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Remedial Response

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February 1991

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Superfund Record of Decision:

Atlas Asbestos Mine, CA

50272-101

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Second Remedial Action - Final

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16. Abstract (Limit: 200 words)

The 450-acre Atlas Mine Area is part of the Atlas Asbestos Mine site in Fresno County, California. The site consists of four geographically distinct areas (the Atlas Mine Area, the Clear Creek Management Area (CCMA), the Ponding Basin of the California Aqueduct, and the City of Coalinga). The Atlas Mine Area is on rural land owned by the Federal government and private parties, and surrounding land is used for mining, ranching, farming, and recreation. The Mine Area includes three open pit asbestos mine surfaces, stockpiles of asbestos waste material, an abandoned mill building, a settling pond, and debris. Construction of an asbestos mill at the Atlas Mine began in 1962, and onsite asbestos mining and milling activities occured from 1967 to 1979. Approximately three million cubic yards of asbestos ore and asbestos mill tailings from onsite operations were bulldozed into piles adjacent to the mill building. In 1976 and 1980, the Atlas Mine was cited for violating asbestos emissions standards. In early 1980, after detecting elevated levels of asbestos in water samples from the California Aqueduct, the State concluded that additional corrective measures were necessary to prevent mine- and mill-generated asbestos from entering the drainage basins. Further State investigations identified high

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Atlas Asbestos Mine, CA
Second Remedial Action - Final
Contaminated Media: soil, sediment, debris, sw, air
Key Contaminants: mining waste, inorganics (asbestos)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 128
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(See ANSI-Z39.18) *See Instructions on Reverse*

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Abstract (Continued)

concentrations of asbestos in the Mine Area soil, surface water, and air. A 1989 Record of Decision (ROD) for the City of Coalinga Operable Unit addressed cleanup of asbestos-contaminated soil in Coalinga, California by burying the contaminated material in a waste management unit with an impermeable cap. This ROD is designed to control the release of asbestos from the Mine Area. No actions are proposed at this time for the CCMA or the Ponding Basin of the California Aqueduct. In 1992, EPA will evaluate the Department of Interior Bureau of Land Management's revised land use plan for CCMA to determine if the plan is adequate to minimize airborne asbestos emissions, and the U.S. Bureau of Reclamation and California Department of Waste Resources actions to minimize airborne emissions from the Ponding Basin to determine if further action is necessary. The primary contaminant of concern affecting the soil, sediment, debris, surface water, and air is asbestos, an inorganic.

The selected remedial action for this site includes paving the road through the Mine Area or implementing an appropriate road maintenance alternative; constructing stream diversions, sediment trapping dams, and other slope stabilization elements; instituting a verification sampling plan involving surface water modeling and surface water and stream bed sampling, as necessary; conducting a revegetation pilot project, and implementing revegetation if found to be technically feasible and cost-effective; dismantling the mill building with offsite disposal along with other debris from the Mine Area; and implementing institutional controls including deed and land use restrictions, and site access restrictions such as fencing. The estimated present worth cost for this remedial action is $4,286,000, which includes an annual O&M cost of $19,000.

PERFORMANCE STANDARDS OR GOALS: All diversion and drainage facilities will be designed and constructed to accommodate the anticipated volume of precipitation and peak flows from surface runoff in a 25-year, 24 hour storm. All tailings will be protected from 100-year peak stream flows. Quantification of risk reduction is difficult because asbestos from natural and disturbed areas will continue to enter the surface water; however, a verification sampling plan will be implemented to confirm that an appropriate reduction in asbestos transport is achieved.

ATLAS MINE AREA OPERABLE UNIT
OF THE
ATLAS ASBESTOS MINE NPL SITE

RECORD OF DECISION

U.S. Environmental Protection Agency
Region IX - San Francisco, California
February 14, 1991

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RECORD OF DECISION

DECLARATION

SITE NAME AND LOCATION

Atlas Mine Area Operable Unit of the Atlas Asbestos Mine Site, Fresno County, California

STATEMENT OF BASIS AND PURPOSE

This Record of Decision ("ROD") presents the selected remedial action for the Atlas Mine Area Operable Unit of the Atlas Asbestos Mine Superfund Site ("Atlas Site"), in Fresno County, California. The remedy was selected pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act, 42 U.S.C. Section 9601 et. seq., ("CERCLA") and in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Section 300 et. seq., ("NCP"). This ROD explains the factual and legal bases for selecting the remedy for the Atlas Mine Area Operable Unit ("Atlas Mine OU"). This decision is based on the Administrative Record for this operable unit ("OU"). The attached index identifies the items that comprise the Administrative Record.

The State of California has concurred in the selection of this remedy. See Administrative Record Document Number 1610.

THE SITE

The Atlas Site includes four geographically distinct areas: i) The Atlas Mine Area (Figure 1); ii) The Clear Creek Management Area (Figure 2); iii) The Ponding Basin of the California Aqueduct (Figure 3); and iv) The City of Coalinga, California. Asbestos mining and milling waste from the Atlas Mine Area has been transported to and come to be located in the other three areas. This OU addresses the Atlas Mine Area ("Atlas Mine Area Operable Unit or Atlas Mine OU").

The Atlas Mine OU is one of two designated operable units for the Atlas Site. A ROD for the City of Coalinga Operable Unit was signed on July 19, 1989. It provides for the clean up of asbestos contaminated soil in Coalinga, California by burying the contaminated material in a waste management unit with an impermeable cap.

The Atlas Mine OU contains an estimated 2.3 million cubic meters (3 million cubic yards) of highly concentrated asbestos ore and asbestos mine and mill tailings. Actual or threatened releases of hazardous substances from the Atlas Mine OU presents an imminent and substantial endangerment to public health, welfare, or the environment. The response actions selected in this ROD address this imminent and substantial endangerment.

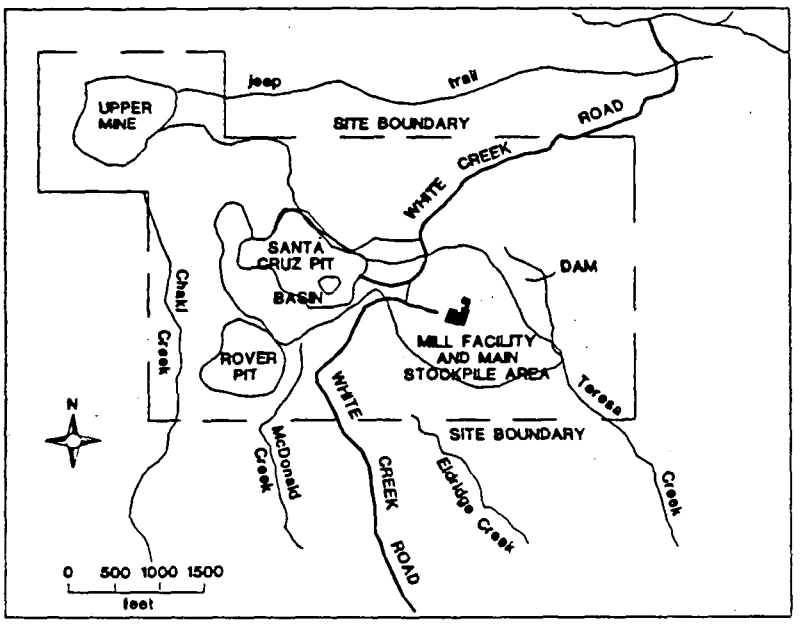

Figure 1
ATLAS MINE AREA

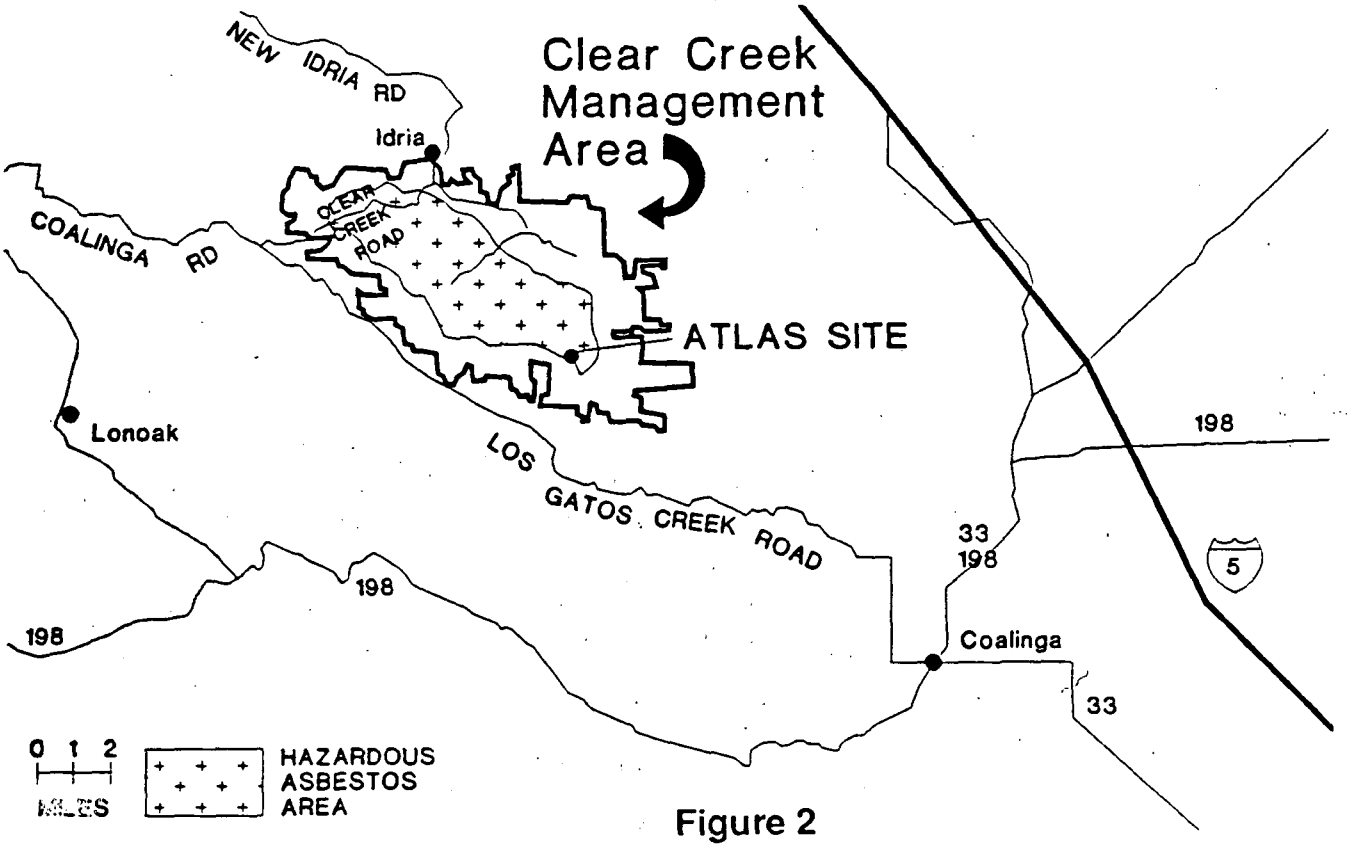

Figure 2
CLEAR CREEK MANAGEMENT AREA

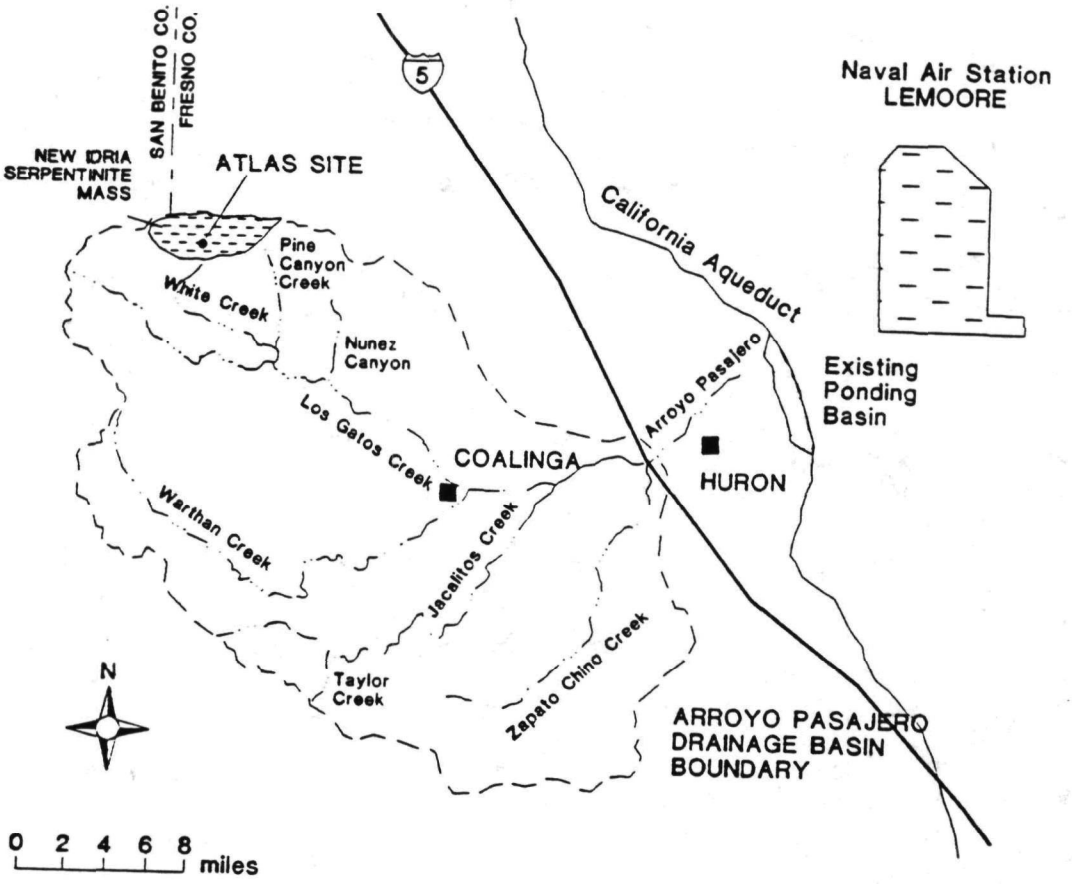

Figure 3
GREATER COALINGA AREA

Asbestos is a hazardous substance as defined in 42 U.S.C. Section 9601(14) and as listed in 40 C.F.R. Section 302.4. Asbestos mining and milling waste is not regulated by the Resource Conservation and Recovery Act ("RCRA"). Asbestos is known to cause lung cancer and mesothelioma in humans. Asbestos also causes other lung diseases such as asbestosis. If asbestos remains uncontrolled at the Atlas Mine OU, the potential for human exposure to asbestos and the resulting increased risk to human health, primarily through the inhalation pathway, will remain.

DESCRIPTION OF THE SELECTED REMEDY

Asbestos waste at the Atlas Mine OU presents three major problems: i) generation of airborne asbestos on-site by vehicular or other human disturbance; ii) the transport of asbestos from the Atlas Mine Area by vehicles which have been driven through the Mine Area; and iii) the release of chrysotile asbestos from the Atlas Mine Area into local creeks during heavy rains and the potential for this asbestos to subsequently become airborne at downstream locations.

Clean up of the asbestos at the Atlas Mine OU includes controlling the release of asbestos from and restricting access to the Mine Area using engineering and institutional controls. The selected remedy entails:

1) Fencing or other appropriate controls to restrict access to the Atlas Mine OU;
2) Paving the road through the Mine Area or implementing an appropriate road maintenance alternative;
3) Constructing stream diversions and sediment trapping dams to minimize the release of asbestos into local creeks;
4) Conducting a revegetation pilot project to determine whether revegetation is an appropriate means of increasing stability and minimizing erosion of the disturbed areas and implementing revegetation if it is found to be appropriate;
5) Dismantling of the mill building and disposing of debris;
6) Filing deed restrictions; and
7) Implementing an operation and maintenance program

Stabilization and control of asbestos waste will minimize the release of asbestos, thus providing long-term protection of human health and the environment. The estimated cost of the selected remedial action is $4.2 million.

Operation and maintenance activities will be required to ensure the effectiveness of the response action. In the event of a natural event such as a flood or earthquake, all repairs necessary to contain the hazardous substances will be made. Because the asbestos waste will not be treated, long term management of the waste will be required. EPA will perform periodic reviews of the remedial action pursuant to CERCLA Section 121(c).

At this time EPA is not proposing any action in the Clear Creek Management Area ("CCMA"). The United States Department of Interior's Bureau of Land Management ("BLM") has indicated that it will revise its land use plan for the CCMA in order to minimize airborne asbestos emissions and the threat to public health represented by the asbestos in the CCMA. In 1992, EPA will evaluate whether BLM's plan is adequate to protect human health and the environment and will publish a public notice of its determination. At that time EPA will decide whether further action under CERCLA in the CCMA is necessary.

At this time EPA is not proposing any action in the Ponding Basin of the California Aqueduct near Gale Avenue ("Ponding Basin") because the U.S. Bureau of Reclamation ("USBR") and the California Department of Water Resources ("DWR") are considering actions to minimize the generation of airborne asbestos-laden dust in this area. In 1992 EPA will evaluate whether USBR/DWR actions are adequate to protect human health and the environment and will publish a public notice of its determination. At that time EPA will decide whether further action under CERCLA in the Ponding Basin is necessary.

STATUTORY DETERMINATIONS

Pursuant to CERCLA Section 121, 42 U.S.C. Section 9621, and in accordance with the NCP, the selected remedy for the Atlas Mine OU: (1) is protective of human health, welfare and the environment; (2) complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action; and (3) is cost-effective. The selected remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies, to the maximum extent practicable for the Atlas Mine OU. Treatment of asbestos contamination at the Atlas Mine OU was determined to be impracticable based on lack of effectiveness, technical infeasibility, problems with implementability and cost factors.

This remedy will result in hazardous substances remaining on site above health-based levels. Pursuant to CERCLA Section 121, 42 U.S.C. Section 9621, EPA will conduct a review within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Daniel W. McGovern
Regional Administrator
EPA Region IX

2.14.91
Date

February 14, 1991

RECORD OF DECISION

DECISION SUMMARY

1.0 SITE NAME, LOCATION, AND DESCRIPTION

The Atlas Asbestos Mine Site ("Atlas Site") includes four geographically distinct areas: i) the Atlas Mine Area ("Mine Area"); ii) the Clear Creek Management Area ("CCMA"); iii) the Ponding Basin of the California Aqueduct near Gale Avenue ("Ponding Basin"); and iv) the City of Coalinga, California. This Record of Decision describes the remedy selected for the Atlas Mine Area.

The Atlas Mine Area

The Atlas Mine Area is an approximately 1.8 square kilometer (450 acre) tract of land located in the southern Diablo Mountains in western Fresno County, California, on land owned by the Federal Government and private parties (see Figure 2). The nearest population center is Coalinga (population 8250) located approximately 29 kilometers (18 miles) to the southeast. The Mine Area includes three open pit asbestos mine surfaces, stockpiles of asbestos waste material, an abandoned mill building, a settling pond and debris. It is drained by a number of intermittent streams (see Figure 1). Lands adjacent to the Mine Area are rural. Land uses include mining, ranching, farming and recreation (camping, hunting, hiking, mineral collecting and riding off-highway vehicles ("OHVs")).

The Clear Creek Management Area

The Atlas Mine Area lies within approximately 124 square kilometers (48 square miles) of serpentine rock (the New Idria Formation) containing large amounts of naturally occurring chrysotile asbestos ("asbestos") as well as other minerals associated with serpentine. Approximately 93 square kilometers (36 square miles) of the New Idria Formation is within the United States Department of Interior, Bureau of Land Management's ("BLM's") Clear Creek Management Area and has been designated a 'Hazardous Asbestos Area' by the BLM (see Figure 2). This Hazardous Asbestos Area has been mined for mercury, chromite, asbestos and other minerals since the mid-1800's and contains numerous mines and exploration cuts as well as innumerable roads and trails. It is also a popular OHV recreation area. The Hazardous Asbestos Area of the CCMA has been included as part of the Atlas Asbestos Mine Site because asbestos mining and milling waste from the Atlas Mine OU has been transported throughout the CCMA by wind, water and vehicular traffic.

The Ponding Basin at the California Aqueduct

The Ponding Basin is an area between State Highway 198 and Gale Avenue to the west of the California Aqueduct (See Figure 3). It was designed to hold floodwaters from the Arroyo Pasajero alluvial fan. During heavy rains, asbestos-bearing sediments are washed down the creeks draining the Atlas Mine OU and other parts of the White Creek Watershed into Los Gatos Creek and are eventually carried through the Arroyo Pasajero drainage basin and deposited in the Ponding Basin and in the surrounding area. During very heavy flooding, asbestos-laden water has filled the Ponding Basin and been released into the California Aqueduct.

The Ponding Basin has been designated as a part of the Atlas Mine Site and the nearby Coalinga Asbestos Mine Site ("Coalinga Site") because it contains asbestos which has been transported from the Atlas Mine OU, the Johns-Manville Mill Area Operable Unit of the Coalinga Site, and other natural and disturbed areas. The Ponding Basin is administered by the United States Bureau of Reclamation ("USBR") and the California Department of Water Resources ("DWR"). Ponding basin land is used mainly for agriculture. Huron, a community of approximately 3000 people, is located adjacent to the Ponding Basin. The USBR and DWR are currently developing plans to address the Arroyo Pasajero flooding and the impact of such flooding on the California Aqueduct.

The City of Coalinga

During the investigations of the Atlas Site, asbestos was discovered in Coalinga, California. This asbestos had been brought from the Atlas Mine OU and other sources to a depot in Coalinga for eventual shipment out of Coalinga by rail and truck. The asbestos is concentrated in a 44 hectare (107 acre) parcel of land in the southwestern corner of Coalinga. The City of Coalinga is an operable unit of the Atlas Site and the Coalinga Site. A ROD was signed for the City of Coalinga Operable Unit on July 19, 1989 and cleanup of the asbestos began in June 1990. The clean up is scheduled to be completed by June 1991.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

In the mid-1950's, an investigation by the California Division of Mines and Geology indicated that the serpentine matrix of the New Idria Formation was mainly chrysotile asbestos. Subsequent investigation in the southeastern third of the New Idria Formation demonstrated that the asbestos ore could be mined and milled to produce a marketable short-fiber asbestos product. From 1959 through 1962, the Coalinga and Los Gatos Creek areas experienced an intensive land rush for asbestos mining claims. In 1962 the Atlas Minerals Division of the Atlas Corporation acquired title to a large block of claims and began construction of an asbestos mill at the Atlas Mine OU. Asbestos mining and milling at the

Atlas Mine OU occurred from 1967 to 1979. The Vinnell Mining and Minerals Corporation, in a joint venture with California Minerals Corporation, owned and operated the mining and milling operation from 1967 until 1974, when they sold it to Wheeler Properties. Wheeler Properties operated the facility until 1979 and filed for bankruptcy shortly thereafter.

The mining activity included digging the asbestos ore out of surface pits and then milling the ore. The by-products of the milling process (the mill tailings) were bulldozed into piles near the mill building. Approximately 2.3 million cubic meters (3 million cubic yards) of asbestos ore and asbestos tailings remain at the Atlas Mine OU.

On December 3, 1976 and on February 15, 1980, Atlas Asbestos Company and Wheeler Properties were cited for violating the National Emissions Standards for Hazardous Air Pollutants ("NESHAPs") regulations regarding control of asbestos emissions.

In early 1980, the Metropolitan Water District ("MWD") of Southern California detected elevated levels of asbestos in water samples from the California Aqueduct near Los Angeles. An extensive sampling program along the Aqueduct, conducted by the MWD in August through September of 1980, suggested that the Atlas Mine was one probable source of asbestos in the California Aqueduct. Asbestos levels of up to 2500 million fibers per liter ("MFL") were measured.

On October 17, 1980, the Central Valley Regional Water Quality control Board ("CVRWQCB") and the California Department of Health Services ("DHS") inspected the Atlas Mine to determine if waste discharges from these facilities were in compliance with state regulations. The CVRWQCB concluded that additional corrective measures should be taken to prevent mine- and mill-generated asbestos from entering the drainage basins.

In March of 1983, the CVRWQCB collected four surface water samples during a period of high run-off in the Arroyo Pasajero watershed. Asbestos fiber concentrations in these samples ranged from 80,000 to 240,000 MFL.

