historic, and 6 multi-component). Of these 180 recorded archaeological sites, 13 are outside of the permit area. The remaining 167 archaeological sites (65 prehistoric, 97 historic, and 5 multi-component) are located within the permit area. The prehistoric and multi-component sites and the majority of the historic sites recorded from this survey were judged to be insignificant at the time of the survey and did not meet the criteria for listing on the NRHP. However, the THC has requested additional information or recommended testing of 10 of the prehistoric sites and 6 of the historic sites in the permit area (Alcoa 2002c [Volume 1]).

Through the combined surveys (UTSA, EHA, and TAS), a total of 194 sites (75 prehistoric, 111 historic, and 8 multi-component) were identified in the permit area. Of the 194 archaeological sites, 134 are located in the proposed disturbance area. Specifically, these 134 sites consist of 71 sites located in the mine area, 30 sites located in the ancillary facilities area, 7 sites located within the transportation and utility corridor, 6 sites located within or immediately adjacent to the proposed road relocations, and 20 sites located within or immediately adjacent to the proposed utility reroutes. The remaining 60 sites are within the permit area but outside of the proposed areas of disturbance.

An initial review of the report of the findings, as presented in the original RRC permit application (Alcoa 2000 [Volume 1]), was completed by the ***USACE and*** THC. The report was revised in October 2001 by TAS in response to the ~~THC's~~ initial review and subsequent field surveys (Alcoa 2001b [Volume 2], 2001c [Volume 2]). The revised report has been reviewed by the ***USACE and*** THC, and their findings are presented in Supplement No. 3 to the RRC permit application (Alcoa 2002c [Volume 1]). To-date, ***it has been*** ~~the THC has~~ determined that five of the historic sites (41BP202, 41BP275, 41BP557, 41BP594, and 41LE306) identified in the permit area are eligible to the NRHP (THC 2001, 2002b). One hundred seventy-three sites identified in the permit area have been determined ~~by the THC~~ to be ineligible for inclusion in the NRHP. Additional information or testing has been requested by the ***USACE and*** THC for 16 sites (10 prehistoric and 6 historic in the permit area) (THC 2001, 2002a).

3.7.1.4 Ethnography and Ethnohistory

From 1999 to 2001, ethnographic interviews were undertaken and focused on local residents and descendants of residents that lived or currently live within the mine area. In total, TAS conducted at least 20 separate interviews of individuals or couples. These personal communications provided valuable information relative to the history of the mine area (TAS 2001).

In the spring of 1999, consultation was undertaken with tribal groups associated with the permit area. Initially, four tribal groups (i.e., Apache, Comanche, Tonkawa, and the Wichita) were contacted to inquire if they had any interest in Three Oaks Mine activities. Only the Tonkawa and Wichita tribal groups responded to this initial contact, acknowledging an association with the permit area and expressing a desire to be updated of these activities as they progress. Due to the lack of response from the Apache and the Comanche tribal groups and the recently identified association of the Kiowa tribal group, further tribal consultation was undertaken. A second attempt at contact was made in the fall of 2001 with the Apache and the Comanche tribal groups, and initial contact was made with the Kiowa tribal group. To date, no response has been received from these groups.

mine block that would be mined during years 11-15. Site 41BP557 is within the mine block that would be mined during years 21-25, and site 41BP594 is within the mine block that would be mined during years 21-25. The remaining archaeological sites have either been determined by the THC to be ineligible to the NRHP, or are undergoing further evaluation or testing prior to subsequent THC and USACE review and eligibility determination (THC 2002a,b).

Approximately 150 acres within the mine area have not been surveyed to-date. Section 106 consultation would need to be initiated and completed for this area prior to any ground disturbing activities.

The fifth NRHP-eligible site (41LE306) within the permit area would be outside of the area of proposed disturbance. However, mining activity has the potential to visually affect this site, which is located in the vicinity of the proposed transportation and utility corridor. Visual impacts are equally as important as direct impacts, and as a result, need to be evaluated accordingly. To minimize visual impacts to this historic property, mitigation would be developed and implemented in accordance with the site protection or treatment plans created in coordination with the THC, USACE, and RRC.

No cultural resource sites eligible to the NRHP would be disturbed by mining or mining-related activities until written or signed agreement is obtained from the THC, RRC, and USACE. A site protection plan has been developed and is included in the RRC permit application. In the event of unanticipated discoveries, including human remains, during mine construction and operation, Alcoa would protect the discovery and contact the USACE and THC in accordance with appropriate state and federal laws.

If the four uncontrolled parcels in the eastern and southern portions of the proposed mine disturbance area and the one uncontrolled property at the southern end of the transportation/utility corridor cannot be obtained by Alcoa, the modification in the disturbance area to accommodate these parcels, as described on pages 2-21 and 2-21a of the Final EIS, would eliminate mine-related disturbance within the uncontrolled parcels. Correspondingly, the disturbance area along the southeastern boundary of the mine area would be extended and the transportation/utility corridor realigned. These changes in disturbance area would not change the impact evaluation for the NRHP-eligible sites as presented in Section 3.7.2.1 of the Draft EIS; however, they would result in the avoidance of two historic sites (ineligible or requiring further testing) in the mine area and two prehistoric sites (ineligible or requiring further testing) in the transportation/utility corridor. In addition, extension of the disturbance area along the southeastern boundary of the mine area and realignment of the transportation/utility corridor could result in the disturbance of additional historic or prehistoric sites, depending on where the disturbance boundaries would be extended to offset the exclusion areas. As discussed above, Section 106 consultation would need to be completed and the appropriate authorization obtained prior to any ground disturbing activities, including activities in the adjustment area of the southeastern boundary and the realignment area of the transportation/utility corridor.

3.7.2.2 No Action Alternative

Under the No Action Alternative, the 134 archaeological sites within the proposed mine disturbance area (including 4 of the 5 sites eligible to the NRHP) would not be affected as a result of mining-related activities. In addition, mining-related visual effects to the fifth NRHP eligible site would not occur. As a result, impacts

to cultural resources within the permit area would be limited to exposure to the elements and deterioration from natural impacts (i.e., erosion).

3.7.2.3 Alternative Mine Plan

Under the Alternative Mine Plan, potential impacts to cultural resources as a result of mine-related activities would be the same as described for the Proposed Action (see Section 3.7.2.1 of the Draft EIS).

3.7.3 Cumulative Impacts

Cumulative activities related to other ongoing or proposed projects in the area cannot be quantified at this time. The clay mining and brick manufacturing industry in the area has affected approximately 1,000 acres of privately owned surface; however, such operations are not subject to the same regulations as the Three Oaks Mine. In addition, the Sandow Mine will have disturbed approximately 15,103 acres by mine-closure.

Although difficult to identify, the cumulative impacts to archaeological sites would include natural impacts (i.e., erosion and dilapidation), as well as direct disturbance and removal of cultural sites that were located, or currently may be located, within the interrelated actions' areas of disturbance. However, all NRHP-eligible sites at the Three Oaks Mine would be mitigated in accordance with site protection or treatment plans in coordination with THC, USACE, and RRC, thereby minimizing direct cumulative impacts to cultural resources. The visual cumulative impacts to aboveground architecture, cultural features, and historic landscapes, however, are more difficult to ascertain. Mining activity and industrial ventures in the area have

a potential to visually affect these cultural elements, while not directly affecting their physical characteristics. However, based on the distance between the interrelated actions, no cumulative visual impacts are anticipated.

3.7.4 Monitoring and Mitigation Measures

To-date, a memorandum of agreement (MOA) regarding specific mitigation and monitoring measures has not been developed. However, as discussed in Section 3.7.2.1, no cultural resources would be disturbed by mining activities until testing has been completed, ~~THC~~ eligibility determinations made, site protection or treatment plans have been implemented, where required, and subsequent written or signed agreement is obtained from the THC, USACE, and RRC. Also, approximately 150 acres within the mine area would need to be surveyed with consultation completed, in accordance with Section 106, prior to the initiation of ground disturbing activities in or adjacent to this area.

Based on this EIS analysis, the USACE is considering the following additional mitigation for cultural resources.

CR-1: Indirect Impact Mitigation. To minimize impacts as a result of illegal collection or vandalism, Alcoa would educate project-related personnel as to the sensitive nature of the resources and implement a strict policy against illegal collection.

3.7.5 Residual Adverse Effects

Significant cultural resources would be protected by measures developed by Alcoa in coordination with the THC, USACE, and RRC. Insignificant sites within the mine area would be lost.

Table 3.8-5
Existing Climate – Mixing Height Conditions in Three Oaks Mine Area

Period	Average Mixing Height (feet)				
	Winter	Spring	Summer	Fall	Annual
Morning	1,506	2,454	3,002	2,146	2,277
Afternoon	3,648	5,092	6,952	5,157	5,213

The combination of relatively high mean wind speeds and a deep mixed layer at the earth's surface indicates that pollutants emitted from sources near the ground would be dispersed throughout a greater volume, thereby reducing the potential for elevated concentrations to occur.

3.8.1.3 Air Quality

Air quality is defined by the concentration of various pollutants and their interactions in the atmosphere. Pollution effects on receptors have been used to establish a definition of air quality. Measurement of pollutants in the atmosphere is expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). Both long-term climatic factors and short-term weather fluctuations are considered part of the air quality resource, because they control dispersion and affect concentrations. Physical effects of air quality depend on the characteristics of the receptors and the type, amount, and duration of exposure. Under the Federal Clean Air Act and Texas Clean Air Act, the USEPA and TNRCC establish acceptable air quality standards and upper limits of pollutant concentrations and duration of exposure. Air pollutant concentrations within the standards are generally not considered to be detrimental to public health and welfare.

The U.S. Congress has established the framework for air quality regulations through passage of the Clean Air Act of 1990 (CAA). The CAA requires the administrator of the USEPA to establish national ambient air quality standards for air contaminants for which emissions, in the judgment of the USEPA, cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare. The presence of emissions in the ambient air results from numerous and diverse mobile and stationary sources. National primary ambient air quality standards define levels of air quality that the USEPA judges are necessary, with an adequate margin of safety, to protect public health. National secondary ambient air quality standards define levels of air quality that the USEPA judges necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

National Ambient Air Quality Standards (NAAQS)

The criteria for impacts to air quality are the lowest concentrations at which adverse human health or ecological effects from exposure to air pollution are known or suspected to occur. For criteria pollutants, these levels have been established through the state and national Ambient Air Quality Standards (AAQS). The AAQS are concentrations established by law to protect public health and welfare from the air pollutants. The main health-based standards are the federal PM_{10} standard and the fine dust particulate matter with an aerodynamic diameter of ~~10~~ ***2.5*** microns or less in diameter ($PM_{2.5}$) standard. The USEPA has established primary and secondary standards for seven pollutants:

In addition to the AAQS, Texas imposes additional restrictions on SO_2 concentrations. "No person in the State of Texas may cause, suffer, allow, or permit emissions of SO_2 from a source or sources operated on a property of multiple sources operated on contiguous properties to exceed a net ground level concentration of 0.4 part per million by volume (ppmv) averaged over any 30-minute period" (TAC Title 30, Part 1, Chapter 112, Subchapter A, §112.3a).

Ambient monitoring for PM_{10} was conducted at four sites in the vicinity of the Sandow Mine for the period of 1990 ***through 1994.*** ~~to 1995.~~ Monthly average, maximum 24-hour, and minimum 24-hour concentrations of PM_{10} are shown in **Table 3.8-7**. There were no exceedences of the AAQS for PM_{10} during this time.

Prevention of Significant Deterioration (PSD)

For areas that have attained the AAQS, the CAA provides for a new source review program to ensure that no significant deterioration of the existing air quality would result from the construction and operation of new emission sources or from the modification of existing emission sources. Pursuant to the CAA, the USEPA has promulgated Prevention of Significant Deterioration (PSD) regulations that provide for a pre-construction review by the state air quality agency of "major" emission sources of air pollutants that are regulated under the CAA. For 28 designated sources of air contaminants, a major stationary source is defined as a stationary source that has the potential to emit 100 or more tons per year of any of the pollutants regulated under the CAA, including any fugitive emissions (non-stationary source). Other stationary sources of pollutants are defined as major if the proposed emissions of any pollutant regulated by the CAA are 250 or more tons per year, excluding fugitive emissions. Lignite mining operations are not one of the 28 designated sources that are considered major at 100 tons per year; however, they potentially could be a major source if point sources emit more than 250 tons per year of a regulated pollutant. In the case of the proposed lignite mining operation, PM_{10} associated with fugitive dust emissions is the only pollutant regulated by the CAA that would be emitted in significant quantities. Therefore, since the lignite mining operation would not be one of the 28 major sources, and there are only non-stationary and minor stationary sources associated with the proposed operation, the PSD regulations do not apply to the proposed operation.

The existing power generating stations operated by Alcoa and TXU are not adjacent to the proposed lignite mine; therefore, they are separate sources for PSD purposes. The project area is designated as a Class II area under the PSD regulations. The Class II designation allows for moderate growth or some degradation of air quality within certain limits above baseline air quality. These limits include the AAQS discussed above and identified in **Table 3.8-6** as well as other incremental limits set by the USEPA and TNRCC that are not to be exceeded. Under the PSD provisions, Congress established a land classification scheme for those areas of the country with air quality better than the AAQS. Class I allows very little deterioration of air quality; Class II allows moderate deterioration, as discussed above; and Class III allows more deterioration. However, in all cases, the pollution concentrations shall not violate any of the AAQS or other federal or state limits. Congress designated certain existing areas as mandatory Class I, which precludes redesignation to a less restrictive class, in order to acknowledge the value of maintaining these areas in relatively pristine condition. These mandatory Class I areas include international parks, national wilderness areas, and national memorial parks in excess of 5,000 acres, and national parks in excess of 6,000 acres existing as of August 7, 1977. No PSD Class I areas are within Air Quality Control Region (AQCR) 15. The nearest

Table 3.8-7
Sandow Mine
Summary of PM_{10} Data from *February 3*, 1990, through December 28, 1994 (µg/m^3)

Date	Average (Month)				Minimum (24-hour)				Maximum (24-hour)			
	West-1	West-2	South	North	West-1	West-2	South	North	West-1	West-2	South	North
1990												
January	--	--	--	--	--	--	--	--	--	--	--	--
February	***16***	***14***	***19***	***15***	***9***	***8***	***10***	***10***	***24***	***23***	***23***	***20***
March	15	15	13	14	12	11	10	12	17	17	16	16
April	17	16	16	18	12	12	11	17	23	23	23	19
May	22	22	19	19	6	6	12	5	32	32	28	37
June	21	20	18	22	15	14	15	17	31	30	25	29
July	37	36	38	35	24	24	18	18	64	62	60	58
August	39	39	31	34	25	24	22	26	50	51	37	42
September	19	16	14	17	7	7	9	12	34	22	20	22
October	21	21	20	19	12	12	10	12	35	35	32	30
November	14	15	15	15	10	10	10	3	25	25	25	28
December	12	12	15	12	7	8	8	6	20	20	29	23
1991												
January	18	15	15	13	17	6	12	4	20	19	19	18
February	13	13	13	11	11	11	9	7	16	16	17	15
March	24	24	19	18	12	13	13	7	33	34	25	26
April	21	21	17	16	18	18	9	9	23	24	24	22
May	18	20	21	21	13	12	16	13	22	26	26	26
June	26	24	26	23	14	14	15	11	52	51	52	53
July	21	22	21	21	12	13	12	11	29	29	35	39
August	25	22	24	21	12	11	11	10	39	34	37	32
September	18	16	17	13	9	9	9	12	30	26	30	14
October	24	22	17	19	12	12	8	9	37	35	25	27
November	18	14	14	13	7	6	10	6	26	22	20	20
December	17	16	13	9	8	7	6	5	37	34	29	14
1992												
January	13	14	11	15	6	8	4	2	24	24	23	25
February	13	12	12	11	7	7	7	7	15	15	24	13
March	13	11	12	14	10	6	9	11	16	16	15	20
April	14	13	11	15	10	9	9	10	16	16	13	19
May	20	19	19	16	9	8	12	9	33	31	29	22
June	14	14	13	13	11	11	12	13	16	17	13	13

The PM_{10} SIP for Texas consists of the State regulation contained in TNRCC Regulation I, Control of Air Pollution From Visible Emissions and Particulate Matter, 30 TAC Chapter 111. The primary Regulation I rule that would apply to the proposed Three Oaks Mine is Rule 111.155, which establishes net ground-level concentration limits for particulate matter of 200 $\mu g/m^3$ averaged over any 3 consecutive hours and 400 $\mu g/m^3$ averaged over any 1-hour period. This rule applies to concentrations **of *total suspended particulates*** **(**TSP**)** and not just to PM_{10}.

TNRCC Chapter 118, Control of Air Pollution Episodes

TNRCC Regulation 118 provides for control of air pollution episodes. It defines a Level 1 air pollution episode for particulate matter (PM_{10}) as 24-hour average concentrations equal to or greater than 420 $\mu g/m^3$. A Level 2 air pollution episode for particulate matter (PM_{10}) is defined as a 24-hour average concentration equal to or greater than 500 $\mu g/m^3$. A Level 1 air pollution episode exists if the following criteria are met: 1) the concentration of any of the air contaminants is equal to or greater than the levels specified for Level 1 and 2) in the case of all air contaminants except ozone, meteorological conditions conducive to high levels of air contamination are predicted to continue for at least 12 hours. (For ozone, the criteria includes meteorological conditions that would be conducive to the likely recurrence of high ozone levels within the next 24 hours). A Level 2 air pollution episode exists if the commission determines that emergency reductions of emissions must be initiated to prevent ambient concentrations specified for Level 2. The requirements of Regulation 118 do not apply to episodes caused by naturally occurring dust storms.

3.8.2 Environmental Consequences

3.8.2.1 Proposed Action

There are no Class I areas within 100 kilometers (approximately 60 miles) of the proposed Three Oaks Mine. Therefore, there would be no air quality impacts on Class I areas due to the operation of the mine.

Construction, Operation, and Reclamation Impacts

Construction and mining activities at the proposed Three Oaks Mine would be sources of TSP, PM_{10}, and $PM_{2.5}$. Fuel-burning mobile (on road and off road) sources would emit low levels of gaseous pollutants (e.g., SO_2, NO_x, CO, and volatile organic compounds [VOCs]). Storage tanks for fuels, oil, and chemicals are potential sources of VOCs. Reclamation activities associated with the Three Oaks Mine also would result in an increase in fugitive and gaseous emissions in the local area during reclamation. However, construction, mining, and reclamation activities at the Three Oaks Mine generally would be a replacement of diminishing similar sources at the Sandow Mine.

Construction would result in temporary air quality impacts due to increases in local fugitive dust levels. Dust generated from these open sources is termed “fugitive” because it is not discharged to the atmosphere in a confined flow stream (e.g., stack, chimney, or vent). The principal sources of fugitive dust would include land clearing, earth moving, scraping, hauling, and materials storage and handling; truck loading operations; and wind erosion from stockpiles.

During construction, operation, and reclamation, vehicle exhaust emissions would be generated; however, such emissions would be small compared to potential fugitive emissions from earth moving, hauling, and other construction activities. Particulate concentrations due to construction, operation, and reclamation activities would vary, and impacts would depend on the activity location and the daily wind and weather. Watering of road surfaces and stockpiles, posting and enforcing of speed limits, placing gravel on coal haul roads, or other measures would be taken to limit fugitive dust emissions. While measures such as watering would reduce the emissions from such activities, some level of fugitive dust emissions would be unavoidable due to the nature of the work. Although some air quality impacts inevitably would occur during construction and reclamation, they would be transitory and limited in duration relative to the mine operations phase, and they would end at the completion of that particular phase of the work. Once reclamation is completed, emissions from that source would cease, and nearby pollutant concentrations would return to background levels.

Air quality impacts due to emissions from mining operations would occur throughout the operational phase of the project. The primary pollutant would be fugitive dust (TSP and PM_{10}) generated by the draglines, loaders, haul trucks, crushers, screens, conveyors, stockpiles, and other processes. All criteria pollutant emission rates from individual sources (not fugitive sources) would be less than 250 tons per year; therefore, the Three Oaks Mine would not be a "major stationary source" as defined by the USEPA (see PSD under Section 3.8.1.3). **Table 3.8-8** lists the estimated operating parameters for the mine. These operating parameters have been used to estimate emissions from the mine during the operational phase.

Table 3.8-8
Estimated Operating Parameters for the Three Oaks Mine

Operation	Amount (average)	Units
Coal production	6,200,000	tons/year
Mine operations	365 7	days/year days/week
Truck loading - Lignite at pit - Topsoil at pit	 6,200,000 1,672,507	 tons/year cubic yards/year
Truck dumping - Topsoil at storage area	 1,672,507	 cubic yards/year
Dragline material handling - Overburden	 140,891,595	 cubic yards/year
Haul trucks - ~~Topsoil hauling~~***In-mine hauling*** - ~~Lignite hauling~~***Haul roads***	 ~~26,414~~***30,586*** ~~51,667~~***215,278***	 vehicle miles traveled/year vehicle miles traveled/year
Road repair	5,000	hours
Disturbed areas (wind erosion) - Lignite pit - Overburden storage - Topsoil storage	 259 300 50	 acres acres acres
Conveyors - Feeder breaker - Radial stacker - Conveyor drops - Aux reclaim hopper - Vibratory feeders	 6,200,000 6,200,000 6,200,000 6,200,000 6,200,000	 tons/year tons/year tons/year tons/year tons/year
Water truck	~~5,000~~***30,374***	~~Hours~~***vehicle miles traveled/year***

occur to the northwest of the mine, along the property boundary. The 24-hour concentrations to the south of the mine are much lower and are not expected to be above 20.0 µg/m^3 for background and incremental impacts.

For comparison, Alcoa has evaluated the environmental effect of placing gravel on the dirt haul roads. The gravel would reduce the silt content of the road surface and would reduce the resulting particulate emissions. Separate air dispersion model runs were made for gravel roads and 15-foot berms (full and partial) and gravel roads with no berm. The results of these model runs are shown in **Table 3.8-14**.

Table 3.8-14
PM_{10} Ambient Air Modeled Impacts
Gravel Roads and 15-foot Berm
(µg/m^3)

Scenario	Period	Three Oaks Mine	Background	Total Mine and Background	AAQS
Gravel, 15-foot berm	Annual	20.8	15.0	35.8	50.0
	24-hour	59.8	15.0	74.8	150.0
Gravel, 15-foot berm western boundary only	Annual	28.7	15.0	43.7	50.0
	24-hour	72.6	15.0	87.6	150.0
Gravel, No berm	Annual	37.1	15.0	52.1	50.0
	24-hour	106.0	15.0	121.0	150.0

The scenarios with gravel roads and 15-foot berms, even if the berms only are located along the western edge of the mine haul road, would result in maximum 24-hour and annual impacts that would be in compliance with AAQS. However, dispersion modeling analysis of the option with gravel roads and no berms shows that this scenario has predicted incremental impacts at 37.1 µg/m^3. Adding a background level of 15 µg/m^3 to the incremental impact yields a total impact of 52.1 µg/m^3. These modeled impacts indicate a potential exceedence of the annual AAQS (50 µg/m^3). As a result, mitigation measures may be appropriate to reduce the impacts below the AAQS at the mine permit boundary. Mitigation may include ~~mine boundary changes, a~~ haul road ~~location~~ ***material*** change~~s,~~ and/or strategically placed berms (see mitigation measure AQ-1 in Section 3.8.4, Monitoring and Mitigation Measures).

If the four uncontrolled parcels in the eastern and southern portions of the mine area cannot be obtained by Alcoa, the modification in the disturbance area to accommodate these parcels, as described on page 2-21 of the Final EIS, would eliminate mine-related disturbance within the uncontrolled parcels and correspondingly would extend the disturbance area along the southeastern boundary of the mine area. As a result, PM_{10} concentrations incrementally would increase in the vicinity of these parcels starting in Year 11 and continuing through Year 25. However, the modification in the disturbance area in the vicinity of these parcels would not change the impact conclusions for PM_{10} concentrations as described in Section 3.8.2.1 of the Draft EIS. For each internal uncontrolled property, it was determined that year 25 would yield the highest ambient air impacts to the properties. Dispersion modeling results indicate that both annual and 24-hour concentrations would be less than the NAAQS at all points on the property boundaries. Results of the dispersion modeling analysis for each of the properties are shown in Table 3.8-14a. In addition, it is assumed that the extension of the mine area to the southeast to offset the loss of these parcels

would not change the impact conclusions for PM_{10} concentrations along the southeast property boundary, also as described in Section 3.8.2.1 of the Draft EIS.

Table 3.8-14a
Highest PM_{10} Ambient Air Modeled Concentrations
Assuming 7 Million Ton-per-year Production, Mine Year 25
($\mu g/m^3$)

Property	Period	Three Oaks Mine	Background	Total Mine and Background	AAQS
T0080	Annual	6.2	15.0	21.2	50.0
	24-hour	34.0	15.0	49.0	150.0
T0130	Annual	7.2	15.0	22.2	50.0
	24-hour	36.3	15.0	51.3	150.0
T0150	Annual	8.0	15.0	23.0	50.0
	24-hour	34.2	15.0	49.2	150.0

Source: Hodges 2003.

Dispersion modeling results for a lignite production of 7.0 million tons per year are shown in Table 3.8-14b. The property boundary for these three scenarios is located approximately 450 feet from the nearest emission source. For the scenarios presented in Table 3.8-14 of the Draft EIS, the property boundary was approximately 200 feet from the closest emission source. Increasing the distance from the potential sources results in a substantial reduction in the ambient air quality impacts. The data also demonstrate that all scenarios, including the no berm case, would result in maximum 24-hour and annual impacts that would be in compliance with the AAQS.

Table 3.8-14b
PM_{10} Ambient Air Modeled Impacts,
Gravel Roads and 15-foot Berm
Assuming 7 Million Ton-per-year Production Rate
($\mu g/m^3$)

Scenario	Period	Three Oaks Mine	Background	Total Mine and Background	AAQS
Gravel, 15-foot berm	Annual	20.3	15.0	35.3	50.0
	24-hour	59.1	15.0	74.1	150.0
Gravel, 15-foot berm western boundary only	Annual	22.6	15.0	37.6	50.0
	24-hour	70.3	15.0	85.3	150.0
Gravel, no-berm	Annual	23.6	15.0	38.6	50.0
	24-hour	74.8	15.0	89.8	150.0

Source: Hodges 2003.

based upon an 8-hour per day, 40-hour per week exposure(Alcoa 2002b; American Conference of Governmental Industrial Hygienists 2001). The maximum 24-hour concentration is nearly 100,000 times less than the 8-hour standard. In accordance with TNRCC guidelines, the highest 24-hour average concentrations can be converted to other averaging periods using the following scaling factors:

1-hour to 3-hour	0.9
1-hour to 8-hour	0.7
1-hour to 24-hour	0.4
1-hour to annual	0.08

Applying these scaling factors to the 24-hour selenium concentration of 0.0022 µg/m^3 would result in a predicted 8-hour maximum value of 0.0039 µg/m^3.

In the absence of ambient air quality standards for a particular substance, industrial standards such as the TWA Threshold Limit Value (TLV) often are scaled by a factor of 50 or 100 to provide a large margin of safety for public exposure to potentially hazardous substances. Adjusting the selenium TLV of 200 µg/m^3 by a factor of 100, the acceptable 8-hour public exposure limit would be 2 µg/m^3. This public exposure limit is nearly 500 times higher than the predicted maximum concentrations that would be produced by the mine at locations accessible to the public, indicating low human health risk due to selenium in fugitive dust at the proposed mine. ***Additional information relative to selenium is present in Section 3.14.1.2 of the Draft EIS.***

3.8.2.2 No Action Alternative

Under the No Action Alternative, air quality emissions would be limited to existing sources of fugitive dust in the area, such as paved and unpaved roads. Air emissions associated with the proposed Three Oaks Mine would not occur. Air emissions from Alcoa's aluminum smelter would be eliminated due to lack of fuel from the mine or other viable fuel source alternatives.

3.8.2.3 Alternative Mine Plan

Under the Alternative Mine Plan, potential impacts to air quality as a result of mine-related activities would be the same as described for the Proposed Action (see Section 3.8.2.1 of the Draft EIS).

3.8.3 Cumulative Impacts

Cumulative impacts to air quality would include impacts from the proposed Three Oaks Mine emission sources, such as gaseous pollutants and fugitive dust; impacts from nearby existing and proposed industrial or mining operations; and impacts from background emission sources (e.g., natural background from windblown dust and public traffic on paved and unpaved roads in the region).

Existing air emissions sources in the Bastrop, Lee, Milam, Travis, and Williamson Counties are shown in **Table 3.8-15**. The most recent emission inventory data available were for 1999.

Table 3.8-15
1999 Emission Inventory
Bastrop, Lee, Milam, Travis, and Williamson Counties
(tons per year)

County	PM_{10}	$PM_{2.5}$	NO_X	SO_2	VOC	CO	NH_3
Mobile, Non-road Mobile and Area Sources							
Bastrop	13,792	2,600	2,412	166	2,306	12,514	2,647
Lee	5,926	1,098	1,048	75	1,322	4,980	2,820
Milam	8,944	1,610	1,739	148	2,068	6,725	3,256
Travis	55,800	12,301	35,934	3,389	41,630	222,650	1,974
Williamson	28,003	5,554	10,241	992	9,212	52,975	2,952
Total	**112,465**	**23,163**	**51,374**	**4,770**	**56,538**	**299,841**	**13,649**
Point Sources							
Bastrop	4	4	2,342	6	93	536	35
Lee	0	0	767	0	195	624	0
Milam	2,389	1,495	25,157	80,100	1,550	21,246	4
Travis	224	149	3,169	208	412	1,439	48
Williamson	0	0	0	0	0	0	0
Total	**2,617**	**1,648**	**31,435**	**80,314**	**2,250**	**23,845**	**87**
Total Emissions							
Bastrop	13,796	2,604	4,754	172	2,399	13,050	2,682
Lee	5,926	1,098	1,815	75	1,517	5,604	2,820
Milam	11,333	3,104	26,896	80,248	3,619	27,970	3,260
Travis	56,025	12,450	39,100	3,597	42,042	224,089	2,022
Williamson	28,003	5,554	10,241	992	9,212	52,975	2,952
Total	**115,083**	**24,810**	**82,809**	**85,084**	**58,789**	**323,688**	**13,736**

Source: USEPA 1999.

importance in regional haze. The total PM_{10} emissions in these five counties amount to over 115,000 tons per year.

A breakdown of PM_{10} emissions by various sources is provided as **Table 3.8-16**. The two largest sources of PM_{10} emissions are fugitive dust and agriculture. These two sources account for over ~~93~~ ***92*** percent of all PM emissions.

Cumulative impacts from existing operations are reflected in the existing measured particulate levels near the Sandow Mine (see **Tables 3.8-10** and **3.8-11**). Fugitive dust impacts from the existing Sandow Mine operations would diminish as the operations there are phased out.

As previously described, fugitive dust impacts from mining operations tend to be localized in the vicinity of the source. The spatial extent of impacts is therefore limited. For the Three Oaks Mine, the maximum spatial extent of annual PM_{10} impacts greater than 1 $\mu g/m^3$ and 24-hour impacts greater than 5 $\mu g/m^3$ is estimated to be less than 7 kilometers from the mine boundary. Highest annual and 24-hour concentrations would occur near the northwestern boundary of the facility. Annual and 24-hour incremental concentrations to the south of the mine are less than 1 $\mu g/m^3$ and 5 $\mu g/m^3$, respectively. Other nearby industrial operations would

three other electrical generating units at Alcoa's Rockdale operations are owned and operated by Alcoa. These units (1, 2, and 3) are older units (built in the 1950s) that are less efficient at removing pollutants than Unit 4. Alcoa is currently upgrading the units, as described below. Alcoa's existing Rockdale operations near the existing Sandow Mine currently have an ongoing program for monitoring SO_2 concentrations at the existing facilities. Monitoring is expected to continue for ambient concentrations of SO_2 as well as meteorology (TNRCC 1995).

To reduce particulate emissions from Units 1, 2, and 3, Alcoa has installed electrostatic precipitators on each of the units. To reduce NO_x, an ozone precursor, Alcoa has applied for air permits under a TNRCC Agreed Order to install NO_x reduction equipment to reduce NO_x emissions from each of the units by 50 percent by the end of 2002. One unit was completed in the summer of 2000, and the other two units ~~are scheduled to~~ receive***d*** the equipment in ***late*** 2002.

To reduce acid gases, including SO_2, from the three units, Alcoa may need to install additional pollution control equipment to meet possible new federal MACT standards for industrial boilers. Alcoa's VERP application includes SO_2 reductions. The decision to upgrade the boilers or shut them down would be made by Alcoa by the year 200***7***~~5~~ (Hodges 200***3***~~1~~).

The combustion of fuel in vehicles and heavy equipment generates emissions of NO_x, CO, SO_2, and VOCs. Emissions for the Three Oaks Mine are shown in **Table 3.8-9**. However, due to the rural nature of the region around the permit area and the low density of combustion sources (e.g., vehicles and other fuel-fired equipment), levels of gaseous air contaminants associated with the Three Oaks Mine are anticipated to remain well below levels determined to be detrimental to public health. The Three Oaks Mine would have minor incremental impact since the mine sources are located several miles away from the power plants and smelter operations which are the dominant sources in the region (see **Table 3.8-15**).

3.8.4 Monitoring and Mitigation Measures

Alcoa proposes measures to reduce dust emissions on haul roads, mining and crushing equipment, and the conveyor. The USACE is considering the following additional mitigation for air quality.

AQ-1: Haul Road Construction ***Monitoring***. To reduce the offsite impact of particulate emissions from the haul road near the northwest boundary of the permit area, Alcoa may construct protective berms in select locations and gravel the haul road. ~~Alternately, Alcoa may move the haul road farther east away from the proposed mine boundary or move the permit boundary farther west away from the road.~~ This mitigation is based on the results of Alcoa's air dispersion modeling.

3.8.5 Residual Adverse Effects

Some air quality impacts are unavoidable due to the nature of the proposed mine operations. The primary air quality effects would be increases in TSP and PM_{10} concentrations in the immediate vicinity of the mine. Adverse effects would be limited spatially to distances up to approximately 7 kilometers (4 miles) from the active mine disturbance. By supplementing natural rainfall with watering roads and stockpiles and other

3.9 Land Use and Recreation

Issues associated with land use and recreation include changes to and conflicts with existing land uses, and effects to environmental resources associated with recreation areas and opportunities.

3.9.1 Affected Environment

The land use study area comprises the permit area and nearby properties within approximately 2 to 5 miles of the permit area. This study area is the same for both direct and cumulative effects, although it is possible that projects outside of the area may affect the study area in a cumulative manner. The recreation study area is more complex; direct effects primarily would be limited to the same study area as for land use; however, potential population changes may drive indirect effects on public recreational facilities in surrounding communities and throughout Bastrop, Lee, and Milam Counties. This broader three-county area also is examined for cumulative recreation effects.

3.9.1.1 Land Use

The Three Oaks Mine permit area contains approximately 16,062 acres. CPS, the San Antonio public utility company, owns 9,911 acres and controls an additional 1,721 acres of the permit area. Alcoa owns 2,855 acres in the permit area and controls an additional 548 acres through leases. There also are a number of private owners of smaller parcels within the area (**Figure 3.9-1**). The CPS land is the only publicly owned land in the permit area.

The study area is a Post Oak Savannah landscape typical of much of the surrounding region. Much of the area is pastureland, with several sizable wooded areas and wooded drainage bottoms. Nearly all of the CPS land is leased for cattle grazing (Friesenhahn 2001). There is very little cultivated cropland in the study area, although some hay is harvested. CPS limits sale of hay from its leases to 50 percent of the production; the rest must be retained for use by the lessee (Friesenhahn 2001). Development is sparse with only 125 residences in, and within 1,000 feet of, the permit area (see **Figure 3.12-1**). Most of the residences are in clusters just outside of the permit area; only nine are located within the mine area. There is a small amount of non-agricultural commercial or industrial development in the permit area, comprised mainly of utility corridors for pipelines and major electric transmission lines. There also are two brick manufacturing plants just outside of the permit area at the southwest corner of the study area. Other land uses include a few churches and a private camp at the Star Ranch.

The ***existing*** land uses in the permit area are illustrated in **Table 3.9-1** ***and Figure 3.9-2***. The categories in the table ***and figure*** are as defined by the RRC***, except for unmanaged wildlife habitat, which corresponds to the RRC's undeveloped category*** (see Section 2.5.3.9). ***The name of this existing use category has been changed to simplify comparison to the post-mining managed fish and wildlife habitat land use category.*** Generally, pastureland is distinguished from grazing land by the dominant forage plant species, with pastureland dominated by introduced species and grazing land dominated by native species. ~~Undeveloped~~ ***Unmanaged wildlife habitat*** land is that which has not been previously developed or which has been allowed to return naturally to an undeveloped state through natural ***succession and*** ~~land~~ is primarily woodlands with some grasslands or shrublands that have not been actively managed in recent years. The ~~undeveloped~~ ***unmanaged wildlife habitat*** grasslands and shrublands have

Table 3.9-1
Three Oaks Mine Permit Area Existing Land Use

Land Use Category[1]	Proposed Disturbance Area		Total Permit Area	
	Acres	Percent	Acres	Percent
Pastureland	3,199.8	37.0	6,488.5	40.4
Grazing Land	982.6	11.4	2,031.0	12.6
Cropland	6.0	0.1	95.0	0.6
Wildlife Habitat Managed	0.0	0.0	0.0	0.0
Wildlife Habitat Unmanaged	4,188.8	48.4	6,930.7	43.1
Industrial/Commercial	159.0	10.8	234.6	1.5
Developed Water Resources	77.1	0.9	167.0	1.0
Residential	34.9	0.4	115.2	0.7
Total	8,648.0	100.0	16,062.0	99.9

[1]As defined by the RRC, except for managed and unmanaged wildlife habitat.

Source: Alcoa 2001 (Volume 3); Hodges 2003.

mesquite, eastern red cedar, and invasive weed species. As indicated in the table, the permit area is essentially entirely rural, whereas Lee and Bastrop Counties are both approximately 96 percent rural in character.

The nearest residential communities are at the southern end of the study area. Butler, a community of a few dozen people, is approximately 1 mile west of the permit area on the north side of U.S. Highway 290.

McDade, with approximately 345 residents, is a similar distance east of the permit area, also on the north side of U.S. Highway 290. Larger communities providing regional shopping and services to the area include Elgin (population 4,846) 4 miles to the west, Giddings (population 5,105) 20 miles to the east, Bastrop (population 4,044) 11 miles south of the permit area, and Rockdale (population 5,439) just north of the existing Sandow Mine. The nearest major city is Austin, approximately 25 miles west of the permit area.

There are several transportation and utility corridors crossing the study area (see **Figures 2-5, 2-6,** and **2-7** and **Tables 2-7** and **2-8**). The Union Pacific Southern Pacific Railroad parallels the southern border of the permit area for 1.25 miles. The existing roads and proposed road relocations are addressed in Section 3.11. There are two major pipelines crossing the area, a 20-inch TUFCO gas line and two 14–inch Seminole gas lines. There is a 138-kV LCRA electric transmission line; a 14.4-kV Bluebonnet power line; and several Aqua Water Supply Corporation water lines, as well as local service fiber optic, phone, and electric lines.

Current land use in the study area has changed very little from historical patterns (Alcoa 2000 [Volume 6]). Underground mining for lignite once took place in portions of the permit area, but these operations are no longer active. Clay mining is still active nearby, but is not being conducted in the permit area. The surrounding area remains predominantly rural with only slight increases in urban development in Bastrop and Lee Counties (Alcoa 2000 [Volume 6]) .

Williamson County
Lee County
CR 304
CR 306
CR 309
CR 306
FM 619
CR 304
TO 37
Proposed Disturbance Area
TO 86
CR 307
Lee County
Bastrop County
CR 303
FM 696
FM 619
Three Oaks Permit Area
CR 89
CR 90
TO 85
CR 305
CR 311
CR 304
CR 102
FM 696
TO 130
CR 129
CR 102
TO 150
Big Sandy Creek
CR 125
CR 126
CR 104
TO 165
CR 103
CR 99
CR 333
McDade

3.9-3

CPS and Alcoa Land Ownership / Control Map

Figure 3.9-1

Three Oaks Mine

Legend

- Alcoa Owned
- Alcoa Jointly Owned
- Alcoa Leased
- CPS Owned
- CPS Leased
- Not Controlled by Alcoa or CPS

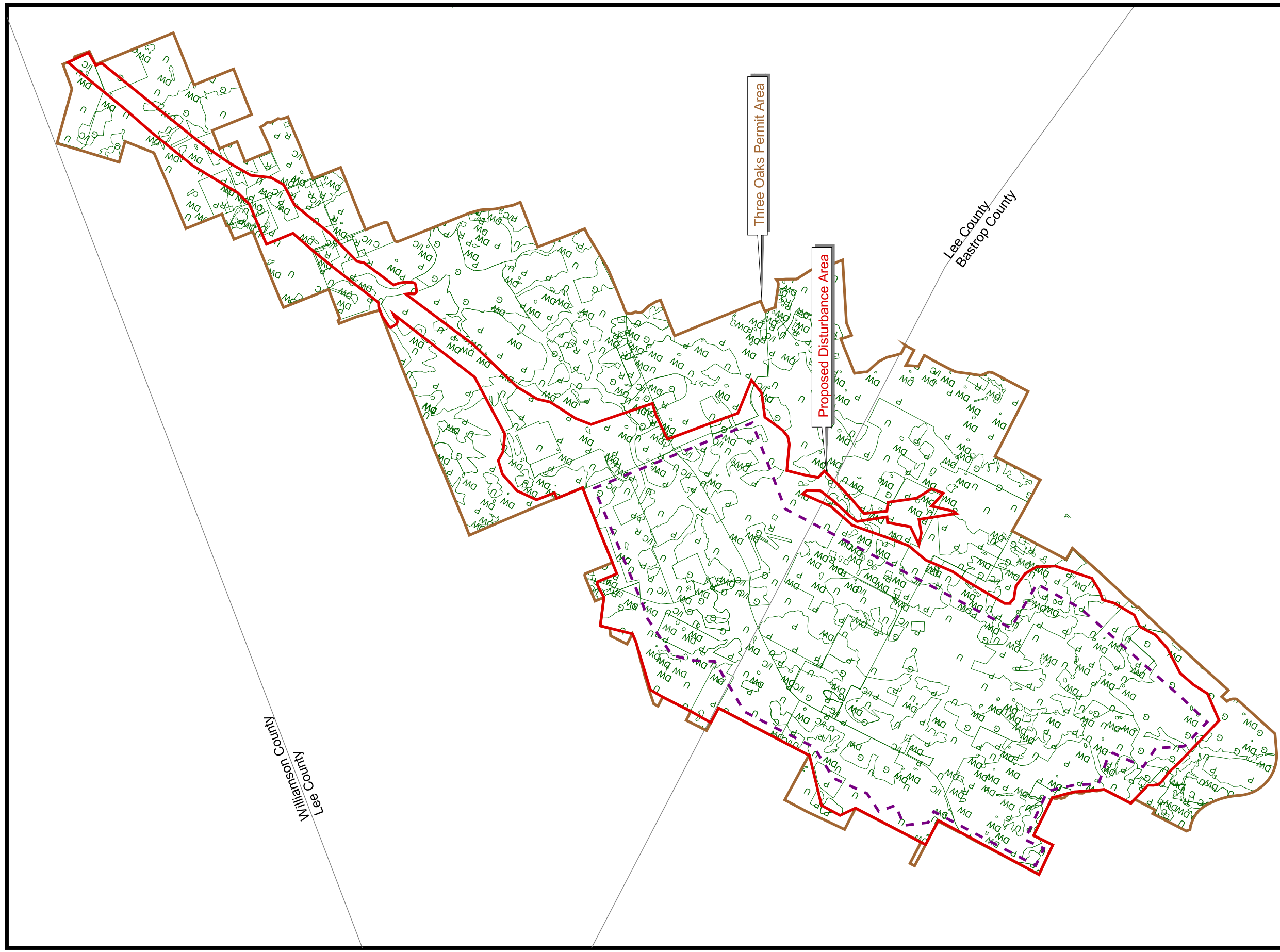
Source: Adapted from Alcoa 2001c.

Figure revision: Revised disturbance area for transportation and utility corridor crossing of Middle Yegua Creek; updated ownership status.

N

0 2000 4000 Feet

2/26/03



Legend

- C Cropland
- DW Developed Water Resources
- G Grazing Land
- I/C Industrial/Commercial
- P Pastureland
- U Wildlife Habitat Unmanaged
- R Residential

Source: Alcoa 2000 (Volume 6).

Three Oaks Mine

Figure 3.9-2

Existing Land Use

3/24/03

development, but the nearest affected area is the extraterritorial jurisdiction area of Elgin, 3 miles west of the permit area.

Recreation

There are no public parks or recreation areas in or near the permit area. Recreation in the area is limited to private activities on private lands; there may be some private hunting, horseback riding, and similar activities. The Star Ranch provides some recreation for members only.

The nearest public recreation areas are the Lake Bastrop Recreation Area, Bastrop State Park, and Buescher State Park, all in the Bastrop vicinity. The state parks have camping facilities, and all three facilities provide a range of water-based recreation.

Bastrop County has developed a Parks, Recreation, and Open Space Master Plan to qualify for grants in an effort to meet identified recreation needs, particularly for youth in the county.

There are no wilderness areas, wild and scenic rivers, or other specially designated recreation or open space facilities in the permit area or vicinity.

3.9.2 Environmental Consequences

3.9.2.1 Proposed Action

Land Use

Approximately 8,654 acres would be disturbed under the Proposed Action over the 25-year life of the project (see **Table 2-5**). Nearly three-fourths of the total (6,466 acres) would be for the mine area itself. However, only approximately 640 acres would be actively disturbed by mining and associated activities at any one time due to sequential backfilling of the pits and concurrent reclamation (see Section 2.5).

Public use of the land in the permit area would not be affected, as the only public land (CPS ownership) is currently not open for public use, and the remainder of the land is currently privately owned and controlled. Use of private land would be curtailed in the mine disturbance area for the life of the mine with compensation paid to current owners through lease agreements. Existing land uses in all disturbance areas would be modified for the life of the mine. ***Of the 8,654 acres of disturbance, 5,172 acres would be in Bastrop County, and 3,482 acres would be in Lee County.*** The 8,654 acres of disturbance of mostly rural land uses represent approximately 0.8 percent of the 1,048,100 total acres in Bastrop and Lee Counties. The resulting changes in land use patterns would continue for the life of the mine.

No data are available on current agricultural production from the permit area. However, combined pastureland and grazing land acreage of the permit area is approximately 1.2 percent of the total Bastrop and Lee Counties' acreage in the same categories, and cropland in the permit area represents approximately 0.1 percent of the two-county total cropland. Assuming that land uses in the disturbance area are distributed approximately the same as in the permit area, and that productivity of the land is average for

the two-county area, approximately 0.6 percent of livestock production and 0.03 percent of crop production in the two counties would be lost as a result of Three Oaks Mine development.

Existing roads and utility lines in the disturbance area would be relocated (see **Figures 2-5, 2-6,** and **2-7** and **Tables 2-7** and **2-8**) as part of the Proposed Action. Utility lines would remain in service throughout the life of the mine except for brief periods during construction when the relocated lines would be connected into existing lines. All utility relocation activities would be coordinated with the owners of the lines. Proposed road relocations are addressed in Section 3.11.2.

It is expected that the proposed development and operation of the Three Oaks Mine would result in some conflict with other nearby land uses, primarily residences within approximately 1,000 feet of the disturbance area. Some landowners may experience impacts to their wells due to groundwater drawdown, as discussed in Section 3.2.3. Conflicts may result from noise and light generated by the mine, especially during nighttime hours. These issues are addressed in more detail in Section 3.12.2. Traffic also would increase slightly on area roads, but the effects are expected to be minor (see Section 3.11.2).

Subsequent to closure of the Three Oaks Mine and completion of final reclamation, most of the post-mining land use in the disturbance area would be devoted to ***managed*** ~~fish and~~ wildlife habitat (~~4,520~~ ***4,550*** acres); the second major category would be pastureland (~~3,031~~ ***2,996*** acres) ***(see Table 3.9-2)***. ***Managed wildlife habitat would differ from the pre-mining unmanaged wildlife habitat category in that it would be designed and actively managed through bond release to provide quality wildlife habitat. Grazing land, as defined by RRC, would no longer exist in the mine area.*** Industrial/commercial and residential areas would be substantially reduced from existing levels, although they currently represent only a small fraction of the area. The relocation of utility lines outside of the disturbance area would account for most of the reduction in post-mine industrial/commercial land. Cropland ***would be increased, but would remain less than 1 percent of the disturbance area*** ~~would be returned to approximately the same acreage as existing cropland acreage~~. Development of surface water features, designated as ***"developed*** water resources" by the RRC, would result in a net increase of approximately ~~825~~ ***817*** acres within the mine area alone.

Table 3.9-2
Three Oaks Mine Permit Area Post-mine Land Use

Land Use Category[1]	Proposed Disturbance Area		Total Permit Area	
	Acres	Percent	Acres	Percent
Pastureland	2,995.7	34.6	6,284.4	39.1
Grazing Land	0.0	0.0	1,048.4	6.5
Cropland	70.0	0.8	159.0	1.0
Wildlife Habitat Managed	4,549.9	52.6	4,549.9	28.3
Wildlife Habitat Unmanaged	13.7	0.2	2,755.6	17.2
Industrial/Commercial	123.2	1.4	198.9	1.2
Developed Water Resources	894.5	10.3	984.5	6.1
Residential	1.0	<0.1	81.3	0.5
Total	8,648.0	99.9	16,062.0	99.9

[1]*As defined by the RRC, except for managed and unmanaged wildlife habitat. See text.*

Source: Hodges 2003.

Effects on occupied uncontrolled properties (T085 and T0130 in Figure 3.9-1 of the Final EIS) within the mine disturbance area would be essentially the same as those described in Section 3.9.2.1 of the Draft EIS for residences within 1,000 feet of the disturbance area. Effects on unoccupied uncontrolled properties would vary with their locations. Such properties in the disturbance area could experience some accessibility changes, but mining would have little effect on current use as a result of adjusting the mine plan. Unoccupied properties in the permit area, but not within the disturbance area, would experience minimal, if any, effects. Conflicts with existing uses near the mine area extensions that would be needed to compensate for the lost tonnage from the uncontrolled properties would depend on exact locations chosen for mining; however, there are few residences or other sensitive land uses in or near lands controlled by Alcoa in the downdip area at the southeastern part of the permit area, so effects likely would be minor. There would be some changes to post-mine land use patterns and acreages, but they would be minor. (See page 2-21 of the Final EIS relative to uncontrolled properties.)

Recreation

The proposed project would cause minimal effects on recreation resources. There are currently no public recreation facilities in the permit area. The small amount of private recreation that now occurs would be precluded from the disturbance area for the life of the mine for safety and security reasons. This recreation activity (e.g., hunting and horseback riding, etc.) would be displaced to other public or private lands in the area; however, it would be of very small scale and would have minimal effects on recreation resources in the region. Potential water resources, vegetation, and wildlife impacts are discussed in Sections 3.2.3, 3.4.2, and 3.5.2, respectively.

The operating work force for the Three Oaks Mine would be transferred from the existing Sandow Mine. As a result, it would not generate new population-related demand for recreation facilities. Over a period of time, however, there may be some movement of the work-force-related population southward, closer to the Three Oaks Mine. This may cause a commensurate shift in recreation demand from Milam County toward Lee and Bastrop Counties; however, it is anticipated that the effect would be minimal. The construction work force would be provided primarily by contractors from the region and would, thus, be unlikely to affect population levels or recreation needs.

Adjusting the mine plan for currently uncontrolled properties (see page 2-21 of the Final EIS) would have few, if any, differential effects on recreation resources in the study area. Depending on the location of mine area extensions needed to compensate for lost tonnage, mining may occur closer to the Star Ranch, which would increase the effects on that facility from noise and night lighting.

3.9.2.2 No Action Alternative

Under the No Action Alternative, there would be no mine-related changes to existing land uses or recreation activities in the permit area. The No Action Alternative would likely result in closure of the aluminum smelter at Rockdale and reduction in the scale of industrial activity there. However, continuing operation of the power plants would maintain the industrial character of the land use at that site. Jobs lost from closure of the Sandow Mine and the smelter could lead to a population decline, primarily in the Rockdale area, which would result in a reduction in urban growth pressure and a reduction in demand for recreation facilities and activities.

3.9.2.3 Alternative Mine Plan

The effects on land use and recreation resources from implementation of the Alternative Mine Plan for the Three Oaks Mine would be essentially the same as those identified in Section 3.9.2.1 of the Draft EIS for the Proposed Action. The only difference would be that instead of mining activity moving consistently away from the northwest edge of the permit area, it would return to the perimeter briefly in project year 4 to mine the lignite under the FM 619 corridor.

3.9.3 Cumulative Impacts

The land use and recreation effects of past and present actions in the study area are described in Section 3.9.1, Affected Environment. Consequently, the cumulative impacts of these activities and the Three Oaks Mine are addressed under the Proposed Action. Effects of the mine, when added to future actions, are addressed below.

Closure and reclamation at the Sandow Mine will result in reversion of most of the remaining mine disturbance area there to rural uses, primarily improved pastures ***(see Table 3.9-3 of the Final EIS)***. This will offset to some degree the conversion of existing land uses at the Three Oaks Mine site to mining uses ***during the active life of the mine***, although the Sandow disturbance area is over 6 miles from the proposed disturbance area. ***After completion of mining and reclamation at the Three Oaks Mine, through the bonding period, the land use changes at Three Oaks would combine with the changes at Sandow for a cumulative increase in managed fish and wildlife habitat.***

Table 3.9-3
Sandow Mine Permit Area Land Use

Land Use Category[1]	Pre-mine		Post-mine	
	Acres	Percent	Acres	Percent
Pastureland	4,871	32.2	12,180	80.6
Grazing Land	6,776	44.9	0	0.0
Cropland	109	0.7	0	0.0
Fish and Wildlife Habitat[2]	1,656	11.0	2,151	14.2
Industrial/Commercial	1,537	10.2	30	0.2
Developed Water Resources	158	1.0	747	4.9
Residential	1	<0.1	0	0.0
Total	15,108	100.0	15,108	99.9

[1] *As defined by the RRC, except for fish and wildlife habitat (see Section 3.9.1.1 of the Draft EIS).*
[2] *Unmanaged prior to mining; managed subsequent to mining.*

Source: Hodges 2002d.

Texas' statewide population is expected to increase by over 50 percent between 2000 and 2030, as shown in **Table 3.10-2**. The three counties' combined population is expected to outpace the statewide growth rate over the same time span, with Bastrop County forecasted to be responsible for most of this growth.

Table 3.10-2
Projected Population Levels from 2000 to 2030

County	Actual		Projected		
	1990	2000	2010	2020	2030
Bastrop	38,263	57,733	***76,265***~~79,326~~	***99,172***~~106,507~~	***125,339*** ~~135,063~~
Lee	12,854	15,657	***18,071***~~17,771~~	***20,837***~~20,047~~	***23,014***~~21,933~~
Milam	22,946	24,238	***25,885***~~24,007~~	***27,523***~~23,873~~	***28,488***~~23,300~~
County Totals	74,063	97,628	***120,221*** ~~121,104~~	***147,532*** ~~150,427~~	***176,841*** ~~180,296~~
Statewide	**16,986,335**	**20,851,820**	***24,395,179*** ~~**23,888,830**~~	***27,917,492*** ~~**27,411,952**~~	***31,197,014*** ~~**31,346,172**~~

Sources: Texas Comptroller of Public Accounts~~ 1998.~~ ***2002; U.S. Census Bureau 2001.***

Bastrop County is projected to continue its relatively high population growth rate of the past two decades into the future, growing by ~~134~~ ***117*** percent from the year 2000 to 2030. Lee County's population is projected to continue its expansion, increasing by ~~40~~ ***47*** percent from 2000 to 2030, while Milam County's population is expected to ~~decline slightly~~ ***grow by a much lower 17.5 percent*** over the same time frame.

3.10.1.2 Employment

The size of a county's labor force is measured as the total number of people currently employed and the number actively seeking employment. Bastrop County has experienced significant growth in the size of its labor force, growing by 56.3 percent from an average monthly size of 18,510 in 1990 to 28,923 in the first 8 months of 2000 (**Table 3.10-3**). This dramatically surpassed the statewide growth of 20.4 percent over the same time. Lee County experienced growth of 19.9 percent, while Milam County's labor force was essentially unchanged, declining by 1.3 percent during the 10-year period.

In addition to experiencing relatively low unemployment and significant labor force growth since 1990, Bastrop County also has experienced growth in its labor force participation rate. This rate is the percentage of the total population in the county that is involved in the active labor force; thus, it provides a measure of the share of the total population that are either job holders or job seekers. **Table 3.10-4** illustrates the labor force participation rate for the three counties and for the State of Texas for the years 1990, 1994, and 1997. Bastrop County experienced a substantial increase from 1990 to 1997, with 4.5 percent more of the population joining the labor force in 1997 than in 1990. Lee County's rate matched Bastrop's in 1994, but dropped back from 1994 to 1997. Milam County's rate was steady from 1990 to 1994, but slipped lower by 1997.

underlying property values and would remain approximately the same until completion of the Three Oaks Mine conveyor system (partially in the district) would cause them to increase again.

Closure of the Sandow Mine would reduce tax revenues for Milam County and Rockdale ISDs as lignite production ceased in the districts and equipment was moved to the Three Oaks Mine. The net tax revenue reduction for Milam County would be expected to exceed $98,000 per year (estimated as an average since tax revenues have varied annually) (Jones 2002). There likely would be no corresponding reduction in demand for services as little or no population shift would be expected due to transfer of employees to the Three Oaks Mine. Although the school district would experience reductions in property tax revenues, it is expected that the reduction would be offset by an increase in state financial support to the schools.

Adjusting the mine plan for currently uncontrolled properties (see page 2-21 of the Final EIS) may result in minor effects on property tax revenues with changes in location and depth of mining, but the tax-benefited jurisdictions are not likely to change.