On June 14, 1983, the risks represented by the Atlas Mine Area were rated using the Hazard Ranking System. The Atlas Site was approved for listing on the NPL in September of 1984. Remedial Investigation/Feasibility Study ("RI/FS") activities were initiated by the United States Environmental Protection Agency ("EPA") in 1985.

The Atlas Minerals Division of the Atlas Corporation, Vinnell Mining and Minerals Corporation, Wheeler Properties Inc., the California Mineral Corporation and the U.S. Bureau of Land Management have been identified as Potentially Responsible

Parties (PRPs) at the Atlas Mine OU. On October 13, 1987 and on June 23, 1988, general notice letters were sent to these PRPs, notifying them of their potential liability.

Enforcement efforts with respect to the City of Coalinga Operable Unit have resulted in a Consent Decree with Southern Pacific Transportation Company under which a clean up is being performed. No PRPs have been sent notice letters with respect to the CCMA or the Ponding Basin.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI/FS Report and the Proposed Plan for the Atlas Site were released for public comment on April 11, 1990. These documents, as well as the Administrative Record, were made available to the public at the EPA Superfund Records Center, Region IX office, San Francisco, California. The complete Administrative Record, which EPA used to select the remedy, was available for public review at an information repository at the Coalinga District Library, Coalinga, CA. In addition, four other information repositories were established in the following California municipalities: Avenal, Hanford, Huron and San Jose. These four repositories contain the most important documents related to the selection of a remedy, including the RI/FS, the Proposed Plan and the Administrative Record Index. Notice of the availability of these documents was published in the Fresno Bee and the Hanford Sentinel on April 9, 1990 and in the Coalinga Record on April 11, 1990.

A 60 day public comment period on the Proposed Plan was held from April 11, 1990 to June 11, 1990. After requests for an extension were received, the public comment period was extended for an additional 30 days to July 11, 1990. In addition, public meetings were held on May 9, 1990 in Coalinga, California and on May 30, 1990 in Sunnyvale, California. The meeting in Sunnyvale was arranged to allow people who live in the San Francisco Bay Area a more convenient opportunity to comment on the Proposed Plan. Most of the people who attended the May 30th meeting were concerned about the potential impact on public access to the CCMA. At these meetings, representatives from EPA answered questions about the evaluation of the Atlas Site and the remedial alternatives under consideration.

EPA has prepared the attached responsiveness summary, which provides responses to the significant comments submitted in writing during the public comment period, as well as responses to significant comments made by attendees at the two public meetings.

4.0 SCOPE AND ROLE OF THE RESPONSE ACTION

The Atlas Mine OU: The principal threat at the Atlas Mine OU is posed by uncontained asbestos which, if not controlled, would lead to the generation of airborne asbestos emissions. This response action is designed to: i) minimize current and future airborne asbestos emissions from the Atlas Mine OU; and ii) limit the surface water transport of asbestos downstream from the Atlas Mine OU. If asbestos carried downstream from the Atlas Mine OU is deposited and then resuspended, the resulting airborne emissions would be a threat to human health. Therefore, it is important to minimize the hydraulic transport of asbestos from the Atlas Mine OU into the local creeks.

The remedial action selected in this ROD addresses the problem of uncontained asbestos ore and asbestos mill tailings in the context of a remote and largely rural area with large amounts of naturally occurring asbestos. The asbestos waste will be stabilized to minimize erosion and to minimize the release of asbestos into the local drainage basin. In addition, access to the disturbed areas within the Atlas Mine OU will be limited to prevent disturbance of the asbestos waste and the resulting generation of airborne asbestos. The abandoned mill building will be dismantled and disposed of in order to reduce the attraction to the public.

The CCMA: The Hazardous Asbestos Area of the CCMA contains numerous disturbed areas (mines and exploration cuts) as well as innumerable unpaved roads and jeep trails. Soils and roads in this area are very rich in asbestos. The area is popular with OHV users because the rugged terrain and sparse vegetation provide a challenging and unrestricted riding experience. EPA's risk assessment indicates that a very significant cancer risk exists for OHV users in areas with high levels of asbestos in the soil. This is discussed in greater detail in Section 6.0 below. At this time EPA is not taking any action in the CCMA. The BLM has indicated to EPA that it will revise its land use plan for the CCMA so that airborne asbestos emissions and the threat to public health are minimized. In 1992, EPA will evaluate whether the BLM's plan protects human health and the environment and will publish a public notice of its determination. At that time EPA will decide whether further action under CERCLA in the CCMA is necessary.

The Ponding Basin: The Ponding Basin contains asbestos which has been transported from the Atlas Mine Area and other natural and disturbed areas in the New Idria Formation. EPA's risk assessment (summarized in Section 6.0 below) suggests that a significant cancer risk may exist for people who live and work adjacent to asbestos-containing areas where agricultural practices put asbestos-laden dust into the air. At this time EPA is not taking any action in the Ponding Basin because the USBR and the

DWR are considering actions to minimize the generation of asbestos-laden dust in this area. In 1992 EPA will evaluate whether USBR/DWR actions are adequate to protect human health and the environment and will publish a public notice of its determination. At that time EPA will decide whether further EPA action under CERCLA in the Ponding Basin is necessary.

Water in the California Aqueduct contains high levels of dispersed asbestos fibers. This water is used to supply municipalities with drinking water and farmers with water for agricultural purposes such as irrigation. Municipalities are required to treat drinking water to remove asbestos under the Safe Drinking Water Act. EPA recommends that the California Department of Health Services ("DHS") and the DWR evaluate the potential, long-term public health effect of delivering asbestos-laden irrigation water to agricultural areas of the Central Valley.

The Region: The problem of asbestos contamination at the Atlas Site is part of a larger, regional problem in the New Idria Formation, where many other mines and disturbances related to mineral exploration exist. EPA conducted a regional assessment, titled Characterization of Disturbances Related to Mining and Exploration in the New Idria/Coalinga/Table Mountain Study Region. EPA intends to address this regional problem in the future.

5.0 SITE CHARACTERISTICS

Figure 3 shows the location of the Atlas Mine Area within the Los Gatos Creek watershed. The Atlas Mine Area is situated on approximately 200 hectares (450 acres) in the southern Diablo Mountains, at elevations of 1220 to 1340 meters (4000 to 4400 feet). The terrain is rugged with slopes ranging from five to 65 percent and averaging 10 to 15 percent. The tailings and ore piles at the Atlas Mine OU contain an estimated 2.3 million cubic meters (3 million cubic yards) of highly concentrated asbestos. The remedial investigation included analyses of soil, air and water at the Atlas Mine Area and in the surrounding area:

Soil: The detailed soil sampling in the Mine Area found large amounts of highly concentrated asbestos. Polarized Light Microscopy ("PLM") analyses (see Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020) detected asbestos concentrations up to four area percent. When the more sensitive Transmission Electron Microscopy ("TEM") method was used, the asbestos levels ranged from three percent to 100%. (See Appendix 1 for a discussion of asbestos analytical techniques).

Water: Water samples taken near the Atlas Mine Area were measured for asbestos using TEM. Asbestos concentrations were extremely high, ranging from $3*10^6$ to $2*10^8$ MFL (3 million to 200 million MFL). Surface water transport modeling showed that

during heavy rains, between five (5) percent and 36% of the total asbestos yield from the Los Gatos Creek watershed is contributed by the Atlas Mine OU.

Air: Regional air monitoring was conducted in the winter and summer of 1986 and 1987. Air monitoring stations were located upwind and downwind of the Atlas Mine OU as well as in Coalinga and thirteen other locations in the greater Coalinga area. Air monitoring samples were analyzed using TEM. The data showed that airborne asbestos concentrations were elevated in the Atlas Mine OU and throughout the Los Gatos Drainage Basin and parts of the Arroyo Pasajero Alluvial Fan compared to other areas of California.

Winds: Winds that exceed the threshold velocity and activities that disturb the mine surfaces and tailings piles, such as driving a vehicle on the tailings piles, can cause airborne asbestos emissions. Over time, a protective crust has formed on the tailings piles that appears to reduce wind erosion if left undisturbed.

6.0 SUMMARY OF SITE RISKS

The Public Health Evaluation: The following discussion of site risk summarizes results of a risk assessment conducted as part of the remedial investigation. The complete risk assessment or public health evaluation ("PHE") is included as Chapter 6 of the RI. Because of certain similarities between the Atlas Mine OU and the JM Mill OU with respect to the contaminant and the media of concern, EPA prepared one PHE for both sites. However, where possible, the excess cancer risk due to each Operable Units' individual contribution of asbestos was calculated separately.

Asbestos - Primary Contaminant: Asbestos is the primary contaminant of concern at the Atlas Mine OU, in the CCMA, in the Ponding Basin and at the City of Coalinga OU. Asbestos is a generic term referring to two groups of naturally-occurring hydrated silicate minerals having a fibrous crystalline structure, the amphiboles and the serpentines. The asbestos found in the New Idria Formation is the serpentine mineral chrysotile. Asbestos fibers have been widely used for their high tensile strength and flexibility and for their noncombustible, nonconducting, and chemical-resistant properties. The fibers have been used in insulation, brake linings, floor tile, plastics, cement pipe, paper products, textiles, and building products.

Asbestos - Health Effects: Asbestos is a human carcinogen for which no level of exposure is believed to be safe. Asbestos has been the subject of numerous epidemiology studies and exposure to asbestos has been positively linked to lung cancer, mesothelioma and asbestosis. Also associated with asbestos exposure in some studies are cancers of the larynx, pharynx, gastrointestinal

tract, kidney, and ovary, as well as respiratory diseases such as pneumonia.

The adverse human health effects from exposure to asbestos are extremely serious. A full discussion of the health effects of asbestos is found in the EPA document Airborne Asbestos Health Assessment Update, June 1986. Remedial action is warranted to mitigate the exposure to a carcinogen that is present as a result of human activity. Actual or threatened releases of hazardous substances from this OU may present an imminent and substantial endangerment to public health, welfare, or the environment.

Asbestos - Sources at the OU: Major sources of asbestos at the Atlas Mine OU are contaminated soils, raw asbestos ore, asbestos mine and mill tailings and unpaved roads and trails. The three media of concern at the Atlas Mine Site are air, surface water and soil. Asbestos is not soluble in water and is not transmitted to ground water.

Routes of Exposure: There are two general routes of exposure to asbestos at the Atlas Mine OU: inhalation and ingestion. Inhalation is the exposure pathway of greatest concern to human health because this pathway has been positively linked to cancer in humans. While not confirmed, there has been one animal study which suggested that ingestion exposure to asbestos may also be associated with an increased risk of cancer.

Populations at Risk: Potentially exposed populations include the following groups: i) individuals who use the Atlas Mine Area and other areas in the CCMA for recreational OHV driving, hiking, camping, hunting, ranching and other public uses; ii) individuals who live in close proximity to the Atlas Mine Area and the CCMA; and iii) the populations of communities in Fresno and San Benito Counties such as Huron, Coalinga, Idria, Five Points, Stratford, Kettleman City, Priest Valley, Lonoak, Panoche and Avenal.

Regional Sources of Asbestos: In the greater New Idria-Coalinga study region, a wide variety of potential regional sources of asbestos may contribute to asbestos concentrations in the air. These regional sources include other mines and disturbed areas in the CCMA, unpaved roads and trails in the CCMA and naturally occurring serpentinite soils in the New Idria Formation. The risk assessment evaluated exposure to ambient levels of asbestos due to all potential regional sources and also to asbestos present in the air due to the Atlas Mine OU alone.

It is extremely difficult to directly measure the individual contribution of asbestos emissions from the Atlas Mine OU to ambient air monitoring results because of the other nearby sources in the New Idria Formation. Therefore, models were used to estimate the concentration of asbestos in air which would exist if the only sources of asbestos in the region were wind erosion of tailings

piles and mine surfaces and vehicle traffic on unpaved roads running through the Atlas Mine Area. The air monitoring data were used in conjunction with historical Total Suspended Particulate ("TSP") data to obtain annual average air concentrations in various locations with all sources considered. The TSP data account for time periods when the threshold wind velocity for entrainment was exceeded. Section 5.2.1 of the RI provides a more detailed discussion of the air modeling methods.

Risk Assessment Methodology: Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., $1*10^{-6}$). In this risk assessment, an excess lifetime cancer risk of $1*10^{-6}$ indicates that, as a plausible upper bound, an individual has a one in one million chance of dying from cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under specific exposure conditions.

Inhalation Risk: The highest risk posed by the Atlas Mine OU is correlated with activity-related exposure, such as exposure due to disturbance by motorized vehicles of asbestos-bearing surfaces. This exposure could either occur at the Atlas Mine OU or in areas to which asbestos from the Mine Area has been transported. Exposure point concentrations were calculated using concentrations of asbestos in soils, mine surfaces and mine tailings in conjunction with estimated emission rates and an air dispersion model. Emissions of asbestos-contaminated dust generated by off-road vehicle activities and by agricultural tilling were estimated using equations presented in EPA's Compilation of Air Pollutant Emission Factors for Stationary Point and Area Sources (EPA, 1985c).

The air dispersion model was a simple box model which defines a certain volume of air (the box) in which emissions from the area sources are present. The box model assumes that wind speed and direction are constant within the box and that the air is uniformly mixed. For exposure to ambient air at the Atlas Mine Area, it was assumed that a 20-year-old-male will be present for 8 hours per day, 52 days per year, for 10 years, to yield an average continuous exposure duration of 0.47 years (the average case). For exposure to air during off-road vehicle activity, it was assumed that a 20-year old male drives for three hours per day, 16 days per year for five years (the average case). Table 1 summarizes the average and reasonable maximum ("maximum") exposure assumptions use for the various activity related exposures. For both types of activity, the EPA unit risk factor of .21386 (PCM fibers/cubic centimeter)1.0E-1 was used. There are data from measurements made in the CCMA by investigators independent of EPA, that confirm EPA's estimates of airborne asbestos concentration made using the air dispersion model. See Administrative Record Document No. 1612. Users of OHVs on serpen-

TABLE 1

SUMMARY OF EXPOSURE PARAMETERS

INHALATION DURING OFF HIGHWAY VEHICLE ACTIVITY

EXPOSURE PARAMETER	PARAMETER VALUE	
	AVERAGE	REASONABLE MAXIMUM
Age At Onset of Exposure (Yrs)	20	20
Total Years Exposed	5	5
Frequency of Occurrence (Hrs/Yr)	48	160

INHALATION DURING HUNTING, CAMPING OR HIKING

EXPOSURE PARAMETER	PARAMETER VALUE	
	AVERAGE	REASONABLE MAXIMUM
Age At Onset of Exposure (Yrs)	20	20
Total Years Exposed	10	20
Frequency of Occurrrence (Hrs/Yr)	416	832

tinite soils may experience exposure levels that are associated with an extremely high cancer risk.

Experiments conducted by the California Department of Health Services ("DHS") in 1985 clearly show that a pickup truck driving on unpaved asbestos contaminated soil can produce asbestos dust concentrations in the air that pose a potential health risk to individuals close to the activity. A discussion of this experiment has been incorporated into the Administrative Record for the Atlas Mine OU.

The estimated excess lifetime cancer risk for individuals hiking, camping or hunting at or nearby the Atlas Mine OU varied from $1*10^{-6}$ to $3*10^{-5}$ under average and reasonable maximum exposure conditions, respectively. The estimated excess lifetime cancer risk for individuals driving a four-wheel-drive truck on the Atlas Mine OU varied from $5*10^{-4}$ to $4*10^{-1}$ under average and reasonable maximum exposure conditions, respectively.

Ingestion Risk: The excess lifetime cancer risk from drinking asbestos contributed to the water from the California Aqueduct by the Atlas Mine OU was not found to be significant. The risk estimates were calculated assuming ingestion of two liters of water per day for a 70 year period by an adult weighing 70 kilograms (154 pounds). EPA's unit risk factor of $1.4*10^{-13}$ $(\text{fibers/liter})^{-1}$ was used (EPA, 1985b).

The estimated excess lifetime cancer risk for individuals ingesting untreated California Aqueduct water, contaminated with asbestos from all sources in the Los Gatos Creek Drainage Basin (not just the Atlas Mine OU), varied from $2*10^{-6}$ to $4*10^{-5}$ under average and reasonable maximum exposure conditions, respectively. However, it should be noted that municipalities are required to filter drinking water under the Safe Drinking Water Act, thereby reducing exposure to asbestos.

Asbestos Measurement - Uncertainty Concerning Risk Levels: When evaluating risk from asbestos in the environment, there are sources of uncertainty associated with asbestos measurement that make quantifying the risk difficult.

Complexities of Particle Measurement: One of these sources of uncertainty is the difficulty of obtaining accurate and precise measurements of asbestos concentrations in soil, air, and water. For example, all risk assessments require an accurate and precise measurement of contaminant concentration. When a gaseous or soluble chemical is the contaminant of concern, the measurement of only one parameter, concentration, is sufficient to establish how much of that contaminant is present in a given sample. However it is significantly more complex to measure the concentration of particulates accurately and precisely, especially fibrous particulates, because many more parameters must be ac-

counted for. When measuring spherical particles the following parameters must be measured: i) the overall particle size distribution; ii) the concentration of each individual size category; and iii) the change in concentration of each size category in different parts of a dust cloud. When measuring fibrous particulates such as asbestos, the parameters become even more complex. The length and diameter of each particle must be measured along with the distribution of complex shapes (such as bundles, clusters and matrices). The concentration of each particle shape must be established, along with the settling velocity of different fiber shapes. Finally, because asbestos analysis involves use of an optical or electron microscope, the relative experience and fatigue of the analyst can influence the ultimate accuracy and precision of a given analysis.

Changes in Asbestos Measurement Methodology: Many of the epidemiology studies which established the link between the inhalation of asbestos and cancer used phase contrast microscopy ("PCM") techniques to measure asbestos concentration. However, PCM is considered inadequate for the analysis of a short fiber mineral such as chrysotile and for the analysis of non-occupational levels of asbestos. Many of these studies were done before TEM techniques were available. Most studies today use TEM as the "state of the art" analytical technique for measuring airborne asbestos concentrations (see Superfund Method for the Determination of Asbestos in Ambient Air, EPA 540/2-90/005a and 005b, May 1990). In the RI, the ambient air samples and surface water samples were measured using TEM while the soil samples were measured using PLM. Limited TEM analyses of the soils samples were used for confirmation. To use TEM data in quantitative risk assessments, one must convert TEM data to PCM Equivalent ("PCME") data using a conversion factor. There are a variety of ways to perform this conversion. Whenever conversions of this type are done, the ability to quantify risks is decreased.

Environmental Assessment: Section 6.6 of the risk assessment provides an environmental assessment of the Atlas Mine OU. From an ecological standpoint, the most significant impacts of the mining appear to be associated with the destruction of habitats in the Atlas Mine Area as opposed to the direct effects of asbestos on wildlife. These impacts will be partially mitigated if the pilot revegetation project is successful and reclamation of the disturbed areas using native vegetation is implemented.

7.0 DESCRIPTION OF ALTERNATIVES

EPA evaluated potential remedial action alternatives for the Atlas Mine OU in accordance with CERCLA Section 121, the National Contingency Plan ("NCP") and the Interim-Final Guidance on Preparing Superfund Decision Documents, June 1989, (OSWER Directive No. 9355.3-02). The Resource Conservation and Recovery Act ("RCRA") does not apply to asbestos and its Land Disposal

Restrictions do not apply to asbestos mining and milling waste.

Minor Changes from Alternative 3, the Proposed Plan: As a result of public comments and EPA's review process, the selected remedy for the Atlas Mine OU differs in some minor respects from Alternative 3, the alternative selected by EPA as the Proposed Plan. As a result of identification of State ARARs by the California Department of Health Services, certain requirements of California's Porter-Cologne Act have been added to the selected remedy. The Proposed Plan did not specifically mention dismantling and disposal of the mill building at the Atlas Mine. A requirement for dismantling and disposal of the mill building has been incorporated into the selected remedy. The Proposed Plan also specified that the road through the Mine Area would be paved. The ROD allows appropriate engineering alternatives to road paving, such as annual road maintenance. The Proposed Plan did not specifically mention deed restrictions. A requirement for filing deed restrictions on private lands at the Atlas Mine OU to restrict use has been added to the selected remedy. The Proposed Plan required additional fencing to restrict access to the Mine Area. The selected remedy allows other appropriate controls to restrict access. These changes are included in Section 10.0, which describes the selected remedy.

Selection of Alternatives: The first step in evaluating potential remedial action alternatives was to determine, based upon Atlas Mine OU characteristics, what set of response actions and associated technologies would be considered from among all possible alternatives. An example of this preliminary determination (or "scoping") was the elimination of biological treatment from further consideration because biological processes capable of detoxifying asbestos contaminated soil do not exist. Section 2.4 of the FS discusses the scoping process in more detail.

The next step in the selection of remedy process was assembling the remaining technologies and/or disposal options into general remedial action alternatives. Pursuant to OSWER Directive No. 9355.3-02, remedial action alternatives are to be developed including those that would eliminate the need for long-term management (including monitoring) and alternatives involving treatment that would permanently reduce the mobility, toxicity or volume of the hazardous substances(s) as their principal element. In addition, containment options involving little or no treatment and a no action alternative are to be developed. The remedial action alternatives developed in the FS were:

Alternative 1:	No Action
Alternative 2:	Access Restriction
Alternative 3:	Stream Diversion/Sediment Trapping Dams, Access Restriction and Revegetation
Alternative 4:	Stabilization of Waste Piles, Stream Diversion/Sediment Trapping Dam, Access

Restriction and Revegetation
Alternative 5: Capping, Access Restriction and Stream Diversion
Alternative 6: Chemical Fixation, Access Restriction and Stream Diversion
Alternative 7: Off-Site Disposal
Alternative 8: Construction of a Dam at White Creek

All of the costs and implementation times presented below are estimates. The cost of monitoring is not included in the cost estimates for Alternatives 2 through 6. Operation and maintenance estimates are for a 30 year period. Details of how the cost estimates were calculated are included in the FS.

Alternative 1: No Action

The Superfund program requires that the "No Action" alternative be evaluated at every site to establish a baseline for comparison. Under this alternative, no remedial action would be taken but a regular program of site monitoring would be started. This monitoring program would include periodic sampling of surface water and airborne asbestos levels in the Atlas Mine Area, as well as aerial monitoring. Capital, O&M (operation and maintenance) and present worth costs are, respectively, no cost, $830,000 and $830,000. Alternative 1 is estimated to require three months to implement.

Alternative 2: Access Restriction

Under this alternative, the mines and stockpile areas would be fenced to restrict access and prevent disturbance by off-road vehicles. Signs warning of asbestos hazards would be posted throughout the mine area. Criteria would be established for all other activity to minimize the amount of airborne asbestos emissions. Capital, O&M and present worth costs are, respectively, $470,000, $88,000 and $558,000. Alternative 2 is estimated to require two months to implement.

Alternative 3: Stream Diversion/Sediment Retention Dams; Access Restriction; Revegetation; Mill Dismantling and Disposal; Slope Stabilization

In addition to access restriction, surface waters would be diverted around mine surfaces and stockpile areas with perimeter dikes and diversion ditches. These stream diversions would minimize erosion of the mine surfaces and tailings piles. Sediment retention dams would be built to reduce the transport of sediments. Minor regrading and/or other appropriate engineering controls, such as box culverts, would improve the surface drainage and stability of the mines and stockpile areas. A pilot study would evaluate whether native vegetation could be established on the disturbed areas. A revegetation project will be implemented

if it is found to be technically feasible and cost effective. Capital, O&M and present worth costs are, respectively, $4,000,000, $286,000 and $4,286,000. Alternative 3 is estimated to require four months to implement.

Alternative 4: Regrading of Waste Piles plus Alternative 3

In addition to all elements of Alternative 3, Alternative 4 adds major improvements to the stability and drainage of mines and stockpile areas. Fully engineered, comprehensive improvements would be performed to minimize slumping and erosion due to run-off. Capital, O&M and present worth costs are, respectively, $9,100,000, $286,000 and $9,386,000. Alternative 4 is estimated to require six months to implement.

Alternative 5: Vegetated Soil Cap; Access Restriction; Stream Diversion

In addition to the stream diversion element of Alternative 3, Alternative 5 includes the construction of a vegetated soil cover on mine surfaces and stockpiles. This vegetated soil cap would be constructed by first reshaping the stockpiles and then covering the mines and stockpiles with 6 to 12 inches of fertile soil cover. Vegetation would then be established on the soil cover. Capital, O&M and present worth costs are, respectively, $14,300,000, $286,000 and $14,586,000. Alternative 5 is estimated to require six months to implement.