Public Education and Housing

As noted above, no substantive population change would be expected from development of the Three Oaks Mine. As a result, there would be little or no change expected in the number of school children in any of the school districts in the study area. Similarly, there would be very little, if any, change in housing needs in the study area.

Property Values

The effects of the Three Oaks Mine on property values in the study area would vary over time. In the short term, it would be expected that residential property in close enough proximity to mining activity to see the disturbance area and hear the heavy equipment noise would be in less demand and therefore would experience a temporary decline in value. It would not be expected that there would be any effect on ranch land or farm property. As mining activity moves farther away from a given residential property and vegetation becomes re-established as part of the reclamation process, it would be expected that property demand and values would return to essentially the same levels as similar properties in the surrounding region. ***In this context, the short-term timeframe refers to the time period from the beginning of clearing and grubbing on a particular parcel of land until approximately 2 years into the reclamation process, when, at minimum, ground cover vegetation has been established. The anticipated rebound of property values would be expected to occur when the heavy equipment associated with all but the reclamation phase of the mine would have moved onto a new mine block farther from the residential property where it would be less visible and less audible.***

In the long term, the mine would be expected to have no effect or potentially could result in a modest increase in values, as much of the mine disturbance area would ***remain as*** open space following the completion of mining ***through bond release***. This estimate of long-term retention of property values is supported by a statistical study of property values near the Sandow Mine by Scout Land Services, which concluded that there was no relationship between property values and proximity to the mine (Fry 2001).

Adjusting the mine plan for currently uncontrolled properties (see page 2-21 of the Final EIS) would adversely affect the property values of the occupied uncontrolled properties within the eastern portion of the mine disturbance area (parcels T085 and T0130 as shown in Figure 3.9-1 of the Final EIS); see the response to general comment SE-3 in Section 4.5.10 of the Final EIS. The jointly owned property near the transportation/utility corridor and the uncontrolled properties on the eastern and southern edges of the mine disturbance area (parcels T037, T0150, and T0165, respectively, as shown in Figure 3.9-1) would experience little, if any, effect on property values because they are either unoccupied or the residential areas are located at a substantial distance from the proposed disturbance areas. The extension of mining beyond the proposed mine area would extend potential property value effects noted above farther to the southeast in the latter years of the mine life, although the extent of the effects cannot be determined until specific areas for mine extension are identified.

The Alcoa smelter is a dominant factor in the manufacturing sector of the Milam, Lee, and Bastrop three-county area, accounting for almost 3.5 percent of the total 1997 employment in the three counties together (15.7 percent of Milam County's total). Closure of the Sandow Mine and smelter would cause substantial changes in the local economy. Approximately $250 million of annual expenditures and 1,400 jobs are currently attributable to the aluminum smelter. Lignite mining activities at the Sandow Mine currently add $72,292,000 in expenditures and 210 jobs. This total of $322 million annual expenditures and 1,610 jobs represents the potential direct losses to the area economy from closure of both the Sandow Mine and the aluminum smelter (Jones 2002).

In addition to the direct losses, there would be indirect and induced economic losses, which, together with the direct losses, would total an estimated $587 million annually and 3,276 jobs (Jones 2002). The job loss would equal approximately 8 percent of the total employment in Milam, Lee, and Bastrop Counties, which would raise the three-county unemployment rate to approximately 9.5 percent from the 2.8 percent level in 2000. Over two-thirds of the Sandow Mine workers live in Milam County. Assuming smelter workers follow a similar residential pattern, the direct losses would raise the number of unemployed in Milam County to 1,963 workers, almost 21 percent of the county labor force.

Closure of the Sandow Mine and smelter would lead to a loss of income for the three-county area estimated at almost $129 million annually (Jones 2002).

Due to the substantial loss of jobs and income in the study area, it is expected that closure of the Sandow Mine and aluminum smelter likely would lead to a large number of people leaving the area (especially in Milam County) in search of jobs. This also could result in a decline in property values with a substantial number of homes and apartments being put on the market; it is not possible to quantify the magnitude of this effect. Assuming a decline in property values would occur, county property tax revenues also would decline.

The social and economic impacts (including beneficial impacts) associated with the Proposed Action are described in Section 3.10.2.1. Under the No Action Alternative, these impacts would not occur, further compounding the effects associated with the closure of the Sandow Mine and aluminum smelter at Rockdale, as described above.

3.10.2.3 Alternative Mine Plan

Potential effects of the Alternative Mine Plan on social and economic resources would be essentially the same as those identified in Section 3.10.2.1 of the Draft EIS for the Proposed Action. Employment and income, the causative roots of social and economic effects, would be the same for the Alternative Mine Plan as for the Proposed Action.

3.10.3 Cumulative Impacts

Effects of the past and present actions are included in the existing social and economic values environment for the study area (Section 3.10.1). Consequently, the cumulative effects of these activities and the Three Oaks Mine are addressed in Section 3.10.2.1 under the Proposed Action.

phase. Motorists crossing the mine area on CR 102 would experience no change in travel distance during the first phase of operations.

The proposed permanent road reroutes would reduce the trip distance for motorists connecting from FM 619 to FM 696 westbound by 0.5 mile and eastbound by 1.1 mile. Travelers from CR 90/89 to westbound on FM 696 would have a 0.5-mile shorter route; those eastbound would have a 0.3-mile longer trip. Through-trips on FM 696 would increase by 0.5 mile. All trips utilizing FM 696 would likely benefit from increased travel speeds as a result of the physical improvements to the roadway.

Trips through the mine area on CR 102 would increase in distance by 0.5 to 1.0 mile as the road would be moved in stages from its current location to a new alignment on reclaimed land farther to the south. The relocation would occur in approximately 0.5-mile segments as each mine block was completed and new ROW on reclaimed land became available. The increase in travel distance would be partially offset by improvements in the quality of the roadway, including a wider cross-section and an improved travel surface. Trips from lower CR 102 to eastbound FM 696 would be reduced by approximately 1.0 mile as the new extension of CR 101 would provide a shorter route on a new and improved road alignment.

In the latter stages of the Three Oaks Mine, CR 304 would be rerouted a short distance to the northeast to avoid the new cut slopes at the northeast edge of the mine area. The change in length of the road and resulting travel time would be minor and would be offset by roadway improvements as noted above for CR 102.

Construction of the Three Oaks to Sandow transportation and utility corridor would cause temporary construction delays on Lee County roads CR 304, CR 306, and CR 312. The delays would be brief, and the roads would remain open. There would be no transportation impacts following installation of the corridor grade separators.

Adjusting the mine plan for currently uncontrolled properties (see page 2-21 of the Final EIS) would require adjustments of road relocation plans to ensure continued access to the occupied properties (T085 and T0130 in Figure 3.9-1 of the Final EIS). The required changes would not be expected to adversely affect safety. There may be minor changes to travel times and distances for some motorists to accommodate the changes.

3.11.2.2 No Action Alternative

The No Action Alternative would result in no identified project-related impacts on transportation in the study area. Traffic volumes would not be affected, and there would be no Three Oaks Mine-related changes to the roads in the area, including the physical improvements to FM 696. The No Action Alternative would include closure of the aluminum smelter at Rockdale. This would result in a minor reduction in traffic levels on roads that currently provide access to the smelter and the Sandow Mine.

3.11.2.3 Alternative Mine Plan

Implementation of the Alternative Mine Plan would alter the timing of transportation effects from the proposed Three Oaks Mine, but would result in only minor changes to the effects themselves. In particular, roadway reroutes would occur 1 to 3 years later than planned under the Proposed Action. The effects mainly would be the same, however, as those identified for the Proposed Action in Section 3.11.2.1 of the Draft EIS. Traffic generation would not change. Changes in travel distances and travel times ultimately would be the same, just delayed. It would be expected that delaying roadway improvements without delaying traffic generation related to the Three Oaks Mine would degrade highway safety conditions slightly until the roadway improvements were accomplished.

3.12 Noise and Visual Resources

Noise and visual resource issues relate to potential impacts from the proposed mine and ancillary facilities on sensitive human receptors in proximity to the proposed project. Potential impacts to other resources are addressed in wildlife (Section 3.5.2) and air quality (Section 3.8.2).

3.12.1 Affected Environment

3.12.1.1 Noise

The study area for potential direct noise effects from the Three Oaks Mine encompasses areas within 3 to 5 miles of the permit area. Noise effects from other land uses may cumulatively affect noise-sensitive receptors in the same area; generally this may include projects up to another 5 miles away, or a total of 8 to 10 miles from the permit area, depending on the nature of the project or activity.

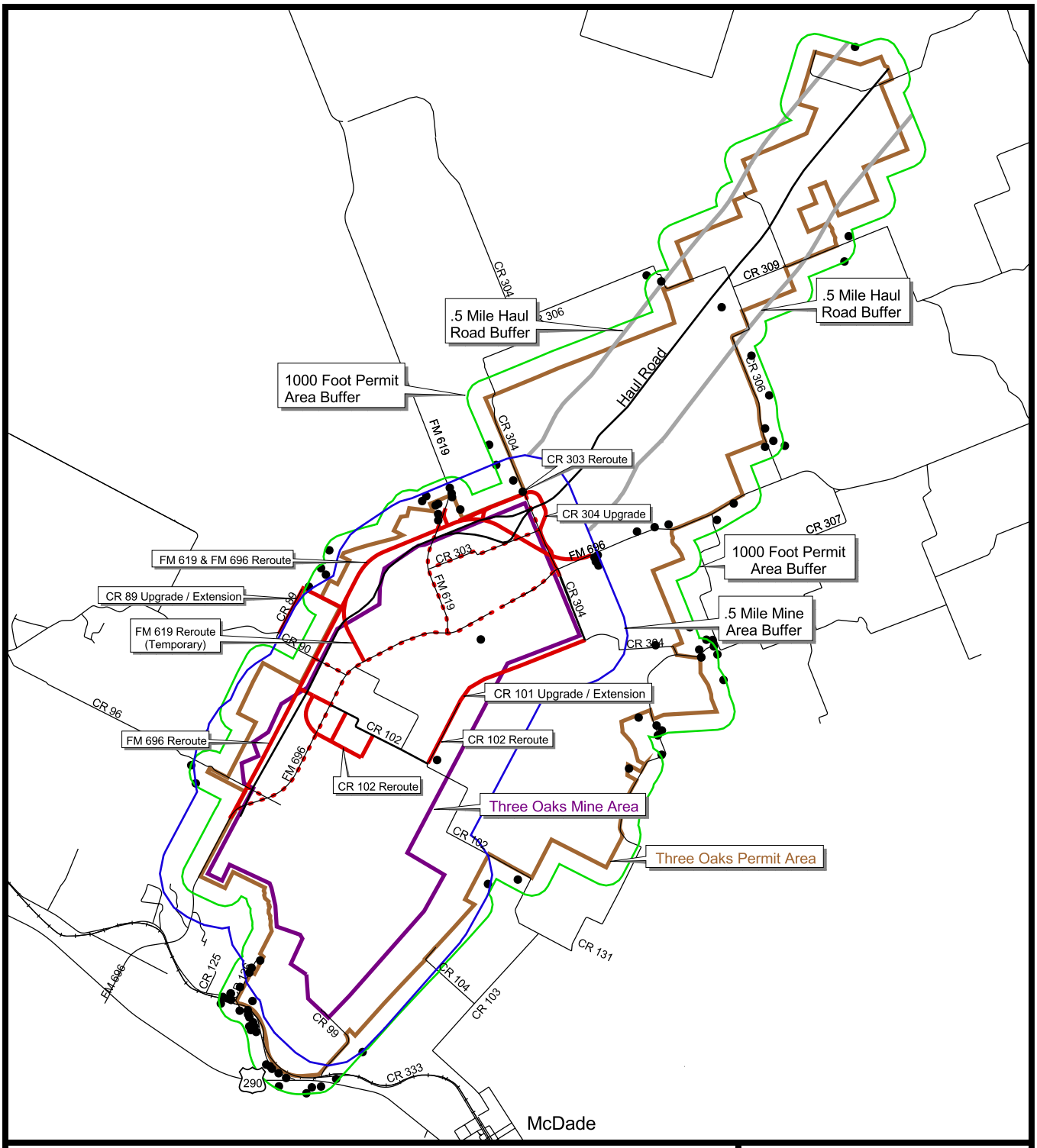
Describing the environment potentially affected by noise involves identifying noise-sensitive receptors and existing noise sources in the vicinity, characterizing terrain features that may affect noise transmission, and determining existing noise levels.

A baseline noise assessment was developed for the permit area using existing data for the region combined with sound measurements taken at selected receptors (Zephyr 2000). The resulting noise levels were compared with estimates prepared using USEPA, HUD, and FHWA techniques for selected areas.

Both HUD and USEPA consider average outdoor noise levels in excess of 65 decibels on the A-weighted scale (dBA) to be "normally unacceptable" for residential areas and other noise-sensitive land uses. Generally, all of the areas evaluated in and around the permit area are below that standard, with the possible exception of the U.S. Highway 290 corridor, where noise is dominated by high-speed traffic.

Noise-sensitive receptors in the study area are predominantly residences ***and a Seventh Day Adventist Church School***. There are approximately 125 residences within 1,000 feet of the mine permit area. Of those, the most sensitive are those closest to proposed high activity areas: 33 residences within 0.5 mile of the proposed mine disturbance area (9 of which are within the proposed disturbance area and would be ~~removed~~***vacated***), and an additional 11 residences within 0.5 mile of the proposed Three Oaks-to-Sandow haul road (see **Figure 3.12-1**). ***The church school is approximately at the 0.5-mile distance on CR 126 near the southern end of the permit area and would be included in the highest sensitivity group of receptors.***

The principal existing sources of noise in the study area are transportation corridors and the higher level of general human activity associated with population clusters in the communities of Butler and McDade. The most dominant source of noise is U.S. Highway 290, which carries an average of 13,416 vehicle trips per day (TxDOT 2000). Noise from U.S. Highway 290 traffic is perceivable as a background "drone" from as far as 2 miles away (Zephyr 2000). FM 696 carries 2,576 vehicle trips per day (TxDOT 2000), but at this level, traffic and the resultant noise are intermittent. Noise from other roads in the permit area is minor and sporadic due to much lower traffic volumes. Away from the human activity areas, noise emanates mainly from aircraft and from natural sounds, including wind, insects, birds, and domestic animals.



Legend

- Existing Roads (to be relocated)
- Road Relocations
- Residence
- .5 Mile Mine Area Buffer
- .5 Mile Haul Road Buffer
- 1000 Foot Permit Area Buffer

Source: Adapted from Alcoa 2001c.

Figure revision: Revised legend.

N

0 2000 4000 Feet

Three Oaks Mine

Figure 3.12-1

Existing Occupied Residences Not Owned or Controlled by Alcoa or CPS

4/16/03

Terrain in the study area typically is flat to gently rolling, with elevations generally ranging from under 400 feet to 500 feet NGVD. The high point in the area is the Yegua Knobbs at 753 feet NGVD, just outside the permit area to the east. Terrain effects on noise transmission are expected to be highly localized, due to the lack of major terrain features in the area. There may be some noise buffering from vegetation where there are extensive woodland lots, although they, too, would be specific to a local area and to local climatic conditions.

Estimates of existing noise levels for the study area were developed based on a combination of daytime field measurements, modeling techniques, and estimation methods (Zephyr 2000). The estimates were prepared for 10 locations in and near the permit area (**Figure 3.12-2**). They included a daytime average level, a nighttime average level, and a day-night average level for each receptor location. The noise estimates are illustrated in **Table 3.12-1**. Day-night average noise levels (L_{dn}) for the 10 receptor areas range from 43 dBA in the most rural parts of the area to 51 dBA in the area adjacent to FM 696. Most of the permit area is estimated to have L_{dn} in the 44 to 45 dBA range. Locations near U.S. Highway 290 are likely to experience noise levels higher than any of the 10 receptor locations evaluated in the study. Day-night average levels at 1,000 feet from U.S. 290 are estimated at 60 dBA, dropping to approximately 54 dBA at 2,500 feet from the highway.

Table 3.12-1
Existing Noise Levels at Selected Noise-sensitive Receptors

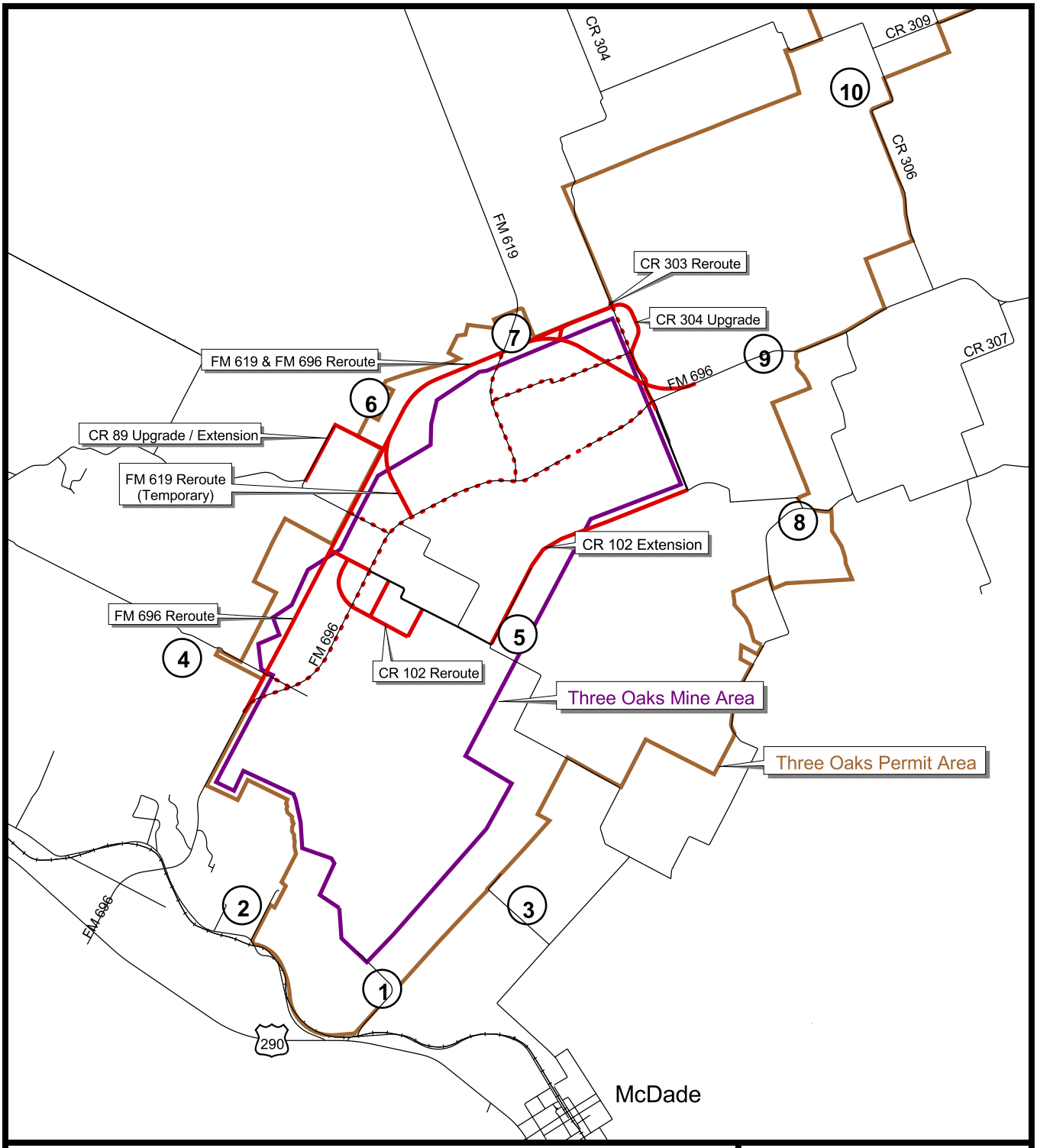
Receptors		Estimated Average Noise Level (dBA)		
No.	**Description**	**Daytime (L_d)**	**Nighttime (L_n)**	**Day-Night (L_{dn})**
1	Three Oaks Cemetery	51	37	49
2	Seventh Day Adventist Church ***School***	49	37	48
3	Star Ranch	44	37	45
4	Raymond Ott residence	43	37	45
5	A. H. French residence	41	37	44
6	Alcoa (formerly J. Bass residence)	40	37	44
7	Weldon Clark residence	39	37	44
8	Glen Bostic life estate	38	37	44
9	Julius Bostic residence	53	37	51
10	John Komandosky residence	37	37	43

Source: Hodges 2001, 2002.

3.12.1.2 Visual Resources

Potential visual effects of a proposed project typically are evaluated based on a combination of the quality of the existing landscape and the sensitivity of likely viewers to visual change. An additional factor is the capacity of the characteristic landscape to absorb visual changes.

Visual quality is somewhat subjective and dependent on context. A small, tree-lined lake would have greater visual importance in the dry prairies of the Texas Panhandle, for example, than in the Piney Woods region of east Texas. In an effort to minimize the subjectivity and ensure that the results of an analysis for a given landscape are likely to be similar, even when performed by different visual analysts, federal land management agencies developed standardized techniques for visual analysis (BLM 1986; USFS 1995).



Legend

- Existing Roads (to be relocated)
- Road Relocations
- (1) Receptor - See Table 3.12-1

Figure revision: Revised legend.

N

0 2000 4000 Feet

Source: Adapted from Alcoa 2001c.

Three Oaks Mine

Figure 3.12-2

Select Receptor Locations for Noise Estimates

1/29/03

be moderate. Sensitivity of viewpoints from county roads in the study area is considered to be low, based on the extremely low traffic volumes they carry.

The only additional visually sensitive areas that have been identified in the study area are three cemeteries, one affiliated with the Knobbs Baptist Church. The visual sensitivity of the cemeteries is considered to be low to moderate because the frequency of visitation is low.

3.12.2 Environmental Consequences

3.12.2.1 Proposed Action

Noise

Noise impacts are commonly evaluated according to two general criteria: 1) the extent to which a project would exceed federal, state, or local noise regulations; and 2) the estimated degree of disturbance to people.

There are no specific federal, state, or local noise regulations that govern the proposed Three Oaks Mine. Neither the State of Texas nor Bastrop or Lee Counties have noise regulations governing mining operations. HUD has developed standards for use in evaluating activities under its jurisdiction. Although HUD does not have regulatory authority over the Three Oaks Mine, the standard is instructive as a guide to human disturbance. The HUD standard for "acceptable" noise levels in residential areas is a L_{dn} of 65 dBA (HUD 1984). For comparison, the TxDOT recommends an equivalent continuous sound level (L_{eq}) standard of 65 dBA (TxDOT 1997). ***For comparison, Table 3.12-1a illustrates typical noise levels of some commonly recognized noise sources.***

Other agencies and cities have differing standards, some less stringent, some more rigorous. Without specific legislative guidance, the degree of disturbance becomes the key factor in evaluating noise effects, with a focus, in this case, on residents near the proposed project. The concept of human disturbance is known to vary with a number of interrelated factors, including changes in noise levels; the presence of other, non-project-related noise sources in the vicinity; peoples' attitudes toward the project; the number of people exposed; the type of human activity affected (e.g., sleep or quiet conversation as compared to physical work or active recreation); wind direction; and buffering features. Consequently, it is helpful to refer to the HUD standard as a quantitative measure of likely disturbance.

As noted in Section 3.12.1.1, the principal noise-sensitive receptors near the Three Oaks Mine are residences. **Table 3.12-2** identifies the distances from each of the three nearest residences to the major activity areas of the proposed mine for each of the time periods identified in the mine plan.

The potential noise effects of the proposed Three Oaks Mine are complex due to the large disturbance area, the anticipated 25-year life of the mine, the variety of noise-generating activities, and the mobility of the noise sources. This analysis addresses construction noise and operations noise separately, although there would be some overlap in timing between the two categories. Construction activities would include two major types: 1) road construction, including both public roads and the mine haul road and 2) construction of

Table 3.12-1a
Typical Values of Sound Level of Common Noise Sources

Sound Pressure Level (dBA)	*Common Indoor Noise Levels*	*Common Outdoor Noise Levels*
110	*Rock band*	*--*
105	*--*	*Jet flyover at 1,000 feet*
100	*Inside New York subway train*	*--*
95	*--*	*Gas lawn mower at 3 feet*
90	*Food blender at 3 feet*	*--*
80	*Garbage disposal at 3 feet, or shouting at 3 feet*	*Noisy urban daytime*
70	*Vacuum cleaner at 10 feet*	*Gas lawn mower at 100 feet*
65	*Normal speech at 3 feet*	*Commercial area, heavy traffic at 300 feet*
60	*Large business office*	*--*
50	*Dishwasher in next room*	*Quiet urban daytime*
40	*Small theater, large conference room*	*Quiet urban nighttime*
35	*--*	*Quiet suburban nighttime*
33	*Library*	*--*
28	*Bedroom at night*	*--*
25	*Concert hall (background)*	*Quiet rural nighttime*
15	*Broadcast and recording studio*	*--*
5	*Threshold of hearing*	*--*

Source: BLM 2002.

Table 3.12-2
Noise-sensitive Residences Nearest the Proposed Three Oaks Mine Activity Areas[1]

	Distance from Major Activity Area to the Three Nearest Residences (feet)		
Component/Project Year	**Nearest Residence**	**Second Nearest Residence**	**Third Nearest Residence**
Mining Activities			
1	700	800	875
2	2,000	2,100	2,250
3	2,700	2,800	2,875
4	2,750	2,750	3,075
5	2,425	3,325	3,375
6-10	900[2]	2,000	2,500
11-15	300[2,3]	1,625	1,750
16-20	300[2,3]	875	2,000
21-25	~~300~~ ***650***[2,3]	1,625	2,750
Ancillary Facilities			
All	1,200	~~1,000~~***1,300***	~~1,500~~***1,425***
Transportation/Utility Corridor			
All	~~625~~**750**	~~860~~***800***	~~1,750~~***875***

[1]Residences peripheral to the mine area that are not owned or controlled by Alcoa or CPS.
[2]Residences on privately owned in-holdings within the mine area.
[3]Mining not permitted within 300 feet of an occupied residence.

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Table 3.12-10
Distance to Threshold Noise Levels for Major Noise Sources

Activity	L_{eq} at 50 Feet	L_{dn} at 50 Feet[1]	Distance in Feet to L_{eq} = 65 dBA	Distance in Feet to L_{dn} = 65 dBA	Distance in Feet to L_{eq} = 47 dBA[2]
Construction					
Ancillary facilities	87	85	629	500	5,000
Road construction	84	82	446	354	3,540
Operations					
Clearing & grubbing	77	75	199	158	1,581
Overburden – dragline[3]	90	96[4]	889	1,774[4]	7,063
Overburden – mobile[3]	89	95[4]	792	1,581[4]	6,295
Lignite mining[3]	88	94[4]	706	1,409[4]	5,610
Stockpile loading	78	76	223	177	1,774
Haul road traffic[3,5]	79	85[4]	251	500[4]	1,991
Crusher and conveyor[3,5]	73	79[4]	126	251[4]	998
Reclamation	82	80	354	281	2,812

[1]The L_{dn} calculation penalizes nighttime noise. Consequently 24-hour operations produce increased L_{dn} levels while daytime only operations typically produce lower L_{dn} levels due to substantially lower nighttime noise levels.
[2]Project-related noise only; not combined with background.
[3]Activity operates 24 hours per day; all others are daytime only.
[4]Assumes background level of 37 dBA (Zephyr 2001).
[5]Either haul trucks or a crusher/conveyor system would be used for transport of lignite to the existing power station.

It should be noted that noise levels are measured on a logarithmic scale, so if two or more of these noise source activities were operating in close proximity at the same time, the noise levels could not simply be added together. For example, if the dragline overburden removal, at 90 dBA, and lignite mining, at 88 dBA, were operating close together, the combined noise level on the logarithmic scale would be approximately 92 dBA.

Comparing **Table 3.12-10** and **Table 3.12-2**, it is apparent that only a few privately owned residences would be affected by noise levels above L_{dn} 65 dBA, unless multiple major noise sources were operating simultaneously in close proximity. For example, no residences would experience L_{eq} noise levels above 65 dBA as a result of construction of the ancillary facilities. The dragline is estimated to produce L_{dn} levels above 65 dBA at three or more residences at times in year 1, but at no residences in year 2. The two residences on private in-holdings are exceptions (**Table 3.12-2**); one could experience L_{dn} levels above 65 dBA during parts of years 6 through ~~25~~***20***, and the other could experience such levels during parts of years 16 through 25.

In addition to the raw numbers, a number of factors that are unquantifiable at this time would influence the effects of Three Oaks Mine noise on nearby residences. Importantly, the lignite mining process is highly dynamic. Most major noise-generating activities are mobile, generally moving through a given area fairly rapidly. The draglines move more slowly, although they, too, work their way steadily through a given area. Though slower moving than most of the mining equipment, they are not stagnant sources of noise. Considering the distances involved, the highest noise levels would move away from a sensitive receptor within a few weeks or months, at most. Also, overburden removal and mining would, in some cases,

progressively work lower into pit areas, effectively creating their own noise barriers over a period of time. Depending on the location of overburden and spoil piles, these also might function as noise barriers. In contrast, the draglines, measured in operation at Sandow, have demonstrated pure tones with harmonic components in their noise signatures at frequencies of 206.25 Hertz (Hz), 412.5 Hz, 618.75 Hz, and 825.0 Hz (Vibra-Tech 2001). Pure tones are single frequency sounds that stand out above the base sound level for the source; in the case of the dragline, the pure tone components exceed the base level by 10 to 20 dB (Vibra-Tech 2001). Pure tones tend to increase the annoyance factor for listeners, possibly due to their constancy (Harris 1979). Supporting this concern, the Vibra-Tech study (2001) was conducted because of complaints from a homeowner approximately 3 miles from the operating dragline. The monitoring results indicated overall noise levels were very low, but the tonal components were nevertheless measurable and apparently sufficiently annoying to provoke a complaint from this one homeowner (Vibra-Tech 2001).

In summary, although the HUD standard is a guideline and not enforceable, there are a few instances where individual project-related noise sources would exceed the HUD 65 dBA (L_{dn}) standard at sensitive receptors in the study area. The standard also would be exceeded if several sources were to operate simultaneously in close proximity to a residence. Exceedences would likely continue for periods ranging from a few days to a few months at a single location. Of equal or greater concern is the fact that the draglines, some of the loudest sources, would operate during nighttime hours, and they exhibit pure tonal qualities in their noise emissions. Pure tones are known to cause community annoyance when they stand out above base noise levels (Harris 1979). Also, although the projected exceedences above the HUD standard would be relatively few, the projected noise levels would be well above existing ambient background levels. The USEPA has concluded that sound level increases greater than 10 dBA often cause nearby community members to take vigorous action to oppose the presence of the noise source, and complaints could be expected (USEPA 1974). This concern applies mainly to major noise sources operating at night, including draglines removing overburden, mining activities, and trucks operating on the haul road.

Noise effects from adjusting the mine plan for currently uncontrolled properties are addressed earlier in this section. See particularly Table 3.12.2 of the Draft EIS, where the nearest residences in project years 6-10, 11-15, 16-20, and 21-25 are the two occupied uncontrolled properties (T085 and T0130 in Figure 3.9-1 of the Final EIS) within the mine area. The sensitive receptor on the uncontrolled property (T0150) outside the southeast edge of the mine disturbance area would be more than 0.5 mile from the nearest mine area activity. Potential noise effects at this location would be minor to moderate, as estimated in Table 3.12-10 of the Draft EIS, but the effects would return periodically over several years as several mine-year blocks converge near the northeastern edge of the mine area in this vicinity. (See page 2-21 of the Final EIS relative to uncontrolled properties.)

Visual Resources

Visual impacts of the proposed Three Oaks Mine would be caused by construction of the mine and ancillary facilities and mine operation. Visual features of the project would include clearing of vegetation, operation of draglines to strip overburden, new roadway construction, new offices and shops, mine pits, spoil piles, lignite processing and conveyance facilities, and reclamation activities. Due to the nature and scale of the project, the location of activities that may affect visual resources would change during the life of the mine, primarily in the mine disturbance area.

Two draglines, currently operating at the Sandow Mine, would be moved to the Three Oaks Mine; both are approximately 404 feet long and 210 feet tall at the top of the boom. Views of the draglines were simulated using precise camera positioning and a computer-aided drafting model to locate silhouettes of the draglines in photographs from each of the letter-designated KOPs. The locations of the draglines in the photos simulated nine time periods over the 25-year life of the proposed mine (Richardson Verdoorn 2002).

The modeling was used to predict both the scale of a dragline in the view perspective and the number of days a dragline would be in view from each location. In each instance, the dragline was modeled at its closest point to the KOP where it could be seen in its entirety. At no location would the view remain constant, as the draglines move across or away from the viewpoint. Generally, the closer the dragline is to the viewpoint, the faster it would appear to move past the viewer. Conversely the farther away it is, the longer it would remain in view. For example, KOP J would have a distant view of the dragline with the longest duration at 75 percent of the 25-year life of the mine. Conversely, KOP C would have a close-up view, but the dragline would be visible for only 18 percent of the life of the mine. This concept is illustrated for KOPs I and P in **Figures 3.12-4** and **3.12-5**, respectively. **Table 3.12-11** summarizes information on the visibility of the draglines.

Table 3.12-11
Dragline Visibility Factors

KOP	Range[1] (feet)	Screening[2]	Visibility[3]
A	2,450	Yes	44%
C	750	No	18%
E	4,700	Yes	68%
G	1,800	Yes	51%
I	5,800	Yes	47%
J	7,800	Yes	75%
P	550	No	38%
Q	2,000	No	18%

[1]Distance from the KOP to the nearest ***dragline.***~~point in the mine area.~~
[2]Availability of existing vegetation or terrain screening.
[3]Percent of the mine life that a dragline would be visible from the KOP.

The distance between a viewer and a dragline is a key factor in the relative dominance of the draglines from a particular view, as **Table 3.12-11** and **Figures 3.12-4** and **3.12-5** indicate. Up to a distance of approximately 0.5 mile (2,640 feet), the size of the draglines would make them visually very dominant. From 0.5 mile to approximately 2.0 miles (10,560 feet), the draglines still would be quite prominently visible, but notably less visually dominant. Beyond 2.0 miles, the draglines still would be visible in some cases, but the scale of their appearance to a viewer would be greatly reduced as other features nearer the viewer (i.e., trees, terrain, and occasionally buildings) would assume greater visual importance. The screening affect of these other features is an important visual consideration, especially at greater distances. For example, the dragline theoretically would be visible 75 percent of the time from KOP J, but the combination of distance and intervening woodlands would dramatically reduce the practical visibility from that vantage point.

Vegetation removal together with pit development and any associated stockpiles would be major physical changes associated with the Three Oaks Mine. While the pit would be screened from some of the KOPs (see **Table 3.12-11**), some of the vegetation clearing and stockpiles would be visible. This would be especially notable at close range, from KOPs A, C, P, and Q during the first 4 years of the project's operation. These features would be highly visible from the numbered KOPs. As with all project-related visual resource modifications, the effects would vary over time. They would be most conspicuous from KOP 1 in the first 4 years of the mine. Subsequently, FM 696 would be relocated and ***the existing*** KOP 1 would ~~be included in the KOPs along the northwest side of the mine area~~***no longer exist***. As reclamation progresses, the views from KOP 2 would gradually return to grassland, then to shrubland, and eventually to woodland as the active mining area moves southeasterly. Similarly, KOP 2 would have views of substantial visual modifications in the first 5 years of the project, which would be moderated as reclamation progressed. KOP 2 again would be impacted when Contingency Area 3 is mined (now estimated as years 6 through 15) and would go through another reclamation period subsequent to the mining. In contrast, the visual effects would be most obtrusive at KOP 3 in years 16 through 25, which would result in reclamation continuing after closure of the Three Oaks Mine.

Road construction activities would create new linear corridor features in the landscape. The most visible to the public would be the relocation of FM 696 and the proposed transportation and utility corridor. FM 696 would be completed by year 4 and disturbed areas would be revegetated soon thereafter. The transportation and utility corridor would be constructed at the outset of the project and would remain throughout the project's life; the transportation and utility corridor would be a strong visual feature in the landscape.

Project-related shop and office structures would be visible from KOP A and from travelers on the relocated section of FM 696. While not rural or agrarian in character, they would be of relatively modest scale and would not be highly conspicuous in the area.

Additional visual quality effects of the Three Oaks Mine would include increased night lighting and, possibly, fugitive dust generated by vehicles and equipment. Night operations at the mine would introduce lighting into what is now a rural and generally dark area. Although the lights used at the pit area would be shielded and aimed downward, there would be an overall increase in ambient light levels in the area. They would be least noticeable in clear weather, whereas low clouds or hazy conditions would tend to reflect the light outward to a greater degree. As with other visual features of the project, the effects of night lighting would vary with proximity to the active pit area.

Dust suppression measures would be implemented throughout the life of the project, and any fugitive dust resulting during transport of the lignite would likely be minor (see Section 3.8, Air Quality). The visual effects of fugitive dust would be most problematic near the transportation and utility corridor. In addition to the residences along the northwest edge of the mine area, there are approximately a dozen residences within 0.5 mile of the transportation and utility corridor that could be affected.

Implementation of the Proposed Action would notably change the overall visual character of the mine area, with lesser effects in the permit area beyond the mine disturbance area. The effects to the viewshed would be short-term for the most part; however, the proposed conceptual post-mining topography would be

substantially out of scale with the existing topography in the study area and would be permanent, if implemented (see Section 3.12.4.2 for mitigation that is being considered by the USACE). Areas mined in the first years of the project would be revegetated to grasses within 1 to 2 years, with sequential pit backfill and reclamation occurring concurrent with mining over the life of the project, thereby minimizing the visual impact of raw, disturbed areas to the extent possible (**Figure 3.12-6**). As a result of concurrent reclamation, much of the mine disturbance area would be returned to a similar vegetative character as the existing permit area and its surroundings by the end of the mine's life, although the topographic modifications would be essentially permanent. The remainder of the disturbance area (i.e., ancillary facilities) would be reclaimed following the completion of mining.

Adjusting the mine plan for currently uncontrolled properties (see page 2-21 of the Final EIS) would not change visual effects for most KOP sites. The two occupied properties within the mine area would be subject to strong visual effects for extended periods of time because the mining activity would virtually surround them and be in close proximity at times during project years 11 to 20 at the northern property (T085) and project years 16 to 25 at the southern property (T0130) (see Figure 3.9-1 in the Final EIS). Unoccupied uncontrolled properties would not be considered sensitive receptors for noise or visual effects.

3.12.2.2 No Action Alternative

Noise

The No Action Alternative would produce no specific identifiable effects on the noise environment in the study area as there would be no new mining activity and there are no known plans for other development. Over time, it is expected that there would be some increase in residential development, which would increase the ambient noise levels commensurate with the increased density. The increase in background levels likely would be small and would occur very gradually unless growth pressures in the area increase sufficiently to create demand for a suburban scale subdivision. There also could be localized increases in noise associated with drilling for and pumping of groundwater for SAWS by CPS, which owns a sizable amount of land in the study area.

Following closure of the Sandow Mine and potentially the aluminum smelter, noise levels in the vicinity of those activities would be reduced somewhat. The levels of reduction are not readily quantifiable, but the overall effect would be expected to be minor because the nearest sensitive receptors are some distance away, and the electrical generating units would continue to operate nearby.

Visual Resources

The No Action Alternative would result in no identified effects on visual quality in the study area as there would be no Three Oaks Mine-related changes to the landscape.

3.12.2.3 Alternative Mine Plan

Noise and visual resource effects of the Alternative Mine Plan largely would be the same as those described for the Proposed Action in Section 3.12.2.1 of the Draft EIS. The only difference for noise would be that operations activities (see Table 3.12-10 of the Draft EIS) would return to the west and northwest edges of the mine area for brief periods in the second or third years of the project to mine the lignite under FM 619, CR 90, and possibly CR 96 instead of completing the mining operations for those areas in year 1 and moving steadily away from that part of the mine area in subsequent years. Road construction activities for FM 619 and FM 696, with their attendant noise effects, also would be delayed.

Changes in visual effects from implementation of the Alternative Mine Plan also would be minor. Motorists traveling on FM 619 and CR 90 may be exposed to close range views of mining activities for a slightly longer period of time than would be the case under the Proposed Action. The effects would be different in duration, not in type.

3.12.4.2 Visual Resources

VR-1: Visual Screening. In those areas where the edge of the active mine is near the permit area boundary (e.g., portions of the western edge) and there are sensitive receptors nearby, edge conditions should be designed to minimize negative visual effects. In particular, existing vegetation should be preserved and augmented as necessary to maximize visual screening. Where possible, berms of adequate height should be placed as close to the receptor as feasible, designed to appear as an extension of the natural topography. Berming and planting should mimic natural topography, vegetative patterns, and plant materials to the degree possible to provide the most natural looking screening effects. Existing groves of trees should be retained where possible to provide visual buffers for Three Oaks Mine activities.

Similar efforts at retaining and enhancing vegetative and topographic screening should be made at the shop/office area to soften the visual effect of the industrial buildings. ~~Large expanses of asphalt and raw dirt should be avoided whenever possible and broken up with landscape islands.~~

Existing vegetative screening along the transportation and utility corridor should be preserved and enhanced to minimize the visual effects of the long linear feature. Overpasses should be planted with screening materials to minimize their visual impact, consistent with TxDOT safety standards.

VR-2: Landforms. Reclamation of lands and water features should employ landforms and linear characteristics mimicking those occurring naturally in the region. The proposed conceptual post-mining topography (**Figure 2-12**) indicates large-scale, flat-topped landforms with several areas of steep geometric slopes. In comparison, the surrounding natural topography, also shown in **Figure 2-12**, exhibits a landscape broken into smaller and more irregular landforms with no straight lines or flat planes. The scale and form of the post-mining, reclaimed landscape should be more in keeping with the existing topography with smaller, less regular landforms. Shrub and tree plantings should be initiated as soon as possible after recontouring the mined areas to facilitate the return of the landscape to a natural appearance.

3.12.5 Residual Adverse Effects

3.12.5.1 Noise

Noise effects would be unavoidable with implementation of the proposed project. Noise emissions from mining activities would decrease with increased pit depth, and the effects would vary depending on the distance from mining activities to the nearest receptors. However, it is anticipated that noise emissions would exceed the HUD standard of 65 dBA (Ldn) in some locations. Following completion of mining and reclamation of disturbed areas, residual noise effects would be essentially nonexistent. The largely rural character of the planned future land use for the mine area indicates long-term noise levels would return to pre-mine levels.

3.12.5.2 Visual Resources

Implementation of the mitigation measures identified in Section 3.12.4.2 would decrease the visual impacts of the proposed project, and the long-term visual character of the Three Oaks Mine permit area would be largely indistinguishable from the surrounding area. Following completion of mining and reclamation of the disturbance areas, residual visual effects would be minimal.

A large-scale release of diesel fuel or several of the other substances delivered to the site could have implications for public health and safety. The location of a release again would be the primary factor in determining the effects of a release. However, the probability of a release anywhere along a proposed transportation route was calculated to be low; the probability of a release within a populated area would be even lower; and the probability of a release involving an injury or fatality would be still lower. Therefore, it is not anticipated that a release involving a severe effect to human health or safety would occur during the life of the project.

Potential Storage and Operational Impacts

The volumes of fuels and lubricants to be stored onsite in tanks are listed in **Table 2-10**. Additionally, mobile tanker trucks would be used onsite to fuel and maintain draglines, haul trucks, and other equipment. Stationary tanks and vessels would be positioned within appropriate containment or diversionary structures to prevent oil or hazardous material from reaching soils or water. In addition, secondary containment structures constructed of concrete would be sufficient to hold at least 110 percent of the volume of the largest tank in the containment area. Portable tanks and drums also would be stored in a manner to prevent spills from reaching soils or water. Used oil would be recycled to a licensed used oil recycler during the life of the mine.

Over the life of the project, the probability of minor spills of materials such as fuel and lubricants would be relatively high. These releases could occur during fueling operations or from equipment failure (e.g., hydraulic hose failure). Spills of this nature would be localized, contained, and disposed of in accordance with the applicable laws and regulations. Accidents involving other hazardous materials also could occur during mine operation. Alcoa would develop and maintain a site-specific Spill Prevention, Control, and Countermeasure (SPCC) Plan to deal with unplanned releases of petroleum products and other hazardous materials. Alcoa has prepared an Emergency Response Plan that establishes procedures for responding to accidental spills or releases of hazardous materials to minimize health risks and environmental effects. The plan includes procedures for evacuating personnel, maintaining safety, cleanup and neutralization activities, emergency contacts, internal and external notifications to regulatory authorities, and incident documentation. Proper implementation of the Emergency Response Plan is expected to minimize the potential for significant impacts associated with potential releases of hazardous materials.

Using proper handling and storage procedures, impacts resulting from spills of hazardous materials should be minimal. MSDSs for the hazardous materials stored and used at the mine would be maintained onsite.

3.13.2.2 No Action Alternative

Under the No Action Alternative, no Three Oaks Mine-related impacts resulting from transportation, storage, use, or disposal of hazardous materials would occur.

3.13.2.3 Alternative Mine Plan

Under the Alternative Mine Plan, potential mine-related impacts resulting from the transportation, storage, use, or disposal of hazardous material would be the same as described for the Proposed Action (see Section 3.13.2.1 of the Draft EIS).

would increase the risk of release of hazardous materials from truck accidents during the life of the project. On U.S. Highway 290 this would represent a small incremental increase over existing conditions due to the existing high truck transport volume. On FM 696 between Butler, Texas, and the permit area, this increase would represent a larger incremental increase in the risk of a spill during transport since the roadway is a rural road assumed to have a relatively low truck traffic volume. With proper implementation of spill prevention and/or emergency response plans, cumulative impacts associated with storage and use of hazardous substances at the site are not anticipated.

The Proposed Action would represent an incremental increase in the transportation of hazardous materials in addition to the Sandow Mine and the clay mining and brick manufacturing operations. Since the Sandow Mine is scheduled for closure shortly after initiation of mining at Three Oaks, the cumulative impacts due to the increase in hazardous materials traffic would be short-term.

According to Alcoa, the aluminum smelter and electrical power station generate approximately 3,868 tons of hazardous waste per year (Waclawczyk 2001). Ninety-five percent of the waste is reportedly from smelter operations. Assuming that the Three Oaks Mine would continue to supply approximately the same amount of lignite as supplied by the Sandow Mine and the smelter output is not greatly increased, then the potential amount of hazardous waste produced by the smelter would not be expected to increase. In addition, economic and regulatory incentives to minimize the generation of hazardous waste may even reduce the amount of waste generated in the future, even if aluminum production is static or increases. Therefore, the Proposed Action is not expected to have a cumulative impact on the generation of hazardous waste.

3.13.4 Monitoring and Mitigation Measures

Alcoa proposes to construct spill containment structures at fuel storage facilities. ***Proposed construction and operation activities would comply with label instructions for proper transportation, storage, use, and disposal of hazardous materials.*** All waste oils and lubricants would be shipped to a licensed recycler. No additional monitoring or mitigation for hazardous materials is being considered. ***Remediation of a spill, if necessary, would be conducted in coordination with the USEPA and other appropriate federal and state agencies.***

3.13.5 Residual Adverse Effects

Residual adverse effects as a result of the transport of a hazardous material would include the potential effects to a populated area or a sensitive environmental resource along the proposed transportation route in the event of a spill. Residual adverse effects from the use of hazardous materials on the project site would depend on the substance, quantity, timing, location, and response involved in an accidental spill or release. Prompt cleanup of spills and releases should minimize the potential for any residual adverse effects of such events. As previously discussed, due to the low probability of impacts of spills on water resources or within populated areas, the potential for residual adverse impacts are anticipated to be minimal.

3.14 Public Health

3.14.1 Proposed Action

Public health issues associated with the proposed Three Oaks Mine include potential water quality effects from the mining operation, including bottom ash disposal and the use of chemicals during reclamation; air quality effects from mine-related air emissions; and the effects of mine noise and light pollution on sensitive receptors. The potential direct impacts to these resources are discussed in Sections 3.2.2, 3.8.2, and 3.12.2, respectively. Public health issues related to potential cumulative impacts include water quality effects from groundwater withdrawals for SAWS, and air quality effects from the existing Rockdale power plant and aluminum smelter. The potential cumulative impacts to water resources and air resources are discussed in Sections 3.2 and 3.8, respectively.

This section summarizes the potential effects to the public health of local residents from mine-related direct and cumulative water quality, air quality, and noise and light effects.

3.14.1.1 Water Quality Effects

The USEPA (Federal Register 2000) has identified issues regarding the disposal of coal combustion materials (i.e., bottom ash and fly ash) in surface impoundments that lack adequate controls (e.g., groundwater monitoring, liners). However, in regard to the disposal of combustion materials into mine pits, the agency acknowledged that it had not "identified a case where placement of coal wastes can be determined to have actually caused increased damage to groundwater." In light of the uncertainties of impacts from the disposal of coal combustion wastes, the USEPA is considering the development of federal regulations for disposal of fossil fuel combustion materials, but not as hazardous waste (Federal Register 2000).

The TNRCC has approved Alcoa's use of bottom ash (a designated Class III waste) as a haul road aggregate at the Sandow Mine. Use of bottom ash as haul road aggregate also is proposed for the Three Oaks Mine (Alcoa 2000 [Volume 8]). As pit areas are backfilled, the bottom ash on the haul roads would be incorporated into the backfill material or disposed of at an approved Class III facility. ***Alcoa estimates that approximately 18,225 tons of bottom ash from TXU Unit 4 would be used annually at the Three Oaks Mine for road surfacing material following the initial mine construction activities (Hodges 2002d). Thus, it would be expected that somewhat less than this amount would be removed annually from temporary road surfaces and placed in the pit and ramp areas being backfilled.*** As discussed under Groundwater Quality Impacts in Section 3.2.3.2, incorporation of bottom ash into the backfill material is not anticipated to degrade groundwater and thus is not expected to pose a health risk.

Alcoa would contract with qualified individuals or companies to apply fertilizers and pesticides on reclaimed areas as needed, to ensure successful reclamation. These contractors would operate in accordance with manufacturer recommendations and agency regulations regarding application rates and handling of materials. No bulk fertilizer or pesticide materials would be stored on the mine site, and associated waste materials would be disposed at appropriate offsite facilities. Spills or other accidental releases would be handled in accordance with Alcoa's SPCC Plan, which addresses accidental releases of all hazardous materials used at the facility. Use of fertilizers and pesticides on the reclaimed areas at the Three Oaks

impacts would be most noticeable during nighttime operations. Dragline noise emissions, in particular, would exhibit pure tonal qualities that may be noticeable above other noise levels, particularly during nighttime hours. Mitigation measures are being considered to reduce the effects of noise emissions (see Section 3.12.4.1, Noise and Visual Resources). Temporary noise levels slightly in excess of the HUD standard are not expected to cause adverse health effects.

The most common adverse health concern from excessive noise is hearing loss. The USEPA and the National Institute for Occupational Safety and Health, among other organizations, established that there is a risk of permanent hearing loss to some individuals from continuous exposure to sound levels of 85 dBA for 40 hours per week (Harris 1979). The worst-case noise level identified for a residence from Three Oaks Mine noise would be an Leq of 74 dBA outdoors for periods of a few days at a time, well below the risk threshold. It is expected that noise levels indoors (where people typically spend longer periods of time) at the same residences would be approximately 30 dBA lower with windows closed. Consequently, no direct risk to hearing would be expected.

Studies on other types of health effects from noise are contradictory and inconclusive (White and Walker 1982). "The evidence … has failed to establish any direct effects of noise on health, excluding, of course, hearing loss …" (White and Walker 1982). Hearing loss is documented for prolonged exposure at high levels. This is primarily a concern for workers, and such levels would be above any level estimated from the Three Oaks Mine that would be found outdoors, except, perhaps, at the two residences within the mine area. It would be well above indoor levels at any sensitive receptor.

There would be potential for annoyance of nearby residents, as noted in Section 3.12.2.1; the degree of annoyance is impossible to accurately predict for any individual or small community of individuals as there are numerous factors that affect a person's tolerance for noise (Harris 1979).

3.14.1.4 Light Effects

As discussed in Section 3.12.2.1, there would be an increase in night lighting during nighttime operations of the proposed Three Oaks Mine. Nighttime operations would introduce new lighting into what is now a rural and generally dark area. The night lighting would be most noticeable during weather conditions of low clouds or hazy conditions, which would result in greater light reflection. These effects would vary depending on the location of the receptor residence to the active pit area. Alcoa has committed to the use of light shields to direct the lights downward, to the extent possible. Increased night lighting is not expected to result in adverse health effects.

3.14.2 No Action Alternative

Under the No Action Alternative, the mine-related effects identified for water quality, air quality, noise, and lighting, as discussed above, would not occur. In addition, the No Action Alternative would result in the closer of Alcoa's aluminum smelter, thereby resulting in the elimination of emissions from that facility. However, as discussed in Section 2.3, No Action Alternative, it is assumed that the four electrical generating units at Rockdale would be converted to use western coal for continued operation.

3.14.2.3 Alternative Mine Plan

Under the Alternative Mine Plan, potential mine-related effects for water quality, air quality, noise, and lighting would be the same as described for the Proposed Action (see Section 3.14.2.1 of the Draft EIS).

3.17 Relationship Between Short-term Uses of the Human Environment and the Maintenance and Enhancement of Long-term Productivity

As described in the introduction to Chapter 3.0, short-term is defined as the 25-year operational life of the mine and 10-year reclamation period; long-term is defined as the future following reclamation. This section identifies the ~~tradeoffs~~ ***relationship*** between the short-term impacts to environmental resources during operation and reclamation versus long-term impacts to resource productivity that extend beyond the end of reclamation. Note that this discussion is not applicable to hazardous materials, public health, or environmental justice.

3.17.1 Geology and Mineral Resources

Short-term lignite mining at the Three Oaks Mine would not affect the long-term potential for development of mineral resources in east-central Texas.

3.17.2 Water Resources

Short-term groundwater impacts include effects to groundwater wells located within the area of potential groundwater drawdown associated with mine-related dewatering and depressurization of the Calvert Bluff and Simsboro aquifers, respectively. These impacts would occur during mining operations and for a period up to approximately 100 years until the recovery of groundwater levels in the aquifers. However, Alcoa would be responsible for the mitigation of mine-related impacts to groundwater wells in compliance with RRC requirements, thereby minimizing the duration of the impact.

Short-term surface water impacts would include the ~~beneficial~~ increase in flows downstream of the Three Oaks Mine surface water discharge locations in the Big Sandy and Middle Yegua drainages. Following the cessation of discharges, there would be a reduction in flows in these drainages associated with groundwater effects in the recharge areas of the Simsboro aquifer that provide flow in these drainages and runoff reduction associated with post-mining topographic changes. Following the recovery of the groundwater levels in the gaining reaches of these streams, there would be minor long-term effects to the productivity of these drainages.

The proposed project would result in the short-term loss of wetlands and waters of the U.S. related to mine pit development and depressurization of the Simsboro aquifer. Reclamation of wetlands and waters of the U.S. would occur upon completion of mining. Long-term impacts to wetland productivity would be limited to the wetlands located in the Simsboro outcrop, which could be affected by a drawdown in the water table. This drawdown would take approximately 40 to 100 years to rebound following the termination of pumping.

3.17.3 Soils

The proposed project would result in both short- and long-term impacts to soil productivity. These impacts are expected to cease with the completion of mining operations and would be mitigated by reclaiming the disturbed areas. The reclamation goal is to develop more productive soils to ensure the success of revegetation, stabilization of the disturbed areas, and soil erosion control. Long-term impacts to soil

Table 3.18-1 (Continued)

Resource	Irreversible Impacts	Irretrievable Impacts	Description
Fish and Wildlife Resources	Yes	Yes	There would be an irretrievable loss of 23.6 acres of intermittent/ ephemeral stream and 69.9 acres of pond habitat as a result of mining. A net total of approximately 825 acres of terrestrial habitat would be irreversibly lost as a result of conversion to water features (i.e., ponds and end lakes). A total of 8,530 acres of wildlife habitat would be incrementally lost during mining operations, an irretrievable commitment of this resource. This land would be reclaimed subsequent to mining.
Paleontological Resources	No	No	No impacts would occur to paleontological resources.
Cultural Resources	Yes	Yes	Cultural resources would be irreversibly and irretrievably lost through disturbance; however, significant cultural resources would be mitigated through avoidance or data recovery.
Air Quality	No	No	There would be no irreversible impacts to air quality. Project air impacts would not exceed federal or state ambient air quality standards. The air quality would return to pre-mining levels after construction, mining, and reclamation activities ceased to be sources of pollutants.
Land Use and Recreation	Yes	Yes	Changes in land use would generally be reversible through reclamation efforts, except for end lake areas where the enlarged water features would be ***permanent.*** Suitability of reclaimed areas for structures is uncertain, depending on the stability of backfilled soils. There would be no irreversible or irretrievable loss of recreation resources.
Social and Economic Values	No	Yes	Social and economic effects of the Three Oaks Mine, though predominantly beneficial, would be reversible. The human and material resources invested in the project would be essentially irretrievable.
Transportation	No	No	Project-related traffic increases would continue for the life of the project, but would be reversible and would cease at project closure. Road system modifications would be reversible, should it be determined to be desirable in the future.
Noise and Visual Resources	No	No	Noise effects would be considered reversible, as they would cease on completion and closure of the project. Certain visual effects, particularly removal of mature trees, would persist for a number of years; however, in the long term, the adverse visual effects would be largely obscured by successful reclamation and vegetation.
Hazardous Materials	No	No	Not applicable.
Public Health	No	No	Adverse public health impacts are not anticipated.
Environmental Justice	No	No	Not applicable.