Alternative 6: Chemical Fixation; Access Restriction; Stream Diversion

2.3 million cubic meters (3 million cubic yards) of asbestos waste materials would be chemically fixed with cementing agents. The asbestos material would be excavated from the mines and stockpiles and transported to an on-site batch mixing plant. At the plant the asbestos would be mixed with cementing agents and water to form a slurry. This slurry would then be transported to the open pit mines and previously excavated areas. After curing, the slurry would harden into a fixed mass similar to concrete. Stream run-on would be diverted around areas containing fixed material, thereby reducing erosion. Capital, O&M and present worth costs are, respectively, $103,336,000, $137,000 and $103,473,000. Alternative 6 is estimated to require 48 months to implement.

Alternative 7: Off-Site Disposal

2.3 million meters (3 million cubic yards) of asbestos contaminated material would be excavated and transported to an off-site landfill permitted to receive asbestos waste. Nearly all of the asbestos waste would be excavated and the need for long-term monitoring and maintenance of the mines and stockpile areas would

be eliminated. Capital, O&M and present worth costs are, respectively, $243,000,000, no cost and $243,000,000. Alternative 7 is estimated to require 120 months to implement.

Alternative 8: Construction of a Dam on White Creek

A dam with an approximate reservoir capacity of 7500 acre-feet and an areal extent of about 91 hectares (200 acres) would be constructed. The probable location would be just below the intersection of White Creek and Diaz Canyon, approximately 7 miles downslope from the Atlas Mine OU. This dam would address the transport of waterborne asbestos from the entire White Creek watershed. However, this alternative would not address specific conditions and health threats at the Atlas Mine OU (except for transport of asbestos bearing sediments from the Atlas Mine Area to the Ponding Basin by surface streams). The present worth cost is estimated at $16,500,000. The time required to implement Alternative 8 is greater than two (2) years.

8.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

This section provides an explanation of the nine (9) criteria used to select the remedy, and an analysis of the eight remedial action alternatives in light of those criteria, highlighting the advantages and disadvantages of each of the alternatives.

Criteria

The alternatives were evaluated based on the nine key criteria which directly relate to the factors that CERCLA and the NCP, 40 CFR Section 300.430, mandate that the Agency assess in selecting a remedy. These criteria are:

(1) **overall protection of human health and the environment**, which addresses whether a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls or institutional controls;

(2) **compliance with applicable or relevant and appropriate requirements (ARARs)**, which addresses whether a remedy will meet the standards of all of the ARARs of other Federal and State environmental laws and/or justifies a waiver;

(3) **long-term effectiveness and permanence**, which refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean-up goals have been met;

(4) **reduction of toxicity, mobility or volume through treatment**, which addresses the anticipated performance of the treatment technologies a remedy may employ;

(5) **short term effectiveness**, which addresses the period of time needed to achieve protection and any adverse impacts on human and the environment that may be posed during the construc-

tion and implementation period, until clean-up goals are achieved;

(6) **implementability**, which is the technical and administrative feasibility of a remedy;

(7) **cost**, which includes estimated capital and O&M costs, as well as present-worth costs;

(8) **state acceptance**, which indicates the support of the State agency for the selected remedy; and

(9) **community acceptance**, which summarizes the public's general response to the RI/FS and Proposed Plan.

Analysis of the Alternatives

Overall Protection. Because Alternative 1, the "no action" alternative, is not protective of human health and the environment, it is not considered further in this analysis as an option for the Atlas Mine OU. Alternative 2 would be protective of human health only for persons attempting to enter the Atlas Mine Area. Alternatives 3 through 7 would all provide adequate protection of human health and the environment by controlling risk through engineering controls, institutional controls or treatment. Alternative 6 is the only option that utilizes treatment. Alternative 3 would control the significant risk from inhalation of asbestos-contaminated air at the Atlas Mine OU and nearby areas by restricting access to the Atlas Mine Area. The stream diversions and sediment retention dams would minimize the release of asbestos from the Atlas Mine OU into local creeks. Alternative 3 would not disturb the protective crust on the stockpiles to a great extent. The revegetation element of Alternatives 3 and 4 could, if successful, help stabilize disturbed areas, minimize erosion and reduce future releases of contaminants. Although Alternative 4 would provide greater slope stability of tailings piles than Alternative 3, Alternative 4 would disturb the protective crust to a greater extent than Alternative 3. Alternative 8 would not address conditions and health threats at the Atlas Mine OU.

Compliance with ARARs. Alternatives 3 through 7 would meet their respective applicable or relevant and appropriate requirements of Federal and State environmental laws. Alternative 2 would comply with the specifications in 40 CFR section 61.153(b) and section 61.156(b) but would not comply with the remaining identified ARARs. Alternatives 1 and 8 would not comply with ARARs.

Long-term Effectiveness and Permanence. Alternative 3 would reduce the amount of asbestos-contaminated material released into the air and the surface water in the Atlas Mine OU. By restricting access to areas where asbestos has been transported, Alternative 3 would also reduce the long-term risk of exposure to asbestos-contaminated air. For this criterion, Alternatives 4 and 5 are comparable to Alternative 3. Alternative 2 would provide long-term protection only to exposure at the Atlas Mine Area as

opposed to downstream exposures. Long term effectiveness will depend on proper maintenance of diversion structures and other engineered elements. The engineered elements of the preferred alternative will be designed to take maximum advantage of the natural systems and to minimize operation and maintenance needs.

Alternative 6 provides the greatest amount of long-term effectiveness and permanence. Alternative 7 would remove all waste to a landfill permitted to accept asbestos, thereby eliminating the long-term risk of exposure at the Atlas Mine OU. As with all landfills, the long-term effectiveness of the containment system may need to be retrofitted or replaced. Therefore, a risk will remain at the landfill site and long-term effectiveness will be dependent on operation and maintenance at that location. Alternatives 1 and 8 do not provide long-term effectiveness and permanence.

Reduction of Toxicity, Mobility or Volume of the Contaminants Through Treatment. Because there is no cost-effective treatment technology for asbestos-containing mining materials at this OU, this criterion is not directly relevant to a choice among alternatives. However, the alternatives were compared with respect to their ability to minimize the mobility (through the air or surface water pathways) of the asbestos-containing material. Only Alternative 6 would treat the waste to reduce the mobility of the asbestos. Alternatives 2 through 5 and Alternative 7 rely on institutional controls or engineering controls to reduce the mobility of the asbestos to varying degrees. Technology is not currently available that would reduce the volume of asbestos contaminated soils.

Short Term Effectiveness. Alternative 2 would quickly reduce direct human contact with asbestos at the Atlas Mine OU. Alternatives 3, 4 and 5 would have a minor, short term risk of exposure for workers at the Atlas Mine OU. Alternatives 6 and 7, because of their greater implementation times, would include a more serious short term risk of exposure for on-site workers. In addition, Alternative 7 would subject the surrounding community to the possibility of accidental spillage during transport of the contaminant from the Atlas Mine OU. Alternative 8 would not be effective in the short term because it does not address exposure at the Atlas Mine Area.

Implementability. Alternatives 2 and 7 would have no unusual technical difficulties that could delay implementation. For Alternatives 3 and 4, the implementability of the revegetation component will be tested in a pilot project. The other elements of Alternatives 3 and 4 should not present an implementability problem. Alternative 5 would face a technical difficulty in finding adequate borrow sources (i.e., areas where clean soil is removed for use as a cap on the contaminated areas) and could face administrative difficulties in getting permits from local

and county development agencies to exploit nearby borrow sources without adversely impacting the Mine Area habitat value. Alternative 6 could face technical difficulties with the process system designed to fix the waste material and would also require a pilot study prior to implementation. These difficulties could include logistical problems related to operating a complex fixation plant in a remote area and the providing power sources to run such a plant. Alternative 7 could face administrative difficulties in getting permits from state and federal agencies for transporting the asbestos material on public roads. Alternative 8 would have no technical difficulties in terms of dam construction but would face formidable administrative difficulties in terms of permitting and environmental impacts, at the state and federal level. In addition, the feasibility of dam construction in an area of known seismic activity is unknown.

Cost. All of the following cost figures are estimates of present worth cost and include operation and maintenance costs based on a 30-year period. For Alternatives 2 through 6, the costs outlined below do not include the cost of continued monitoring. However, monitoring will be required as part of the selected remedy. The cost of Alternative 1 is $830,000 (for continued monitoring). Alternative 2 has a cost of $558,000. The cost of Alternative 3 is $4,286,000. Alternative 4 has a cost of $9,386,000. Alternative 5 has a cost of $14,586,000. Alternative 6 has a cost of $103,473,000. The highest cost alternative is Alternative 7 at $243,000,000. The cost of Alternative 8 is 16,500,000.

State Acceptance. The State of California has concurred in EPA's selected remedy. However, the State has indicated that it would prefer a more fully engineered remedy that includes large-scale regrading of the tailings piles.

Community Acceptance. The majority of the commenters from the Coalinga area preferred Alternative 8. They believe that a dam would provide the most protection to Coalinga and Huron from asbestos bearing sediments and would also help recharge local groundwater. EPA also received comments from members of the OHV user community and other recreational users of the CCMA. The OHV user community expressed concern that, although this ROD does not select any remedial action in the CCMA, revision of BLM's land use plan for the CCMA to consider possible human health effects of asbestos exposure could result in access restriction or closure of the CCMA to recreational and other public use. Several PRPs questioned EPA's results and conclusions as to the health risk that the Atlas Site represents, given the natural occurrence of asbestos in the New Idria Formation. These PRPs concluded that a "No Action" decision is appropriate.

9.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

Under Section 121(d)(1) of CERCLA, 42 U.S.C. §9621(d)(1), remedial actions must at a minimum attain a degree of clean-up which assures protection of human health and the environment. Additionally, remedial actions that leave any hazardous substance, pollutant, or contaminant on-site must meet a level or standard of control that attains standards, requirements, limitations, or criteria that are "applicable" or "relevant and appropriate under the circumstances of the release." See Section 121(d)(2) of CERCLA, 42 U.S.C. §9621(d)(2). These requirements of Section 121(d)(2), known as "ARARs", may be waived in certain instances, as stated in Section 121(d)(4) of CERCLA, 42 U.S.C. §9621(d)(4).

"Applicable" requirements are those clean-up standards, standards of control and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant or contaminant, remedial action, location, or other circumstance at a CERCLA site.

"Relevant and appropriate" requirements are clean-up standards, standards of control and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. For example, requirements may be relevant and appropriate if they would be "applicable" but for jurisdictional restrictions associated with the requirement. The determination of which requirements are "relevant and appropriate" is left to EPA's discretion. EPA may look to the type of remedial actions contemplated, the hazardous substances present, the waste characteristics, the physical characteristics of the site, and other appropriate factors. It is possible for only part of a requirement to be considered relevant and appropriate.

Additionally, only substantive requirements need be followed. If no ARAR covers a particular situation, or if an ARAR is not sufficient to protect human health or the environment, then non-promulgated standards, criteria, guidance, and advisories may be used to provide a protective remedy.

Types of ARARs

There are three types of ARARs. The first type is a "contaminant specific" requirement. This ARAR type sets limits on concentrations of specific hazardous substance, pollutants, and con-

taminants in the environment. Examples of this type of ARAR are ambient water quality criteria and drinking water standards. The second type of ARAR is a location-specific requirement that sets restrictions on certain types of activities based on site characteristics. These include restriction on activities in wetlands, floodplains, and historic sites. The third type of ARAR is an action-specific requirement. This ARAR type is a technology-based restriction which is triggered by the type of action under consideration. An example of an action-specific ARAR is the Occupational Safety and Health Act ("OSHA") which sets permissible levels of exposure to asbestos for workers.

ARAR Identification Process

ARARs must be identified on a site-specific basis from information about specific chemicals at the site, specific features of the site location, and actions that are being considered as remedies.

ARARs identified for the Atlas Mine OU address emission of asbestos fibers from contaminated soils, inhalation of asbestos fibers, disposal of asbestos contaminated soils, protection of endangered species, regulation of mining waste, fugitive dust emissions and protection of wetlands.

Contaminant-Specific ARARs For Asbestos:

1. Clean Air Act, National Emission Standard for Hazardous Air Pollutants (NESHAPs)

Asbestos was first designated as a hazardous air pollutant under the Clean Air Act in 1971. The National Emission Standard for Hazardous Air Pollutants ("NESHAPs") for asbestos found at 40 C.F.R. Section 61.152 and 40 C.F.R. Section 61.156 are ARARs for the implementation of the remedy at this Site. 40 C.F.R. Section 61.153 is an ARAR for the completion of the remedy at this operable unit.

2. California Air Resources Act, Health and Safety Code, Division 26, section 39000 et seq. 17 CCR, Part 3, Chapter 1, Specifically the Fresno County Air Pollution Control District PM 10 standard

The Fresno County Air Pollution Control District has adopted PM 10 as a particulate matter standard. This PM 10 standard means that ambient levels of particulate matter greater than 10 microns in length shall not exceed 30 micrograms per cubic meter (annual average) or 50 micrograms per cubic meter over a 24 hour period.

Location-Specific ARARs:

1. The Endangered Species Act of 1973, 16 U.S.C. Section

1536(a-d)

The Atlas Mine OU is located in an area that contains endangered species (the San Joaquin kit fox and the blunt-nosed leopard lizard). Generally, when a project potentially impacts an endangered species or critical habitat, activities carried out by Federal agencies should not jeopardize the continued existence of an endangered species or cause adverse modifications of critical habitat.

2. USFWS Mitigation Policy (46 Fed.Reg. 7644-7663, January 1981).

This policy is triggered in accordance with the Fish and Wildlife Act of 1956, Fish and Wildlife Coordination Act, Watershed Protection and Flood Prevention Act and the National Environmental Policy Act. The mitigation policy defines resource categories and establishes mitigation goals and guidelines for each. Guidelines to achieve the goal include avoiding or minimizing habitat loss, immediate rectification or reduction of habitat loss or replacement of habitat in kind.

3. Federal Water Pollution Control Act, Section 404(b)(1), 33 U.S.C. Section 1344(b)(1).

This statute is designed to ensure that if no practicable alternative to impacting waters of the United States including wetlands exists, any unavoidable, adverse impact on the wetlands must be mitigated.

4. California Hazardous Waste Control Laws, Health and Safety Code, Div. 20, Chapter 6.5, Section 25220-25241 et seq. and 22 CCR, Div. 4, Chapter 30, Section 66001 et seq

The actual substantive restrictions contained in Section 25232(a)(1) and (2) are an ARAR for the privately owned lands at the Atlas Mine OU. However, the procedural requirements related to notice, hearing and the mechanisms for implementing deed restrictions do not fall within the definition of an ARAR. CERCLA

Section 121, 42 U.S.C. 9621.

Action Specific ARARs:

1. Occupational Safety and Health Act ("OSHA")

OSHA has set a permissible exposure limit ("PEL") for all asbestos fibers at 0.2 fiber per cc ("f/cc") for occupational exposure and an "action level" (the level above which employers must initiate compliance activities) of 0.1 f/cc as an 8-hour time weighted average (51 C.F.R. Section 22612 (1986)). While this standard was meant for occupational exposure (8 hours per day, 40 hours per week, 52 weeks per year) and not for continuous ambient

exposure, it provides an upper threshold for evaluating permissible ambient exposure limits. In other words, a concentration of .2 PCM fibers per cc or less is not permissible for ambient exposure, since this requirement is applicable or relevant and appropriate for exposure during the cleanup of this operable unit.

2. California Porter Cologne Water Quality Act, 23 CCR, Chapter 3: Subchapter 15, Article 7 - Mining Waste Management, Sections 2570-2574, Specifically 23 CCR Section 2572(b), 23 CCR Section 2572(h)(1)(A), 23 CCR Section 2572(h)(3), 23 CCR Section 2546(d) and 23 CCR Section 2546(e)

This state act contains regulations establishing waste management requirements for all mining waste. The act's construction standards require accommodation of 25-year, 24-hour storm run-off controls in design criteria for the drainage and diversion structures at the Atlas Mine OU as well as 100 year peak stream flow protection for all waste piles at this operable unit. These requirements are applicable and relevant and appropriate for remedial action at this operable unit.

10.0 THE SELECTED REMEDY

The Selected Remedy consists of Alternative 3 with some modifications. It includes access restrictions, construction of stream diversions and sediment trapping dams, grading and/or other slope stabilization elements, a revegetation pilot study (with implementation if found to be appropriate), road paving or an engineered alternative, mill dismantling, disposal of debris, deed restrictions and implementing an operation and maintenance program.

Access Restriction: The perimeter of the Atlas Mine OU has been fenced and berms along White Creek Road have been constructed by the BLM to discourage access of the Mine Area. In addition, access to disturbed areas will be further limited, if necessary, by additional fencing or other appropriate means. By restricting access to the Atlas Mine OU, the generation of airborne asbestos emissions will be minimized, reducing the risk from inhaling asbestos fibers for persons in the immediate area.

Construction of Stream Diversions and Sediment Trapping Dams, Grading and/or Other Slope Stabilization Elements: Surface water would be diverted around mine surfaces, ore stockpiles and mine tailings piles with perimeter dikes and diversion ditches. These stream diversions would reduce erosion and transport of asbestos waste material from the Atlas Mine OU into local drainages. Sediment retention dams would be built downslope from the mine surfaces and mining waste to control the release of asbestos into the local drainage. Minor regrading of ore stockpiles and tailings piles would improve surface drainage and stability of these

areas. Other engineering controls, such as box culverts, will be constructed to further stabilize the tailings piles.

Each of these engineering controls consist of the following components:

Stream Diversion (Run-On Control) System:
- --Interceptor ditches
- --Diversion dikes
- --Primary channel

Sediment Trapping (Run-off Control) System:
- --Flood retention dikes
- --Sediment retention dams
- --Revegetation pilot project:

Tailings Pile Stabilization and Control:
- --Grading
- --Rock filled gabions, box culverts or other appropriate slope stabilization structures.

All diversion and drainage facilities shall be designed and constructed to accommodate the anticipated volume of precipitation and peak flows from surface run-off in a 25-year, 24 hour storm. All tailings piles shall be protected from 100-year peak stream flows. All structures shall be designed and constructed with safety factors that ensure the integrity of these structures in the event of seismic activity of magnitudes known to occur in the Coalinga area.

All containment structures shall be designed by a registered civil engineer and construction shall be supervised and certified by a registered civil engineer or certified engineering geologist. All containment structures will be designed to include factors of safety that will protect these structures from seismic events of a size known to occur in this area.

Because asbestos from natural and disturbed areas is already present in and will continue to enter the surface water pathway, it is extremely difficult to quantify the reduction in risk that this portion of the remedy will achieve. However, it is believed that significant removal of the Atlas Mine OU contribution to asbestos entering the local drainage would produce a reduction in downstream risk due to inhalation of resuspended asbestos fibers. A verification sampling plan ("VSP") will be instituted to confirm that an appropriate reduction in hydraulic transport rate of asbestos is achieved. The VSP will include surface water modeling and surface water and stream bed sampling, as necessary.

Revegetation Pilot Project: A pilot study will evaluate if native vegetation could be established on the disturbed areas. If revegetation is found to be technically feasible and cost effec-

tive, the disturbed areas will be reclaimed with vegetation to the extent found to be appropriate.

Road Paving or an Engineered Alternative, Mill Dismantling, Disposal of Debris and Deed Restrictions: The road through the Mine Area will be paved or an alternative will be adopted to suppress dust. The mill building will be dismantled and disposed of along with other debris in the Mine Area. A deed restriction will limit use of the privately held land and prevent disturbance of the contaminated material left at the Mine Area OU.

Operation and Maintenance: Visual inspections, both on the ground and from the air, will be required to ensure the integrity of the engineering and institutional controls. Operation and maintenance activities will be required to ensure the effectiveness of the engineering controls. These activities will include: (1) inspection of engineering systems to ensure integrity and performance, (2) removal of sediments from retention dams, (3) any repair work necessary to maintain the integrity of the remedial systems, (4) maintenance of the vegetation, and (5) regular policing of the Atlas Mine Area by BLM rangers.

Five Year Review: EPA will review the effectiveness of the remedial actions pursuant to CERCLA Section 121(c), 42 U.S.C. Section 9621(c).

Cost: Using a conservative estimate, the total capital cost for the selected alternative is $4 million. Annual operation and maintenance activities are estimated at $19,000. The total present worth cost for the selected remedy is estimated to be $4,286,000. Table 2 summarizes costs for the selected alternative.

During the remedial design and construction process, that follows this ROD, some changes to the selected remedy may be required and will be made in accordance with the NCP. CERCLA Section 117, 42 U.S.C. Section 9617 and 40 C.F.R. Section 300.435(c)(2).

11.0 DOCUMENTATION of SIGNIFICANT CHANGES

The selected alternative for the Atlas Mine OU is construction of engineering systems to control the release of airborne and waterborne asbestos from the Atlas Mine Area and accompanying measures, as detailed in Section 10, above. At this time no significant changes from the Proposed Plan have occurred. Minor changes are described in Section 7.0.

12.0 STATUTORY DETERMINATIONS

Overall Protection of Human Health and the Environment

The selected remedy protects human health and the environment by minimizing exposure to asbestos-contaminated materials. Proper

TABLE 2

SUMMARY OF COSTS FOR THE SELECTED REMEDY

Capital Cost (per cubic meter)	O&M (per yr)	Total Present Worth Cost	O&M (Present Worth)
$1.70	$18,600	$4,200,000	$286,000

O&M = Operation and Maintenance

operation and maintenance practices will ensure the integrity of the stream diversions, sediment trapping dams, vegetation and fencing. Strict dust control procedures will be followed during construction. Proper health and safety measures, including ambient air monitoring and personnel monitoring during implementation, will ensure that the health of on-site workers and the local population is protected.

Cost-Effectiveness

The selected remedy is cost-effective in that it provides overall effectiveness commensurate to its costs. The estimated cost of the selected remedy is less than one half the cost associated with Alternative 4 and less than one third the cost associated with Alternative 5, and yet the selected remedy and Alternatives 4 and 5 are similar in terms of the level of public health and environmental protection provided.

Compliance with ARARs

The selected remedy will comply with all applicable or relevant and appropriate requirements that have not been waived.

Utilization of Permanent Solutions to the Maximum Extent Practicable

Currently there is no known permanent treatment or resource technology which would control release of asbestos from the soil at the Atlas Mine OU. A chemical fixation alternative was identified, but it was eliminated from further consideration due to difficulties associated with implementation and very high cost. Of those alternatives that are protective of human health and the environment, comply with ARARs and are cost effective, EPA has determined, that the selected remedy provides the best balance of the various factors that CERCLA requires be considered in remedy selection.

The Atlas Mine OU is located in a largely rural area, remote from any population centers and within a large area of serpentine which is a source of naturally occurring asbestos. Off-site disposal of the mining waste would be prohibitively expensive and would have a significant short-term risk associated with transport of the asbestos to a landfill licensed to accept asbestos waste.

Preference for Treatment as a Principal Element

Currently there is no proven, cost-effective treatment technology that would permanently and significantly reduce the mobility, toxicity or volume of asbestos at the Atlas Mine OU. Since no cost-effective treatment alternative exists for this OU, treatment was not selected as a remedy. Although several treatment

technologies were investigated during the feasibility study, it was determined that no technology presently exists that would result in a permanent and significant decrease in the toxicity, mobility or volume of asbestos at the Atlas Mine OU in a cost effective manner. Alternative 3 was found to be the best method for addressing the threats posed by the Atlas Mine OU, taking into account all of the statutory requirements and preferences.

APPENDIX 1

REVIEW OF ASBESTOS ANALYTICAL METHODS

I. Asbestos Analytical Techniques

There are three commonly accepted analytical techniques used to measure asbestos. They are:

1) Phase Contrast Microscopy ("PCM"): An optical technique useful in examining minute particles.

2) Polarized Light Microscopy ("PLM"): An optical technique that uses polarized light to identify minerals.

3) Transmission Electron Microscopy ("TEM"): A technique using an electron microscope to achieve extremely high resolution of asbestos fibers too small to be resolved using optical methods.

A brief description, including the advantages and disadvantages of each technique, is presented below.

A. Phase Contrast Microscopy

Phase contrast microscopy ("PCM") is a technique of optical microscopy that is commonly used to analyze air samples collected in the work place (e.g. in enclosed spaces). PCM translates differences in the phase of light transmitted or reflected by the object into differences of intensity in the image. The method is better suited to analysis of work place air than ambient air because in the work place, asbestos accounts for a high fraction of total particulates as opposed to in an environmental setting, where the situation is normally reversed. Most of the available medical studies of asbestos diseases have measured asbestos using PCM. This is because PCM was the only technique available when most of the occupational studies were done.