CHAPTER 4
CONSULTATION AND COORDINATION

Dallas Morning News
Elgin City Hall
Elgin – City of Library
Elgin Public Library
Fort Worth Star-Telegram
Fred Schmidt Documents Department, The Libraries
Giddings City Hall
Giddings – City of Library
Lee County Courthouse
Lexington City Hall
Milam County Courthouse
Rockdale City Hall
Rockdale – City of Library
Rockdale Reporter
Travis County Courthouse
San Antonio Express–News

4.1.1 Other Organizations

Albert Muniz Revocable Living Trust
Bastrop County Environmental Network
Caddo Tribal Headquarters
Conference Of Olympus
National Wildlife Federation
Neighbors for Neighbors
Presbyterian Childrens Home
Rev. Alvin Epperson L. Faith Lutheran Church
Reverend H. Sherrill J. House of Prayer
Roman Catholic Diocese
Seventh Day Adventist Church - C/O Wray Serl
Sierra Club
Sportsmen Conservationists of Texas
The Nature Conservancy Texas Field Office

4.1.2 Industry/Business

Acme Brick
Alcoa, Inc.
Aztec Development Company
Batalla Corporation
Bluegrass Coal
Brazos River Authority
Capital Area Planning Council
B&H Environmental Services, Inc.

4.4 Public Comments and Responses

This section is entirely new text; therefore, for ease of reading, the text is shown in plain type rather than in ***bold italics***.

During the 74-day public comment period on the Three Oaks Mine Draft EIS, the USACE received 88 comment letters. The letters are reproduced in their entirety in Appendix H of this Final EIS. Each comment is identified by a bracket and a letter and comment number (e.g., comment 3-4 refers to the fourth comment in letter 3). The response to each comment accompanies the letter and is identified by the reference number of the respective comment (e.g., response to comment 3-4).

The USACE conducted a public information meeting on October 1, 2002, and a formal public hearing on October 2, 2002, for the Three Oaks Mine EIS. Both events were held at the Elgin High School in Elgin, Texas. Court reporters were present at both events to record oral comments; a translator was present at the public hearing to translate Spanish comments into English for the court reporter.

A total of 71 people signed in at the October 1 public information meeting, and a total of 148 people signed in at the October 2 public hearing. Oral comments provided to the court reporter and formal comments presented at the public hearing are provided in Appendix H with the associated responses. These transcript comments and responses are labeled with a T (e.g., T-1).

Table 4-1 lists each of the comment letters and transcript statements. Each letter and transcript statement has been reviewed in its entirety and considered by the USACE in its review of the proposed project.

4.5 Responses to General Comments

This section is entirely new text; therefore, for ease of reading, the text is shown in plain type rather than in ***bold italics***.

Certain general comments and issues relative to the Draft EIS were raised by multiple commentors during the public review period. In this section of the Final EIS, the USACE has identified these general comments and provided comprehensive responses to these comments.

4.5.1 NEPA Issues

NEPA–1 Objectivity of Baseline Data

Comment – The Draft EIS relied on baseline studies conducted by Alcoa and Alcoa's contractors as the basis for the description of the affected environment in the EIS. How can this information be considered objective when it was collected by the applicant?

Response – The applicant is responsible for providing basic information and initial analyses. Federal budget restrictions and cost considerations require that those who may benefit from a project pay the major costs of assuring environmental compliance. Baseline data collection typically requires a considerable amount of

Table 4-1
Draft EIS Public Comments

Number	Commenter
Letters	
1	Tony Zucco
2	U.S. Department of Commerce, National Oceanic and Atmospheric Association, National Marine Fisheries Service
3	Congress of the United States, House of Representatives, 11th District, Texas
4	City of Cameron, Mayor
5	Citizens National Bank
6	Milam County Judge
7	First National Bank in Cameron
8	Minerva Water Supply Corporation
9	Texas House of Representatives, District 52
10	L. B. Kubiak, D.V.M.
11	Milam County Commissioner, Precinct 4
12	Harold E. Reagan
13	Texas House of Representatives, District 32
14	Thorndale Independent School District
15	Texas State Senate, District 19
16	The Senate of the State of Texas, District 5
17	U. S. Environmental Protection Agency, Region 6
18	Lexington Independent School District
19	Chamber of Commerce, Cameron, Texas
20	Richard Neidig
21	Priscilla Jarvis
22	Rockdale Independent School District
23	Texas Cooperative Extension
24	Cynthia Shelp
25	Carl Altman-Kasagh
26	Bill Glover
27	John F. Franklin
28	Jerry Mehevec
29	Hugh Brown
30	Judy S. Ellis
31	Cathy Snider
32	Betty Beaty
33	Brad Stafford
34	Manville Water Supply Corporation
35	Jerry Mehevic (Duplicate of 28)
36	Randy Waclawczyk
37	Neighbors for Neighbors, Inc.
38	Eva Villegas
39	Leslie Currens
40	Donna Blackstone
41	Save Barton Creek Association

Table 4-1 (Continued)

Number	Commenter
42	Bastrop County Audubon Society
43	Bastrop County Audubon Society
44	Gary L. Trdy
45	The Senate of the State of Texas, District 25
46	City of Milano, Mayor
47	Kristen Marie Freeman
48	Angela Buentello
49	Shudde Bess Bryson Fath
50	City of Taylor, Mayor
51	Greg Barker
52	City Public Service of San Antonio, Texas
53	Robin Lively
54	Ron Giles
55	Congress of the United States, House of Representatives, 14th District, Texas
56	Mona Mehdy
57	United States Department of the Interior, Office of the Secretary
58	Lloyd Sargent
59	Judy S. Ellis
60	The University of Texas at Austin
61	U.S. Environmental Protection Agency, Region 6
62	Molly Alexander
63	Charles Lundgren
64	Elwanda Lundgren
65	Duane and Lara Schenk
66	Kay and Joanna Hicks
67	Elgin Main Street Board
68	Donna Snowden
69	Gary Snowden
70	Erick and Raychelle Schaudies
71	Jeanette Shelby Realtors
72	Silicon Hills Documentation Services
73	Dan and Sandra Hicks
74	Sierra Club, Lone Star Chapter
75	Lower Colorado River Authority
76	Hill Gilstrap Riggs Adams & Graham, L.L.P. (Neighbors for Neighbors, Inc.)
77	Frederick-Law (Neighbors for Neighbors, Inc.)
78	Lost Pines Groundwater Conservation District
79	Bastrop County Environmental Network
80	Neighbors for Neighbors, Inc.
81	George R. Givens
82	Texas Commission on Environmental Quality
83	Texas Historical Commission
84	Victoria Saxl

Table 4-1 (Continued)

Number	Commenter
85	Texas Parks & Wildlife
86	Brazos River Authority
87	Clean Air Task Force
88	Alexander Birchler
Transcripts	
T1	Mary Wilson
T2	Sammy Reese
T3	Lloyd Sargent
T4	Sammy Reese
T5	Mary Wilson
T6	J.S. Duncan
T7	Tom Puccio
T8	Wallace Jones
T9	Lee Wray Russell
T10	Vester Crocker
T11	Gerald Niemtschk
T12	Earline Cloudt
T13	Gaye Bland
T14	James Foster
T15	Billy Woods
T16	Cathy Snider
T17	Chris Dyess
T18	W.P. Hogan
T19	Travis Brown
T20	Nathan Smith
T21	Denice Doss
T22	Larry Fisher
T23	Joan Ratliff
T24	Nena Simpson
T25	Sandy Murphree
T26	Donna Blackstone
T27	Michelle McFaddin
T28	Barry Williams
T29	Ken Cooke
T30	Sherri Korsmo
T31	Kerry Starnes
T32	Burke Baverschlag
T33	Randy Henderson
T34	Lisa Davidson-Gerthe
T35	Ricky Stewart
T36	Floyd Brockenbush
T37	Cullen Tittle
T38	Billy Gillum
T39	Carita Simons

Table 4-1 (Continued)

Number	Commenter
T40	Tony Hernandez
T41	Kathleen Wolfington
T42	Ann Franklin
T43	John Franklin
T44	Ron Giles
T45	Wanda Hannah
T46	Ariel Correa
T47	Robert Avila
T48	Jerry Meherec
T49	Jim Stanley
T50	Jim Buchanan
T51	Melissa Cole
T52	Jeffrey Byers
T53	Lloyd Sargent
T54	Lisa McClain
T55	Brad Stafford
T56	Carl Altman-Kaough
T57	Joan Hardy
T58	Hugh Brown
T59	Priscilla Jarvis
T60	William Montgomery
T61	Cynthia Shelp
T62	Jeremiah Jarvis
T63	Melvin Dube
T64	Rick Nalle
T65	Paul Smith
T66	Herb Blamire
T67	Lilian Kerlin
T68	Jonathan Beisert
T69	Mary Wilson
T70	D.L. Bearden

time in advance of the beginning of EIS preparation; therefore, the applicant begins baseline data collection well in advance of the EIS. In addition, the EIS typically relies on data collected by an applicant for a variety of other purposes, including environmental permit compliance. Regardless of the source of baseline data, it is the responsibility of the federal agency preparing the EIS (and its third-party contractor, if applicable) to thoroughly review the adequacy and accuracy of baseline data for use in describing the affected environment of the proposed project. In the case of the Three Oaks Mine EIS, the USACE reviewed the baseline data and, in many cases, discussed the data with local agency resource specialists to ensure the data's accuracy as the baseline condition for impact assessment.

The applicant also is responsible for providing engineering and design information as the basis for the project description (i.e., the Proposed Action) to be analyzed in the EIS.

In this situation, because the USACE is evaluating an applicant's permit application, information about the proposed project must come from the applicant. Nevertheless, the USACE has examined and evaluated this information and, to the extent the information is used in the NEPA analysis, the USACE has determined that the information is adequate for the USACE's analysis. Some of the general comments about data provided by Alcoa or Alcoa's contractors merely object to the use of the data for that reason alone, but do not provide any specific rationale regarding the inadequacy or inaccuracy of the data. Where used in this analysis, the USACE has critically reviewed the information and adopted it for the purposes of this analysis.

NEPA–2 Impacts of Existing Rockdale Facilities

Comment – The EIS does not analyze the environmental impacts associated with the existing Sandow Mine, power plants, and aluminum smelter. The EIS also does not analyze the future environmental impacts of exporting water to San Antonio.

Response – The CEQ regulations for implementation of NEPA require analysis of the cumulative impacts of past, present, and reasonably foreseeable future actions together with the Proposed Action. These actions relative to the proposed Three Oaks Mine are identified in Section 2.6 of the EIS. In compliance with NEPA, the potential cumulative impacts of these actions on each resource are analyzed in Chapter 3.0 of the Draft EIS.

NEPA–3 Relationship of Three Oaks Mine and EIS to SAWS and CPS Contracts

Comment – The impact analyses in the EIS do not consider the terms and conditions of the Alcoa/SAWS contract and the CPS/SAWS contract and the associated environmental impacts.

Response – The applicant's preferred alternative (Proposed Action) is described in detail in Section 2.5 of the Draft EIS. This Proposed Action does not include the potential transfer of groundwater from the mine area or vicinity to the City of San Antonio (or other users) via the Alcoa/SAWS contract or the CPS/SAWS contract. Such actions related to these water supply contracts should not be confused with the proposed pumpage of groundwater as part of the Proposed Action. Part of the water pumped for dewatering and depressurization would be used for dust control and other mine-related activities. Excess water pumped from the mine area as part of the Proposed Action initially would be discharged into local drainages and may at a later date be included in water transferred to SAWS or other users. However, the amount of water pumped from the mine area during the life of the mine would be determined by mining requirements as approved by the RRC, not by any provision of the Alcoa/SAWS or CPS/SAWS contracts. Alcoa does not own the water beneath the CPS lands and could pump only the volume required for mining purposes. Thus, water produced at the Three Oaks Mine by Alcoa that could be provided to SAWS would be a maximum of 11,000 acre-feet per year inclusive of any water produced for mine-related purposes. Issuance or denial of Alcoa's Section 404 permit application for the Three Oaks Mine (the triggering mechanism for this EIS) by the USACE would convey no corresponding approval or denial related to the potential implementation of the Alcoa/SAWS or CPS/SAWS contracts related to water supply and delivery. For purposes of this impact assessment, it is assumed that groundwater pumped for the SAWS contract would be conveyed via a pipeline directly from the well field to San Antonio without being discharged into a local drainage or surface

impoundment. If SAWS decides to convey water via any natural stream, SAWS would need to obtain any necessary permits and approvals for such actions.

Implementation of the Alcoa/SAWS and/or CPS/SAWS contracts in relation to water pumped from areas outside the Three Oaks Mine permit area is independent of the Proposed Action but is addressed in this EIS as a reasonably foreseeable future action for purposes of evaluating cumulative effects. The EIS addresses the Three Oaks Mine and estimated cumulative pumpage that would originate from the Three Oaks/Sandow area owned/operated by Alcoa. A total of 15,000 acre-feet per year from Three Oaks after the mine ceases operations is the current estimate to be pumped by CPS for SAWS from lands leased or owned by Alcoa. Pumpage of 40,000 acre-feet per year from the Sandow area is the current estimate from lands owned/operated by Alcoa in the Sandow Mine area. Any additional pumpage that CPS plans for the future from lands it owns/leases is uncertain at present and not included in the EIS because the numbers for pumpage are not firm and have not been provided to the public. The EIS presents an estimate of cumulative pumpage from the Three Oaks/Sandow area based on the best publicly available information.

The USACE expects that implementation of future SAWS development, largely undefined at the present time except for general water quantities, would be conducted in accordance with regulatory requirements and through the appropriate regulatory agencies having jurisdiction over the project at the time of development. Such permits and regulatory oversight may or may not require preparation of a separate EIS, depending on the specific details of the development and the types of permitting required at that time.

NEPA-4 Relationship Between the USACE and Other Jurisdictional Agencies' Permitting Processes

Comment - The local, state, and federal permitting processes for the proposed Three Oaks Mine do not adequately provide for input from affected interested parties.

Response - As stated on page 1-1 of the Draft EIS, the proposed project requires a permit from the USACE for the discharge of dredged and fill of materials into waters of the U.S. under Section 404 of the Clean Water Act. As this permit decision is a major federal action with the potential to significantly affect the quality of the human environment, the USACE determined that an EIS was necessary prior to making a Section 404 permit decision. The USACE procedures for implementing NEPA relative to permits issued under Section 404 of the Clean Water Act are prescribed in agency regulations. Preparation of the EIS has been conducted in accordance with these procedures and the CEQ NEPA guidelines, which provide for public and agency input prior to (scoping) and during (review and comment on the Draft EIS) preparation of the EIS.

Tables 1-1 and **1-2** of the Draft EIS identify the other environmental permits and other requirements and approvals that Alcoa must receive prior to initiation of mining at the Three Oaks Mine. While the USACE has coordinated with TCEQ relative to TCEQ's TPDES permit and the USACE's Section 404 permit and preparation of this EIS, the USACE actions are relatively independent of other local, state, and federal permitting actions. These various other permits, such as the mine permit issued by RRC, TPDES permit issued by TCEQ, and approvals for county road realignments are separate processes from the USACE's Section 404 permit and related EIS process.

Each of these permitting processes has independent opportunities for public review and participation as well as a schedule of activities. Thus, it is not generally practical for all permit processes to be coordinated in a fashion to enable completion of the EIS prior to occurrence of public participation in the other permitting processes.

4.5.2 Alternatives Issues

Alternatives–1 Clarification of Fuel Alternatives and Pricing Comparisons

Comment – The Draft EIS does not provide adequate economic justification for Alcoa's proposed continuation of lignite use at Rockdale as opposed to other fuels and fails to consider the potential savings and social benefits including reduced ash disposal costs, reduced mine power consumption, and improved air quality that could result from a switch to western coal or natural gas. The fuel cost comparison does not use current cost data.

Response – Section 2.4.1 of the Draft EIS includes a discussion of various alternatives available to Alcoa that would not require construction of the Three Oaks Mine. The EIS is not intended to provide a comprehensive economic analysis of Alcoa's mine, generating unit, and smelter operations, but rather to evaluate Alcoa's assertion that mining of local lignite represents the only practical option for generating the power necessary to maintain smelter operations at the Rockdale facility. On this basis, Section 2.4.1 presents the relative costs of alternative fuels available to Alcoa along with the estimated costs, where appropriate, for converting the facilities to use such fuels, and the advantages/disadvantages associated with each fuel type. Any comparison of this type represents a snapshot view at a particular point in time using data from sources available at that time. Obviously, the various fuel costs have continued to change since the 1999 to 2000 timeframe on which most of the costs presented in this section are based. Most of the changes over the past 2 years, however, tend to reinforce Alcoa's assertions regarding: 1) the instability of natural gas prices and 2) the price differentials between lignite and either western coal or natural gas. For example, data available on the Energy Information Administration webpage (http://www.eia.doe.gov) show natural gas prices to electric utility customers in Texas peaked in January 2001 at the equivalent of $8.74/MMBTU with an increase in annual average from $2.93 in 2000 to $5.80 in 2001. The average prices to industrial consumers generally parallel those for electric utilities.

The USACE analyzed the projected cost of Powder River Basin coal delivered to Rockdale for comparison with cost projections provided by Alcoa. The USACE recognizes that a number of electric utilities in Texas use western coal at prices below Alcoa's quoted threshold of $1.25/MMBTU. These prices, however, do not mean that Alcoa could currently execute a long-term coal supply contract for an equal or lower price. In conducting its independent estimate of the cost for western coal, the USACE used as a basis for its projections the Federal Energy Regulatory Commission database (www.ferc.gov/electric/f423/f423.htm) for Powder River Basin coal contracts delivered to 13 Texas generating stations during the period from 1996 through June 2001. These contracts covered delivery of over 250 million tons during this period. The delivered price for each contract was adjusted by the difference in rail haul distance and estimated incremental cost for delivery to Rockdale since transportation costs are a major factor in coal pricing. Considerations for competing transport pricing from the Union Pacific and Burlington Northern Santa Fe railroads were not taken into account as this opportunity may or may not be available for a given contract.

The projected delivered prices by contract were weighted by volume to calculate a weighted average by quarter for the 5.5-year history evaluated. Review of the adjusted delivered price shows that projected weighted average pricing declined from approximately $1.67/MMBTU in the first half of 1996 to approximately $1.36/MMBTU in the last half of 1999 and then increased to approximately $1.45/MMBTU in the first half of 2001 (see **Figure 4-1**). The overall weighted average for the 5.5-year period was approximately $1.49/MMBTU.

Alternatives–2 Clarification of No Action Alternative

Comment – The No Action Alternative should not include potential water development for SAWS.

Response – As described in Section 2.3 of the Draft EIS, the No Action Alternative would involve the USACE denying Alcoa's application for an individual permit pursuant to Section 404 of the CWA. This denial would not be anticipated to affect reasonably foreseeable future actions in the vicinity that are not considered dependent on the proposed Three Oaks Mine. Hence, future development of local groundwater resources for municipal use appears to be a probable activity that should be recognized under this alternative. For this reason, the USACE has included the SAWS contract as a factor in this scenario.

Alternatives–3 Introduction of Alternative Mine Plan into Final EIS

Comment – The Draft EIS fails to address the alternate mine plan contained in Alcoa's Mine Application Supplements 4 and 5 as subsequently approved by the RRC.

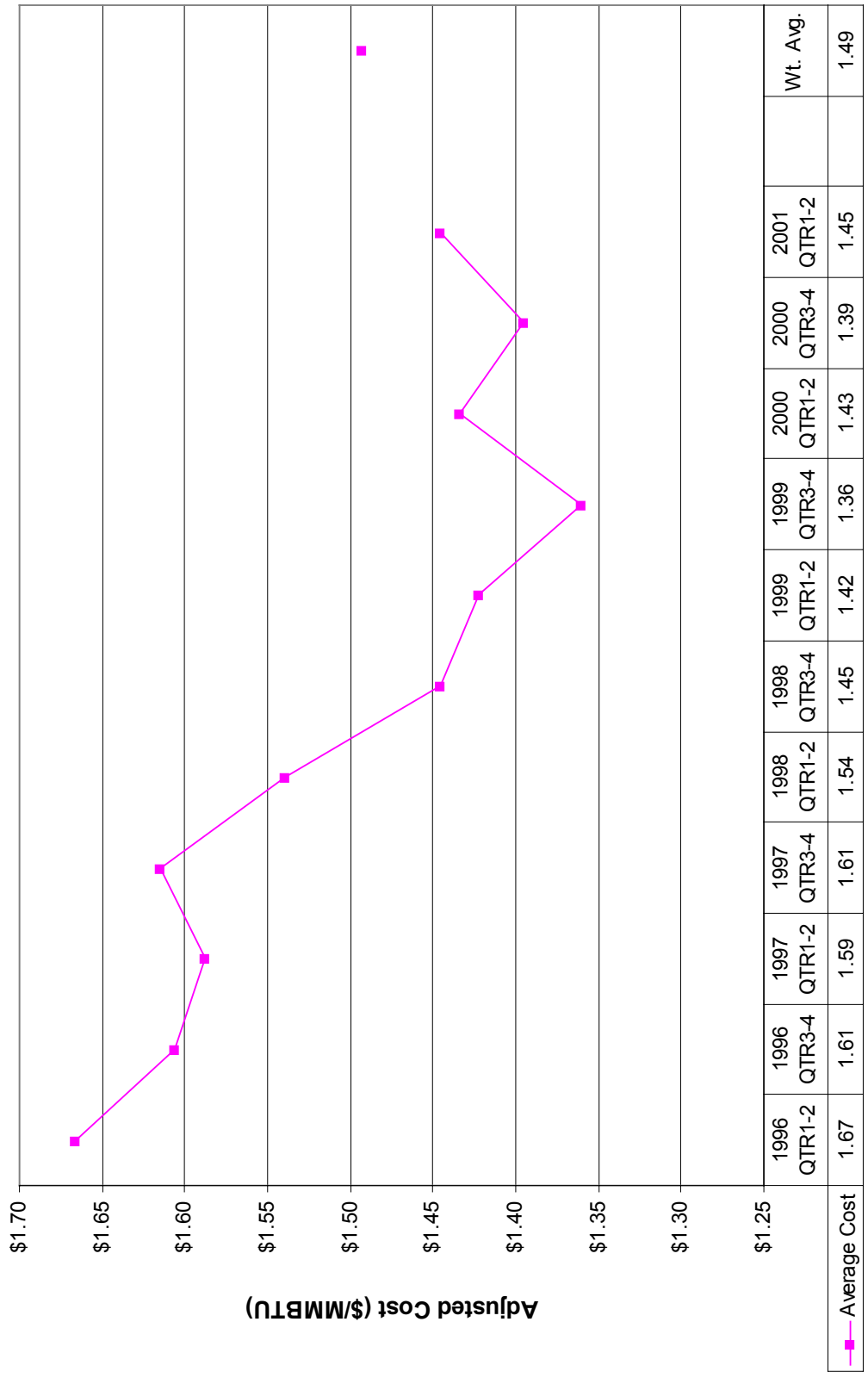
Response – Because of potential delays in obtaining the desired approvals from Bastrop County and the Texas Department of Transportation for relocation of Farm-to-Market roads 619 and 696 and various Bastrop County roads, Alcoa submitted an alternative mine plan to the RRC that addresses commencement of mining in the absence of these road relocations. This alternative plan, as described in Supplements 4 and 5 to Alcoa's RRC permit application, was approved subsequent to publication of the Draft EIS. It was approved by the RRC on September 20, 2002. The differences between this alternative mine plan and Alcoa's preferred plan (the Proposed Action) are described in Section 2.7 of the Final EIS. The potential impacts of the alternate mine plan are addressed in Chapter 3.0 of the Final EIS for potentially affected resources.

4.5.3 Proposed Action Issues

PA–1 Ash Disposal and Recycling

Comment – The Draft EIS fails to adequately address the potential impacts of disposing of over 800,000 tons of ash at the proposed Three Oaks Mine.

Response – For a number of reasons (presented below in more detail) the USACE believes the Draft EIS accurately assessed the potential environmental impacts associated with the proposed use and disposal of bottom ash at the Three Oaks Mine. This response provides specific additional information and reviews in more detail the information considered in preparation of the Draft EIS.



	1996 QTR1-2	1996 QTR3-4	1997 QTR1-2	1997 QTR3-4	1998 QTR1-2	1998 QTR3-4	1999 QTR1-2	1999 QTR3-4	2000 QTR1-2	2000 QTR3-4	2001 QTR1-2	Wt. Avg.
Average Cost	1.67	1.61	1.59	1.61	1.54	1.45	1.42	1.36	1.43	1.39	1.45	1.49

Figure 4-1. Adjusted PRB Fuel Costs FOB to Alcoa Rockdale Plant - Actual Data 1996 through June 2001 (Adjusted for Rail Haulage Differential)

Note: PRB = Powder River Basin
FOB = Freight on Board

As noted in the Draft EIS, and reflected in comments on the Draft EIS, the potential for impacts from this process includes the migration of potentially hazardous trace constituents into groundwater (the Calvert Bluff aquifer) and surface water runoff. The Draft EIS concludes (Section 3.2.3.2) that "the burial of bottom ash in the reclaimed pits should not degrade water in the nearby Calvert Bluff aquifer." While the Draft EIS did not state conclusions specifically addressing the anticipated impacts to surface water (through storm water runoff) associated with use of bottom ash as aggregate in roadbed construction, it concluded that adverse surface water quality impacts, collectively from all potential sources, were not anticipated.

The overall assessment that no adverse environmental impacts would be expected from bottom ash disposal was based on consideration of four issues, which together define the potential for this disposal to create environmental impacts. The four issues and the key information considered for each of these issues are presented below.

Issue 1: Existing studies identifying trace constituents present in the ash materials, and management practices that potentially would represent a threat to human health or the environment.

A number of comments refer to studies conducted by the USEPA to evaluate the potential risks associated with various disposal practices used to manage fossil fuel combustion (FFC) wastes, and public comments generated from review of these studies. This series of documents consists of an initial Report to Congress (USEPA 1999a), subsequent responses to public comments concerning the aforementioned report (USEPA 2000), and supporting documentation regarding the technical studies that formed the basis of the report (Center for Environmental Analysis 1998; USEPA 1998a, 1999b).

Data in these reports were developed from both fly ash and bottom ash at a variety of facilities and locations across the nation. These studies were undertaken to evaluate the need for changes in regulatory requirements for the management of these materials. Specific aspects were:

- To define the universe of potentially hazardous constituents contained in FFC wastes;
- To identify those potentially hazardous constituents recognized as likely sources of adverse impacts (i.e., those that should be considered in evaluating the potential impacts from FCCs);
- To define the range of concentrations of such constituents (both total and leachable); and
- To evaluate the environmental impacts associated with various disposal practices.

Regarding the constituents of potential environmental concern in coal combustion wastes, the USEPA found that these constituents were limited to eight metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) listed in the RCRA as the basis for defining Toxicity Characteristic Hazardous Waste. No organic constituents, including dioxins, and no radionuclides were identified at potential levels of concern in the characterized wastes (USEPA 1999a). In response to public comments questioning the adequacy of the data developed by the USEPA to support its conclusions, the agency stated, "EPA used all of the data available to it in its characterization of FFC wastes. The Agency is obligated to make use of the best available data and has done so in this case with full and explicitly noted consideration of its potential

limitations. The EPA believes its characterization to be complete and accurate. With regard to the constituents considered, the EPA believes it has described all the constituents that were tested for, and likely to be present in FFC waste as completely as possible based on the available data" (USEPA 2000). The data used in the Draft EIS to evaluate the potential environmental impacts associated with the management of FFC wastes at the Three Oaks Mine include data for all of the constituents of potential concern identified by the USEPA in its studies.

Regarding the potential consequences associated with various management practices, the USEPA evaluated a number of practices, which included "beneficial use" and "minefilling." Beneficial use specifically included use as road bed material with the possible exceptions of minefilling and agricultural beneficial uses, the USEPA concluded that "No significant risks to human health and the environment were identified or believed to exist for any beneficial use of these wastes" (USEPA 2000). Consequently, the USEPA determined that the current regulatory approach to these materials, used in this manner, should continue. Minefilling, as reviewed by the USEPA, is the practice of filling surface or subsurface voids created from mining with FFC waste materials. This practice involves the placement of large, contiguous volumes of undiluted waste material; in comparison, Alcoa proposes the dispersed placement of relatively small volumes of bottom ash within natural backfill materials. Alcoa's Three Oaks Mine plan involves beneficial use of a small portion of the FFC waste produced at the Rockdale power generating facilities, and ultimate dispersed placement of this material within the backfilled mine area during reclamation. This process does not constitute minefilling as evaluated by the USEPA. The specifics of these management practices are presented in detail in the following section of this response.

The USEPA's findings with respect to beneficial uses of coal ash are based in part on non-groundwater exposure pathways and human health and ecological risks (Center for Environmental Analysis 1998). These findings are applicable to the assessment of the Proposed Action relative to potential exposure from surface water runoff. The USEPA's contractor conducted extensive transport and exposure modeling for a variety of disposal methods that could contribute to surface water transport of coal combustion by-products (Center for Environmental Analysis 1998). The Universal Soil Loss Equation and constituent loading models were applied to the prediction of transport and exposure. The conclusions reached by the USEPA were based on extensive waste characterization and exposure pathway modeling, which the USEPA believes are adequate to support the agency's conclusions regarding beneficial uses (USEPA 2000). The consideration presented in the Draft EIS, in conjunction with the information provided in this response, is consistent with and adequate for the evaluation of potential environmental impacts associated with the use and disposition of lignite combustion by-products at the Three Oaks Mine, and represents an appropriate basis for evaluation of potential impacts. Additionally, no minefilling use of lignite bottom ash is proposed for the Three Oaks Mine (Hodges 2002d).