The PCM technique has three major limitations concerning its use in the ambient environment: i) the method cannot detect fibers with diameters of less than 0.2 micrometers. Many fibers in the environment are much smaller than this; ii) PCM does not distinguish between asbestos fibers and other types of fibers. Therefore, in the environment, the PCM fiber count may be completely unrelated to the asbestos fiber content; and iii) PCM is also very sensitive to the ratio of total particulates to fibrous dust. In environmental samples this ratio is sufficiently high that fibers may be effectively obscured so that PCM counts may severely underestimate fiber concentrations.
For these reasons, it is widely accepted that the PCM method is totally unsuitable for measurement of asbestos fibers in ambient atmospheres.

The major advantages of PCM are that it is a quick, cheap, well established technique for measuring occupational levels of exposure.

B. Polarized Light Microscopy

Polarized Light Microscopy ("PLM") is the preferred technique for analysis of bulk insulation samples. The PLM technique is relatively inexpensive, quick (1/2 hour/sample) and allows: (1) identification all asbestos types, (2) distinguish between asbestos and other fibrous and non-fibrous minerals and (3) identify most non-asbestos components of samples. The resolution capacity of PLM is 200x to 400x magnification.

There are two counting procedures that have been adopted for use with PLM analysis, the point counting method and the field comparison or visual estimation method. The point counting method uses a superimposed grid (graticule) with 100 points. The operator counts the points where asbestos is present. The method (point count) involves the preparation of eight slides, each of which can be viewed at 100 possible points, to establish the presence or absence of asbestos at 50 points on each slide. The result is recorded and reported as area percent based on the number of positive points. The following format is used for determination:

Area percent = a/n (100)

where:

a = number of points with asbestos fibers present
n = number of non-empty points counted.

The field comparison method, also called the 2-minute method, with the stereobinocular light microscope, is used to quantify a large sample (e.g., 1 ounce) using the microscope at 30-40x. The operator estimates the homogeneity of the mixture and estimates the percentage of each individual fibrous component.

The disadvantages associated with PLM include:

- Asbestos content determination is usually done by visual estimate (field comparison) or point counting, and is thus qualitative; concentration is expressed as the ratio of asbestos to non-asbestos particles or percent by area.
- Small fiber identification is difficult because certain optical properties (birefringence and the angle of extinction) are hard to determine in small fibers.
- The thinnest fibers that can be observed are approximately 0.4 micrometers in diameter; fibers this small, though observable, cannot usually be identified for mineral type.

- Highly skilled analysts are required, particularly in view of the subjective nature of the determinations.

- The detection limit is 1 area percent. Samples may still contain asbestos in quantities below the PLM detection limit.

- A precise procedure for sample preparation has not been developed. Therefore, PLM suffers from the variation introduced during sample grinding and preparation. It is very difficult to standardize the preparation of bulk samples, especially soil samples.

Using PLM to identify asbestos in soils can be difficult because soils are subjected to erosion and weathering; asbestos bundles become separated and broken into smaller, possibly sub-optical, sizes much more quickly than fiber bundles in relatively undisturbed insulating materials. Asbestos fibers may also be dispersed by wind and by seasonal flooding. Therefore, a sizeable fraction of the asbestos fibers in soil could be below optical resolution. On the other hand, PLM is the only method of measuring asbestos with an EPA approved methodology for sampling and analysis, even though this methodology is specifically for bulk insulation samples. Therefore, it is the one analytical method that can be controlled, to a limited extent, in a quality assurance/quality control plan.

C. Transmission Electron Microscopy

Transmission electron microscopy ("TEM") is the most powerful analytical technique available for measuring asbestos. TEM has been used for air, water, or soil analysis. It is the preferred instrumental technique for measuring asbestos in ambient atmosphere since it incorporates the most powerful combinations of identification methods. TEM analysis uses electron microscopy, at magnifications of 10,000 to 50,000 times, to detect asbestos structures as thin as 0.2 nanometers in diameter. This is sufficient to identify the thinnest asbestos fibrils under most circumstances. Besides the transmission electron microscope, which allows the operator to locate very small fibers, this technique can also utilize two mineral identification tools. These are Selected Area Electron Diffraction ("SAED") and Energy Dispersive X-ray Analyzer ("EDXA"). Using these tools, the operator can identify the mineral type from a single point on the specimen.

The disadvantages associated with TEM include the following:

- No widely accepted TEM method is available for the analysis of asbestos in soils, making it difficult to correlate interlaboratory data. Sample preparation methods are not standard among workers, making the comparison of results between sites or laboratories

very difficult or meaningless.

- Analysis requires a minimum of 6 to 8 hours over 2 to 3 days. Highly skilled analysts are required and large differences in results can occur due to operator variance. TEM analysis is extremely expensive, over 20 times the per sample cost of optical methods.

- TEM analysis is performed on a much smaller sample than PLM so that obtaining homogeneity during sample preparation is more critical.

- Typically, total structures are counted. Sample preparation (i.e., grinding) destroys the structure size distribution.

TEM sample preparation alters the soil matrix. This is significant because the sample is dispersed into very fine particles before it is put onto a filter for analysis. Since asbestos occurs in clusters and bundles as well as fibers, the sample preparation process (in the case of soil) can destroy the structure of those forms and produce a very large number of individual fibers of small size. Although total fibers are counted as part of the TEM analysis, these results must be converted to weight percent, using data on length, width, and density. This conversion to mass is necessary due to the sample preparation grinding process, which artificially increases the fiber count. How the TEM weight percent compares with air emissions and risk tables has not been standardized by government or industry. Therefore, interpretation of soil data results relative to air samples and/or risk charts is very difficult, at best.

II. Problems with Using Asbestos Data in Quantifying Risk

Although the role of asbestos as a cause of cancer is clear, the ways in which fibers cause disease are not well understood, and this has complicated efforts to measure asbestos successfully. Asbestos researchers have not agreed upon which attributes of asbestos are important to measure to assess risk, including size and shape of individual fibers, number of fibers, total mass of fibers, inclusion of asbestos bundles, clusters, and matrix debris in the fiber count, and asbestos mineralogical type. For example, most researchers think that longer, thinner asbestos fibers (those longer than 8 micrometers and thinner than 1.25 micrometers) are more carcinogenic, i.e., The "Stanton Hypothesis". However, other researchers question this approach, suggesting that both long and short fibers may be biologically active. In addition to fiber dimension, surface chemistry of the asbestos fibers may play a role in causing disease. Further, there is disagreement whether mineral type is a factor in disease causation. Some would argue that chrysotile asbestos may partially dissolve in weakly acidic environments, facilitating fiber clearance from the lung. However, EPA policy is that all asbestos mineral types are equally carcinogenic.

To compound the problem, analysis of ambient samples for asbestos is much more difficult than occupational or work place samples, because the concentration of asbestos in the environment is typically much lower. It should be noted that there are areas, such as in the New Idria Formation in central California's Diablo Mountains, where environmental levels have equaled work place levels when asbestos bearing soils have been disturbed. Asbestos fibers found in ambient air are typically too short and thin to be detected by conventional microscopes, and may be agglomerated with other particulate matter so that they are masked or hidden. Further, although EPA has attempted to standardize asbestos analytical techniques, differences in sample handling, preparation, instrument capabilities, operator proficiency, and counting procedures make it extremely difficult to compare results from different laboratories. In short, accurate measurement of asbestos is impeded by many factors, greatly complicating any estimates of environmental risk.

ATLAS MINE AREA OPERABLE UNIT
of the
ATLAS ASBESTOS MINE NPL SITE

RESPONSIVENESS SUMMARY
for the
REMEDIAL INVESTIGATION/FEASIBILITY STUDY AND PROPOSED PLAN

February 14, 1991

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY RESPONSE TO COMMENTS ON THE REMEDIAL INVESTIGATION/FEASIBILITY AND PROPOSED PLAN FOR THE ATLAS ASBESTOS MINE SUPERFUND SITE

I. INTRODUCTION

The United States Environmental Protection Agency ("EPA") held a public comment period from April 11, 1990 through July 11, 1990 on EPA's Remedial Investigation/Feasibility Study ("RI/FS") and Proposed Plan for the asbestos contamination at the Atlas Mine Area Operable Unit ("Atlas Mine OU") of the Atlas Asbestos Mine Superfund Site ("Atlas Site") in Fresno County, California. The purpose of the public comment period was to provide interested parties with the opportunity to comment on the RI/FS and Proposed Plan. The RI/FS, the Proposed Plan and the complete Administrative Record were made available on April 11, 1990 at the Coalinga Public Library, designated information repository for the Atlas Asbestos Site, and at EPA's Region IX office in San Francisco, California. By April 11, 1990, fact sheets containing EPA's Proposed Plan had been mailed to all interested parties. Notification of the public comment period was published in Coalinga, Fresno and Hanford area newspapers.

The initial 60 day public comment period (April 11 through June 11) on the RI/FS and Proposed Plan was extended for 30 days (to July 11) after requests for an extension were received from community members and representatives of the Potentially Responsible Parties (PRPs). Public meetings were held on May 9, 1990 in Coalinga, California and on May 30, 1990 in Sunnyvale, California. The meeting in Sunnyvale was arranged so that people who live in the Bay area could provide comments on the proposed plan. Most of the people who attended the May 30th meeting were concerned about EPA's statement in the Proposed Plan about potential future actions which might affect public recreation in the Clear Creek Management Area ("CCMA"). At these meetings, representatives from EPA answered questions about the evaluation of the Atlas Site and the remedial alternatives under consideration.

Section 113(k)(2)(B)(iv) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) requires that EPA respond to significant comments on EPA's Proposed Plan. This responsiveness summary provides a review and summary of significant public comments on the RI/FS and the Proposed Plan. In

addition to summarizing significant concerns and questions, this document presents EPA's responses to those concerns.

II. OVERVIEW OF THE RECORD OF DECISION

EPA's selected remedy is engineering controls designed to minimize the release of asbestos from the Atlas Mine OU into the local drainage basin and institutional controls designed to minimize exposure of persons on or near the mine area to airborne asbestos emissions. The selected remedy includes the following elements: i) stream diversions; ii) sediment trapping dams; iii) minor grading and/or other slope stabilization elements; iv) revegetation pilot project; v) access restriction; vi) dismantling of the mill building and disposal of debris; vii) road paving or an appropriate engineering alternative; and viii) deed restrictions on private property.

Other alternatives fully analyzed in the FS included: 1) No Action; 2) Access Restriction; 3) Fully engineered stream diversions and sediment trapping dams, revegetation pilot project, major grading; 4) Capping; 5) Chemical Fixation; 6) Off site disposal in an approved landfill; and 7) Building a dam on White Creek.

At this time EPA is not taking any action in the CCMA or in the Ponding Basin. Other federal and state agencies are addressing the problems related to asbestos contamination in these areas. In 1992 EPA will evaluate the actions taken by the other federal and state agencies and decide whether further EPA action under CERCLA is necessary.

III. SUMMARY OF SIGNIFICANT COMMENTS AND AGENCY RESPONSES

The following section summarizes the major comments and responses received on EPA's Proposed Plan. A comprehensive collection of detailed comments and responses can be found in Section IV. If any conflicts or ambiguity appear between the two sections, follow Section IV.

Comments on the Atlas Mine Area Operable Unit

Most of the commenters from the greater Coalinga area supported EPA's clean-up proposal for the Atlas Mine OU (Alternative 3 in the Proposed Plan). Some suggested that a dam or series of dams on White Creek would improve the proposal. EPA believes that the sediment trapping dams in the proposal are adequate.

Several state agencies commented on EPA's proposal for the Atlas Mine Area. The California Department of Water Resources questioned some of the hydrogeological modeling and asbestos sampling results used by EPA in its decision-making. The California Department of Health Services recommended Alternative 4 which in-

cludes EPA's preferred alternative with additional regrading of the asbestos waste piles more fully engineered structures. EPA based all of its responses to these concerns on the Administrative Record.

Several federal agencies also commented on EPA's proposal. The United States Bureau of Reclamation questioned EPA's asbestos sampling techniques and results and the cost-effectiveness of the plan. EPA acknowledged the uncertainty of asbestos testing. The Bureau of Land Management of the U.S. Department of the Interior (BLM) supported EPA's proposal with a few exceptions. BLM question some aspects of the Remedial Investigation and Feasibility Study, including the watershed and air modeling. BLM pointed out several problems with the Public Health Evaluation (PHE) and stated that it overestimated the risks associated with the Site.

Comments on the Ponding Basin

The City Manager of Huron questioned EPA's decision to defer addressing conditions at the Ponding Basin to the U.S. Bureau of Reclamation (USBR) and the California Department of Water Resources (DWR). EPA decided to defer action at the Ponding Basin to USBR and DWR because they are currently planning to address EPA's concerns about that portion of the Site.

Comments on the Clear Creek Management Area (CCMA)

EPA received hundreds of letters from Off-Highway Vehicle (OHV) users concerning EPA's statement in the Proposed Plan concerning the Clear Creek Management Area (CCMA). The majority of these letters were variations of form letters generated by OHV user groups. Most opposed EPA's proposals and strongly objected to the exposure scenarios in the risk assessment. A few commenters expressed approval for the proposal.

The Risk Assessment/Public Health Evaluation

Many OHV users thought that the exposure scenarios in the risk assessment were unrealistic. For example, some riders said that 50 or 96 hours of riding a year was more realistic than the 240 hours per year in the risk assessment. They also protested the use of data from dry, dusty months like June. They believe that data from wet months like January would be more realistic since that is when most people ride in the CCMA. Based on information received during the public comment period, EPA has determined that the exposure scenarios used in the risk assessment were representative of typical use in the CCMA. EPA did not use data from either wet or dry months in estimating the risk. Rather, EPA modeled the concentration of asbestos in the air based on a concentration of asbestos measured in the soil and assuming disturbance of that soil.

Many of the commenters also questioned why EPA's goal is to reduce the risk range to one in a million (1.0×10^{-6}) excess cancers when the agency can accept an excess risk of one in ten thousand (1.0×10^{-4}). Most felt that the one in ten thousand range was more reasonable for the CCMA. For known carcinogens such as asbestos, EPA is required by law to choose a remedy that reduces the risk to between one in ten thousand and one in one million. In this ROD, EPA does not establish a standard for acceptable risks to recreational users in the CCMA

EPA received many comments about the different types of asbestos and the carcinogenicity of each type. For example, according to the commenters, most studies linking asbestos to lung cancer and other diseases like mesothelioma deal with amphibole asbestos, not with chrysotile asbestos, the kind found in Clear Creek. EPA notes that a review of the scientific literature shows that exposure to all types of asbestos, including chrysotile, is associated with an increased risk of lung cancer. There is some evidence suggesting that chrysotile may not be as potent in inducing mesothelioma as amphibole asbestos.

Commenters also questioned the lack of asbestos-related health and epidemiological studies done in the area. EPA is not aware that any epidemiology studies of the local population have been conducted. Because the local population is small, an epidemiology study restricted to this population would probably not be sensitive enough to detect the incidence of asbestos-related disease, even if it is occurring at an unacceptable rate.

Some commenters questioned EPA's statement that the soils at Clear Creek contain over 50% asbestos. EPA based this statement on studies done on the New Idria Formation by Santa Fe Pacific Realty Corporation, as well as additional geologic literature. These studies show that the soils contain in excess of 50% asbestos and some areas contain up to 84% asbestos.

Other commenters questioned the level of asbestos in the air and water. EPA used a mathematical model to determine the amount of asbestos that would be put into the air if asbestos-bearing surfaces were disturbed. EPA did not measure airborne asbestos levels during disturbance of asbestos-bearing surfaces. However, when EPA compared air sampling results done in an independent study with those projected by the mathematical model, they were very similar.

<u>The BLM Land-Use Plan Revision</u>

Many commenters felt that the current BLM plan for the CCMA is adequate and that EPA should not require a revision. One commenter requested information on the criteria that will be used to evaluate and revise BLM's plan for the CCMA. EPA has not

developed any detailed criteria for BLM to follow, but will provide them with some guidance during the revision of the plan.

Several commenters noted that if the BLM plan or EPA called for the closing of the CCMA, OHV riders would be forced to ride in less desirable areas such as private property. Commenters also expressed concern about the amount of stress that closing Clear Creek would cause for OHV riders. EPA states that these concerns should be raised during BLM's public input process that will be part of BLM's revision of its land use plan.

Financial Concerns

Many commenters were concerned about the financial aspects of any change in the CCMA's current use. Some expressed concern that local economies would be affected. EPA's overriding concern is protection of public health and the environment. The issue of economic hardship on local communities should be raised with BLM during their review process.

Commenters requested that EPA fund all future studies instead of BLM-OHV funds being used. BLM has informed EPA that the funding for the plan revision will not come from the OHV improvements budget. EPA's costs will be limited to EPA personnel working with BLM's technical review team. Commenters also requested information on how much a land-use revision would cost. BLM has budgeted approximately $100,000 over two years for their review of the plan.

Some commenters also requested that EPA furnish the OHV users with new riding areas if CCMA is closed. The commenter compared this situation to EPA purchasing homes in Love Canal and Times Beach. EPA responds that designating other land for OHV use is out of EPA's jurisdiction and that OHV users do not have a vested property interest in the CCMA the way a homeowner does in a house he or she has purchased.

EPA's Jurisdiction

Several commenters questioned whether EPA had authority to regulate the CCMA because EPA does not have authority under CERCLA to regulate naturally occurring substances. EPA responds that it can regulate the CCMA because mined or milled asbestos, which is no longer considered naturally occurring has been transported throughout the CCMA by vehicles, wind erosion, and surface water. CERCLA, the Superfund law, applies to ". . . any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located . . . " Therefore the CCMA qualifies as part of a Superfund site.

EPA's Priorities/Motives

Some commenters expressed their distrust of EPA and its intentions. Some suspected that the agency was trying to expand its bureaucratic control and was trying to bully the Bureau of Land Management into closing the CCMA. EPA responds that it is fulfilling its charter to protect public health and the environment. Other commenters were concerned that EPA had already made a decision before the public could comment on the proposals. EPA responds that it does not make decisions until all public comments have been considered. This document, which responds to the concerns raised during the public comment period, is completed before a final decision is made.

Additional Requests and Suggestions

Many commenters felt that the rider, not the government, should decide whether to ride in CCMA. They suggested several ways to educate the riders and to limit the exposure to the asbestos. Some of these suggestions were to require riders to wear breathing filters and to develop a user card system to count the number of times someone entered the area. Some commenters suggested allowing OHV use in the CCMA after riders had signed a waiver saying that the rider would not hold the government responsible if the rider became ill because of the asbestos. EPA suggests that the OHV users make these suggestions to the BLM during its revision of its land use management plan for the area.

The organized OHV groups requested more opportunities for public involvement in the decision making process for CCMA. They asked for an advisory council to be established to help EPA and BLM with the decision. BLM has informed EPA that it will form a technical review team (TRT) which will include representatives from EPA, USGS and OHV groups to help in revising the land use plan.

Support for Changes in the BLM Plan

One person requested that the CCMA be closed until catchment dams are built, dust monitoring instruments are installed, and vegetation projects are tested. He also suggested closing CCMA to vehicular traffic when the soil is dry. Another commenter felt that the CCMA should be closed if air monitoring showed that there were dangerous levels of asbestos in the air. EPA notes these comments and suggests that the BLM review them.

Comments by Potentially Responsible Parties

The Potentially Responsible Parties (PRPs) questioned all aspects of EPA's RI/FS and Regional Study Reports. The PRPs asserted that the RI/FS and Regional Study are so fundamentally flawed that it is impossible for EPA to find that the Atlas Mine OU rep-

resents an imminent and substantial endangerment to human health and the environment. Therefore, the PRPs argue that a "No Action" alternative is the only appropriate alternative. EPA acknowledges that sampling, analysis and interpretation of asbestos data are subject to uncertainty. However, asbestos is a known human carcinogen, and EPA is obligated to select a remedy which protects public health. The selected remedy is cost-effective, easily implemented and is consistent with standard mining reclamation practices.

IV. PUBLIC COMMENTS RECEIVED AND AGENCY RESPONSES

This section includes EPA's response to significant public comments on the RI/FS and the Proposed Plan received during the public comment period. The public comments included letters sent to EPA and comments/questions presented during the May 9, 1990 and May 30, 1990 public meetings. Complete transcripts of the public meetings have been entered into the Administrative Record.

The comments responded to herein have been summarized or paraphrased as appropriate.

A. COMMENTS MADE BY THE INTERESTED PUBLIC

A.1 Comments regarding the Proposed Plan for the Atlas Mine Area.

A.1.a. Comment: Most commenters from the greater Coalinga area supported EPA's proposed plan for the Atlas Mine OU because it would minimize the release of asbestos from the Mine Area and the transport of asbestos down White Creek. A number of commenters suggested that the addition of a dam or a series of dams on White Creek would improve the effectiveness of the Proposed Plan.

A.1.a. Response: A dam on White Creek was evaluated in the FS as Alternative 8. EPA has determined that the sediment trapping dams included in the selected remedy are a less costly and sufficiently effective method of mitigating release from the Atlas Mine OU.

The United States Bureau of Reclamation ("USBR") and the California Department of Water Resources ("DWR") are currently evaluating alternatives for controlling flood waters in the Arroyo Pasajero. One of the alternatives under study by USBR and DWR is a series of catchment dams downslope from the mining area but upslope from Coalinga.

A.1.b. Letter from Levine-Fricke, consultants for Santa Fe Pacific Corporation ("SFPC"), dated July 11, 1990. (SFPC is a PRP for the Coalinga Mine Site).

A.1.b.1. Comment: SFPRC submitted comments on the Atlas Mine Site Proposed Plan. These comments were directed at the Atlas Mine Site RI/FS and regional report titled "Characterization of Disturbances Related to Mining and Exploration in the New Idria/Coalinga/Table Mountain Study Region". The main purpose of the comments was to clarify the record with respect to the Coalinga Mine Site. The comments also noted that: "...the discussions of technology types ... did not adequately consider the difficulties of defining the vertical extent of the Atlas Site ... The Atlas site's vertical extent is difficult to define as the asbestos rich parent material extends for several miles below the surface."

A.1.b.1. Response: SFPRC's comments did not address the remedy selected for the Atlas Mine Site. Therefore, EPA will not respond to these comments at this time. SFPRC's letter is included in the Administrative Record for the Atlas Mine OU.

A.1.b.2. Comment: Commenter stated that almost as much asbestos came down from the mine area before the mills were put in.

A.1.b.2. Response: EPA's watershed modeling estimated that between five percent (5%) and thirty six percent (36%) of the asbestos currently being delivered by the Los Gatos Creek drainage basin is contributed by the Atlas Mine Area.

A.2. Comments regarding the CCMA.

A.2.a. Comments regarding public involvement and clarification of the proposed plan.

A.2.a.1. Comment: EPA has already made its decision to force BLM to revised its land use plan for the CCMA, despite the requirement that the public's input be taken into account before a decision is made.

A.2.a.1. Response: EPA's final decisions on this operable unit and on all Superfund sites are made only after considering all comments received during public comment period. EPA's proposed and final decision is not to take any CERCLA action in the CCMA at this time, because BLM has indicated that it will revise the land use plan for this area and take into account EPA's concerns about the public health threat from asbestos.

A.2.a.2. Comment: User groups should be included in the decision making process for the CCMA land use plan. User groups should be included on any task force or similar group that is created to help EPA and BLM make decisions regarding the CCMA.

A.2.a.2. Response: BLM has informed EPA that it will form a Technical Review Team ("TRT") to help in revising the land use plan for CCMA. This TRT will include members of user groups, EPA representatives, United States Geological Survey representatives and other U.S Department of Interior representatives. In addition, BLM will hold public hearings to solicit public input on the land use plan revision.

A.2.a.3. Comment: One commenter requested information on how to appeal a Superfund Record of Decision ("ROD").

A.2.a.3. Response: EPA's ROD for the Atlas Mine Area Operable Unit has been signed by the Regional Administrator for EPA Region IX. This ROD is EPA's final decision and was made after careful consideration of all public comments received during the public comment period. There is no process within EPA to appeal a ROD. If a Consent Decree is signed for performance of the selected remedy, there will be a 30 day comment period, and all comments submitted during this period will be submitted to the court. Members of the public are free to initiate legal action against EPA in Federal Court pursuant to CERCLA Section 113(h), alleging that the remedial action taken violates CERCLA.

A.2.a.4. Comment: The commenter requested clarification on EPA's recommendation to BLM regarding the CCMA and the criteria EPA will use to evaluate BLM's revision of the land use plan. He felt that it would be important for him to understand the criteria so that he could become involved in BLM's revision process.

A.2.a.4. Response: EPA has not developed detailed criteria for BLM to use in the plan revision. As EPA stated in its Proposed Plan, EPA will consider the extent to which the revised plan reduces airborne asbestos emissions, minimizes asbestos exposure and addresses the public health impact of the Hazardous Asbestos Area. In addition, EPA will consider the extent to which the revised plan reduces accelerated erosion and off-site transport on vehicles and clothing due to OHV use.

A.2.a.5. Comment: What process will take place if BLM does not meet EPA's standards in the CCMA?

A.2.a.5. Response: If EPA determines that an imminent and substantial endangerment to public health remains following BLM's revision of its land use plan for the CCMA, EPA will consider designating the CCMA as an operable unit of the Atlas Asbestos Mine NPL Site. If the CCMA is designated as an operable unit, EPA will perform an Operable Unit Feasibility Study to evaluate alternatives to protect human health and the environment.

A.2.a.6. Comment: How will EPA's decision affect enduro races in the CCMA?

A.2.a.6. Response: It is EPA's understanding that BLM's current land use plan for the CCMA will remain in effect during the 18 to 24 month revision period.

A.2.b. Comments Regarding EPA's Jurisdiction/Site Definition

A.2.b. Comment: The CCMA should not be included as part of the Atlas Mine Site. "The EPA has no legal or scientific justification for extending its control to that part of the CCMA outside the Atlas Mine Site (>99% of CCMA). ... Since the EPA does not have jurisdiction over naturally occurring 'hazardous' materials, EPA does not have jurisdiction over the CCMA." Another commenter stated that the transport theory is "a clear overstretching of logic and only serves to plunge EPA into an area where it doesn't belong." Another commenter stated that this extension of jurisdiction "violated the spirit of the Superfund Law."

A.2.b. Response: Once asbestos is mined and/or milled, it is no longer considered a naturally occurring substance. 40 C.F.R. Section 61.140 et seq. Mined and milled asbestos has been transported from the Atlas Mine OU throughout the CCMA by vehicles, by wind erosion and by surface water. Although naturally occurring asbestos is present in the CCMA, EPA's jurisdiction is based on the spread of mined and milled asbestos from the Atlas Mine Area over a period of more than twenty years. The Comprehensive Environmental Response, Compensation and Liability Act of 1980 ("CERCLA") Section 101(9)(B) defines a "facility" as "...any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located ..." Therefore the CCMA meets the CERCLA definition of a facility.

A.2.c. Comments Regarding the Public Health Evaluation ("PHE")/ Risk Assessment.

--Risk Range Chosen

A.2.c.1. Comment: Many commenters felt that the relative risk of engaging in recreational activity in CCMA is so small compared to other risks in everyday life (such as driving on a freeway or smoking cigarettes), that regulating activity in CCMA makes no sense. In addition, many commenters felt that using a risk target of one in one million ($1*10^{-6}$) is inappropriate for the CCMA and that a higher risk target, such as one in ten thousand ($1*10^{-4}$), should be used.

A.2.c.1. Response: EPA recognizes that some risks that are voluntarily taken by the public, such as smoking cigarettes, may be greater than those represented by OHV use in the CCMA. However, for known carcinogens such as asbestos, the law requires EPA to choose a remedy which achieves exposure levels that repre-

sent an excess lifetime cancer risk to an individual of between one in ten thousand to one in one million. In this ROD, EPA does not establish a standard for acceptable risks to recreational users in the CCMA.

If EPA takes action at a Superfund site, it is required to choose a remedial alternative that is protective of human health and the environment. Community acceptance of an alternative can be a basis for choosing among remedies which provide adequate protection. Once BLM revises its land use plan for the CCMA, EPA will consider whether the plan adequately protects human health and the environment.

A.2.c.2. Comment: "EPA's goal is risk reduction to the level of a one in one million chance for lung cancer while it is legally permitted to accept a risk as high as one in ten thousand, the level of statistical detectability of lung cancer in the general population. Detecting a risk of one in a million is not possible for a disease that is much more prevalent than that figure in the general population."

A.2.c.2. Response: As noted above, EPA is not taking any action in the CCMA at this time and has not chosen a remedy or a risk reduction goal. EPA is required to implement the National Contingency Plan which states: "For known or suspected carcinogens, acceptable exposure levels are generally concentrations levels that represent an excess upper bound lifetime cancer risk to an individual of between $1*10^{-4}$ and $1*10^{-6}$ using information on the relationship between dose and response. The $1*10^{-6}$ risk level shall be used as the point of departure for determining remediation goals for alternatives when Applicable or Relevant and Appropriate Requirements (ARARs) are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure." 40 CFR 300.430(e)(2).

Even though it may not be possible to measure a specific risk does not mean that such a risk is absent. The number of interacting variables that affect human health among the general population is large so that it is not surprising that many risks, although known to exist, remain below the ability to detect them in the general population. Given an estimate of risk, it is possible to reduce the level of risk (even though it cannot be measured) by reducing exposure to an appropriate degree.

-- Carcinogenicity of Different Asbestos Types

A.2.c.3. Comment: The PHE is built on general estimates of asbestos potency that are clearly inappropriate for chrysotile fibers from asbestos-containing serpentine mined in the CCMA. CCMA chrysotile asbestos' uniqueness is that it is free of tremolite, an amphibole asbestos family member. There is a grow-

ing belief among scientists that amphibole asbestos fibers produce increased pathogenicity, as compared to serpentine chrysotile asbestos. Tremolite asbestos is unknown in the CCMA. EPA should note the article in Science titled "Asbestos: Scientific Developments and Implications for Public Policy" in the January 1990 issue.

"EPA has based its risk assessment in the CCMA on a poor analysis of the scientific literature on the roles of the various mineral forms included under the generic term 'asbestos'. It fails to take into account the fact that the kind of asbestos found at Clear Creek (chrysotile) has been shown to be the least dangerous form of asbestos since it does not cause lung cancer in non-smokers, although it increases the risk in smokers."

"Several extensive studies have been done by the Canadians concerning chrysotile asbestos, the same mineral found and mined within the CCMA. In these studies, it was found that no single conclusive case of asbestos related lung cancer was documented even though people, both miners and their families, have lived with asbestos for more than 50 years in and around the asbestos mines of Quebec, Canada. Additional studies conducted in both South Africa and Western Australia indicated that exposure to chrysotile showed no conclusive evidence of lung cancer. This is additional support for the Canadian findings!"

A.2.c.3. Response: Although EPA is aware of the recent studies cited in the comment, EPA policy at this time continues to assign a single cancer potency factor to all forms of asbestos because data indicating that there may be different cancer potencies for different asbestos types are still preliminary. Although there is evidence suggesting that chrysotile asbestos may be less potent than the amphiboles at inducing mesothelioma, the relationship between chrysotile exposure and lung cancer is not the same. The commenters' characterization of chrysotile asbestos as benign in terms of causing lung cancer in nonsmokers is misleading. Although the cause of lung cancer in any particular case cannot be confirmed and there is a significant background (of lung cancer) in the general population, it is misleading to say that asbestos-related lung cancer has not been documented in existing epidemiology studies. Virtually all scientific studies to date strongly indicate that there is an association between exposure to each of the asbestos mineral types (including chrysotile) and the incidence of lung cancer in the exposed population.

The implication that exposure to chrysotile asbestos has only been linked to an increase in lung cancer among smokers is similarly misleading. Evidence for an association between asbestos exposure and lung cancer (even among non-smokers) is no worse than other associations established based on the epidemiological data. McDonald et al (1980) in their study of chrysotile miners

in Quebec provide clear evidence of an association between lung cancer and exposure to asbestos. Although the incidence of lung cancer among smokers is elevated in comparison to that found among non-smokers for the same level of asbestos exposure, the incidence of lung cancer is elevated in comparison to controls even among non-smokers who are exposed to asbestos.

A.2.c.4. Comment: "EPA stated at the Public Input Meeting in Sunnyvale (May 30, 1990) that asbestos causes mesothelioma, but the project toxicologist admitted that mesothelioma has never been reported in the vicinity of Coalinga. EPA fails to acknowledge that mesothelioma is caused only by amphibole asbestos and that EPA does not have any scientific data to show that this particular type of asbestos occurs at Clear Creek."

A.2.c.4. Response: The transcript of EPA's presentation at the abovementioned public meeting reads as follows (page 18, lines 17 to 25): "I'd like to make something very clear up front, is that we are primarily concerned with lung cancer in this particular presentation. We're really not concerned with asbestosis, which is a non-carcinogenic disease that's really found mostly in occupational exposures. And we are less concerned with mesothelioma, which is a cancer of the lung lining, because that is more linked to amphibole asbestos as opposed to the type we see in Clear Creek." See also Response A.2.c.3.

A.2.c.5. Comment: A commenter asked if there were any studies that showed the relative degree of hazard between the unprocessed asbestos that you find at Clear Creek and the refined asbestos that you would get from building material or something like that.

A.2.c.5. Response: EPA is not aware of any studies that specifically looked at the relative hazards of unrefined versus refined asbestos. However, studies do suggest that the potency of chrysotile appears to differ over various industrial settings and that exposure during mining is associated with a dose/response factor that falls in the lower end of the scale of observed factors in various settings. The reason for this variation is unclear.

-- Flawed Exposure Assumptions

A.2.c.6. Comment: EPA's PHE used exposure assumptions that overestimated the typical recreational use of the CCMA. The PHE should be redone using more realistic exposure assumptions.

"EPA's estimate of the number of hours and days of exposure per year for recreational users is significantly overstated. For example, EPA's Worst Case Assumptions for Hikers/Campers/Hunters in CCMA assume 104 days per year of usage. It is absurd to assume that ANY member of this group spends an average of 2 days per week, week in and week out, in the CCMA. Such an estimate defies

credulity and is patently absurd." Some commenters suggested that for OHV use, 50 or 96 hours per year would be a more realistic exposure assumption.

A.2.c.6. Response: EPA uses conservative exposure assumptions in its PHE studies to ensure that the results are protective. The estimated risks of most concern to EPA are those related to OHV use of surfaces containing chrysotile asbestos. The information which EPA received from OHV users during the public comment period suggests that the PHE's exposure assumptions for OHV use are representative of the typical use in this area. During BLM'S revision of its land use plan the public will have the opportunity to participate and assist the agencies in improving the accuracy of the exposure assumptions used to estimate risk.

-- Lack of Adequate Epidemiology Studies in Clear Creek

A.2.c.7. Comment: The PHE is inconsistent with EPA's lack of finding unreasonable risk regarding environmental exposures surrounding asbestos mining and milling operations. EPA's Airborne Asbestos Health Assessment Update, (June, 1986) reviews the associated human epidemiological evidence and summarizes that 'Chrysotile mining and milling ... appear to have lower unit exposure risks than chrysotile textile and other uses of asbestos.' And, EPA dismisses the chrysotile mining and milling studies in calculating the risks for lung cancer and mesothelioma. The exposures from recreational activity in the CCMA and agricultural tilling in the Central Valley seem to be far more similar to those found at and around asbestos mining and milling operations than at an indoor asbestos textile plant. Yet the PHE completely ignores relevant health data associated with asbestos mining and milling operations. This is a serious flaw in EPA's PHE, therefore the risk estimates do not relate at all to the exposures of concern.

A.2.c.7. Response: It is EPA's policy at this time to use a single cancer potency factor for asbestos exposure because the currently available studies have not provided sufficiently definite and detailed information to allow EPA to estimate different potency factors for different situations. As stated in the ROD: "EPA's risk assessment indicates that a very significant cancer risk exists for OHV users in areas with high levels of asbestos in the soil ... There are data from measurements made in the CCMA by investigators independent of EPA, that confirm EPA's estimates of airborne asbestos concentrations made using the air dispersion model. Users of OHVs on serpentinite soils may experience exposure levels that are associated with an extremely high potential cancer risk." See also Response A.2.c.3. and A.2.c.8.

A.2.c.8. Comment: Many commenters asked if any epidemiology studies had been done of persons living in the CCMA vicinity,

persons who have used the CCMA for recreation or of persons who worked in the asbestos mines in the area, to see if lung cancer occurred more frequently in these populations. These commenters felt that if such studies did not show any increased evidence of cancer in people living in and/or using the CCMA, then EPA should not be taking any action in the CCMA.

A.2.c.8. Response: EPA is not aware of any systematic studies of the incidence of asbestos related disease among populations living or working in the vicinity of the New Idria formation that have been conducted. Without such a study, it is not possible to say whether or not asbestos related diseases are occurring. The reason that mesothelioma or lung cancer deaths have not been reported may be because no one has looked for them.

Although a systematic study of the incidence of asbestos related diseases among the local population may prove enlightening, it may not. Because the local population is small, an epidemiology study restricted solely to the local population may not be sufficiently sensitive to detect the incident of asbestos-related disease even if it is occurring at an unacceptable rate. Published epidemiology studies of special workplace populations indicate that all forms of asbestos (including chrysotile) are human carcinogens. While there are uncertainties associated with extrapolating these data to the general population, it is not necessary to repeat epidemiology studies for every possible exposure scenario to reasonably assume that exposure to asbestos in all such environments represents a potential risk.

-- Inadequate Methodology and Data

A.2.c.9. Comment: Several commenters indicated that EPA should revise the PHE after it has obtained additional data on Clear Creek including better information on actual use and the carcinogenicity of chrysotile. They also questioned the accuracy of EPA's testing methods.

A.2.c.9. Response: In the event that EPA determines in its 1992 re-evaluation that further action should be taken in the CCMA pursuant to CERCLA, EPA will obtain additional information and revise the PHE. EPA has taken into account the inherent uncertainty in its test methods in selecting the remedy. See the discussion of asbestos analytical methods in Appendix 1 of the ROD.

A.2.c.10. Comment: "EPA's presentation of data and risk assessment calculations at the Sunnyvale Public Input Meeting, May 30, 1990, was incredibly sloppy and lacking in adequate explanation of its methodology. In spite of many slides showing risk assessment exposure assumptions, asbestos/air monitoring data and the standard exposure equation for risk calculation, EPA's purported risk assessment results cannot be calculated from the data and assumptions presented. The credibility of EPA's risk assessment

is therefore highly suspect purely on a mathematical basis, aside from the great difficulties arising from defective assessment of "asbestos" hazards in general."

A.2.c.10. Response: EPA's presentation at the abovementioned meeting was not designed to provide all of the information required to allow a member of the audience to make risk calculations. Rather it was designed to explain the basic concepts of risk assessment to an audience with widely varying technical expertise. Chapter 6 of the RI, associated appendices and other documents in the Administrative Record contain a complete explanation of all assumptions made, models used and risk ranges calculated.

-- Soil Concentration

A.2.c.11. Comment: "EPA officials have stated that Clear Creek soils are greater than 50% asbestos. Such statements are ludicrously inaccurate for virtually all areas outside the Atlas Mine site proper. Having visited many parts of the region over the years while engaged in mineral collecting, I have personally observed very little asbestiform minerals (Chrysotile only) outside the asbestos mines in the Atlas vicinity."

A.2.c.11. Response: A regional study, performed by the Santa Fe Pacific Realty Corporation on the New Idria Formation under EPA oversight, as well as much of the geological literature, indicate that the serpentinite soils in the New Idria Formation generally contain in excess of 50% chrysotile (for example see Mumpton, F.A. and Thompson, C.S., 1975, Mineralogy and Origin of the Coalinga Asbestos Deposit: Clay and Clay Minerals, Vol. 23, pp 131-143). Serpentinite soils of the New Idria Formation, analyzed during a RI of the Johns-Manville Coalinga Asbestos Mill Area Operable Unit, were found to contain up to 84% chrysotile. EPA has determined that there is a wide range of chrysotile concentrations in the serpentinite soils of the New Idria Formation.

-- Air Concentrations

A.2.c.12. Comment: Several commenters objected to EPA using data measured during the month of June, a dry and dusty time of year, to calculate asbestos exposure as opposed to using data measured during the rainy season.

"EPA uses data for its exposure assessment in the hot, dusty month of June rather than the months of the rainy season, when most recreational activity takes place. EPA starts with badly skewed numbers and gets a unrealistic result, claiming a hazard level that is much too high. EPA stated that for the exposure level measured for the dusty month of June, '... the asbestos exposure approached or exceeded by a little bit the standards that the Occupational Safety and health Administration has set for

workplace level of exposure to asbestos...'. Apparently, if EPA had used data from the wetter months, the risk assessment would have been about a factor of 10 less than the workplace level permitted by OSHA and approximately the same level as EPA's conservative 'goal' of one in a million risk for lung cancer."

A.2.c.12. Response: EPA used modeled not measured airborne asbestos concentration data. The data referred to in the comment was presented by EPA at the public meeting in Sunnyvale, California on May 30, 1990 solely to verify the results of EPA air dispersion modeling, which was used in the PHE to predict airborne asbestos concentrations from asbestos concentrations measured in the soil. When airborne asbestos concentration data, (measured during an independent study not done under EPA auspices), were substituted for the predicted values, the risk results were very similar to what EPA calculated in the PHE. This suggests that EPA's model is able to predict airborne asbestos concentrations relatively well.

BLM will be seeking public input as part of its land use plan revision process. At this time, the commenter can raise the possibility of BLM performing air sampling when soils are wet in order to better evaluate the risks under those conditions.

-- Water Concentrations

A.2.c.13. Comment: The baseline risk assessment miscalculates the risk estimates for waterborne asbestos exposure and disregards the more recent California and EPA "no risk" determination.

"The Atlas Report presents risk estimates associated with human ingestion of waterborne asbestos fiber. EPA does recognize that its cancer potency factor of the risks associated with waterborne asbestos fibers greater than ten microns in length are based on the research findings of only benign tumors in animals (RI, p. 6-76). Yet, EPA goes foward in its calculation of risk estimates by using the measurements of total fibers (RI, p. 6-73). Any risk determination based on total fiber calculations would constitute a gross misrepresentation of the evidence cited and of EPA's current regulatory policy toward asbestos in drinking water. In May 1989, EPA announced a rule-making under the Safe Drinking Water Act, as amended in 1986, which would re-propose a maximum contaminant level goal for asbestos of 7.1 million fibers greater than ten microns per liter of water, but qualified that 'EPA is not proposing to regulate asbestos as a carcinogen since the agency has determined that asbestos is not a carcinogen when ingested, only when inhaled.' (EPA Press Release, 'EPA to Regulate 17 Pesticides in Drinking Water,' May 2, 1989). Limited evidence was recognized regarding the health effects of ingested asbestos. EPA noted that in one study there was an increased incidence of benign polyps in male rats following ingestion of in-

termediate (greater than ten micron in length) range chrysotile asbestos. Accordingly, this evidence provides EPA sufficient basis to justify the proposed rule. 54 FR 22073. But it does not provide EPA a sufficient basis to count all asbestos fibers or count fibers greater than five microns in length in making determinations such as the risk estimates in the Atlas Report. In addition, EPA's baseline risk assessment ignores the other findings by state and federal agencies that are contrary on this issue. EPA, therefore, should amend the Atlas Report to include the latest information on the health effects of waterborne asbestos exposures and EPA should completely drop the related risk estimates from the baseline risk assessment."

A.2.c.13. Response: EPA did not rely on any ingestion related risk in selecting its remedial action for this Operable Unit. In its Integrated Risk Information System ("IRIS") database, EPA notes that some animal studies have shown an increase in benign tumors in male rats subjected to asbestos ingestion. An increase in benign tumors can be an indication of increased carcinogenicity. The PHE used EPA's unit risk factor for asbestos ingestion to estimate the risk from drinking asbestos-contaminated water from the California Aqueduct. As stated in the ROD, even when the risk from asbestos from all sources in the Los Gatos Creek Drainage Basin, not just the Atlas Mine OU, was considered, EPA found that the excess lifetime cancer risk from ingestion was at most $4*10^{-5}$. Given that municipalities are required to filter drinking water to remove asbestos and that only a portion of the asbestos in the aqueduct originates at the Atlas Mine OU, EPA did not rely on this risk in selecting its remedy.

-- Off Site Risk/Transport

A.2.c.14. Comment: Several commenters noted that the risk of secondary exposure for families of OHV riders who carry asbestos from the CCMA is not analagous to that of the families of asbestos workers.

A.2.c.14. Response: EPA does not have sufficient information to determine the difference in risk between secondary exposure for families of OHV riders in the CCMA and families of asbestos workers. EPA has reviewed studies which show that secondary exposure has led to an increased incidence of cancer in the families of asbestos workers. These studies were one factor in EPA's decision to review BLM's revised land use plan.

-- Standards of Ambient Exposure

A.2.c.15. Comment: "One area within the U.S. Government that regulates asbestos exposure to what is more closely the situation in the CCMA is the Mine Safety and Health Administration (MSHA) and that of the U.S. Bureau of Mines. The tolerance health risk levels as specified by MSHA are 20 times more liberal than yours

and it is for people who by choice work at mining this material. Based upon these standards it would seem that a better base upon which to issue to the BLM some guidelines be prepared."

A.2.c.15. Response: EPA has determined that exposure levels that are appropriate for asbestos workers are inappropriate for the general public. This is because the general public includes the elderly, the infirm and children. The method for measuring asbestos promulgated by the MSHA standard, phase contrast microscopy, is not sensitive enough to measure asbestos in the ambient environment (see Appendix 1 in the ROD). EPA's exposure levels must be protective of human health for all populations, not merely workers or OHV riders.

A.2.c.16. Comment: Asbestos may be a workplace hazard but this cannot apply to an open area of 36 square miles used for recreation.

A.2.c.16. Response: BLM workers in the CCMA use the OSHA standard to determine whether respiratory protection is needed. The OSHA standard for acceptable asbestos exposure in the work place applies to both indoor and outdoor industrial facilities. For example, the OSHA standard applies to shipyards.

Asbestos has been found to be a hazard in places other than the workplace. EPA now enforces asbestos standards in public schools. EPA's best evidence to date indicates that persons engaged in OHV activity on asbestos-bearing soils run a significant risk of dying from lung cancer under certain exposure scenarios.

A.2.d. Comments Regarding Existing Conditions in CCMA - BLM Monitoring

A.2.d.1. Comment: BLM should make all of their monitoring data available so that EPA and the users can make a decision as to whether it is safe to use the CCMA.

A.2.d.1. Response: BLM performs air monitoring to see if OSHA limits are being exceeded and whether respiratory protection for BLM employees is necessary. BLM has informed EPA that these data are available upon request.

A.2.d.2. Comment: Some commenters questioned why EPA is allowing the operation of an active asbestos mine in the CCMA.

A.2.d.2. Response: EPA's current information is that the remaining active asbestos mine in the CCMA is operating in compliance with federal and state laws.

A.2.e. Reducing Risk in the CCMA.

A.2.e.1. Comment: Some commenters noted that the PHE did not consider the possibility that OHV riders could use respiratory filters.

A.2.e.1. Response: These commenters could raise the possibility of using respiratory filters during BLM's public involvement process. It should be noted that in order for respiratory filters to be used effectively, formal training is required and the user can have no facial hair in order for an effective seal to be maintained.

A.2.e.2. Comment: Commenters suggested that increased education and awareness programs should be used to reduce risk to riders and that the trail system could be reconfigured around rather than over asbestos piles. The increased awareness program could include more signs that say whether the risk is low, moderate or high that day. Messages on how to reduce risk while riding would also be helpful. Other commenters suggested that there should be a system of controlled access to CCMA which would allow individual users a limited number of entries per year, that there should be a wash down area to remove soil from vehicles and equipment and that the CCMA should be open only during the rainy season.

A.2.e.2. Response: As noted in the response to the previous comment, these suggestions should be brought to BLM's attention during the public input phase of BLM's land use plan revision.

A.2.f. Right of the Public to Knowingly Take Risk

A.2.f. Comment: Many commenters stated that they should have the right to knowingly take the risks involved in OHV use in the CCMA. Some commenters suggested that riders sign a waiver agreeing not to hold the government responsible for the risk from asbestos at the CCMA.