Issue 2: The amounts of ash materials that ultimately would be placed or disposed of in mining excavations and beneficially used at other locations during mine operation.

The actual amounts of ash material that ultimately would be returned to mining excavations is an important factor for assessing the potential impacts associated with this practice. Likewise, the amount of such material used in a manner that could allow migration of constituents to the environment during mine operations is important. As discussed in Section 1.1.2.2 of the Draft EIS, Alcoa's generating units at

Rockdale currently produce approximately 340,000 tons of bottom ash and 610,000 tons of fly ash each year; a total annual production of coal combustion waste (CCW) of approximately 950,000 tons. Approximately 30 percent of the fly ash and 57 percent of the bottom ash is recycled for commercial use. As an example, bottom ash from Alcoa's generating units is sold for use in sandblasting grit and roofing tile material. Remaining ash from Alcoa's Units 1, 2, and 3 that is not recycled is disposed of in a manner approved by TCEQ.

During operation of the Three Oaks Mine, excess fly ash (that not recycled for commercial use) would continue to be disposed of at a TCEQ-permitted, lined landfill adjacent to the generating station and the Sandow Mine, and excess bottom ash would be disposed of at appropriately permitted off-site disposal facilities. The only ash to be used (and ultimately disposed of) at the Three Oaks Mine would be approximately 18,225 tons per year of bottom ash from TXU Unit 4 that would be used for road surfacing materials (aggregate) during operation of the mine. As these roads are closed and removed during mining operations, this bottom ash material would be incorporated into the mine spoil and buried to a depth of at least 4 feet. Information clarifying the amount of bottom ash to be so used has been added on page 2-39 of the Final EIS. At the time the Draft EIS was prepared, this quantity had not been defined, though it was understood that a relatively small portion of the bottom ash generated would be required for this beneficial use and eventually would be returned to the backfilled mine area.

The 18,225 tons per year of bottom ash from TXU Unit 4, which ultimately would be placed in the backfilled mine area, is less than 2 percent of the total annual ash (CCW) generation from the generating units at Rockdale, and approximately 5 percent of the bottom ash generated. The specific quantities presented in the Final EIS address various comments indicating that undetermined amounts of "coal combustion waste (which consists of both fly ash and bottom ash) may be placed in mining excavations." Finally, it should be noted that the potentially hazardous constituents present in the lignite combustion waste stream are present in the unmined lignite (and surrounding soils). By returning 2 percent of the CCW, consisting only of bottom ash, to mined areas, the total amount of potentially hazardous constituents would be reduced, compared to existing quantities. To put this in perspective, on a volumetric basis, this amount of bottom ash represents approximately 0.03 percent, or 300 parts per million, of the total volume of backfill that would be placed during the life of the mine.

Issue 3: The physical and chemical nature of the materials to be placed; in particular, the leachability of potentially hazardous constituents out of the materials into ground and surface water.

The chemical and physical nature of coal combustion wastes depends on both the source coal and the specific form of the waste. Fly ash and bottom ash are significantly different in terms of their potential to leach potentially hazardous constituents to the environment. As noted above, the only CCW that ultimately would be returned to mining excavations is from TXU Unit 4 and represents approximately 5 percent of the bottom ash waste stream from the Rockdale facility. Bottom ash is produced in the form of relatively large particles and is of a vitrified nature (glass- or sand-like). Accordingly, the potential for leaching of constituents is significantly lower than that of fly ash.

Potentially hazardous constituents are ubiquitous in the environment. The heavy metals noted by the USEPA to be of potential concern in FFC wastes are present in soils, at relatively similar concentrations. It is

important to understand that the environmental risk, hazard, or impact posed by a material is based on three factors:

- Whether that material contains constituents that are potentially hazardous (i.e., constituents that may, when receptors are exposed to them at some concentration, cause adverse health impacts);

- Whether potentially hazardous constituents are present at high enough concentrations to cause adverse health impacts; and

- The extent to which receptors (human or environmental) are or might be exposed to such constituents at such levels.

In the case of lignite bottom ash used and ultimately disposed of in the manner anticipated under the Proposed Action, the appropriate measure of risk or hazard, and hence impact, is:

- The extent to which the potentially hazardous constituents in the bottom ash can be expected to be released to the environment in a manner that may reach a receptor; and

- A comparison of the projected concentrations of these constituents in such environmental releases against standards that define thresholds for adverse health effects.

While the information developed by the USEPA concerning FFC wastes is comprehensive and useful for the global purposes for which it was developed, it does not provide a basis for quantitatively projecting environmental impacts at the proposed Three Oaks Mine. As indicated above, the appropriate basis for evaluating the extent to which constituents in the bottom ash used as road aggregate, and then placed in excavations at the Three Oak Mine, can be expected to leach to the environment is analysis of the leachability of this specific material. Leachability data of bottom ash from TXU Unit 4 (the specific material to be placed in mining excavations) was presented in Alcoa's RRC mine permit application (as noted in Section 2.5.1.9 of the Draft EIS). Comments note the same data presented in the mine permit application were received and reviewed by commentors (Neighbors for Neighbors comments, page 69).

These data originally were developed and presented to the TCEQ to support a waste classification determination (as a Class III industrial waste) relative to disposition of this material at the Sandow Mine. The data are presented in Appendix 139-C of Alcoa's RRC permit application (Alcoa 2000 [Volume 8]), waste characterization information presented to TCEQ (then TNRCC) (Alcoa 1997). The data consist of both Toxicity Characteristic Leaching Procedure (TCLP) data and TNRCC 7-day Distilled Water Leaching Test data. The data are presented and compared to relevant standards for determining the risk posed to human health in the following section of this response.

Comments from Neighbors for Neighbors (pages 69 and 71) suggest that the data presented for waste classification of bottom ash from the TXU Unit 4 were inappropriate and inadequate to support the determination by TCEQ that bottom ash from the TXU Unit 4 facility met the stringent requirements for a Class III industrial waste. A review of these data indicates that the sampling, analysis, and subsequent waste classification were performed in accordance with applicable regulatory requirements. The process by

which TCEQ determines waste classifications, and the data required for such determinations, is set forth in a guidance document (TNRCC 1998). This guidance defines a step-wise process for first determining if a representative sample of an industrial waste meets the definition of a hazardous waste, using knowledge of the process generating the waste and TCLP data. If it is found to not be a hazardous waste, this guidance then requires a subsequent determination if it meets the definition of a Class II or Class III waste, utilizing the TCEQ 7-day Distilled Water Leaching Test.

TCLP (USEPA Method 1311) data are required to determine if a representative sample of a waste meets the definition of a hazardous waste, on the basis of the Toxicity Characteristic. A comment from Neighbors for Neighbors notes this test method "is the only test methodology for characterizing whether a material is hazardous" (Neighbors for Neighbors comments, page 69). However, as clearly defined in Texas and federal hazardous waste regulations (and reflected in the Draft EIS), this test methodology is solely a measure of whether a material meets the regulatory definition of a hazardous waste.

This procedure involves agitating the waste material in an acidic solution (at a pH of 2.5), and subsequently measuring the concentration of a specified set of constituents in the leachate produced. The numeric criteria associated with the TCLP (Toxicity Characteristic levels) were developed by the USEPA. They are found in Table 1 of 30 TAC Chapter 355, Subchapter R. The basis for these numerical standards, explained at the time the TCLP was promulgated by the USEPA in the Federal Register (55 FR 11862, March 29, 1990), was to define leachate concentrations that typically would be protective of groundwater in the event of unregulated, improper disposal of waste materials. Using an acidic solution for leaching is a very conservative basis for determining the leaching potential of a waste material. Lowered pH significantly increases the solubility, and hence mobility, of metals.

As stated in the Draft EIS, TCLP data from a 1994 analysis of a representative sample (composed of approximately 25 aliquots collected over a 200-square-foot area) of bottom ash from TXU Unit 4 demonstrated that this material does not meet the regulatory definition of a Toxicity Characteristic hazardous waste. As seen, and discussed in more detail in the following section, only one metal, barium, was found above detection levels in the TCLP leachate. Notably, the measured concentration was 1.1 percent of the USEPA standard (Maximum Contaminant Level [MCL]) for drinking water (USEPA 2002b).

As indicated above, if a waste material is shown to not be a hazardous waste, TCEQ then requires 7-day Distilled Water Leaching Test data to determine if the material is classified as a Class II or Class III waste. The stringent and environmentally protective standards for Class III wastes are defined (TNRCC 1998) as "inert and essentially insoluble, usually including but not limited to materials such as rock, brick, glass, dirt, certain plastics, rubber, and similar materials that are not readily decomposable." The requirements for being classified as a Class III waste, and the potential for environmental impacts associated with such wastes are further clarified by a recent TCEQ (2002) response to public comments on the Three Oaks Mine TPDES permit application (emphasis added):

> "Bottom ash is a Class III waste under the terms of TCEQ's rules on industrial solid waste. To be so classified, a material must be inert and essentially insoluble and pose no threat to human health or the environment. In August 1995, the TCEQ issued a Co-Product Use Determination for several coal combustion by-products that approved the use of bottom ash for road construction material."

A comment from Neighbors for Neighbors (page 71) states that "typically, the TCEQ regulates bottom ash and fly ash as Class II industrial solid waste." As reflected in the above response from TCEQ, bottom ash typically meets the criteria for a Class III waste and is typically regulated as such. Fly ash, as noted above, is different in chemical and physical properties. Depending on the specific source, it may or may not meet the criteria for Class III. Comments from Neighbors for Neighbors (pages 45, 70, and 72) also assert that materials meeting the criteria for Class III wastes should be managed in disposal facilities that meet the standards required for the disposal of municipal solid waste , as put forth in the RCRA Subtitle D solid waste management program. The existence of the Subtitle D regulations reflects the USEPA's recognition that municipal solid waste is not inert and does contain soluble, potentially hazardous constituents, and if improperly managed, these constituents represent a threat to human health and the environment. Conversely, the less stringent management standards promulgated by TCEQ for materials meeting the Class III criteria are based on their stated determination that these materials "pose no threat to human health or the environment."

Eight samples of bottom ash from TXU Unit 4 were analyzed using the TCEQ 7-day Distilled Water Leaching Test. Four samples of this material were collected and analyzed by the same TCEQ-specified method in 1986. Details on the collection of these samples were not available. Four composite samples, consisting of approximately 25 aliquots collected over a 400-square-foot area, were collected and analyzed in 1992. To obtain a Class III determination, TCEQ guidance requires the results to be compared against a table of MCLs. These samples were all determined to be below the MCLs. This table is found in Appendix D of the guidance (TNRCC 1998).

The TCEQ 7-day Distilled Water Leaching Test, compared to the TCLP test, is the most appropriate basis for determining the leachability of a material when exposed to rainwater or groundwater within a normal pH range, and thus evaluating the potential for constituent concentrations in the leachate derived from the material to pose a risk of degrading receiving waters. As noted in the Draft EIS (page 3.2-29), it is anticipated that long-term pH levels in the groundwater within the reclaimed areas of the mine would be within a normal range of 6.0 to 7.5. As discussed in more detail below, the concentrations of constituents of potential concern expected to be leached from this material are below drinking water standards (see Issue 4 below). The analysis presented in the Draft EIS is consistent with and adequate for the chemical and physical characteristics of the bottom ash that would be placed in the backfilled mine areas and represents an appropriate basis for evaluation of potential impacts.

Issue 4: The relative concentrations at which such constituents can be expected to leach into water compared to established standards that have been determined to pose no threat to human health or the environment (i.e., would not degrade receiving ground or surface waters).

As discussed above, the leachability of constituents from bottom ash from the TXU Unit 4 was analyzed in 1986, 1992, and 1994. The results of the 1992 and 1994 data, which were developed in accordance with TCEQ sampling and analytical requirements, provided to TCEQ in 1997 (Alcoa 1997), and presented in Appendix 139-C of Alcoa's RRC permit application to the RRC (Alcoa 2000 [Volume 8]), are summarized in **Table 4-2**. This table also incorporates the data developed by Alcoa in 1986 (Hodges 2002d).

Table 4-2
Sandow-TXU Unit 4 Bottom Ash Leachability Analyses

Analytical Procedure	Constituent	Average Concentration in Leachate[1] (mg/l)	Maximum Concentration in Leachate[2] (mg/l)	Toxicity Characteristic Level (for hazardous waste)[3] (mg/l)	Maximum Contaminant Level (for drinking water)[4] (mg/l)
TCLP [5,6]			For constituents not detected, detection limit (DL) is shown[7]		
	Arsenic	ND[8]	ND - 0.02 DL	5.0	0.01[9]
	Barium	1.1	1.1	100	1.0
	Cadmium	ND	ND – 0.05 DL	1.0	0.005
	Chromium	ND	ND – 0.05 DL	5.0	0.1
	Lead	ND	ND – 0.2 DL	5.0	0.05[10]
	Mercury	ND	ND – 0.004 DL	0.2	0.002
	Selenium	ND	ND – 0.2 DL	1.0	0.05
	Silver	ND	ND – 0.1 DL	5.0	0.05
7-Day Distilled Water Leachate[11,12]					
	Arsenic	ND	ND-0.005-0.05 DL	--	0.05[9]
	Barium[13]	0.168	0.2	--	1.0
	Cadmium[14]	0.00275	0.008	--	0.005
	Chromium[15]	0.012	0.015	--	0.1
	Lead	ND	ND-0.005-0.02 DL	--	0.05[10]
	Mercury	ND	ND-0.0002-0.001 DL	--	0.002
	Selenium[16]	0.01	0.0054	--	0.05
	Silver	ND	ND-0.005-0.01 DL	--	0.05
	Nickel[17]	0.0125	0.02	--	0.1[18]
	Thallium	ND	ND-0.005 DL	--	0.002[19]
	Fluoride	0.232	0.30	--	4.0[20]
	Nitrate (as N)	0.215	0.23	--	10.0[21]
	Total dissolved solids	335.5	356	--	500

[1]Average of all samples; average uses ½ of laboratory detection limit for results reported as Not Detected (30 TAC 290).
[2]The maximum concentration reported from all samples. For analyses where all samples were reported as Not Detected, the laboratory DL is shown.
[3]The leachate concentration defining if a material is a Toxicity Characteristic hazardous waste (Table 1 of 30 TAC Chapter 355, Subchapter R).
[4]Values shown are MCLs as presented in TCEQ guidance criteria for Class III wastes (TNRCC 1998, Appendix D). In almost all cases, these MCLs correspond to MCLs (drinking water standards) currently promulgated by the USEPA (USEPA 2002b). Where other, lower values exist for MCLs in the current USEPA listings, the lower value is shown, and the source noted.
[5]Toxicity Characteristic Leaching Procedure; USEPA Method 1311.
[6]The results shown are from analysis of a representative composite sample in 1994 (Sample ID Unit 4 Bottom Ash).
[7]Reported laboratory detection limits varied between the 1986 and 1992 analyses. In cases where analyses for a constituent were performed in both years, and the constituent was not reported as detected, the range of DLs is shown.
[8]Not Detected (at the reported laboratory method detection limit) (30 TAC 290).
[9]TNRCC 1998 shows a MCL of 0.05 mg/l. USEPA 2002b shows a lower MCL for arsenic of 0.01 mg/l.
[10]The USEPA currently does not list a MCL for lead. USEPA 2002b identifies a MCL goal of zero.
[11]TCEQ method required for Class III waste determination (TNRCC 1998, Appendix F).
[12]The results shown are from 4 samples analyzed in 1986 (Sample IDs 1, 2, 3, and 4), and 4 representative composite samples analyzed in 1992 (Sample IDs 4BA 4-TOB, 4BA 3-MHB, 4BA 2 MHB, and 4BA 1 MHB).
[13]Of the eight samples analyzed, a detectable concentration of barium was seen in one sample in 1986.
[14]Of the eight samples analyzed, a detectable concentration of cadmium was seen in two samples in 1986.
[15]Of the eight samples analyzed, a detectable concentration of chromium was seen in four samples in 1986.
[16]Of the eight samples analyzed, a detectable concentration of selenium was seen in three samples; one in 1986 and two in 1992.
[17]Of the eight samples analyzed, a detectable concentration of nickel was seen in two samples in 1986.
[18]MCL from USEPA 2002b; TNRCC 1998 does not present an MCL for nickel.
[19]MCL from USEPA 2002b; TNRCC 1998 does not present an MCL for thallium.
[20]MCL from USEPA 2002b; TNRCC 1998 does not present an MCL for fluoride.
[21]MCL from USEPA 2002b; TNRCC 1998 does not present an MCL for nitrate as N.

In summary, the 1986 and 1992 data show that the concentrations of potentially hazardous constituents recognized to be of concern by the USEPA, that could be expected to leach from TXU Unit 4 bottom ash when exposed to rainfall or groundwater, are well below established drinking water standards. These standards have been set to be fully protective of human health and the environment. When it is considered that these materials would be dispersed at low concentrations throughout mine backfill material, any impacts to groundwater from such leaching would be further diluted. The information presented in the Draft EIS, in conjunction with the information presented in this response, is consistent with and adequate for identifying and assessing the environmental impacts that could be expected from the proposed use and disposition of bottom ash at the Three Oaks Mine.

The conclusion in the Draft EIS that the burial of bottom ash in the reclaimed pits should not degrade water in the nearby Calvert Bluff aquifer is fully supported by these data. On the same basis, the leaching of potentially hazardous constituents to storm water runoff at drinking water concentrations, as a result of rainfall on mine roads where this material would be used as road surfacing material, would not adversely impact runoff water quality. The information in the Draft EIS and this response is adequate to understand the volume, use and disposition, and relevant chemical and physical nature of bottom ash at the Three Oaks Mine. As a result, the information presented adequately identifies and considers the potential environmental impacts associated with the planned use and disposition of bottom ash, and provides an appropriate basis for concluding these practices would not degrade water quality or represent a threat to human health or the environment.

PA-2 Regulations Governing the Use and Disposal of Bottom Ash

Comment – The Draft EIS does not correctly identify the waste classification of bottom ash.

Response – The TCEQ is authorized under RCRA to promulgate and enforce all RCRA regulations for classification, management, and disposal of hazardous and nonhazardous wastes. Hence, disposal of waste materials in accordance with state regulations (Title 30 TAC) is in accordance with RCRA regulations.

Alcoa's handling, recycling, and disposal of ash (both fly ash and bottom ash) at its Sandow Mine are subject to regulations administered by both TCEQ (for solid waste handling and disposal) and RRC (for mining operations). These operations at Sandow are not at issue in this EIS except as they may relate to assessment of cumulative impacts for the Three Oaks Mine. The potential contribution of ash handling and disposal activities to cumulative environmental effects are addressed in appropriate sections of the Draft EIS and further clarified in the response to general comment PA-1.

As indicated in the Draft EIS and further clarified in the response to general comment PA-1, the bottom ash from TXU Unit 4 that would be used as road surfacing material at the Three Oaks Mine has been classified by TCEQ as a nonhazardous Class III waste. Based on demonstrated chemical characteristics (as discussed in the response to general comment PA-1), the proposed use of bottom ash for road surfacing material and its subsequent burial in the mine pit are not considered to pose a significant threat to human health or the environment. The use of bottom ash for road surface application meets the state regulatory criteria for use or recycling of a nonhazardous by-product. Specifically, it meets the following state criteria of being:

- A by-product (30 TAC §335.17(a)(3));
- Nonhazardous (30 TAC §335.507);
- Recycled if it is used, reused, or reclaimed (30 TAC §335.17(a)(7)); and
- Used or reused as an effective substitute for a commercial product (30 TAC §335.17(a)(5)(B) or 30 TAC §355.1(124)(F)(ii)).

When bottom ash is used as a road surfacing material, the State no longer considers it to be a solid waste (see 30 TAC §355.1(124)(F)(ii)); however, the material again would be classified as such when it is removed for disposal. Upon abandonment and removal of the roads involved, the bottom ash/soil mixture from the road surface would be removed and buried in the active mining area as a Class III nonhazardous waste. The placement of this material would be conducted in accordance with applicable regulations in effect at that time and would be subject to approval or permitting by TCEQ under applicable solid waste regulations.

4.5.4 Groundwater Issues

GW-1 Use of the Groundwater Availability Model (GAM) for Cumulative Impact Assessment

Comment – The EIS does not use the TWDB GAM for estimating cumulative impacts, even though this is the best model for the region. What is the rationale for not using this model?

Response – The GAM for the Central Carrizo-Wilcox Aquifer System was under development during preparation of the Three Oaks Mine Draft EIS. The USACE approached the TWDB about the availability of the model and its use for the Three Oaks Mine Draft EIS. The TWDB recommended that the GAM for the Carrizo-Wilcox not be used in the EIS because it was still under development and declined to release any data on the model to the USACE. The draft GAM for the Carrizo-Wilcox became available on the TWDB website after release of the Three Oaks Mine Draft EIS. The USACE has reviewed the draft GAM for the central Carrizo-Wilcox aquifer. The GAM covers a larger area than the Modified Region G Model and has more layers. Aquifer properties used in the GAM are similar to those used in the Modified Region G Model. For the most part, the GAM for the central Carrizo-Wilcox is an extension of the Region G Model of R.W. Harden & Associates, Inc. However, pumpage in the GAM is different than that used in the Modified Region G Model. SAWS pumpage is not included in the GAM. The GAM also has irrigation and stock water pumpage; the Modified Region G Model specifically excludes this pumpage. See also the response to general comment NEPA-1 in Section 4.5.1 of the Final EIS.

GW-2 Use of the Dutton Model for Cumulative Impact Assessment

Comment – Why was the Dutton model not used for the groundwater cumulative impact assessment in the EIS?

Response – The groundwater model developed in 1999 by Alan Dutton of the Texas Bureau of Economic Geology (Dutton 1999) was reviewed by the USACE for possible use in the Three Oaks Mine EIS. This model was one of the first attempts to develop a groundwater model for the Carrizo-Wilcox Aquifer System. The model is limited in its areal extent and did not include the Bryan/College Station area and its municipal pumpage. The data used in the model already had been superseded by data available on the TWDB

website and in the draft version of Water for Texas-2002. The USACE considered the Region G groundwater model of R.W. Harden & Associates, Inc. (RWHA 2000) to be more representative of the cumulative impact area for the Three Oaks Mine EIS, and the Region G model was, therefore, selected for use in the Three Oaks Mine EIS for estimating cumulative impacts. This model was expanded in area to include most of Bastrop County and the reach of the Colorado River that flows through Bastrop County. This expanded model became the Modified Region G Model used in the Three Oaks Mine EIS.

GW-3 Reliance on Alcoa Groundwater Models for Impact Assessment

Comment – The EIS uses proprietary groundwater models developed by Alcoa and its consultants to determine impacts. Therefore, how can the EIS be based on objective analyses?

Response – The EIS uses two models for estimation of groundwater impacts: 1) the Three Oaks Life-of-Mine (LOM) groundwater model developed for Alcoa by R.W. Harden & Associates, Inc., and 2) the Modified Region G Model, which is based on the publicly available Region G Carrizo Wilcox Groundwater Model developed for the Texas Water Board by R.W. Harden & Associates, Inc. The Three Oaks LOM model was used to determine the probable direct impacts of mine dewatering and depressurization at the proposed Three Oaks Mine. The model was developed for that purpose by R.W. Harden & Associates, Inc. The USACE used the model as designed to estimate groundwater impacts. The Modified Region G Model was used to estimate cumulative impacts of regional municipal pumpage, including pumpage of water by the proposed Three Oaks Mine. The models were verified for use in the EIS by the USACE, the U.S. Geological Survey, and the Office of Surface Mining (Three Oaks LOM model only). The methodology used to verify the Three Oaks LOM model is described on pages 3.2-19 and 3.2-20 of the Draft EIS; the methodology used for the Modified Region G model is described on pages 3.2-32 and 3.2-37 of the Draft EIS. The models were found suitable for use in estimating impacts of groundwater pumpage by all of the reviewing agencies. Complete descriptions of the Three Oaks LOM Model and the Modified Region G Model, including model review and verification, are found in the respective model technical reports (ENSR Corporation and HydroGeo, Inc. 2002a,b).

GW-4 Groundwater Impacts of Bottom Ash Disposal

Comment – The EIS does not adequately address the degradation of groundwater that would be caused by bottom ash disposal. This disposal would seriously affect water quality in private wells near the Three Oaks Mine.

Response – See the response to general comment PA–1 for a description of the proposed recycling and disposal of bottom ash from the Three Oaks Mine. Data presented in the response to general comment PA-1 show that leachate test results on TXU Unit 4 bottom ash from existing Sandow Mine lignite are well within TCEQ limits; the ash, therefore, is classified as a Class III (non-hazardous) waste. Bottom ash from the proposed Three Oaks Mine is anticipated to have similar characteristics to Sandow Mine bottom ash. Thus, bottom ash that would be generated from burning lignite from the Three Oaks Mine is not expected to degrade groundwater or surface water quality and would not pose a threat to human health or the environment.

GW-5 Groundwater Conservation Districts and Groundwater Withdrawal by the Three Oaks Mine

Comment – The Draft EIS does not discuss the restrictions on groundwater withdrawal in Bastrop and Lee Counties that could be imposed by the LPGCD.

Response – The Texas RRC regulates groundwater use by surface mines that is related to mining or mining needs. The law passed to create groundwater conservation districts, such as the recently enacted LPGCD, specifically exempts mine groundwater from the district's jurisdiction. The Three Oaks Mine would pump groundwater for dewatering and depressurization throughout the life of the mine; this groundwater use would be regulated by the RRC. When the Three Oaks Mine ceases operation, any continued pumpage of groundwater from the mine permit area by CPS/SAWS would be subject to the jurisdiction of the LPGCD or other applicable groundwater conservation districts. Similarly, while the Sandow Mine is operating, groundwater use would be regulated by the RRC. Subsequent groundwater pumpage from the Sandow Mine permit area by Alcoa for SAWS after the cessation of Sandow mining may be under the jurisdiction of groundwater conservation districts. In addition, during mine operation, any groundwater pumping in excess of mine needs (dewatering/depressurization) would be subject to the jurisdiction of groundwater conservation districts.

GW-6 Impacts to Colorado River from Three Oaks Mine Groundwater Pumpage

Comment – Pumpage of groundwater from the Simsboro aquifer will cause a loss of water from the Colorado River. The Dutton report says that 50,000 acre-feet per year will be lost by pumping from the Simsboro aquifer. Why is this impact not addressed in the EIS?

Response – The potential effects of Three Oaks Mine pumpage on groundwater base flow contribution to the Colorado River were estimated using the Modified Region G Model. The cumulative impact scenario for Three Oaks Mine pumpage plus municipal pumpage from year 2000 to year 2030 was run in the model; this is the Three Oaks without SAWS cumulative impact scenario as described in Section 3.2.3.3 of the Draft EIS. Based on the modeling results for the Simsboro aquifer, Dutton estimated reduction in groundwater flow contribution to the Colorado River due to pumpage at the Three Oaks Mine and municipal pumpage in the Region G model area is 1.46 cfs at year 2030. For all aquifers in the model domain (i.e., the Hooper, Simsboro, Calvert Bluff, Carizzo, and Reclaw aquifers), the estimated total reduction in base flow contributions to the Colorado River is 1.97 cfs. To put this potential effect in perspective, the average annual flow rate of the Colorado River currently ranges between 1,000 and 5,000 cfs. Low-flow periods currently have average flow rates of 500 to 1,000 cfs. Therefore, the estimated cumulative reduction in groundwater base flow contribution to the Colorado River due to pumpage from the Three Oaks Mine and municipal pumpage in the modified Region G Model area is quite small (typically less than 0.4 percent) relative to current Colorado River low flows.

GW-7 Impacts to Lake Bastrop from Three Oaks Mine Groundwater Pumpage

Comment – Pumpage of water at Three Oaks will lower water levels in Lake Bastrop. Why is this impact not addressed in the EIS?

Response – Lake Bastrop lies mostly within the Calvert Bluff and younger formations. It is not in hydraulic communication with the Simsboro aquifer. Pumpage of water from the Calvert Bluff by the Three Oaks Mine to dewater the lignite sand zones is estimated to generate a maximum drawdown in the 200 lignite zone of 10 feet in the vicinity of Lake Bastrop. This lignite zone lies well below Lake Bastrop and does not communicate hydraulically with the lake. Therefore, dewatering of the Three Oaks Mine is not anticipated to affect Lake Bastrop. Regional cumulative pumpage in the Calvert Bluff from municipal and agricultural sources would generate an estimated maximum of approximately 10 feet of drawdown in the upper Calvert Bluff near Lake Bastrop by year 2050. This regional drawdown in the upper Calvert Bluff may cause a decline in water levels at Lake Bastrop, depending on the nature of the hydraulic connection between Lake Bastrop and the Calvert Bluff. Because the nature of the connection between Lake Bastrop and the Calvert Bluff is not known, the extent of impact on the lake by an estimated 10-foot decline in water levels in the upper Calvert Bluff is not known.

GW-8 Requirements for Alcoa Aquifer Dewatering and Depressurization Pumpage in Relation to Regional Pumpage

Comment – Explain the relationship between the need for groundwater pumpage for Three Oaks Mine dewatering and depressurization relative to pumpage by other entities in the region.