A.2.f. Response: EPA has determined that an imminent and substantial endangerment to the public health may exist when OHV use occurs in the CCMA. CERCLA Section 106 gives EPA the authority to abate such an endangerment. This authority has been used at many Superfund sites as a basis for restricting access. EPA is required to consider nine criteria in evaluating alternative remedies. One criteria which the selected remedy must meet is that it be protective to human health and the environment. CERCLA Section 121(b)(1). Community acceptance is a modifying criteria for remedy selection at Superfund Sites which can be used to choose between protective alternatives. Hence, if BLM identifies an alternative which abates the danger to public health and the environment and allows OHV use to continue, EPA would support such an alternative.

A.2.g. Financial Issues

A.2.g.1. Comment: Some commenters stated that future studies and planning for the CCMA should be done out of EPA's budget and not out of funds allocated for improvement of OHV facilities, such as the Green Sticker Fund. Approximately $1,000,000 from the Green Sticker Fund has been invested in the CCMA and this money should be refunded by EPA if the CCMA is closed.

A.2.g.1. Response: BLM has informed EPA that the land use plan revision will be funded from BLM sources separate from the resources allocated for OHV improvements. If EPA decides to take CERCLA action in the CCMA following its 1992 re-evaluation, this action will be funded either by EPA's Superfund or by Potentially Responsibility Parties. BLM has informed EPA that the Green Sticker Funds that have been invested to date in the CCMA were committed with the understanding that there was a risk that the area might eventually be closed.

A.2.g.2. Comment: If the CCMA is closed, some commenters requested that the state funds given to the BLM for CCMA should be reimbursed to the state for future OHV use in other areas. "We feel that EPA should be responsible. You're taking away something that's vitally important to these people. And if you want to take it away, you've got to replace it."

A.2.g.2. Response: If the CCMA is closed, this issue should be raised with the BLM. It is outside EPA's jurisdiction.

A.2.g.3. Comment: Several commenters stated that if the CCMA is closed to OHV use, EPA should compensate the OHV community for the loss similar to what was done at Times Beach and Love Canal.

A.2.g.3. Response: The situation of homeowners in Times Beach and Love Canal is not comparable to that of OHV riders using the CCMA. OHV riders do not have a vested property interest in the CCMA.

A.2.g.4 Comment: Several commenters stated that many businesses in towns near the CCMA depend on the money that OHV riders spend while they are using the CCMA. This source of income will be lost to these businesses and economic hardship could result if the CCMA is closed down. The commenters asked if this factor had been included in EPA's analysis of the alternatives.

A.2.g.4. Response: This issue should be raised with the BLM during the public input for BLM's land use revision. As noted in other responses, EPA's mandate is to protect public health and the environment. Community acceptance is a modifying criteria for reaching decisions at Superfund sites.

A.2.g.5. Comment: A commenter requested information on the cost of EPA's proposal to revise the BLM plan.

A.2.g.5. Response: BLM has informed EPA that the cost of revising the land use plan will be approximately $100,000 over a two-year period. EPA's costs will be limited to costs for EPA personnel serving on BLM's technical review team.

A.2.h. Opposition to Proposed Plan for CCMA

A.2.h.1. Comment: The majority of commenters stated that they opposed closing the CCMA to recreational and other public uses. Many commenters indicated that they wanted no change in the BLM Plan.

A.2.h.1. Response: Neither the Proposed Plan nor the ROD require closing of the CCMA to public uses. As noted in other responses, EPA has determined that it will take no CERCLA action in the CCMA at this time because BLM has indicated that it will revise its land use plan for the CCMA to take public health concerns into account. EPA will reassess whether to take any action in the CCMA under CERCLA in 1992.

A.2.h.2. Comment: OHV users of the CCMA said that if the area was closed, such a closing would disrupt and create additional stress in their lives. They stated that EPA's approach does not address recreational concerns of the affected public, especially since the CCMA is the only area of its kind in Northern California and that if the CCMA were to be closed, they would be forced to go to Nevada or use less appropriate areas.

A.2.h.2. Response: OHV users of the CCMA should inform BLM during BLM's public input process of all of their concerns about the consequences of closing the CCMA.

A.2.h.3. Comment: The commenter stated that many OHV users are eager to work with BLM and EPA to find a solution to the asbestos issues in the CCMA that satisfy the needs of the users and the need to protect human health and the environment.

A.2.h.3. Response: Comment noted. User groups are encouraged to participate in BLM's public input process when the revision of the land use plan for the CCMA is begun.

A.2.i. Support of the Proposed Plan for the CCMA

A.2.i.1. Comment: "A number of years ago the BLM, at my repeated suggestion, contracted for a study of airborne asbestos levels during ORV use of the site. The results of the study indicated extremely high levels of airborne asbestos caused by ORV disturbances, especially during dry periods. This result, as well as obvious indications of accelerated water erosion of ORV-

disturbed asbestos-bearing soils, led me to recommend closure of the site to ORV use. This recommendation was not based on risk to ORV users, who choose to ignore the warnings signs erected by BLM, but rather on risk to non-ORV users who have, under multiple-use management, equal right of access to these public lands, risk to those exposed to airborne asbestos that leaves the site of use, and risk to those who use the water drained from the site, in particular, users of Hernandez Reservoir. BLM has paid no attention to such recommendations, from myself or other scientists."

"I believe that if BLM is to continue ORV use of the area, the following stipulations should be required management procedures, and the area should be closed until such procedures are implemented:"

1) "Catchment dams should be built on all drainages that cross the site boundaries on the downstream end of the drainages, and appropriate filters installed to ensure that water leaving the dams has acceptable asbestos content."

2) "The area should be closed to vehicular use when the soil is dry, or use should be restricted to areas/trails on which dust suppressant are sufficient to keep airborne asbestos levels to acceptable standards."

3) "Dust monitoring instruments should be installed on the periphery of the site. If acceptable levels of airborne asbestos cannot be maintained on a year-round basis, consideration should be given to permanent closure and rehabilitation."

4) "Experiments should be immediately undertaken to demonstrate the ability of BLM to stabilize ORV-disturbed areas with permanent vegetative and other natural soil stabilizers. If these experiments are unsuccessful, consideration should be given to permanent closure of the area to ORV's."

A.2.i.1. Response: Comment noted. EPA will suggest that the above comment be considered by BLM in BLM's revision of the land use plan for the CCMA.

A.2.i.2. Comment: One commenter stated that if air monitoring indicates that the area is not safe, he would support a decision to close the area down.

A.2.i.2. Response: Commented noted.

A.3. Comments Regarding the City of Coalinga

A.3. Comment: The commenter asked if there was presently a risk from airborne asbestos in the City of Coalinga.

A.3. Response: EPA is overseeing remedial action on asbestos- and nickel-contamination that was found in the southwestern corner of Coalinga. At the present time this area does not pose a significant risk because access to the area has been restricted and a dust suppressant has been applied. Access to the area is limited to workers wearing respirators.

B. COMMENTS MADE BY LOCAL, STATE AND FEDERAL AGENCIES

B.1 Comments of the city manager of Huron, Mr. John Luthy, at the public meeting on May 9, 1990 in Coalinga California and in a letter addressed to the U.S. Department of Interior, Bureau of Reclamation, dated May 9, 1990. This letter included an attachment of results from a polarized light microscopy ("PLM") analysis of a soil sample, taken from the streambed at the corner of Merman Avenue and Lassen Avenue.

B.1.1. Comment: Mr. Luthy questioned EPA's decision to defer addressing conditions in the Ponding Basin. He noted that water containing asbestos runs from the Atlas Mine to the City of Huron. He submitted pictures of fugitive dust near Huron and also noted that he was submitting an analytical report showing 5% chrysotile asbestos in the soil being cultivated on ponding basin land outside of Huron. He expressed concern about the impact of such fugitive dust on the health of Huron residents and wildlife. Mr. Luthy's letter to the USBR also expressed concern about flooding. He noted that the training dike north of Huron has created an artificial obstacle to the natural flow of water in the Arroyo Pasajero. This has caused flood waters to be directed towards Huron and on one occasion has caused flood waters to run into Huron's water treatment plant. Mr. Luthy states that studies done by the USBR/DWR have projected a rise in the height of the flood plain elevation that will cause Huron to no longer be higher than the Ponding Basin flood plain.

B.1.1. Response: EPA has decided to defer taking action in the Ponding Basin at this time based on indications that the USBR and the DWR are aware of and plan to address the concerns expressed by Mr. Luthy on behalf of Huron. The Arroyo Pasajero Feasibility Study, dated June 1990, prepared by the DWR and USBR evaluates alternatives to control fugitive dust and flooding. The alternative include: i) taking Ponding Basin land out of agricultural production in order to minimize airborne asbestos emissions; ii) expansion of the Ponding Basin and building a system of upstream dams to control flooding;

Letter from David Kennedy, Director of the California Department of Water Resources, dated May 4, 1990.

B.1.2. Comment: The results of hydrologic modeling performed by DWR varies significantly from the results of hydrologic modeling

obtained by EPA although based on identical data. There is not enough detail in the RI report to determine the reason for the discrepancy.

B.1.2. Response: The results of the DWR study are not included in the Administrative Record for the Atlas Mine OU. Two different modeling studies were considered in selecting the remedy for this operable unit. A comparison of the two modeling studies included in the Administrative Record indicates that models are subject to considerable uncertainty. EPA has determined that the selected remedy is necessary to protect human health and the environment regardless of which modeling results are used.

B.1.3. Comment: Although the data are difficult to interpret, it appears from the results of soil sampling by Levine - Fricke, Inc. that the asbestos content of sediment deposits in the Arroyo Pasajero alluvial fan has remained relatively constant for a considerable length of time. This conflicts with EPA's assessment that serpentine soils of the New Idria Serpentine Mass contribute only 6-10 percent of the total asbestos yield from the Los Gatos Creek Watershed with the rest resulting from mining operations.

B.1.3. Response: The RI notes the discrepancy between EPA and Levine-Fricke results and states that it may be due to the following: i) Variations in asbestos content throughout the New Idria Serpentinite Mass; and ii) difficulties in asbestos analytical techniques. EPA has determined that the selected remedy is appropriate even if the RI has overestimated the contribution of the Atlas Mine to the asbestos content in the Arroyo pasajero alluvial fan. Appendix 1 of the ROD provides a more complete discussion of the problems with asbestos analytical techniques.

B.1.4. Comment: DWR has revised its estimate for the alternative in EPA's FS described as Regulation of Intrusive Occupational Activities within the USBR ponding basin (page 2-11 of the FS). DWR currently estimates the present worth cost of this alternative to be $106 million compared to $80,145,000 in DWR's 1984 appraisal level study, Arroyo Pasajero Alternatives.

B.1.4. Response: This comment is noted but it does not affect EPA's evaluation of alternatives.

B.1.5. Comment: EPA's FS concludes that a ban on future agricultural production in the Ponding Basin would eliminate occupational health hazards for agricultural workers. This statement may be misleading if asbestos concentrations are shown to be fairly consistent throughout the alluvial fan. Farmworkers are likely to simply be moved to different areas on the alluvial fan without reducing occupational risks. DWR currently plans to remove any land purchased for basin expansion from agricultural activities. However, DWR opposes any EPA regulation restricting

the use of retention basin land while ignoring activity on other land on the alluvial fan with similar levels of asbestos.

B.1.5. Response: As noted in the comment, the relative concentrations of asbestos in locations throughout the alluvial fan were not studied in the RI. EPA will be re-evaluating this issue when it review DWR's and USBR's plans for and actions in the Ponding Basin in 1992.

Letter from Anthony J. Landis, California Department of Health Services ("DOHS"), Dated July 20, 1990.

B.1.6. Comment: "Alternative 3 was chosen by EPA over the fully engineered system of Alternative 4, primarily because "3 provides protection from the same contaminant pathway at a much lower cost". Alternative 3 may not be protective of human health due to a lack of reliability. This lack of reliability is due to reliance on an unquantified 'crust', a seismically active site, faulty cost figures, and a less reliable design."

Unquantified Crust: The presence of a crust that has apparently formed on some of the waste piles is explained as a natural result of seasonal wet-dry cycles which brings magnesium carbonate to the surface. The crust appears to reduce wind related emissions but the amount of crust is not quantified in the RI. "While a crust may exist and could be valuable to this project, staff cannot recommend protecting an unquantified 'crust' without some greater understanding of its value."

Seismicity: The Atlas site consists of several hundred acres of high, steeply angled waste piles and cut faces in a very seismically active area. The potential for slope failure is very high. "The 'spot' improvements of Alternative 3 recommended by EPA will be very susceptible to burial, damage, or destruction over time due to slope failure."

Costs: The initial cost of Alternative 3 is less than alternative 4. However, the overall cost differential may not be as great as the FS suggests if grading costs for Alternative 3, the cost of water for the two alternatives and the O&M [operation and maintenance] cost figures for Alternatives 3 and 4 are re-evaluated.

Design Reliability: "The FS states that Alternative 4 'will generally be more complete, predictable, and reliable' than Alternative 3. This is due to the susceptibility of the 'spot' improvements of Alternative 3 to chronic failure. For this reason, Alternative 3 may not meet long term protectiveness or reliability criteria."

Summary: The Department of Health Services comments that "no practical or cost effective method exists for this site that will

significantly reduce air emissions or the toxicity or volume of asbestos at the site. The total emissions from this site will continue in a slightly abated way for a great deal of the geologic future." The Department of Health Services recommends Alternative 4 for the following reasons:

1) Greater system reliability,
2) Greater long term protectiveness,
3) Potentially reduced air emissions due to reduced slope angles with accompanying reduction of slope failure,
4) More consistent and level surface conditions for revegetation projects, and
5) Substantially reduced long term O&M costs.

B.1.6. Response: EPA's analysis of alternatives in the FS evaluated the considerations raised by DHS. EPA concluded that although many factors are subject to considerable uncertainty, Alternative 3 appears to provide almost equivalent protection to that provided by Alternative 4 at approximately one half the cost, even when O&M are included.

Unquantified Crust: While it is true that the amount of crust at the Atlas Mine Site has not been quantified, the existence of the crust and its ability to limit airborne emissions have been confirmed by geologists and engineers who examined both the Atlas Mine Area OU and the Johns-Manville Coalinga Mill Area OU. Alternative 3 utilizes this natural barrier to wind erosion, while the grading component of Alternative 4 would destroy it. The current crust has formed over a period in excess of 20 years and following regrading, formation of a new crust of comparable strength could be expected to take a similar length of time.

Seismicity: As noted in the response on 'Design Reliability' below, it is possible to use greater factors of safety in the design of structures that may be vulnerable if a large seismic event occurs. EPA has determined that all features of Alternative 3 that could fail during a large seismic event will be designed with such factors of safety built in. Such design details will be considered during the remedial design phase of the clean up.

Costs: O&M costs have been included in the analysis of present worth costs of Alternatives 3 and 4 and Alternative 3 is still less than half the cost of Alternative 4.

Design Reliability: While Alternative 4 would be more fully engineered than Alternative 3, EPA does not believe that Alternative 3 would be subject to chronic failure. It is possible to use greater factors of safety in the design of structures which may be vulnerable in the event of a large seismic event or flood. Alternative 3 will be constructed using standard mine reclamation techniques. Alternative 3 was designed to include minimally

intrusive features for several important reasons: i) to reduce the scope (and therefore the cost) of construction activities to the minimum degree consistent with effective long-term performance; ii) to minimize intrusive construction activities such as grading and excavation work that may generate large quantities of fugitive dust emissions during implementation; and iii) to maintain to the degree possible the existing crust that has been observed on a large portion of the asbestos waste material. .

Summary: EPA has determined that Alternative 3 will provide comparable long term protectiveness at a substantially lower cost. While it is true that the graded surfaces resulting from Alternative 4 would provide a better substrate for revegetation, this potential benefit has to be weighed against the much higher cost of Alternative 4 and the substantial risk that regrading would pose to on-site workers.

Draft comments from the USBR on the Atlas/Johns-Manville RI Report, received in May 1990.

B.1.7. Comment: EPA's RI report relies on "fairly unreliable/sketchy sampling techniques and results. Two different types of asbestos measurements are referred to, polarized light microscopy (PLM) and transmission electron microscopy (TEM). They are qualitative only, and determine only whether or not asbestos is present or absent. Also, one single water sampling event was used as calibration for the surface water transport modeling. This data base needs to be expanded by recording future rainfall events."

B.1.7. Response: EPA has noted in the RI and the ROD that asbestos analytic methods are subject to considerable uncertainty (see Appendix 1 of the ROD). However, all of the sampling and analysis included in the RI were performed pursuant to an EPA approved Sampling and Analysis and Quality Assurance/Quality Control Plans. PLM and TEM are not qualitative only. Both methods provide an estimate of the percentage of asbestos present in air, water or soil samples. As a result of drought conditions since the inception of EPA's study, only one storm event created sufficient run-off to allow appropriate sampling of surface water. This sampling program was designed to determine which streams were contributing asbestos to the local drainages and to define subwatersheds for use in the surface water transport modeling. This is why the sampling stations were located above stream confluences. The surface water sampling program was not used to calibrate the surface water transport modeling. EPA acknowledges that sampling of additional storm events would have improved the definition of subwatersheds.

B.1.8. Comment: "No comprehensive EPA guidelines have been established for ambient airborne asbestos; sample results in the

Report are based on OSHA standards for the workplace. Are these standards an applicable ARAR?"

B.1.8. Response: The commenter is correct that EPA has not yet established comprehensive guidelines for ambient airborne asbestos exposure levels. As a result EPA uses calculations of cancer risk in various exposure scenarios in order to choose an appropriate level of remediation. OSHA standards for exposure to airborne asbestos are applicable to workers performing remediation at the site. EPA did not use the OSHA level as an applicable ARAR for other exposure scenarios.

B.1.9. Comment: "It is questionable whether the database used for the Report would be defensible in court. Quality assurance/quality control seems to be lacking. EPA standard lab practices should have been utilized in analyzing data throughout the study. Also, the Report states that heavy metals are present at the site, but no comparisons to EPA toxic levels are provided. Are the amounts of heavy metals high enough to require concern?"

B.1.9. Response: All data used in the RI were collected, analyzed and validated using EPA approved Sampling and Analysis and Quality Assurance/Quality Control Plans specifically prepared for the Site. These plans include all standard EPA lab practices. The baseline risk assessment (Chapter 6 in the RI) discusses the heavy metal analyses performed as part of the study. The heavy metal concentrations measured during the RI were found to be within the background levels typical of serpentine soils.

B.1.10. Comment: "EPA states that they believe 5% of the airborne asbestos in population centers (Huron and Coalinga) originates at the two mine sites. Is it cost effective to pursue cleanup at these sites for 5% of the problem? Origin of the remaining 95% is not investigated, and the specific effects of the asbestos processing plant on the air quality in Coalinga is not stated."

B.1.10. Response: Regional air modeling suggests that the Atlas Mine OU contributes less than 5% of the airborne asbestos to Coalinga and surrounding areas. This estimate, however, does not take into account the potential for significant releases of asbestos from the Atlas Mine OU via surface streams, if remedial action is not pursued. In the City of Coalinga, EPA found hot spots of asbestos within the city limits resulting from spillage of milled asbestos product, transported to Coalinga for shipping. The only asbestos processing facility currently operating in the Coalinga region is at the King City Asbestos Mine. It is EPA's understanding that the operation of this facility is being supervised by appropriate County and State authorities.

B.1.11. Comment: "All of the creeks contributing to watershed run-off should be referenced, and hydrologic information for them

should be stated. This information is necessary to define all sources of asbestos at the site. No detail was given on soil erodibility/watershed management/revegetation plans. A detailed discussion of these plans should be included."

B.1.11. Response: Maps showing all creeks contributing to watershed run-off were included in the watershed modeling performed as part of the RI. Pertinent hydrologic information and soil erodibility information were also included. This information can be found in Appendices A-2, D and E-1 of the RI. Detailed discussions of watershed management and revegetation plans will be included in the remedial design.

Letter from Ed Hastey, U.S. Department of Interior, Bureau of Land Management ("BLM"), dated July 11, 1990.

BLM Comments on the Proposed Plan:

B.1.12. Comment: The BLM supports Alternative 3 for the Atlas Mine Site with the following three exceptions:

1) Road Paving: BLM believes that paving the 1/2 mile stretch of road through the Atlas Mine Area is not warranted and is an inappropriate expense. "The road was well constructed; has, and continues to be well maintained each year; has good drainage features; and the surface is continually in good condition. We believe the restriction of access to the Mine site, through the proposed fencing, will help achieve the objective of reducing visible emissions. Secondly, there are many miles of road in the CCMA virtually all of which are unpaved." The expenditure of public funds to pave this road does not seem justified from a public health standpoint. If EPA determines that paving is a necessity, there are other dust suppressant methods which are less costly.

2) Mill Buildings: The site contains the remnants of old buildings, scrap metal and other debris from the operating mine. The remedy should require removal and appropriate disposal of all such material and grading of the site to its natural contour.

3) Ownership: "The remediation plan is silent as to the ownership of the 10-acre mill site on the Atlas Mine site. We believe the current ownership of the mill site should be clarified so that the responsibility for cleanup and disposal of materials left on the site (refer to 2 above) is clear."

B.1.12. Response:

1) Road Paving: In response to BLM's comments, the Record of Decision requires either paving the portion of White Creek Road that runs through the Atlas Mine OU or an appropriate en-

gineering alternative such as annual maintenance in combination with access restriction.

2) Mill Building: The Record of Decision requires that the mill building be dismantled and that the mill building remnants and all other debris be disposed of in an appropriate manner.

3) Ownership: EPA will deal with the issue of land ownership in the enforcement process. Clarification of the ownership of the mill area is not relevant to selection of remedy.

BLM comments on the RI/FS:

B.1.13. Comment: BLM made three main comments on the Atlas RI/FS report and followed these with more detailed comments:

"A. The available data and modeling runs are subject to a wide range of values, thus data can be manipulated to support a wide range of findings or recommendations."

"B. Field data and associated unmeasured data are used for conservative protection measures which extends data beyond data quality limits."

"C. The field data (measured) and predicted data (nonmeasured) modeling analysis appear to contradict each other."

BLM's detailed comments and EPA's responses follow:

B.1.13.1. PLM/TEM Data:

B.1.13.1. Comment: There is very little correlation between PLM and TEM measurements of asbestos in soil samples. The RI "should stress the difficulty in measuring asbestos concentrations and make conclusions concerning the quality and usability of the data. ... After reviewing the available soil data ... it is reasonable to conclude that soil asbestos measurements are widely variable and semi-qualitative... . These measurements have limited value and should identify the limitations if used in numerical surface water modeling, air modeling or risk assessments. Air data is generally of higher quality, but the report does not discuss the quality of air asbestos data. Detailed sections on the quality and acceptable uses for the data should be added to the report."

B.1.13.1. Response: EPA acknowledges that asbestos analytical techniques can yield varying results depending on a number of different factors (see Appendix 1 of the ROD). All PLM/TEM data were produced under EPA approved Sampling and Analysis Plans and QA/QC Plans. EPA has determined that the data are appropriate for use in estimating risk from exposure to asbestos under the

exposure scenarios developed in the PHE. See also Response C.2.8.

B.1.13.2 Watershed Model Use:

B.1.13.2. Comment: One main objective of the RI report was to quantify the amount of asbestos being transported from the Atlas Mine Area to the California Aqueduct during flood events. Conservative assumptions used in developing input parameters for the model could result in the model making overly conservative predictions as to the amount of asbestos transported. "These surface water transport modeling results should only be considered to be valid over a wide range of modeling input parameters and the best and worst case scenarios presented."

B.1.13.2. Response: EPA uses conservative assumptions when designing studies to evaluate hazardous waste sites because this ensures that human health and the environment are protected. The selection of the preferred alternative did not rely solely on the results of the watershed modeling or any other single piece of data. Rather, the ROD takes into account all of the data collected as well as ARARs.

B.1.13.3. Unrealistic Input Parameters For Watershed Model:

B.1.13.3. Comment: The surface water model requires asbestos concentration of the soils, mine surfaces and tailings pile as input parameters. The concentrations used in the model are unrealistically conservative (for example 100% asbestos for the mine surfaces and tailings piles and 1% for the serpentinite soils). The commenter suggests that a more realistic range of values be used as input parameters in the watershed model.

B.1.13.3. Response: A sensitivity analysis was performed to measure the sensitivity of the watershed model to changes in asbestos concentration of the serpentinite soils. The results showed that the model is sensitive to changes in asbestos concentration of the serpentinite soils. The sensitivity analysis results are included in Appendix F of the RI and summarized on page 5-98 of the RI. See also Response C.4.7.