Response – Potentiometric surface drawdown in the Simsboro aquifer would occur as a result of aquifer depressurization for the Three Oaks Mine. Alcoa pumpage would only occur to the extent needed to depressurize the Simsboro so that mining of the lowest lignite seams in the Calvert Bluff could proceed safely. Alcoa estimates that a maximum pumpage rate of approximately 11,000 acre-feet per year would be required. If municipal pumpage that occurs during the time the Three Oaks Mine is in operation results in a substantial lowering of the potentiometric surface in the Simsboro beneath the Three Oaks Mine, then Alcoa would need to pump less water during the life of the mine to obtain the same level of depressurization in the Simsboro beneath the mine area. Thus, the amount of pumpage of groundwater from the Simsboro by the Three Oaks Mine is dependent in part on the extent of municipal pumpage from the Simsboro during the time period that the Three Oaks Mine is in operation. Dewatering at the Three Oaks Mine would be limited to sand lenses in the Calvert Buff Formation associated with the 200 and 800 lignite seams.

GW-9 Groundwater Ownership in the Project Area

Comment – The ownership of groundwater in the project area needs to be clarified.

Response – Groundwater in the Three Oaks Mine permit area primarily is owned by CPS as is the land surface. Alcoa has obtained the right from CPS to pump groundwater in the Simsboro aquifer and the Calvert Bluff for the purpose of depressurization of the Simsboro and dewatering the Calvert Bluff beneath the Three Oaks Mine. The RRC regulates the amount of Alcoa pumpage to depressurize the aquifer. This amount would reach a maximum of approximately 11,000 acre-feet per year during the operation of the Three Oaks Mine. After the mine ceases operation, CPS could remove as much water from the Simsboro as allowed by groundwater regulatory authorities at that time.

GW-10 RRC Regulation of Mine-related Groundwater Production

Comment – What agency regulates groundwater production associated with mining at the proposed Three Oaks Mine?

Response – In accordance with Texas Water Code, the RRC has regulatory authority over groundwater use by surface mines. The RRC determines the quantity of water Alcoa can pump from the Calvert Bluff and the Simsboro aquifers at the Three Oaks Mine. The RRC does not regulate domestic use of groundwater, only water used to facilitate mining. See also the response to general comment GW-5 regarding groundwater conservation districts.

GW-11 Sensitivity of Groundwater Impacts to Pumpage Rates

Comment – What would be the effect on groundwater impacts from a change in the volume or duration of groundwater pumpage at the Three Oaks Mine?

Response – The relationship between pumping rate at a well and drawdown in the part of a confined or artesian aquifer affected by the pumping well is linear for an idealized aquifer. That is, if the pumping rate doubles, drawdown in the affected part of the aquifer doubles for every part of the aquifer affected by the pumping well. This relationship is based on the Theis equation for an idealized confined aquifer (Fetter 1994). Most aquifers are not idealized; therefore, drawdown is likely to vary from that predicted by the Theis equation for an idealized confined aquifer. The relationship between duration of pumping (time) and drawdown is more mathematically complex and depends on the parameters used to determine the well function (based on distance from the well, transmissivity, storage coefficient, and time) for the pumping well. In general, if the duration of pumping doubles, the drawdown would increase 20 to 50 percent on average. At large distances from the pumping well, where the well function is a small number, doubling of the duration of pumping can double, and sometimes quadruple, the drawdown.

4.5.5 Surface Water Issues

SW-1 Proposed Surface Water Monitoring Plan for Water Quantity and Quality

Comment – The Draft EIS fails to adequately define a surface water monitoring plan to ensure compliance with RRC, TCEQ, and USACE regulations.

Response – As part of the Proposed Action, Alcoa has developed a surface water monitoring plan to comply with RRC and TCEQ permit requirements. The majority of this proposed program is outlined in Section .146 of the RRC permit application and subsequent supplements. Additional surface water monitoring provisions are set forth in the draft TPDES permit prepared by TCEQ. The program is described in Appendix C (**Tables C-18** and **C-19** on page C-31a) of the Final EIS, and a summary is provided below. In addition to the proposed monitoring and any permit stipulations from RRC and TCEQ, the USACE may identify additional requirements as part of its regulatory role under the Clean Water Act.

Surface water monitoring in compliance with the RRC permit for the Three Oaks Mine would be conducted on a quarterly basis at the existing baseline monitoring sites LLS, LBS, LMY, UBS, and a new site, UMY. The existing sites are shown in **Figure 3.2-21** in the Draft EIS. The placement of the new proposed site, UMY, would be on Middle Yegua Creek immediately upstream of the proposed permit boundary. Site UMY would be located approximately at the low-flow inventory site LF-12 shown in **Figure 3.2-21**. Other small watersheds upstream of the permit boundary or within the proposed active mine blocks were monitored during the baseline inventory and typically do not flow. These drainages, which are not proposed for long-term monitoring, include Chocolate Creek, Mine Creek, Marshy Branch, and Willow Creek.

For the RRC permit monitoring program, the field parameters measured quarterly would include:

Discharge	Electrical conductivity
Temperature	Dissolved oxygen
pH	

Stream flow measurements would be conducted using either a direct displacement method, a v-notch weir or other suitable measurement structure, or by the velocity-area method using standard methods in a suitable channel section.

The water quality constituents and parameters measured quarterly by laboratory analyses for the RRC permit would include:

Acidity	Electrical conductivity	Sodium
Ammonia nitrogen	Fluoride	Sulfate
Bicarbonate	Hardness	Total alkalinity
Calcium	Magnesium	Total dissolved solids
Carbonate	Nitrate nitrogen	Total iron
Chloride	Oil and grease	Total manganese
Dissolved iron	pH	Total suspended solids
Dissolved manganese	Potassium	

The water quality constituents measured annually by laboratory analyses for the RRC permit would include:

Total aluminum	Total chromium	Total nickel
Total arsenic	Total lead	Total selenium
Total barium	Total mercury	Total zinc
Total cadmium	Total molybdenum	

TDPES sampling would occur below the sediment ponds constructed to manage storm water runoff and dewatering discharges, and above conceptual Outfalls 001, 002, and 003. These outfalls are shown in **Figure 2-9** in the Draft EIS. They would be re-numbered as 101, 102, and 103, respectively, for the post-mining reclamation-phase TPDES monitoring.

For the TPDES permit, the water quality constituents and parameters measured above Outfalls 001, 002, and 003 during the active mining phase would include:

- Flow (million gallons per day), minimum of once per day when discharge occurs
- Total suspended solids, minimum of once per week when discharge occurs
- Total iron, minimum of once per week when discharge occurs
- Total dissolved solids, minimum of once per week when discharge occurs
- pH, minimum of once per week when discharge occurs

In addition, no discharge of floating solids or visible foam would be permitted other than trace amounts, and no discharge of visible oil would be allowed.

For the TPDES permit, the water quality constituents and parameters measured above Outfall 201 (treated domestic wastewater) would include:

- Flow (million gallons per day), minimum of once per day
- Total suspended solids, minimum of once per week
- Biochemical oxygen demand (5-day), minimum of once per week
- Total residual chlorine, minimum of once per week

For the TPDES permit, the water quality constituents and parameters measured above Outfalls 101, 102, and 103 during the post-mining (reclamation) phase would include:

- Flow (million gallons per day), minimum of once per day
- Settleable solids, minimum of once per week when discharge occurs

In addition, the following other requirements apply to the TPDES permit:

- The ambient total dissolved solids concentration of the receiving waters for Outfalls 001, 002, and 003 will be measured by grab samples taken at a frequency of once every 3 months. Sampling locations for each receiving water will include a point that is upstream of all discharges from the facility and unaffected by the discharges and a point that is between 300 and 1,000 feet downstream of commingling point of all discharges. The specific receiving waters that are required to be monitored include the following:

  Outfall 001 - Middle Yegua Creek
  Outfalls 002 and 003 - Big Sandy Creek

  The permittee will submit a report with the next TPDES renewal and/or amendment permit application, which includes a summary of the following information related to this requirement:

  a. A map documenting the location of all receiving water sampling points.

  b. A summary of all analytical data obtained, which includes the following information:

1. Date of analysis.
2. Analytical results in the units of milligrams per liter (mg/l).
3. Location of where sample was taken.
4. Analytical results from associated outfalls by corresponding dates.

c. An estimate of the receiving water flow at the corresponding sampling location.

- For discharges from “active mining area” ponds, the following effluent limitations will apply:

a. Any discharge caused by precipitation within any 24-hour period less than or equal to the 10-year, 24-hour precipitation event (or snowmelt of equivalent volume) will comply with the following limitations in lieu of the limitations specified on pages 2, 2c, and 2e of the permit:

Pollutant or pollutant property - maximum for any 1 day
Settleable solids - 0.5 mg/l
pH - within the range of 6.0 to 9.0 standard units

The permittee bears the burden of proof in establishing the volume of a precipitation event.

b. Any discharge or increase in the volume of a discharge caused by precipitation within any 24-hour period greater than the 10-year, 24-hour precipitation event (or snowmelt of equivalent volume) will comply with the following limitations:

Pollutant or pollutant property - maximum for any 1 day
pH - within the range of 6.0 to 9.0 standard units

The permittee bears the burden of proof in establishing the volume of a precipitation event.

Furthermore, in accordance with the draft TPDES permit, within 90 days from the initiation of discharge through each outfall (Outfalls 001, 101, 002, 102, 003, 103, and 201), the permittee will perform a minimum of two analytical tests for each of the pollutants listed below. (A table with the analytical results will be completed for each outfall and sent to the TCEQ). Based on a technical review of the submitted analytical results, an amendment may be initiated by TCEQ staff to include additional effluent limitations and/or monitoring requirements.

	MAL[1] (µg/l)
Biological oxygen demand (5-day)	----------
Chemical oxygen demand	----------
Total organic carbon	----------
Ammonia nitrogen	----------
Total suspended solids	----------
Total dissolved solids	----------
Nitrate nitrogen	----------

Total kjeldahl nitrogen	----------
Total phosphorus	----------
Total petroleum hydrocarbons	----------
pH (standard units; minimum/maximum)	----------
Total aluminum[2]	20.0
Total arsenic[2]	10.0
Total barium[2]	10.0
Total cadmium[2]	1.0
Total chromium[2]	5.0
Trivalent chromium[2]	N/A
Hexavalent chromium[2]	10.0
Total copper[2]	10.0
Cyanide, amendable to chlorination[2]	20.0
Total lead[2]	5.0
Total magnesium[2]	20.0
Total mercury[2]	0.2
Total nickel[2]	10.0
Total selenium[2]	5.0
Total silver[2]	2.0
Total zinc[2]	2.0

[1] MAL = maximum analytical level.

[2] Test methods utilized should be sensitive enough to detect these constituents at the MAL specified above in micrograms per liter (µg/l).

In addition, based on further permit review, TCEQ proposes to add sulfide and total magnesium to the lists above. Monitoring for sulfates and chlorides could be added to constituents measured at the outfalls and in receiving waters. Also, a provision has been added to the draft permit to require that all wastewater treatment facilities be designed or located to be protected against the 100-year frequency flood level.

SW-2 Estimated Total Dissolved Solids

Comment – There is no basis for the estimate of 1,000 mg/l of TDS projected from disturbed areas in the Draft EIS.

Response – The predicted levels of TDS in Alcoa's permit application are based on potential levels that may occur under adverse conditions. The value of 1,000 mg/l is an arbitrarily high estimate and does not reflect the lower values that are expected to typically occur. For reference, the 1,000 mg/l TDS value is a secondary standard for public drinking water systems as listed in 30 TAC 290.105(b).

Water quality monitoring results from the RRC permit program at the Sandow Mine indicate that TDS values have exceeded current Somerville Lake standards (Segment 1212) in recent years (approximately 61 percent of recent streamflow monitoring analyses). However, monitoring at Sandow also indicates that high TDS levels naturally occur upstream of the mine (Alcoa 1999). Baseline monitoring for the Three Oaks

Mine area also indicated that the respective TDS standards are exceeded in approximately 69 percent of the streamflows prior to mining. This condition occurs in both the lower Colorado River tributaries (Big Sandy Creek, Chocolate Creek, and Little Sandy Creek), as well as in Brazos River tributaries (Middle Yegua Creek, Lower Mine Creek, and Lower Willow Creek). The only baseline monitoring sites that did not have a considerable number of naturally-occurring TDS exceedences were in upper Big Sandy Creek (Station UBS) and upper Willow Creek (Station UWC). Both of these stations are in the upper portions of their watersheds and probably are influenced to varying degrees by Simsboro outcrop baseflows.
Releases from the proposed Three Oaks Mine surface water management system would not create water quality impacts beyond those already occurring in regional watersheds in their baseline condition. Approximately 8,654 acres would be disturbed by mining activities during the life of the proposed project, and generally 640 acres or less would be in a disturbed and unreclaimed state at any given time. In contrast, approximately 98,000 acres of cropland occur in Bastrop and Lee Counties combined. Water quality concerns from non-point (widely distributed) sources such as agricultural and urban runoff are an ongoing concern in central Texas, as documented by the Texas Water Resources Institute. It is unlikely that the controlled and monitored releases from the Three Oaks Mine would contribute noticeably to water quality impacts that already exist in the region from other sources.

Most of the recorded higher TDS values at the Sandow Mine resulted from releases of dewatering water in the early 1990s. This source of water at the Three Oaks Mine would be collected in the surface water control system, and then would be typically removed from that system and used for dust suppression. When dewatering water is released through the regulated outfalls, it typically would be managed in combination with storm water runoff and depressurization water. TDS levels in these combined managed releases would meet TCEQ requirements and would support existing downstream uses.

It should be noted that as a result of TPDES permit requirements, the Three Oaks Mine would be regulated under anti-degradation regulations listed in 30 TAC 307.5. Other water quality requirements administered by the state and federal governments pertain to the Clean Water Act. In addition, "…pollution in stormwater shall not be allowed to impair existing or designated uses…" per 30 TAC 307.8(e). Under current (1997 to 1998) water quality standards, Somerville Lake (Segment 1212) has a TDS standard of 300 mg/l. The Colorado River above LaGrange (Segment 1434) has a TDS standard of 425 mg/l. The Colorado River below Town Lake (Segment 1428) also has a TDS criterion of 425 mg/l. (The latter regulatory segment extends from Austin to Utley, ending approximately 12 river miles above the City of Bastrop, and approximately 8 river miles upstream of the confluence with Big Sandy Creek.) These standards may increase for each of the segments if proposed (2000) standards are adopted (see new **Table C-10** in Appendix C of the Final EIS).

SW-3 Flooding Potential below Three Oaks Mine Discharge Points

Comment – The Draft EIS fails to address the potential flooding effects that could result from discharge of SAWS-related pumpage through the Three Oaks Mine outfalls, especially Outfalls 2 and 3.

Response – The only discharge planned for the three outfalls at the Three Oaks Mine would include storm water runoff from the mine area after passing through the water control system, groundwater inflow to the mine from shallow sand lenses intercepted by the pit, dewatering water pumped from the Calvert Bluff

aquifer, and depressurization water pumped from the Simsboro aquifer. The amount of storm water discharged would be a direct function of the precipitation received, although the water control system would reduce peak flows while extending the period of discharge. The amount of pumped water discharged through these outfalls would not exceed the amount necessary for mine operations (currently estimated to reach a maximum of approximately 11,000 acre-feet per year). Most to all of the Calvert Bluff pumpage is expected to be used onsite in mine operations.

The potential for flooding would exist downstream of the Three Oaks Mine, particularly along Middle Yegua Creek, Big Sandy Creek, Chocolate Creek, and an unnamed tributary of Chocolate Creek. Such impacts could result from storm runoff and groundwater discharges from the mine site. However, essentially the same potential for flooding exists today without the mine. Under the Proposed Action, this potential would be substantially mitigated during the active mining phase by construction and operation of the surface water management system. Subsequently, the creation of end lakes, pond and riparian area restoration, and revegetation would alleviate the potential for increased flooding susceptibility along these steams in the post-mining phase of the Proposed Action.

To investigate these potential impacts further, approximately 480 channel and floodplain cross-sections were delineated from topographic maps along Big Sandy Creek and its tributaries (Little Sandy Creek, Chocolate Creek, and the unnamed tributary). Peak discharge predictions were generated using the USACE HEC-1 model for the 100-year, 24-hour event at locations along the drainage system. Modeling was conducted using software and program inputs that are widely accepted in the water resources profession. Rainfall (10.5 inches) and unit hydrograph inputs were derived from NOAA and NRCS sources, respectively, and rainfall abstractions were developed with the NRCS curve number method. The peak flows then were used as inputs to the USACE HEC-RAS hydraulic model for the Big Sandy drainage system, using the cross-sections to define the channel and floodplain geometry. Reasonable boundary roughness values were used in modeling the flow.

The predicted 100-year, 24-hour peak discharges for the major modeling scenarios of interest are shown in **Table 4-3**. Reaches were defined in the model generally where changes in discharge or other flow characteristics would occur, such as at confluences.

As can be seen from the peak discharge estimates, the potential maximum addition of 10 to 15 cfs to the channels from depressurization discharges would not be significant in comparison to the natural flood peaks estimated to occur in the Big Sandy drainage network near the proposed mine. The HEC-RAS hydraulic modeling for the pre-mine, active mine, and post-mine scenarios show virtually no difference between the modeled cases with respect to water surface elevation and flow velocities. The changes in water surface elevations along the tributaries are generally less than 0.1 foot and typically decrease for the active and post-mining scenarios. In general, the channel velocities are approximately the same between scenarios as well.

Table 4-3
Estimated 100-year, 24-hour Peak Discharges

Stream	Reach[1]	Approximate Pre-mine Peak Discharge (cfs)	Approximate Active and Post-mine Peak Discharges (cfs)
Little Sandy Creek	1	13,627	13,627
Big Sandy Creek	1	1,793	1,793
Big Sandy Creek[2]	1	5,491	3,745
Big Sandy Creek	2	15,762	15,478
Big Sandy Creek	3	18,140	17,794
Unnamed Tributary to Chocolate Creek	1	9,628	9,453
Chocolate Creek	1	2,503	2,503
Chocolate Creek	2	11,345	11,175

[1]Reach numbers relate to specific channel lengths modeled within the HEC-RAS network by Alcoa Inc.
[2]Additional tributaries enter this reach of Big Sandy Creek; however, for purposes of the model topology, it has the same reach number.

Since the 100-year, 24-hour flood is a rare event, peak discharges for the more common, 2-year, 24-hour event were predicted for the Big Sandy system. This also was done using HEC-1 modeling with the appropriate NOAA rainfall input (4.3 inches), similar to what was done for the 100-year event. Estimated peak discharges for the 2-year, 24-hour event at various points of interest (see Draft EIS **Figure 3.2-21**) are:

- CC (lower Chocolate Creek) = 2,112 cfs
- LBS (lower Big Sandy Creek) = 6,469 cfs
- LMY (lower Middle Yegua Creek) = 7,455 cfs

From these values, it still can be seen that the additional proposed groundwater discharges from the Three Oaks Mine would not be significant to flooding potential along the drainage systems, even under these more frequent storms. Even if the actual 100-year and 2-year, 24-hour peak flows were considerably smaller than these modeled predictions, the additional mine discharges would have negligible flooding effects.

On a day-to-day basis, depressurization discharges in the Big Sandy or Middle Yegua drainage systems may range from nearly zero to roughly 10 or 15 cfs. Although the larger discharge rates still would be relatively small, they may fill up the normal channel cross-sections and create essentially continuous flow conditions. This could create additional inundation near the channel edges during the year from small, more frequent storms and/or releases from existing, non-mining impoundments. If discharges also were occurring from the brickyards at the time, the width and depth of additional inundation would be somewhat greater. The additional ponding from smaller, more common storms is not expected to be nearly as extensive, or to have as long a duration, as flooding conditions that already exist on an average annual basis in the area. However, stream flows could go somewhat out-of-bank, and/or create ponding in depressions adjacent to the channels, on a more frequent basis as a result of small storms and groundwater discharges. These conditions likely would be shallow and short-lived, and would occur only in proximity to the proposed mine

during its active phase. Such effects would be negligible farther downstream as additional watershed areas contribute to flows. If depressurization discharges were to cease as a result of the SAWS contract, such effects would not occur.

Alcoa is required under RRC permit agreements to improve low-water crossings and mitigate other access problems resulting from mine water management. RRC oversight and compliance review of this issue would mitigate potential impacts to low-water access.

With regard to erosion issues, the HEC-RAS modeling for the Big Sandy system indicates that channel flow velocities frequently are less than 2.5 feet per second for the more gently sloping sections of the system, even under discharges on the order of thousands of cubic feet per second. (There are steeper sections where this is not the case, however.) If a flow velocity of 2 to 2.5 feet per second is used as a regional threshold for the onset of channel erosion (BLM 1980b), then the much smaller proposed depressurization discharges would not generate noticeable impacts. The longitudinal geometry of Big Sandy Creek is characterized by long, deep pools separated by shallower, more resistant riffles. It is possible that limited additional erosion may occur from the small mine discharges within the narrower, low-flow portion of the shallower channel portions. This would be limited to steeper stream reaches during drier seasons in some years. Such an impact is expected to be minor in comparison to naturally occurring erosion associated with larger storm events. Similar potential impacts are anticipated for Middle Yegua Creek.

With respect to potential effects on downstream conditions and property values from mine discharges into the Middle Yegua and Big Sandy creek drainage systems, additional mitigation has been recommended to address potential stream erosion from end lake discharges. It also is anticipated that the discharges would encourage the establishment of additional riparian vegetation communities along the stream channels. However, the establishment of more extensive jurisdictional wetlands (which could affect existing land values) is not anticipated for the reasons explained below.

Depending on discharge rates, the channel areas themselves may be inundated from bank to bank. Such areas within the ordinary high-water mark are already subject to regulation as waters of the U.S. Under the Proposed Action, hydrologic conditions would be modified by variable man-made effects over approximately 25 years. It is very unlikely that soil characteristics needed for additional wetlands would develop within the timespan of the proposed mining discharges. Therefore, additional impacts to land uses or property values from more extensive jurisdictional wetlands are not anticipated.

SW-4 Role of the Federal Emergency Management Agency (FEMA) and Local Counties in Floodplain Management

Comment – The USACE failed to coordinate with FEMA and the counties relative to analysis of floodflows and effects to floodplains.

Response – Based on minimum standards provided by FEMA, the local jurisdiction is responsible for regulating development in floodplains. The FEMA regional office consists of technical, financial, and

regulatory staff. At the regional level, FEMA's role in the Three Oaks Mine EIS is one of a reviewing agency. Under applicable federal regulations (U.S. Code Title 42, Chapters 1 and 50; Public Law 103-325, Title V), FEMA is directed to identify flood-prone areas; carry out studies and investigations related to floodplain management, protection of wetlands, and environmental considerations; and to interact with the public in regard to these activities. FEMA has responsibilities under NEPA similar to those of other federal agencies having roles under the Clean Water Act. FEMA is authorized to consult with, receive information from, and enter into any agreements with other federal departments or agencies in order to perform these responsibilities. This role includes reviewing and commenting on, as appropriate, environmental impact statements prepared by other agencies within the respective FEMA regions.

In their efforts to protect floodplain uses (including habitat functions), and manage and protect floodplain developments, the local jurisdictions would monitor, review, permit, and report any changes in the regulatory floodplain to FEMA. In this situation, Alcoa would work with the respective jurisdictions to identify any changes that could occur, evaluate their potential for future damage, and obtain appropriate permits, prior to developing within a regulated floodplain. Once certain criteria have been met, the jurisdiction would report those changes to FEMA for a map change, if needed. The primary areas of concern are base flood elevations and the occurrence of structures in the floodplain. A base flood elevation is the water surface elevation along the floodplain caused by the flow from a selected runoff event. In the Three Oaks Mine area, this event is the flood having a 1 percent chance of being equaled or exceeded in any given year. FEMA maps indicate that Zone A floodplains are located downstream of the proposed mine in Bastrop County along Big Sandy Creek, Chocolate Creek, and unnamed tributaries of those drainages. A Zone A delineation is one where floodplains are identified without site-specific hydrologic or hydraulic analyses to identify the base flood elevations along the channels. Zone A floodplains also occur in Lee County at the proposed haul road bridge crossing of Middle Yegua Creek.

If development proposals (such as the Three Oaks Mine) may create changes in floodplain characteristics, then further investigations of the effects of those changes are warranted under FEMA regulations. Changed physical conditions that create additional data needs may include modifications of hydrologic conditions and/or hydraulic conditions. The potential changes from the Three Oaks Mine primarily would be to hydrologic conditions. By federal regulation, the hydrologic and hydraulic analysis to be investigated for Zone A floodplains is the 100-year, 24-hour event. The additional data relative to the project are provided in the EIS, the RRC application, and further HEC-1 and HEC-RAS modeling conducted for the project (see general response SW-3). Additional work has been carried out for a more frequent event (the 2-year, 24-hour storm) as a result of impact assessment needs for the EIS.

The FEMA floodplain management program typically is administered cooperatively with local departments at the county level. Each county in the proposed project area has its own floodplain administrator. These officials are responsible for the management of floodplain development and administration of the permitting program for floodplain modifications. Permits for floodplain modifications are issued at the county level. Copies of the EIS and relevant information pertaining to the occurrence of delineated floodplains, related public concerns, and predicted hydrologic effects of the proposed project have been sent to the FEMA regional office and to both the Bastrop and Lee County floodplain administrators. The USACE is soliciting review and comment from FEMA and related county officials. Alcoa will comply with local jurisdictional

requirements as determined through review. Revisions have been incorporated beginning on page 3.2-71 of the Final EIS to reflect this clarification.

SW-5 Use of Toxic Release Inventory (TRI) Data in the EIS

Comment – TRI data available for the Rockdale smelter and generating station complex show high levels of various pollutants such as barium and manganese. These releases are not discussed in the Draft EIS.

Response – The Rockdale TRI data were not addressed in the Draft EIS because the Sandow Mine and Rockdale operations are not part of the Proposed Action, and the TRI data were not considered to contribute to the cumulative effects analysis for the Three Oaks Mine. The total quantities of these naturally occurring contaminants are less meaningful for the impact analysis than are the discharge concentrations.

However, in response to this general comment on the Draft EIS, the USACE requested that Alcoa provide additional details regarding the Rockdale TRI data. This response provides those details. As part of Section 313 of the Emergency Planning and Community Right-to-Know Act, USEPA requires industrial facilities to report releases of toxic chemicals and their compounds on an annual basis. As a result, Alcoa has reported its releases of toxic compounds (as identified by USEPA) every year, using the USEPA facility reporting forms. The resulting records provide a history of the TRI performed at the smelter and Alcoa Rockdale power generating station, including TXU Unit 4 and the Sandow Mine.

TRI data indicate that barium and manganese compounds form the primary releases of USEPA-listed toxic chemicals into surface water from the site. As a result, there are potential cumulative surface water issues related to these releases and their effects on surface water resources and uses.

The TRI data indicate that prior to 1995, essentially no barium or manganese compounds were released to surface waters. Beginning in 1995, however, approximately 4,500 pounds of manganese were released. This amount dropped to 2,000 pounds in 1996, and since then has been steadily increasing. Approximately 4,200 pounds of barium compounds were released in 1998, with steadily increasing rates since. As of the year 2000, 30,300 pounds of manganese compounds and 14,230 pounds of barium compounds have been released to surface waters (USEPA 2002a).

Releases of manganese and barium (as reported in the TRI) are directly proportional to the volume of water discharges from the Sandow Mine's final discharge ponds. These releases were calculated by multiplying the manganese or barium concentration for each outfall by the estimated volume of water discharged through the ponds within the outfall. The volume of water discharged through each outfall was determined using the weekly flow estimates reported in the discharge monitoring reports on file with the TCEQ and RRC.

Although depressurization discharges have increased only slightly over the past 5 years, the estimated volume of water discharged through Sandow's final discharge ponds has increased substantially and rapidly since 1996 (as explained below). Consequently, the reported releases of manganese and barium compounds have increased accordingly. **Table 4-4** summarizes annual pond discharges, as estimated using the discharge monitoring reports for the years 1996 through 2000.

Table 4-4
Annual Pond Discharges at the Sandow Mine
(acre-feet per year)

Year	North Area Discharges	South Area Discharges	Total Discharges
1996	876	1,675	2,551
1997	2,441	2,410	4,851
1998	12,200	11,926	24,126
1999	33,767	7,867	41,584
2000	77,952	11,258	89,209

The reasons for the increases in pond discharges primarily are due to: 1) developments in the surface water control system and 2) rainfall variations.

1) Developments in the Surface Water Control System

- Depressurization water in the southern end of the Sandow Mine, which is pumped from the Simsboro aquifer, is discharged directly into Walleye Creek or its tributaries without being routed through sedimentation ponds in accordance with existing permits for the facility. As discussed in Section 3.2.3.1 of the Draft EIS, groundwater in the Simsboro aquifer is generally of good quality and suitable for consumption. Since this water is not routed through a sedimentation pond, the flow is not included in the TRI calculations.

  Similarly, in the northern end of the Sandow Mine, prior to 1997, East Yegua Creek was routed around mining operations in advance of mining. Almost all depressurization water from the northern end of the mine was discharged directly into East Yegua Creek without flowing through a final discharge pond in accordance with the mine's permit. In 1997-1998, the management of depressurized water discharges from this area changed.

  Alcoa had concluded mining in the Sandow Mine E Area in early 1994. However, final reclamation of the E Area pit was not completed until 1997. During this time, a large portion of the rainfall runoff from the northern half of the mine was routed into the abandoned mine pit. Once the E Area pit reclamation was finalized and the landscaping for the E Area end lake was accomplished, East Yegua Creek was routed behind active mining, through the reclaimed area, and through the E Area end lake. At that time, all north-end depressurization water and much of the rainfall runoff from the northern end of the mine was routed to the end lake to help it fill with water. The end lake subsequently began discharging in October 1998.

  Consequently, prior to late 1998, no depressurization water was included in the TRI equation. Since October of 1998, the TRI reports have included depressurization water from the northern end of the mine. **Table 4-5** lists depressurization pumpage and discharges by area and year, with Alcoa's estimate of the amount of depressurization water included in the TRI volume.

Table 4-5
Depressurization Pumpage and Discharge at the Sandow Mine
(acre-feet per year)

Year	Total Pumpage	Volume Used Internally	Discharges to East Yegua Creek	Discharges to Walleye Creek	Alcoa's Estimate of Discharge Volumes Included in TRI Calculations
1996	25,935	5,000	13,224	7,711	0
1997	23,479	5,000	12,636	5,843	0
1998	27,464	5,000	14,758	7,706	3,700
1999	30,033	5,000	16,550	8,483	16,550
2000	30,775	5,000	16,770	9,005	16,770

Note: Includes all depressurization discharges to East Yegua and Walleye Creeks plus the 5,000 acre-feet per year used internally.

Source: Hodges 2002d.

- Watershed increases

Typically, as mining advances, additional watershed acreage is incorporated into the surface water control system. In the mid-1990s to the present, as mining at Sandow moved progressively eastward in the southern end of the mine (the H Area), four new sedimentation ponds were constructed ahead of active mining to control and treat water from future mining areas. With each of these ponds, large areas of watershed were added to the surface water control system, and discharge volumes due to storm water runoff increased correspondingly. **Table 4-6** provides details on the progressively larger area under surface water control in the southern Sandow Mine active mining area between 1996 and 2000.

Table 4-6
Area of Surface Water Control System

Year	Watershed Acreage within the H Area Surface Water Control System (acres)
1996	594
1997	594
1998	678
1999	1,282
2000	1,586

Source: Hodges 2002d.

Additionally, in the northern end of the mine, the upper East Yegua Creek watershed was added to Outfall 07 during 1997 when East Yegua Creek was routed behind active mining, through the reclaimed area, and

through the E Area end lake, as previously described. The East Yegua Creek reroute added 4,392 acres of watershed to this surface water control system. The E Area end lake began discharging in October 1998.

2) Rainfall Variation

Precipitation for Rockdale and Thorndale for years 1996 through 2000, based on NOAA historic rainfall records, are summarized in **Table 4-7**. Also included are rainfall totals recorded at the Sandow Mine by mine personnel (Hodges 2002d).

Table 4-7
Area Rainfall

Station	Year	Rainfall (inches)
Rockdale	1996	29.38
	1997	33.00
	1998	26.36
	1999	16.74
	2000	35.66
Thorndale	1996	21.15
	1997	33.98
	1998	42.26
	1999	21.58
	2000	43.99
Sandow Mine	1996	21.05
	1997	32.28
	1998	34.96
	1999	16.78
	2000	39.47

The large majority of discharges through the Sandow Mine outfalls are composed of storm water runoff. These discharges are directly proportional to rainfall runoff. The rainfall records indicate that rainfall during year 2000 was more than double the rainfall during year 1999 at the Sandow Mine. Consequently, discharges during year 2000 were more than double the discharges from year 1999 (89,200 acre-feet in year 2000 compared to 41,584 acre-feet in year 1999).

pH Values

Water quality data for the mine-impacted outfalls provides information relative to manganese releases in relation to pH levels over time. Discharge monitoring reports from the Sandow Mine contain pH values for all outfall discharges for the years 1996 through 2000. The median pH values reported at each outfall for these years have been calculated and are presented in **Figure 4-2**.

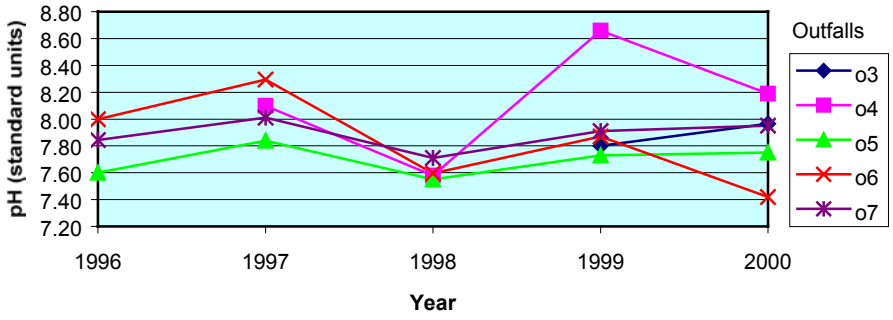


Figure 4-2. Median pH Values by Sandow Mine Outfall (1996 through 2000)

Source: Hodges 2002d.

Based on the reported data, there is no identifiable downward trend in pH values for any outfall, with the potential exception of Outfall 06. The lowest recorded pH at Outfall 06 between 1996 and 2000 was 6.77, which is within the TPDES discharge limitations. All other pH levels recorded at Outfall 06 were above 7.0. Additionally, Outfall 06 has not received any discharges from the active mine area since January 1996. Since then, the only discharges through Outfall 06 have been storm water runoff discharges. Pond 18 (upstream of Outfall 06) is located ahead of active mining and receives runoff from some service roads, but receives no pit water or water that has been in contact with spoil (Hodges 2002d). Consequently, observed fluctuations in pH in Outfall 06 discharges likely are due to natural fluctuations of pH in storm water runoff rather than to mining activities.

Manganese Concentrations

Manganese naturally occurs within central Texas streams. Baseline water quality data for streams within the Sandow Mine I Area and the proposed Three Oaks Mine permit area show that manganese concentrations have ranged from 0.01 mg/l to 9.26 mg/l and have averaged 0.96 mg/l (Hodges 2003). For comparison, manganese concentrations were included in the discharge monitoring reports prior to 1998. Flow-weighted manganese concentrations reported for Years 1996 and 1997 are shown in **Table 4-8**.

Table 4-8
Flow-weighted Manganese Concentrations at Sandow Mine Outfalls (mg/l)

Outfall	1996	1997
04	NA	0.03l
05	0.46	0.60
06	0.02	0.02
07	0.11	0.29

NA = Not available

The manganese concentrations seen in discharges from the mine outfalls are within the range of baseline manganese concentrations for the area.

Quarterly stream monitoring is conducted at the Sandow Mine, both upstream and downstream of mining impacts. The manganese concentrations reported between 1996 and 2000 at the upstream and downstream monitoring stations associated with Outfalls 04, 05, and 07 are presented **Table 4-9**.

Based on the reported data, manganese levels may be slightly elevated downstream of mining during some of the monitoring periods; however, concentrations for each station show substantial fluctuations from year to year, and steady increases in concentrations are not indicated.

Table 4-9
Manganese Concentrations Reported at Sandow Mine Stream Monitoring Stations
(mg/l)

	Outfall 04 Ham Branch		Outfall 05 East Yegua Creek		Outfall 07 Walleye Creek	
Year	Upstream Station 12	Downstream Station 11	Upstream Station 6	Downstream Station 7	Upstream Station 1	Downstream Station 2
1996	0.02	0.05	0.03	0.19	0.14	0.09
1997	0.18	0.18	0.11	0.25	0.07	0.14
1998	0.08	0.18	0.03	0.21	0.05	0.10
1999	0.12	0.31	1.04	0.01	0.04	0.13
2000	0.02	0.17	0.02	0.02	0.03	0.04

Barium Concentrations

Similar to manganese, barium occurs naturally within central Texas streams. Baseline water quality data for streams within the Sandow Mine I Area and the proposed Three Oaks Mine permit area show that barium concentrations have ranged from 0.05 mg/l to 19 mg/l and have averaged 0.21 mg/l (Hodges 2003). This range and average include the upper Big Sandy Creek monitoring station, which is unusually high in barium compared to the other baseline monitoring stations. Without this outlier, the range of barium concentrations is from 0.05 mg/l to 0.26 mg/l, and the average baseline concentration for the area streams is 0.12 mg/l.

The barium concentrations reported between 1996 and 2000 at the upstream and downstream monitoring stations associated with Outfalls 04, 05, and 07 at the Sandow Mine are presented **Table 4-10**.

This comparison shows barium concentrations downstream of mining are approximately the same as upstream of mining; no increase in barium concentrations downstream of the outfalls is indicated.

It should be noted that the TPDES permit facility configuration for the site combines the Sandow Mine with the power plant and smelter; this is allowed, and even encouraged, by USEPA and Texas regulations. Furthermore, the TRI reports data as a total weight of the compound released, which is a product of the concentration and the amount of flow, as discussed above.

Table 4-10
Barium Concentrations Reported at Sandow Mine Stream Monitoring Stations
(mg/l)

Year	Outfall 04 Ham Branch		Outfall 05 East Yegua Creek		Outfall 07 Walleye Creek	
	Upstream Station 12	Downstream Station 11	Upstream Station 6	Downstream Station 7	Upstream Station 1	Downstream Station 2
1996	0.07	0.04	0.03	0.08	0.25	0.17
1997	0.09	0.06	0.06	0.08	0.11	0.15
1998	0.07	0.06	0.04	0.07	0.06	0.11
1999	0.08	0.03	0.04	0.03	0.06	0.09
2000	0.05	0.05	0.05	0.05	0.07	0.11

An additional consideration for the Three Oaks Mine, relative to potential direct impacts of the Proposed Action, is that the proposed mine would be permitted separately under the TPDES program. No exchange of waters between Three Oaks and TXU/Sandow would occur under this permit configuration. Therefore, the USACE has determined that potential direct impacts from the proposed Three Oaks Mine would not result from TXU/Sandow water management operations.

SW-6 Selective Handling of Overburden Relative to Surface Water Quality

Comment – Acidic mine soils and overburden would lead to acid mine discharge and prevent effective reclamation.

Response – Under the RRC mine permit program, Alcoa is not allowed to leave toxic or acid-forming materials on the reclaimed surface of the mined area. In addition, Alcoa is proposing to substitute comparable or better overburden materials for plant growth than the native topsoils, in areas not designated as prime farmlands, as discussed in Section 3.3.1.3 of the Draft EIS. To achieve this program and encourage successful reclamation and post-mining land use, Alcoa proposes to incorporate selective handling of overburden and interburden into its mine plan. The details of this selective handling, and the availability of suitable materials to accomplish this program, are described in Sections 2.5.2.6 and 3.3.1.3, respectively, of the Draft EIS.

In practice, Alcoa conducts this program by training dragline operators and pit supervisors in the selective handling program objectives. Using collected geologic and geochemical information, personnel are instructed so as to recognize the areas of suitable and unsuitable materials as mining progresses, and to handle them accordingly. Weekly meetings between the pit staff keep them informed of selective handling considerations as pits progress through the landscape. Finally, as the recontoured surface is prepared for reseeding, a soil testing program is implemented to check on the suitability of the plant growth medium. If problems are found, they are rectified prior to further reclamation practices. Typically this is accomplished by removal and burial in the pit, or by placing sufficient suitable cover over the area of concern, as discussed in Section 2.5.3 of the Draft EIS. These programs will ensure that suitable materials are placed on the reclaimed surface, that revegetation practices can be successful, and that potential surface water impacts from runoff water quality are mitigated as part of the Proposed Action.

USACE has further investigated the acid- or toxic-mine drainage issue and discussed it with impartial regional experts in the field (Feagley 2003; Hossner 2003; Rhodes 2003). Given the nature of the site, the proposed selective handling program, and postmining testing and materials management as described in RRC permit documents, toxic- or acid-mine drainage is not anticipated to occur at the Three Oaks Mine.

4.5.6 Air Quality Issues

AQ-1 Air Quality Impacts of Existing Rockdale Facilities

Comment – The Draft EIS fails to adequately analyze the effects of air pollutants emitted from the Rockdale smelter and generating stations as a component of the Proposed Action.

Response – Operation of the existing aluminum smelter and power plants and the associated emissions of criteria pollutants and hazardous air pollutants would be considered cumulative if the emissions from proposed mining construction and operations add to the emissions of specific pollutants from the smelter and power plants. A cumulative impact is defined by the CEQ (40 CFR 1508.7) as the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative air quality effects (concentration of pollutants) are those that cause an incremental additional impact when combined with emissions directly attributable to the proposed mining activities. As discussed in Section 3.8.2.1 of the Draft EIS, construction and operation of the proposed Three Oaks Mine are not anticipated to increase the total criteria pollutants or hazardous air pollutants or to increase emissions from the existing Rockdale facilities; therefore, cumulative air quality impacts associated with the generation of criteria pollutants or hazardous air pollutants from the existing Rockdale facilities are not anticipated.

AQ-2 Projected Air Quality Improvement Associated with the Voluntary Emissions Reduction Program (VERP) at the Rockdale Facilities

Comment – The Final EIS should clarify the anticipated effects of the technology improvements at the power plants.

Response – Alcoa's Rockdale Power Plant currently meets USEPA limits on emissions of pollutants. The TCEQ issued Alcoa a VERP for Alcoa power plant units 1, 2, and 3 on November 1, 2002. In this approved VERP, Alcoa committed to a 50 percent NO_x reduction by 2003 and a 90 percent SO_2 reduction by March 1, 2007 (based on the 1998 inventory). The NO_x reductions would be obtained from the existing separate over-fire air and low NO_x burners installed as part of the 2000-0032-SIP Agreed Order with the TCEQ. The SO_2 reductions would be achieved by installing wet scrubbers on the existing units. Alcoa submitted an application for an amendment to the VERP on November 1, 2002, in which Alcoa committed to further emissions reductions. These reductions included a NO_x reduction of 90 percent and a SO_2 reduction of 95 percent (based on the 1997 inventory). These reductions would be obtained by: 1) installing wet scrubbers on the existing boilers, 2) installing new Clean Coal Circulating Fluid Bed boiler technology, or 3) shutting down the old units no later than year end 2007. An amendment to the air quality permit was

submitted for the construction of two fluidized bed units. This application was declared administratively complete on November 20, 2002.

AQ-3 Analysis of PM_{10} versus $PM_{2.5}$

Comment – The EIS should analyze the effects of $PM_{2.5}$ in addition to PM_{10}.

Response – For mining operations, $PM_{2.5}$ is a subset of PM_{10} (approximately 31 percent). The modeled PM_{10} concentrations (see **Table 3.8-13** of the Draft EIS) are 30.8 µg/m^3 and 64.6 µg/m^3 for annual and 24-hour impacts, respectively. The modeled concentrations indicate a maximum $PM_{2.5}$ concentration of 9.5 µg/m^3 and 20 µg/m^3 for annual and 24-hour impacts, respectively. This compares to 15 µg/m^3 and 65 µg/m^3 for the annual and 24-hour ambient air quality standards (see **Table 3.8-6** of the Draft EIS), respectively.

4.5.7 Transportation Issues

T-1 Effects of Relocation of County Road (CR) 90

Comment – The DRAFT EIS does not address modifications to CR 90, which is purported to be a heavily traveled shortcut from FM 696 to Elgin and Austin. CR 90 is a narrow, two-lane road with single-lane bridges that will not handle major traffic increases safely.

Response – CR 90, Old Lexington Road (which becomes FM 3000 approximately half-way to Elgin), was not addressed in the Draft EIS because of low existing traffic volumes and the expectation that the Three Oaks Mine would not greatly increase traffic. Traffic counts taken in April 2002 indicate there are approximately 240 total vehicle trips per day through the intersection of CR 90 and CR 89, Willow Creek Road (Rowan 2002). It is estimated that peak hour traffic through the intersection would be approximately 35 vehicles, or slightly more than one every 2 minutes. This level of traffic is well within the capacity of the intersection and roadway.

The effects of the proposed Three Oaks Mine on CR 90/FM 3000 traffic likely would be minimal. There are very few Sandow Mine employees living in either Elgin or Austin, therefore, it is unlikely that worker commuting traffic would use CR 90/FM 3000. During the first (temporary modifications) phase of road relocations, the reroute of Old Lexington Road traffic along Willow Creek Road would increase the distance by 0.5 mile, which would not be attractive to additional through traffic.

Subsequent to the rerouting of FM 696, the Old Lexington Road route would be shortened by 0.3 mile, but the FM 696 route also would be shortened by an almost equivalent 0.2 mile, and the FM 696 route would be substantially improved. These changes would make travel easier and faster for traffic to access U.S. Highway 290. Over the life of the project, the Three Oaks Mine could attract some traffic from Elgin, some of which would use CR 90/FM 3000, but the numbers are expected to be small. Most traffic through the project area bound to or from Austin likely would use FM 696 and U.S. Highway 290, as travel through Elgin would be much more circuitous and slower via CR 90/FM 3000.

For perspective, if an unlikely 20 percent of the peak hour, mine-generated traffic were to use CR 90/FM 3000, it would slightly more than double traffic on the route, but it still would average only 1 vehicle every 51 seconds. Traffic effects during off-peak hours would be substantially lower.

The cumulative effects activity associated with population growth would likely increase traffic on CR 90/FM 3000 over time commensurate with the level of growth. No projections are available for CR 90/RM 3000; however, it is expected that the increases would be within the capacity of the road through the life of the Three Oaks Mine; the main growth in traffic would occur on the major roadway, FM 696. This would be reinforced by roadway improvements on U.S. Highway 290.

T-2 Effects of Truck Traffic on the Elgin National Register Historic District (NRHD)

Comment – The proposed Three Oaks Mine would realign State Highway 696, providing a shorter route to U.S. Highway 290. This may increase truck traffic through the Elgin NRHD to the detriment of the district.

Response – The road and highway realignments proposed in the Three Oaks Mine plan would facilitate traffic access from FM 696 and FM 619 to U.S. Highway 290, which would encourage both existing and mine-generated traffic bound for Elgin, Austin, and other points west to use the main highways (FM 696 and U.S. Highway 290). This would be especially true for heavy trucks, which tend to avoid unnecessary stops, turn movements, and congested traffic areas when better alternatives are available. Consequently, it is expected that there would be little, if any, project-related increase in truck traffic through Elgin's downtown historic district because the route from the mine vicinity to and through downtown Elgin via CR 90 and FM 3000 is narrower, more circuitous, and would require more stops and starts than the route via U.S. Highway 290.

For additional discussion of traffic effects on Elgin, refer to the response to Comment T-1 regarding CR 90/ FM 3000.

4.5.8 Noise Issues

N-1 Request for Table of Common Noise Levels for Comparison Purposes

Comment – Quoting the noise effects in decibels isn't meaningful; can you express the noise levels in a way that we can understand them more easily?

Response – A table (**Table 3.12-1a**) relating typical sound levels in decibels to common noise sources has been added on page 3.12-7 of the Final EIS.

4.5.9 Land Use Issues

LU-1 Inconsistency of Project-related Growth with Bastrop County Growth Plans

Comment – The Draft EIS does not adequately account for the growth that will occur in the project area, which is in Austin's designated Smart Growth corridor. The project also is contrary to Bastrop County efforts

to manage growth and Elgin's land use plan. We think this is a result of relying on data from Alcoa's consultants.

Response – The Draft EIS relies on official Texas state agency projections for growth forecasts. See, for example, **Table 3.10-2** of the Draft EIS regarding population growth projections for potentially affected counties, including Bastrop County, and Section 3.11.3 regarding traffic growth forecasts. These projections came from the Texas Comptroller of Public Accounts and TxDOT, respectively.

Regarding Bastrop County growth management, the county has no zoning or land use planning authority and no land use plan (Cabe 2001; Hunt 2001). While Bastrop County is in the path of growth from Austin, the effect of the Three Oaks Mine would be expected to be minor. It would impede growth in the permit area for the life of the mine and thereafter until the reclamation bond was released, typically approximately 7 years after completion of final reclamation. After release of the bond, development in the area would depend on the desires of the major landowners, Alcoa, and CPS. It is expected that the long-term development pattern would mimic the growth pattern in surrounding areas with somewhat more wildlife habitat and open space than would be found in surrounding areas. However, the major growth pressure during the time period addressed is expected to be near the larger communities of Elgin and Bastrop, continuing the trends that have been developing over the past two decades. Consequently, the effects likely would be to retard growth in the permit area in the short term, but the growth would tend to catch up with surrounding areas in the long term.

None of the municipal or county governments in the study area have jurisdiction to impose land use controls in the Three Oaks Mine permit area. Austin's growth corridors and Smart Growth Plan address only land within the city's full-service city limits and extraterritorial jurisdiction (ETJ) boundary, which is approximately 11 miles from the permit area at its closest point (Librach 2002). The growth corridors primarily address preferred land use patterns along major traffic arteries in the city. The Smart Growth Plan is very general in relation to land use, designating essentially the entire city west of MoPac Expressway as a Drinking Water Protection Zone and everything east of the expressway as a Desired Development Zone. These Austin plans do not apply to the Three Oaks Mine area, and there is no evidence to indicate the mine would conflict with the plans.

As indicated in the Draft EIS text (Section 3.9.1.1), Elgin has an adopted Comprehensive Plan, which is updated every 5 years (Cooke 2002). The jurisdiction of the plan ends at Roy Davis Road, the ETJ boundary, which is 1 mile beyond the city limits and approximately 3.5 miles from the nearest point on the proposed permit area boundary. While Elgin has been growing rapidly in recent years, the bulk of the growth has been to the west, toward Austin, not to the east where the proposed Three Oaks Mine would be located (Cooke 2002; Dunaway 2002). It is common for outlying communities to grow toward larger cities, as Elgin has done, and this general pattern would be expected to continue. There is no evidence that the Three Oaks Mine would conflict with Elgin's Comprehensive Plan.

LU-2 Potential Long-term Effects of Land Development Following RRC Bond Release

Comment – The Draft EIS does not adequately address the potential effects of development of the permit area after the RRC reclamation bond is released.

Response – The post-mining land use plan analyzed in the Draft EIS primarily addressed the period of time following completion of mining while the RRC bond ensuring reclamation according to the reclamation plan still would be in effect. The land use pattern after bond release cannot be determined with any precision. The counties do not have land use plans or zoning authority to provide guidance. Consequently, the pattern of development would be largely determined by landowners. It is expected that the reclaimed mine area would retain more wildlife habitat than the surrounding area, but, in general, it would be assumed that land use in the permit area gradually would grow to mimic surrounding areas. There likely would be a mixture of small farming operations intermixed with low-density residential development. For the most part, residential lots would be 1 acre or larger, based on TCEQ standards for septic systems (Czora 2002). Large scale commercial or residential development would not be expected.

4.5.10 Socioeconomic Issues

SE-1 Inconsistency of Project-related Growth with Bastrop County Growth Plans

Comment – The Draft EIS does not adequately account for the growth that will occur in the project area, which is in Austin's designated Smart Growth corridor. The project also is contrary to Bastrop County efforts to manage growth and Elgin's land use plan. We think this is a result of relying on data from Alcoa's consultants.

Response – See response to general comment LU-1 in Section 4.5.9 of the Final EIS.

SE-2 Aggregated Data

Comment – The Draft EIS lumps together Milam, Lee, and Bastrop Counties, suggesting they are a single region, which is inaccurate and misleading.

Response – All of the data in the Social and Economic Values sections of the Draft EIS (Section 3.10) are presented in a disaggregated format, as are the text discussions of the data. This approach not only provides the reader a description and analysis of each county's individual situation, it also permits the reader to conduct an independent analysis and draw his/her own conclusions. What little lumping of data or analysis occurs is a result of comparing and contrasting the effects of the proposed Three Oaks Mine project on the counties, most commonly differentiating Milam County effects from those projected for Lee and Bastrop Counties, which would be more similar to each other.

SE-3 Effects on Property Values

Comment – Mining activity will cause a reduction in property values that will not rebound until after the project is completed in approximately 25 years. This will adversely affect property owners and will cause a reduction in assessments and property tax revenues for local jurisdictions. Property owners suffering losses should be reimbursed under the Texas Government Code Chapter 2007, which requires compensation for reduction of property value resulting from government action.

Response – The text in Section 3.10.2.1 of the Draft EIS is believed to be accurate in estimating that residential property values may decline during the period when active mining would be close by but would be expected to rebound when nearby mining was completed. For most properties, the reduced value would be expected to last no more than 1 to 2 years, not for the 25-year life of the mine, as some readers have inferred. There are a few properties near the northeastern and southwestern boundaries of the disturbance area and two within or partially within the disturbance area (parcels T085 and T0130 as shown in **Figure 3.9-1** of the Final EIS) where the decrease in property values would last longer because the overburden removal and mining activity would return periodically to the ends of several mine blocks nearest the residences over a period of years. The noise and visual effects of the mining activity, which would most influence residential value, would not be constant during the time the effects would be observed because of the transient nature of the mining, and because the lignite resource occurs at significant depth in these areas. When draglines and mining equipment would operate below the surface level, both noise and visibility would be reduced. There also is some existing vegetative screening for the residences outside the disturbance area, which would moderate the effects to some degree. The effects, however, potentially would be observable from time to time from approximately mine year 6 through mine year 25, or longer, depending on the specific location. These effects would be further minimized by implementation of mitigation measures N-2 (Noise Barriers) and VR-1 (Visual Screening) as identified in **Table 2-15** of the Final EIS.

With regard to the effects on local tax revenues, if a property assessment were readjusted during the time when the valuation was temporarily depressed, it would have a comparable effect on the tax revenue from the property. However, the potentially affected properties are a small percentage of the total properties in any taxing jurisdiction, and any revenue losses likely would be offset by revenue gains from the mining in the same vicinity in most cases.

The concern about a decline in the property tax base due to reclassification of properties in the permit area to “Ag Exempt” or “Wildlife” is unfounded. Three Oaks Mine property would remain classified as it currently is until lignite is actively produced from the lease. Currently, the land in the mine area not owned by CPS is taxed based on livestock use and should continue as such until the land becomes part of the active mining block. Under Texas law, once the mine is in production, property taxes would be based on the value of the mineral reserves. Normally, this would apply to property within a 5-year mine block, working sequentially through the mine area. This value is determined by estimating:

- The expected future life of the reserves
- The price of the minerals
- The annual volume of production
- A discount factor (market interest rate plus a risk factor) that discounts income from each year of the mine’s life to a present value
- Summing all discounted future annual incomes to a total present value which becomes the appraised value for tax purposes in the appropriate tax year

This method was used to estimate the property taxes on minerals in the Draft EIS based on Alcoa's mining plan.

After mining, the land would return to its current classification for property tax purposes, and taxes would be based on its agricultural productivity value. At the Sandow Mine, and at other mines around the state, reclaimed agricultural land is more productive, and thus of higher value for tax purposes, than it was in its original state prior to mining. According to one Texas A&M University study of the Big Brown lignite operation near Fairfield, Texas, the agricultural use value of land increased from $60.50 per acre before mining to $103.50 per acre after mining and reclamation (Morris 1984).

4.5.11 Cultural Resource Issues

CR-1 Effects to the Elgin NRHD

Comment – The Draft EIS fails to address potential impacts to the NRHD in downtown Elgin.

Response - The USACE identified resource-specific study areas for the EIS analyses that were based on the anticipated nature and spatial distribution of effects potentially resulting from the construction, operation, and reclamation of the proposed Three Oaks Mine (Proposed Action). This study area for cultural resources, as identified in Section 3.7.1.1 of the EIS, would include the proposed Three Oaks Mine permit area and road relocations. The USACE has concluded that project-related activities, including mine-related earth disturbance, road relocations, and the negligible shift in population, would not directly or indirectly affect the Elgin NRHD. Refer to Section 3.7.2.1 of the Draft EIS relative to cultural resource surveys and eligibility determinations for identified cultural sites (including historic) in the study area, as well as required approvals prior to initiation of ground disturbing activities.

The study area for air quality, as identified in Section 3.8.1 of the Draft EIS, encompasses parts of the five-county area comprising Bastrop, Lee, Milam, Travis, and Williamson Counties. As stated in Section 3.8.2.1, it is anticipated that project-related emissions (fugitive dust and gaseous pollutants) would not exceed state or federal ambient air quality standards. Refer to the response to general comment NEPA-2 for clarification of the scope of the EIS analyses relative to existing Rockdale operations.

Table 3.12-10 of the Draft EIS illustrates the estimated distance from each of the major mine-related noise sources that would be required to meet the HUD standard of 65 dBA (L_{dn}). It also shows the distance required to reduce the sound level to 47 dBA, 10 dBA above the rural ambient nighttime background level that EPA has identified as a level of disturbance triggering complaints (Zephyr 2001). As shown, the maximum distances required to meet these levels would be 1,774 feet (approximately 0.3 mile) and 7,063 feet (approximately 1.3 miles), respectively, from the source. The distance from the closest part of the mine to downtown Elgin is approximately 5.5 miles or 29,000 feet.

At other mines, mine-related vibration effects can occur off-site as a result of blasting; however, as stated in Section 2.5 of the Draft EIS, no blasting is proposed at the Three Oaks Mine. As a result, off-site vibration effects are not anticipated.

For information relative to traffic effects in the Elgin NRHD, refer to the response to general comment T-2 for Transportation.