B.1.13.4. Selection of Watershed Model:

B.1.13.4. Comment: "The SEDIMOT II model has some inherent problems, since the model incorporates the modified universal soil loss equation (MUSLE) to calculate sediment yields. The MUSLE calculates sheet and rill erosion only and does not account for mass wasting (landsliding, debris flow and channel bank sloughing). The New Idria Serpentinite Mass is highly sheared and unstable, with slope failures and resulting mass wasting being common in the watershed which adds significantly to the sediment transport of asbestos. The geologic map of the

Atlas/Coalinga site (Figure 3-17) shows this instability as large areas of landslide deposits. Since SEDIMOT II was calibrated using measured sediment data (which includes mass wasted material, channel bank and bed erosion) in addition to sheet and rill erosion, model predictions that are described only as sheet and rill erosion are actually overestimated by an amount equal to the mass wasting component of the total sediment loading. In order to properly calibrate the model, separate estimates of mass wasting should have been made for each of the subwatershed units, and these amounts should have been subtracted from the total measured sediment load. Otherwise, model predictions are overstated. A separate analysis of mass wasting should be provided to accurately represent this significant sediment source. Also MUSLE is not designed for slopes greater than 20%, although much of the modeled basin has slopes much greater than this value. This may also contribute to modeling results that appear to be nonrepresentative of the watershed."

B.1.13.4. Response: The rationale for selecting the SEDIMOT II model is presented in Section 5.2.2 of the RI, pages 5-100 to 5-119.

B.1.13.5. Calibration/Verification of the Watershed Model:

B.1.13.5. Comment: "The SEDIMOT II model was not properly calibrated or verified with available sampling data. Model results for different precipitation storm events are given in Tables 5-15 through 5-19 and are supported by data in Appendix A-2. These results were not adequately calibrated to observed asbestos concentrations during storm run-off, to observed sediment concentrations during storm run-off, or to reported annual sediment yield (page 5-81). Even though limited data were available, calibration of the model to observed asbestos concentrations for storm water run-off samples collected during the remedial investigation report was not done. Since the primary function of the model is to calculate (predict) asbestos transport offsite, failure to calibrate and verify using observed data questions the utility of using these modeling results.

"Total suspended sediment (TSS) concentrations for rain run-off were also available for calibration, but were not used. Most important, however, are model results in Appendix A-2, which reveal that the SEDIMOT II model predicted peak TSS concentrations of over 700,000 mg/L for the 1-year event (2-year, 6-hour storm event), and over 1,000,000 mg/L for the 100 year/24-hour storm event during existing conditions. These TSS concentrations are unrealistic (i.e. this condition would be similar to a mud flow), and prove that the model cannot produce valid predictions. The peak observed TSS concentration was 17,000 mg/L at site S23 and 162 to 5,300 mg/L for the remaining sites (page 4-22). Since the 100-year/24 hour modeled storm was used as the basis for the risk assessment (Section 6.3.2.2), use of SEDIMOT II model pre-

dictions introduces significant errors in the determination of risk...The use of these overly conservative estimates results in a very improbable estimate of asbestos concentration in aqueduct drinking water. These models should be recalculated using realistic values and the model be verified using measured data. Existing sampling data of surface water is unrepresentative of existing conditions because only one run-off event was sampled, and therefore is limited for model calibration and verification."

B.1.13.5. Response: The results of the watershed modeling were used to assess the Site's contribution to risk from asbestos ingestion. This risk was found to be small and was not the basis for any of the elements of the selected remedy for the Atlas Mine OU. The watershed modeling estimates of the Atlas Mine Area's contribution of asbestos to the local drainage basin is supported by the presence of deep gullies in the tailings piles. See also Response C.4.11.

B.1.13.6. Air modeling:

B.1.13.6. Comment: "The assumptions used for the air modeling were generally more realistic than those used for the surface water model. The most conservative assumption is that the entire tailings pile and mine surface areas are completely disturbed on a monthly basis (page 5-18). As stated in the text, this assumption will lead to an overestimation of erosion emissions. A sensitivity analysis describing the difference in erosion emissions as a function of assumed level of disturbance should have been provided to assess the degree of overestimation introduced by this assumption.

"The effects of the asbestos 'crust' of mine waste and tailings in the report states the the 'crust, if undisturbed, does appear to provide some protection against sheet-flow hydraulic erosion and wind erosion'. A second model run that allows for the effect of the crust should be performed for comparison purposes. As discussed on page 5-38, numerous assumptions were made during air modeling that will tend to overestimate the actual airborne asbestos concentrations."

B.1.13.6. Response: As noted above, conservative assumptions are used by EPA to ensure protection of human health and the environment. A sensitivity analysis that accounted for the crust on the asbestos waste was not necessary for selection of the remedy for the Atlas Mine Site. The selected remedy is designed to minimize airborne asbestos related to disturbance of asbestos-bearing surfaces by vehicles. The crust would be destroyed by a vehicle crossing its surface and therefore would not affect the amount of asbestos entrained into the atmosphere by vehicular disturbance. Also see Responses in Section C.1.

BLM Comments on the Risk Assessment

B.1.14. Comment: The risk assessment greatly overestimates risk due to a series of highly conservative assumptions...risks have undoubtedly been overestimated. BLM will need a Risk Assessment that predicts risk throughout the Management Area during the process of revising the Clear Creek Management Plan. In order for the BLM to consider realistic alternatives to minimize asbestos exposure in the area, a defensible Risk Assessment must be prepared. Since the BLM has no expertise in this field, we will need the EPA's assistance in designing and conducting such a Risk Assessment.

B.1.14. Response: To the extent that BLM believes that EPA's assumptions in the risk assessment were overly conservative or otherwise inaccurate, EPA will work with BLM during BLM's land use plan revision process to revise the risk assessment and its assumptions. However, it is EPA's standard practice to consider reasonable maximum exposure scenarios and to use conservative assumptions in order to ensure protectiveness. See also Responses C.5.1., C.5.3., C.5.4., C.5.5. and C.5.7.

B.1.15. Comment: Several problems were identified in procedures used to apply sediment transport modeling results to the risk assessment...Several limitations in the data and models result in an overly conservative estimate of asbestos concentration in aqueduct drinking water.

"In revising the Clear Creek Management Plan, BLM must assess the effects of existing land uses on sediment transport. We have no additional data we can use. In addition, the Management Area includes lands within other watersheds. We will need EPA's assistance in gathering and analyzing sedimentation data to determine the impact of land uses on sediment transport and subsequent exposure of the public."

B.1.15. Response: As noted in Response B.1.13.5, the results of the watershed model were used to assess the Site's contribution to risk from asbestos ingestion and because this risk was found to be small, it was not used as a basis for remedy selection at the Atlas Mine OU. EPA expects to participate in BLM's planning process and to provide technical assistance to help BLM correlate its sedimentation data to human health risk.

B.1.16. Comment: BLM has identified the following problems with the risk assessment:

1) The risk assessment does not follow current EPA guidance. For example, EPA's Integrated Risk Information System (IRIS) database is supposed to be the primary source of risk assessment data. The asbestos file from the IRIS database (U.S. EPA 1989a) was not consulted.

2) The risk assessment used $1*10^{-7}$ as the lower limit of risk in contrast with standard risk assessment practice and the new National Contingency Plan lower limit of $1*10^{-6}$.

3) The risk posed by heavy metals should be evaluated if they are found to be above background levels.

4) The risk assessment fails to distinguish between different asbestos types in terms of toxicity.

BLM is concerned about the risks associated with other metals found in the CCMA and the need to predict those risks. "We will also need EPA's assistance in determining how environmental exposures are related to the effects known to occur from occupational exposures. As you realize, large numbers of people use the Clear Creek Management Area whereas none use the Atlas Mine Site. The justification for changing management practices must be based on data that accurately describes asbestos transport and the risks associated with that."

B.1.16. Response: EPA provides the following responses to BLM's specific comments on the risk assessment:

1) While EPA has used the asbestos file in responding to other comments, it was not part of the IRIS File when the risk assessment for this Site was prepared.

2) In accordance with the April 1990 NCP, the ROD uses the risk range of $1*10^{-4}$ to $1*10^{-6}$ in selecting the remedy.

3) Surface water samples downstream from the mine area, asbestos mine surfaces and natural soils were analyzed for metals. The level of metals was found to be comparable to background levels, indicating that the Site was not a source of excess metals emissions.

4) See Response C.5.2., C.5.3., C.5.4. and C.5.6 for discussions of asbestos carcinogenicity.

As noted above EPA will be available to provide technical assistance to BLM during its revision of the CCMA land use plan.

Letter from Ed Hastey, U.S. Bureau of Land Management, dated January 4, 1991.

B.1.16.a. Comment: BLM raised the following additional issues in a letter dated January 4, 1991: (1) BLM does not believe that inclusion of the CCMA in the Atlas Site definition is appropriate; (2) BLM does not believe that their status as a PRP has been adequately clarified in the ROD; and (3) BLM does not believe that a revegetation pilot project is appropriate at the Atlas Site because BLM has information that indicates that revegetation can not be accomplished cost-effectively, and, in addition, BLM believes that the project is duplicative of revegetation pilot projects that are planned for the Johns-Manville Coalinga Mill Area and the King City Asbestos Mine.

B.1.16.a. Response: EPA has determined that these issues do not require a reopening of the public comment period. (1) The issue of inclusion of the CCMA in the Site was addressed in response to other public comments received during the public comment period. See Response A.2.b. (2) EPA has not addressed the bases for identification of any of the potentially responsible parties in the Record of Decision, because it is not relevant to the selection of the remedy. (3) EPA believes that a pilot revegetation project at the Atlas Mine Area is necessary to determine whether revegetation can be implemented cost-effectively at that site. If revegetation pilot projects are undertaken prior or concurrently at the Johns-Manville Coalinga Mill Area and the King City Asbestos Mine, EPA will recommend that information obtained from these projects be utilized at Atlas and that the Atlas project be scaled to reflect that other similar projects have been undertaken.

Letter from Anthony J. Landis, California Department of Health of Services, dated September 7, 1990.

B.1.17 Comment: DOHS stated that it concurs in the selected remedy, and that the remedy contains "appropriate management components to reduce asbestos releases from this site due to erosion and man-made air emissions."

B.1.17 Response: Comment noted.

B.1.18 Comment: DOHS stated that several state laws are considered by DOHS to be ARARS, including:

California Air Resources Act
Health and Safety Code, Div. 26
Section 39000 et seq.
17 CCR, Part 3, Chapter 1

This state act has identified asbestos as a toxic air contaminant but has not established a state-wide ambient standard. However, the act has established an ambient air quality standard for particulate matter which is enforced by the Fresno County Air Pollution Control District. While it is understood that EPA's permit exemption applies, the substantive requirements of this ambient requirement should be met by cited federal ARARs.

B.1.18. Response: The Fresno County Air Pollution Control District has adopted PM 10 as a particulate matter standard for Fresno County, pursuant to delegated authority under the California Air Resources Act, Health and Safety Code Section 39000 et. seq. This standard is an ARAR for the Atlas Mine Area Operable Unit. As noted in the DOHS comment, this standard will be met by the same measures which will ensure that the applicable federal NESHAPs for asbestos are met (i.e., misting measures during con-

struction and access restrictions and other controls after construction). The state's identification of asbestos as a toxic contaminant is not an ARAR because, as recognized by DOHS, the state has not promulgated a standard or level of control for this contaminant. EPA has determined that compliance with the federal asbestos NESHAPs found at 40 C.F.R. Section 61.147 and 40 C.F.R. Section 61.153 will provide adequate protection of public health and the environment.

B.1.19. Comment: In identifying ARARs to EPA, DOHS also cited and stated the following:

Porter Cologne Water Quality Act
23 CCR, Chapter 3: Subchapter 15
Article 7 - Mining Waste Management
Section 2570-2574

This state act contains regulations establishing waste and site classifications and waste management requirements for all mining waste. While included exemptions for liners and leachate collection appear appropriate for this site, other construction standards which require accommodation of 10-year, 24-hour storm runoff controls in design criteria for drainage and diversion structures as well as 100 year peak stream flow protection for all waste piles are applicable and relevant and appropriate for remedial action at these sites.

B.1.19. Response: For existing units such as the Atlas Mine Area, a determination of what requirements of Article 7 of the 23 CCR should be complied with must be made on a case by case basis. See Title 23, Section 2570. EPA agrees that the construction standard which requires accommodation of a 100 year peak stream flow, found at Title 23, Section 2572(b), is an ARAR for this operable unit. EPA also agrees that the requirement of construction standards which require accommodation of storm runoff controls in design criteria for drainage and diversion structures are ARAR. However, after reviewing Article 7 and the other Sections of Title 23 referenced therein, EPA has determined that the correct ARAR requires that the construction standards incorporate storm runoff controls designed to control a 25-year, 24-hour storm event, not a 10-year, 24-hour storm event. This is because the Atlas Mine Area Operable Unit is classified as a Group A mining waste, not a Group B mining waste. See Title 23, Section 2571(b)(1) and Section 2572(h)(1); see also, Title 22, Section 66300 and Section 66310. Therefore, EPA identified as an ARAR Title 23, Section 2572(h)(1)(A) and Section 2572(h)(3). This latter Section incorporates by reference Title 23, Section 2546(d) and (e), so the requirements of these two subsections are also ARAR. They deal with measures required to ensure the adequacy of the precipitation and drainage control systems.

B.1.20. Comment: In identifying ARARs to the EPA, DOHS also cited and stated the following:

California Hazardous Waste Control Laws
Health & Safety Code, Div. 20, Chapter 6.5
Section 25220-25241 et seq. and 22 CCR, Div. 4,
Chapter 30, Section 66001 et seq.

These laws provide minimum standards for the determination and management of hazardous waste. Most proposed actions on site will meet the standards of these laws or will be exempt. One aspect which continues to be applicable to and recommended for these sites is the deed restriction and land use constraints for permitted facilities. At a minimum, the 10 acres of privately held land at the Atlas site and the entire Coalinga Mill site should be deed restricted as detailed in the Health & Safety Code. Additionally, the SARA amendments recognize the need for similar institutional controls on federal lands. Therefore, it is further recommended that the public lands with asbestos containing soils and waste piles be deed restricted also.

B.1.20. Response: EPA agrees that the substantive portions of California Health and Safety Code Section 25232 are an ARAR for the portions of this operable unit that are privately owned. Any requirements related to notice, hearing and other procedural mechanisms for implementing the deed restrictions do not fall within the the definition of an ARAR; however, the actual substantive restrictions contained in Section 25232(a)(1) and (2) are an ARAR. EPA has determined that all of the private property (ten acres) at this operable unit should be deed restricted to prohibit the uses described in the California Health and Safety Code Section 25232(a)(1) and (2). EPA shall determine the appropriate manner for implementation of this requirement during the enforcement and implementation process for the remedial action. Other than this ten acres, the land which makes up this operable unit is entirely owned by public entities. EPA believes that the access restrictions imposed on this federally owned land under the selected remedial action are adequate to ensure protection of public health and the environment on these publicly owned lands, especially where this land is owned by a federal agency, the Bureau of Land Management, that is actively working with EPA to ensure the enforcement of the land use restrictions.

B.1.21. Comment: In identifying ARARs to EPA, DOHS also cited and stated the following:

California Drinking Water and Toxic Enforcement Act
Health & Safety Code, Div. 20, Chapter 6.6
Section 25249.5 et seq.

This act sets prohibitions on contaminating drinking water with specific carcinogens and reproductive toxins. Asbestos has been

identified under this act as a carcinogen. While insufficient design detail exists at this time to determine if the discharge prohibitions of this law are applicable, the notice and warning requirements are relevant. This notice and warning requirement appears to be met by EPA's public participation requirements and application of requirements listed in 40 C.F.R. 61.156.

B.1.21. Response: The warning and notice requirements only apply to a "person in the course of doing business" who knowingly and intentionally exposes an individual to a covered chemical. CH&S Code, Section 25249.6. The statute provides that a "person in the course of doing business does not include . . . the federal government or any department or agency thereof; . . ." Ninety-seven percent of the land which makes up this operable unit is owned by The Bureau of Land Management, a federal agency. Therefore, this law does not apply to such land.

While DOHS states that insufficient detail exits to determine whether the waste discharge prohibition in Health and Safety Code Chapter 6.6 apply, in fact this requirement would not apply to the federally owned land, for the reason that the prohibition only applies to "people in the course of doing business." As explained above, the federal government, which owns the majority of the land that makes up this operable unit, is specifically exempted from this definition by statute.

As for the ten acres of privately owned land that make up the remaining 3 percent of this operable unit, the notice and warning requirements of this law would not be ARAR because they are not substantive standards or levels of control. See CERCLA Section 121(d), 96 U.S.C. Section 9621(d). Furthermore, these requirements only apply to a "person in the course of doing business" who knowingly and intentionally exposes an individual to a covered chemical. CH&S Code, Section 25249.6. The operable unit is an abandoned mill and mine. No business is or will be operated there; therefore, this law does not apply.

Furthermore, the exemption in CH&S Code Section 25249.10(c) would be applicable to any releases expected to occur from this operable unit.

While DOHS states that insufficient detail exits to determine whether the waste discharge prohibition in Health and Safety Code Chapter 6.6 apply, in fact this requirement would not apply to the ten acres of privately held land either, for the reason that the prohibition only applies to "people in the course of doing business." See CH&S Code Section 25249.5. As explained above, no one is or will be doing business at this abandoned mine and mill site.

EPA has also determined that no part of this law is relevant and appropriate at this operable unit.

C. COMMENTS MADE BY POTENTIALLY RESPONSIBLE PARTIES

The following comments have been summarized from Administrative Record Document Number 1244. The reference immediately following the comment gives its location in this document.

C.1 Comments Regarding Air Studies

C.1.1. Contribution of the New Idria Formation

C.1.1. Comment: "By ignoring wind erosion emissions from the majority of New Idria Formation within the White Creek Drainage Basin, the total regional asbestos emissions are underestimated, and the contributions from the Atlas site are grossly and arbitrarily overestimated." C.1.a.1 page III-8.

C.1.1. Response: The focus of EPA's study was to assess potential human health risk from asbestos emissions resulting from the Atlas Mine OU and the JM Mill OU separate from the New Idria Formation. The issue with respect to the air pathway is whether airborne asbestos emissions attributable to these specific sites pose a significant incremental human health risk, regardless of ambient asbestos levels attributable to other sources.

The commentor is apparently referring to the percentages given in the RI of modeled concentrations from the Atlas and Johns-Manville OUs as opposed to monitored asbestos levels at various receptor locations. Given the conservative nature of the dispersion modeling, it is indeed likely that these percentages are overestimates of the contributions from the OUs at these locations. The RI concludes that the Atlas and Johns-Manville OUs together contribute less that 5% of the ambient asbestos levels detected at the cities of Huron and Coalinga, the two major population centers within the project study area. However, the intent of reporting these percentages in the RI was to give an upper bound estimate of the potential relative importance of these sites as contributors to regional airborne asbestos levels. These percentages were not used in the health risk assessment. Cancer risk via the air pathway was assessed by modeling estimated emissions from only the two OUs and associated roads.

C.1.2. Estimates of Ambient Asbestos Concentrations

C.1.2. Comment: ".... annual average asbestos concentrations from emission sources other than the Atlas and Johns-Manville Coalinga sites were estimated by subtracting modeled concentrations for these two sites from the adjusted concentration observations made during the 1986 and 1987 air sampling program. This approach is fundamentally flawed..." because the model used overly conservative input parameters and because the model was not calibrated to reflect observed asbestos levels near the sites. C.3.b page III-23.

C.1.2. Response: EPA acknowledges that this method of estimating the contribution of sources other than the sites to the regional asbestos levels overestimated the contribution of the sites and established an upper bound scenario. However, this method of calculating the sites' contribution in combination with the actual sampling upwind and downwind of the sites indicated that the sites' contribution to regional ambient levels was low. As a result, the selected remedy does not address wind erosion from the sites.

C.1.3. Wind Erosion Model - Need For Time Averaging Factor

C.1.3. Comment: "The RI apparently treated the "annual emission rates" estimated using the wind erosion model as an emission rate that occurs when the ambient wind speed exceeds the threshold velocity, and did not include an appropriate time-averaging factor. This has resulted in:...The misidentification of major emission source areas, resulting in the major source of contamination being incorrectly apportioned to the vehicular traffic on or near the Atlas Site." C.1.a.2. page III-9.

C.1.3. Response: The wind erosion asbestos emission factors in Table 5-8 are only used when the wind exceeds the threshold velocity. A time averaging factor does not need to be included in those emission factors as the modeling program assigns a value of zero to the emission factor when the wind is below the threshold limit.

C.1.4. Wind Erosion Model - Computational Error

C.1.4. Comment: "...that wind erosion emission factors may be overestimated by 42-fold due to a computational error. In these tables, the emission factor appears to have been inappropriately multiplied by a factor of 42 in calculating the wind erosion emission rate. An explanation of this factor is not provided in the text." C.1.a.3, page III-10.

C.1.4. Response: The commenter is correct. The wind erosion emission rates have been overestimated by a factor of 42. However, this is not significant because the RI found that most of the asbestos emissions from the operable unit were generated by vehicular disturbance. The risk from asbestos at the Atlas Mine OU eroded by wind alone is not significant enough to warrant remedial action. The wind and vehicle emissions are shown in Table 5-12 pg 5-41 of the RI Report.

C.1.5. Contribution of regional vehicular traffic

C.1.5. Comment: "The significant emission of asbestos from numerous other unpaved roads and trails in the region were not considered. As a result, total regional asbestos emission from vehicular traffic were highly underestimated in the RI, and the

relative contributions associated with these two particular roads were potentially overestimated." C.1.b.1 page III-11.

C.1.5. Response: Dust emissions from vehicular traffic on dirt roads which were not part of EPA's study area were not calculated. The only unpaved road emissions that were included were potential emissions from the two dirt roads associated with the two sites. Therefore, EPA does not understand the statement that "...total regional asbestos emissions from vehicular traffic [from the numerous other unpaved roads] were highly underestimated...." Such emissions were not calculated at all because they were not part of the study. The statement that "...the relative contributions associated with these two particular roads were potentially overestimated" is taken by EPA as reference to the RI's comparison of modeled concentrations attributable to the two sites and associated roads against monitored regional asbestos levels. See Response C.1.1.

C.1.6. Vehicular Traffic - Misidentification of Equation

C.1.6. Comment: "Although Appendix C-2 of the RI Report claims that the emission factor for vehicular traffic was estimated using Equation 1 presented above, the results presented in Table 1 of Appendix C-2 indicated that Equation 2 was actually used for calculations used in Section 6." C.1.b.2 page III-12

"Numerous errors, either typographical, use of inconsistent parameters or computational were made in Table I of Appendix C-2, which appear to have resulted in overestimating on-site emission factors by over 100-fold."

C.1.6. Response: The comment correctly notes that the text in Appendix C-2 of the RI states that "Equation 1" was used for the baseline risk assessment presented in Section 6 (on-site exposures due to off-road vehicle activity), however, "Equation 2" was actually and appropriately used.

While EPA has discovered several errors in Table 1 of Appendix C-2 of the RI, the comment is incorrect that these errors resulted in "overestimating on-site emission factors by over 100 fold." All errors were data inputs for the Coalinga Mine Site. First, the particle size multiplier (k) should have read "0.36" rather than "0.036". Second, for the "average" Coalinga truck and motorcycle, examination of Table 4-6 in Section 4 of the RI reveals that the "silt fraction" (s) should have read "63.8" percent rather than "6.8" percent. Finally, for the "maximum" Coalinga truck and motorcycle cases, the silt fraction should have read "82" percent rather than "50" percent. The calculated "ev" emission factors reported in Table 1, however, are correct, except for the "average" Coalinga truck and motorcycle cases. In these cases, the reported emission factors are an order of magnitude lower than what would have resulted from the correct in-

puts. With the conservatism incorporated elsewhere in the baseline risk assessment, EPA has determined that the baseline risk assessment should still provide for an adequate margin of safety.

C.1.7. Vehicular Traffic - Discrepancy in input parameters in air dispersion modeling and risk assessment

C.1.7. Comment: "...critical input parameters used to calculate emissions in the baseline risk assessment in Section 6 were different from those used in the air dispersion modeling in Section 5, in some cases by more than an order of magnitude.... This would suggest that the risk levels in Section 6 of the RI are artificially inflated as a result of calculational inconsistencies." C.1.b.2 pages III-12 and III-13.

C.1.7. Response: The commentor correctly notes that the input parameters used in Section 5 and Section 6 of the RI are different. The emission calculations presented in Section 5 and Section 6 are associated with different activities. The air dispersion modeling presented in Section 5 is concerned with on-road vehicle activities associated with site operations, where one round trip per day is considered typical. The baseline risk assessment discussed in Section 6 is concerned with recreational off-road vehicle activities in the drainage basins in the vicinity of the Atlas and John-Mansville sites (e.g. 4-wheel-drive pickups and motorcyles), where estimates of 50 to 250 trips per day are considered representative. These different vehicle types would also have different vehicle speeds and weights associated with them. Therefore, the use of different input parameters in Section 5 and Section 6 is appropriate.

C.1.8. Vehicular Traffic Emissions - Typographic/Calculation Errors

C.1.8. Comment: "...where the value 0.85 was mistakenly typed as 0.05, there appears an additional unexplained factor of 0.85 introduced into the calculation in Table 5-10. This factor arbitrarily decreases the vehicular traffic emission rate by 0.85. C.1.b.3 Page III-15.

C.1.8. Response: The commenter is correct that the equation provided on page 5-19 of the RI was incorrectly written, the following equation was used for calculations:

$$E_{10} = (.85)(s/10)(S/24)^{.8}(W/7)^{.3}(w/6)^{1.6}(365-p/365)$$

The correct factor of 0.85 was used in the actual emission calculations.

The commenter is also correct that an additional factor of 0.85 was introduced into the equation. This occurred because the "w/6"

term in the emission equation was raised to the 1.6 power instead of the 1.2 power. See A Method for Estimating Fugitive Particulate Emissions From Hazardous Waste Sites (EPA 1987a). If the (w/6) term is raised to the 1.6 power instead of the 1.2 power, an additional factor of 0.85 is introduced.

As a result predicted emissions are 85 percent of what would have been predicted by the correct equation. This 15% reduction in predicted emissions, however, does not create a statistically significant difference in the risk assessment's estimate of the risk to receptors in the immediate vicinity from vehicular emissions. Hence, no change in remedy selection is appropriate as a result of this correction.

C.1.9. Vehicular traffic - variations based on time of day and topography

C.1.9. Comment: "The RI acknowledges that: (1) the traffic-generated emission generally occurs during daytime (page 5-37 of RI); (2) the typical upslope/downslope diurnal flow with low wind speeds observed during most of the year is strongly dependent on time of day and local topography (pages 5-37 of RI); and (3) the usual meteorological scenario includes a night time drainage flow and a daytime upslope wind (page 3-3 of RI). The RI has ignored these important factors by assuming erroneously that the traffic-generated dust emissions would occur continuously at the same rate 24 hours/day throughout the year. As a result, the off-site asbestos concentrations estimated in the RI are highly inaccurate...." C.1.b.4 pages III 15-16.

C.1.9. Response: The assumptions used in estimating asbestos emissions from vehicle traffic were based on the information available concerning total traffic, wind speed and wind direction. The results of the initial modeling effort using these average values indicated that the level of exposure to all receptors, except for those in the immediate vicinity, was low and therefore a more detailed dispersion analysis was not necessary.

C.1.10. Use of ISCLT model

C.1.10. Comment:

1. Effect of Joaquin Ridge: "A simple terrain approach (like the ISCLT) to simulate the transport of airborne particulates neglects the effect of the Joaquin Ridge on the plume dispersion at the Atlas site and consequently creates unaddressed uncertainties in estimating downwind asbestos concentrations and resultant health risks." C.2.a.1 page III-17.

2. Long term versus short term models: "Another concern regarding the use of the long term model (ISCLT) for the Atlas site is its inability to address time-varying emissions. As previously

mentioned in our comments, the traffic-generated dust emission strongly depends on the time-varying local meteorological conditions. The long term model is not equipped with this modeling option. Use of the short term model (ISCST), which utilizes the hourly surface meteorological condition, would be more appropriate than the long term in the dispersion modeling for the Atlas site." C.2.a.2 pages III 17-18.

3. Deposition: "The RI does not consider deposition, and therefore overestimates maximum downwind air concentrations attributable to modeled source areas." C.2.b.1 page III-20

4. Atmospheric Stability: "Assuming an atmospheric stability that does not disperse the airborne asbestos plume leads to a significant and unrealistic over estimation of the annual average asbestos concentrations at receptor locations downwind of source locations." C.2.b.2 page III-20.

C.1.10. Response: All of the refinements to the air dispersion modeling proposed by the commenter would decrease the estimated contribution of the Atlas Mine OU to regional ambient airborne asbestos levels. EPA concluded, based on results from the ISCLT model, that the contribution of this site to the regional ambient airborne asbestos levels did not warrant remedial action. As a result, refinements to the model which produced lower estimates of the site's contribution would not have changed EPA's remedy selection.

C.1.11. Air Dispersion Modeling - Use of Coalinga Mine Site Data

C.1.11. Comment: "The RI analysis apparently relies on meteorological data collected at both sites, rather than just the Atlas site. This approach should be explained, given the fact that the RI Report states that the data from the Atlas site are more representative of the winds in the general project region." C.2.b.3 page III-22.

C.1.11. Response: The air dispersion modeling calculations which used meteorological data from Coalinga Mine Site were not used to select a remedy at the Atlas Mine Area OU. As noted in the previous response, EPA concluded that the contribution of this site to the regional asbestos levels did not merit remedial action. Therefore, regardless of whether the meteorological data was drawn from one or both sites, the selected remedy for the Atlas Mine OU would remain the same.

C.1.12. Ambient Asbestos Levels - Adequacy of Sampling

C.1.12. Comment: EPA's approach to air sampling, to assess the contribution of the Atlas and Coalinga Mine Sites to ambient asbestos concentrations in air was flawed because the number and

location of the sampling stations were inadequate to determine the relative contribution of either site. C.3.a page III-23.

C.1.12. Response: The results of sampling at the four stations located at the sites did not show that wind erosion from the sites contributed significant quantities of asbestos to ambient levels. Therefore, a more extensive sampling program was determined to be unnecessary.

C.1.13. Meteorological Monitoring - Presentation of the Program in the RI

C.1.13. Comment: The meteorological monitoring program is not clearly presented, making a full critical evaluation of the results difficult if not impossible. "For example, the latitude and longitude of the monitoring stations are not provided in Appendix E-6, and the description of the monitoring equipment does not include the height of the sensors above ground level. The data generated by the meteorological monitoring program would be unreliable if calibration was not conducted; if calibration was conducted, the RI report should include a description of the specific protocols followed and documentation that calibration was conducted." Appendix E-6 does not refer to the preparation of a Quality Assurance Plan....then the data generated by the meteorological monitoring program are suspect." C.3.c page III 24-25.

C.1.13. Response: As stated on pages 2-13 and 2-18 of the RI report, calibrations of the instruments used in the meteorological monitoring program were conducted both before and after completion of the monitoring program. The procedures followed are described in detail in Appendix D of Quality Assurance Project Plan for Performance of Remedial Investigation -Feasibility Study at the Atlas/Coalinga Site, Fresno County, California (Administrative Record Document No. 114). These details are also presented in Appendix A of the Air Sampling and Analysis Plan (AR Document No. 356). Documentation that these calibrations were carried out may be found in the Meteorological Monitoring Data Report September 1985 through June 1987 for the Atlas and Coalinga Sites, Fresno County, California (AR Document No. 358). Locations of the meteorological monitoring stations are presented in Figure 2 of Appendix E-6, AR document number 358. The commenter correctly notes that the description of the monitoring equipment does not include the height above ground level of the sensors.

C.1.14. Air Monitoring - Filter Overload

C.1.14. Comment: "...some filters became overloaded and required an indirect preparation for analysis....The indirect preparation procedure breaks up asbestos bundles, clusters, and

matrices, resulting in a higher fiber count." C.3.e.2 page III-27.

C.1.14. Response: The samples that required indirect analysis were not used for any calculations and were considered void for all purposes, as stated on page 2-4 of Appendix E-2. Therefore the air sampling program results are not affected by the indirectly prepared samples.

C.1.15. Air Monitoring - Small Sampling Volume and Asbestos Detection Limit

C.1.15. Comment: "...the use of a smaller sampling volume to avoid overloading the filters resulted ultimately in air sample asbestos concentrations that were below detection limits and resulted in meaningless information to predict ambient airborne asbestos concentrations." C.3.e.3 page III 27-28.

C.1.15. Response: EPA agrees that a single measurement for which the asbestos loading on the filter is light may have relatively poor precision, and therefore a single measurement should not be used to represent the mean asbestos concentration at a particular location. However, these data were used along with all other valid measurements, to estimate average asbestos concentrations. The variance of data collected at locations with very low asbestos concentrations and hence low asbestos loadings on the filters has been fully accounted for in the statistical procedures which were used to assess differences between mean measured concentrations at sampling locations. The detection limit for each sample was calculated. The method for this calculation is presented in Section 4.3 of Appendix E-3 - Airborne Asbestos Sampling Data Report (Ar Document No. 358). Of the 59 samples which used a smaller sampling volume, eight samples were determined to be below the detection limit. This represents a sampling success of 87%.

C.1.16. Air Monitoring - Duplicate Samples and Samples Left Exposed

C.1.16. Comment: "...duplicate samples were apparently not collected at all sampling locations....In addition, sampling cassettes were apparently left open to the atmosphere for as much as 12 hours before and after sampling." C.3.f page III-28

C.1.16. Response: The purpose of duplicate samples is to provide a measure of sampling precision. Therefore, duplicates are not required for every sample taken. See Section 2.2.1. of the RI. In addition, as part of the laboratory QA/QC, analyses of some sample splits were performed to assess analytical precision.

The commentor is correct that sampling cassettes were left open to the atmosphere for as much as 12 hours before and after sam-

pling. However, the affect on accuracy was minimized because: (1) cassettes were inverted with respect to the ground, minimizing the potential effects of gravitational settling of airborne asbestos fibers during nonsampling periods; and (2) cassettes were grounded and mounted in conductive cowls to minimize the electrostatic attraction of airborne asbestos fibers during nonsampling periods, as per NIOSH Method 7402. In addition, sample blanks were taken in the field, opened to the atmosphere, and returned to be laboratory for analysis to assess the magnitude of potential filter contamination.

C.1.17. Air Monitoring - Loss of wind direction Data and Samples

C.1.17. Comment: "If the failure [of the wind sensor] occurred during implementation of the expanded air sampling program in 1987, then ground meteorological data are not available to evaluate relationships between upwind and downwind concentrations, or to assess air transport patterns for the area...wind direction data were apparently lost from the USGS gauging station due to problems with instrumentation further limiting the utility of EPA's RI efforts....The sampling program was designed to detect differences in means greater than a factor of 2; this goal may not be achievable due to the loss of data. C.3.g page III-29.

C.1.17. Response: Despite the malfunction of the wind detection equipment during the 1987 sampling, the 1986 air sampling program provided extensive information on wind direction which was confirmed by sampling team observations during the 1987 sampling program. Upwind and downwind sampling indicated that the contribution of of wind erosion from the site to regional asbestos levels was low.

As noted by the commenter, the program was designed to detect differences of mean concentrations between one location and another or between night and day of a factor of two or greater. the number of samples was selected on this basis. The commenter is correct that due to the loss of a significant number of samples, the sensitivity of the analyses for many sampling locations was reduced, so that differences of a factor of two could not be detected. The sampling was not repeated because, as noted elsewhere in these responses, the valid samples which were obtained indicated that the contribution of wind erosion from the Atlas site to regional ambient asbestos levels was low.

C.2 Comments Regarding the Soil Studies

C.2.1. Soil Sampling - Inconsistency between PLM results for sedimentary soils and modeling assumptions

C.2.1 Comment: "For sediment transport modeling purposes, the asbestos concentrations of sedimentary soils was assumed by EPA to be 0 percent. EPA notes (page 5-55, of RI report) that these concentrations are "based on the results of laboratory tests for grain-size distribution and asbestos content...." These asbestos content assumptions are not consistent with actual PLM soil sampling data collected before this RI, during this RI, or samples collected subsequent to this RI, even recognizing the limitation of PLM analysis of soils." C.1.a page IV-5.

C.2.1 Response: As indicated in the RI, all sedimentary soil samples contained less than one percent asbestos by PLM. Therefore the assumption that the sedimentary soils contain zero percent asbestos is supported by the data collected during the remedial investigation. The data summarizing the asbestos content of sedimentary soils are presented in the Upland Soil Samples Table 4-8 and 4-10 of the RI. These data were collected, analyzed and validated using an EPA approved QA/QC plan.

The commenter has failed to identify or cite any "actual PLM soil sampling data" which provides higher values for the asbestos content of sedimentary soils in this area. EPA is aware, however, that higher values were obtained for sedimentary soils near the Coalinga Asbestos Mine NPL Site.

C.2.2. Soil Sampling - EPA use of Serpentinite Soil data for transport modeling

C.2.2 Comment: "On page 4-40 of the RI report, EPA states that asbestos contents in natural serpentinite soil samples were 2 percent (PLM) and 3.45 percent (TEM) in one soil sample and less than 1 percent in the remaining three samples analyzed. These data appear to have been ignored in EPA's sediment transport modeling efforts." C.1.a, page IV-5.

C.2.2 Response: The average of the Polarized Light Microscopy (PLM) asbestos analytical results for serpentinite soils was used in the sediment transport modeling. It is a standard to assume that the three samples with less than 1% asbestos contain 0.5%. As a result, the average value of the PLM analyses was 0.875 percent. This value was rounded up to one percent for use in the sediment transport modeling.

C.2.3. Soil Sampling - Use of soil sampling data in risk assessment

C.2.3 Comment: "The maximum asbestos concentrations assigned to the Atlas site and off-site soils in the baseline risk assessment were 1 and 0.5 percent (PLM) for an average case, respectively and 3 and 6 percent (PLM) for a maximum case, respectively. These asbestos contents calculated using EPA's soil sampling data directly contradict the values used in EPA's risk assessment ef-

forts and hence invalidate their risk assessment results." C.1.a, page IV-6.

C.2.3 Response: The reference to concentrations of asbestos are apparently from Table 6-18 of the risk assessment. The commenter does not reference any specific EPA soils sampling data which are inconsistent with the values used in the risk assessment. The values used in the risk assessment are consistent with the PLM results obtained in EPA soil sampling program. See Tables 4-6, 4-8 and 4-10 in the RI. Although TEM values were significantly higher, at the time that the risk assessment was prepared, PLM was the EPA approved method of measuring asbestos in soils. As a result the TEM values were not used.

C.2.4. Soil Sampling - Precision of composite vs single grab sample

C.2.4 Comment: "EPA indicated there would be 16 sample location stations for each of the four representative source materials. EPA stated that "the precision of the composite sample increased by about 68 percent over that of a single grab sample". This statement is unsubstantiated and there is no evidence to show the precision of composite samples is any greater than that of single grab samples. In order to obtain quantitative rather than qualitative data for modeling, sample compositing should have been either prohibited or supported through implementing an approved Quality Assurance Project Plan." C.1.b, page IV-6.

C.2.4 Response: The Final Soil Sampling and Analysis Project Plan ("SSAP") for the Atlas and Coalinga Sites (AR Document Number 122), the RI and Appendix E-1, contain a complete rationalization for the number of samples, sample site selections, and compositing of samples. The SSAP was designed to produce data for use in the EPA's Hydrologic Simulation Program - Fortran (HSPF). An EPA approved Quality Assurance Project Plan was followed during the project.

C.2.5. Soil Sampling - Stratified random sampling to locate sampling stations

C.2.5 Comment: "EPA discusses the location of sampling stations based on stratified random sampling scheme. The use of stratified random sampling techniques for the selection of erodibility analysis is questionable principally because EPA indicated they planned to calculate erodibility using the universal soil loss equation. Universal soil loss parameters, specifically erodibility, as well as the equation itself, were developed under specific constraints based on slope, plot length, and cover (Chow 1964). Therefore, site selections should have considered the constrains of the equations being used." C.1.c, page IV-6.

C.2.5 Response: EPA did not use the stratified random sampling techniques for selection of the erodibility analysis. The stratified random sampling techniques allow for determining random sampling locations over a given area; there is no direct relationship between these techniques and selection of the erodibility analysis.

C.2.6. Soil Sampling - Statistical adequacy of the number of samples

C.2.6 Comment: "In discussing the number of soil samples to be collected, EPA indicates that "some limited data that do exist on the variability of the parameters in concern suggest that roughly 16 samples will be sufficient in this case". EPA does not indicate or present these limited data or explain how they reached this conclusion. The statistical adequacy of 16 samples being representative of site conditions is neither discussed nor validated." C.1.d, page IV-6,7.

C.2.6 Response: The discussion and validation of the number of soil samples to be collected can be found in Appendix A of the Final Soil Sampling and Analysis Project Plan (Administrative Record Document Number 157).

C.2.7. Soil Sampling - Improper composite sampling

C.2.7. Comment: "Two of EPA's composite soil samples do not appear to reflect the types of materials which they are reported to represent in the soil sampling report (RI Appendix E-1). EPA's Soil Sampling Report describes Composite Sample C-01 as being derived from mine surface soils. However, a comparison of Figures 3-2 (RI Appendix E-1) and Figure 5-6 (RI report) indicates that several of the subsamples which compose C-01 were collected from soils defined as unmined serpentine soils. Therefore, EPA's sampling results may be less than representative of site conditions. L-F (1989b) field observations and review of historic aerial photographs which predate development of the Atlas site suggest that 7 of the 8 subsamples which compose C-01 were obtained from the actual serpentine matrix exposed by gully erosion in an area approximately one-half mile south of the Atlas site. Composite Sample C-06, described as "serpentine soil" in the Soil Sampling Report, appears to contain one subsample obtained from an area defined as Dumps and Pits on Figure 5-6 of the RI report." C.2.c, page IV-8.

C.2.7. Response: All C-01 sample locations were selected because they had been worked by heavy equipment for mining purposes. It is very difficult to classify soil on a point by point basis using aerial photographs.

Soil Sample SS-31, which is apparently referenced above, as well as SS-32, SS-3 and SS-34 which compose Composite C-06, were all

collected from undisturbed serpentine soil surfaces. The area designated as Dumps and Pits by the Soil Conservation Service ("SCS") included areas with residual undisturbed serpentine soils (Section 4.3.3 page 4-53 RI report).

C.2.8. Soil Sampling - Differentiating between the contribution of the Atlas Mine and the New Idria Formation

C.2.8. Comment: "In the summary of streambed program results, the discussion alludes to the fact that all samples containing over 1 percent asbestos were collected in close proximity to the Atlas and Johns-Manville Coalinga mine sites. However, it is also important to note that the source areas for these streams are the New Idria Formation, which is geologically an asbestos-producing formation. EPA did not sufficiently differentiate between the mine sites and the New Idria Formation sources areas." C.4.a, page IV-9.

C.2.8. Response: The methods available to EPA to differentiate between asbestos in streambeds which originated from the Atlas Mine site sources and from the rest of the New Idria Formation were limited. For instance, because the Atlas Mine Site is located at the top of a ridge, no unaffected upstream samples were available for a comparative analysis. EPA noted that streambed samples collected closest to the Atlas Mine Site had significantly higher concentrations of asbestos than samples collected further downstream. This suggests that the Atlas Mine OU is a significant source of downstream asbestos contamination. See Sections 4.3 and 5.2.2 of the RI.

C.2.9. Soil Sampling - No streambed samples collected upstream of the Atlas Mine Area

C.2.9. Comment: "EPA collected no streambed samples upstream from the Atlas site and only one streambed sample immediately downstream (Sample S-1) of the site. EPA reports that Sample S-1 had a PLM asbestos concentration of 6 percent. This number is meaningless in the absence of upstream samples to assess the contribution of the Atlas site to off-site migration of asbestos. In any event, the asbestos concentration in S-1 is mostly likely to simply reflect the New Idria Formation asbestos content since that is the source are from which the sample is collected." C.4.b, page IV-9.

C.2.9. Response: As noted in Response C.2.11, the Atlas Mine OU is at the top of a ridge and therefore, no upstream sampling is possible. Another method used by EPA to compare streambed sediments unaffected by the Atlas Mine OU to those which have been affected was to collect samples above and below the confluence of Los Gatos Creek and White Creek. Above this confluence, Los Gatos Creek is not affected by the Atlas Mine OU. Runoff from the Atlas Mine OU drains into White Creek. Streambed sampling

showed that Los Gatos Creek above this confluence contained two percent asbestos and below this confluence, six percent asbestos, suggesting that the Atlas Mine OU has contributed significant quantities of asbestos to White Creek. See Section 4.3.1 in the RI.

C.2.10. Soil Sampling - Asbestos content of soils in the Ponding Basin

C.2.10. Comment: "Executive Summary, page 4 states 'All samples containing more than 1 percent asbestos (the detection limit for PLM analysis) were located in close proximity to the Atlas site and the Johns-Manville Coalinga mill site. Asbestos content there ranged from nondetected to 6 percent by PLM. Highest values found by EPA were near the Atlas site, including the White Creek drainage where it flows out of the New Idria serpentinite mass. All sedimentary basin samples collected by EPA contained less than 1 percent asbestos by PLM analysis.' This statement is misleading since EPA fails to acknowledge the massive contribution to regional asbestos concentrations made by the New Idria formation. EPA wrongly implies that the asbestos detected in sedimentary basin soils near the California Aqueduct is attributable to the Atlas site. This conclusion is not justified by the studies conducted to date." C.4.c, page IV-9.

C.2.10. Response: EPA acknowledges that the New Idria Formation is a major source of asbestos in the Ponding Basin near the California Aqueduct. However, some of the asbestos in the sedimentary soils near the California Aqueduct clearly originates from the Atlas Mine OU. EPA's watershed modeling indicates that between five percent and 36 percent of the total asbestos yield from the Los Gatos Creek watershed is contributed by the Atlas Mine OU. Nothing in the RI implies that all of the asbestos being delivered by the Los Gatos Creek watershed originates at the Atlas Mine OU.

C.2.11. Soil Analysis - Asbestos content using PLM and TEM

C.2.11. Comment: "Significant differences were found between EPA's PLM and TEM derived asbestos contents, whenever asbestos was detected. This is best evidenced by results such as those from sample C-01 which had an asbestos concentration of less than one percent by PLM and an asbestos content of 100 percent by TEM analysis. This magnitude of variation makes EPA's data largely unusable and highly suspect. EPA's ARARs for this site are based on PLM analysis and we believe that only PLM data should be used for drawing conclusions in the RI report." C.2.a, page IV-7.

C.2.11. Response: EPA acknowledges that major discrepancies exist between some of its TEM and PLM analyses. However, EPA does not agree that these data are unusable and highly suspect. Because soil samples are heterogeneous and TEM looks at extremely

small portions of a sample, large variations in results do not indicate that the techniques are inaccurate or that the analyses were improperly performed. EPA has continued to approve and utilize both PLM and TEM analyses of asbestos content in soils because the two techniques are complementary. PLM is a rapid and cost effective method for screening for the presence of asbestos and giving a rough estimate of its concentration in a relatively large sample. In contrast, TEM allows more accurate measurement of the asbestos content of small portions of a sample; however it is extremely expensive and time consuming.

The statement that the ARARs for the Atlas Mine OU are based on PLM analysis is incorrect. ARARs for this OU and other sites are Applicable or Relevant and Appropriate Requirements. While the presence of significant quantities of asbestos affected the identification of ARARs, the specific level of asbestos did not. ARARs for this OU are discussed in Section 9.0 of the ROD.

C.2.12. Soil Analysis - Asbestos content of mine surfaces and serpentinite soils

C.2.12. Comment: "Contrary to EPA soil results, L-F [Levine-Fricke] sampling results of serpentine soils document that, non-anthropically affected serpentine soils in the New Idria Formation outcrop have asbestos concentrations approximately the same as mine surfaces and tailings. For example, ...we believe it is appropriate to assume that mine surfaces and non-anthropically affected serpentinite materials have relatively the same asbestos concentrations." C.2.b, page IV-7.

C.2.12. Response: The commenter indicates that EPA's results are inconsistent with Levine-Fricke's work at the Coalinga Mine Site. This is only partially correct. Consistent with Levine-Fricke's results from sampling soils on and around the Coalinga Mine Site, EPA's PLM results on and around the Atlas Site showed similar concentrations of asbestos in natural soils, mine surfaces and tailings piles.

In contrast, EPA's TEM results indicate very high concentrations of asbestos in the mine surface samples and low concentrations in the surrounding natural soils. The inconsistency between these TEM results and both Levine-Fricke's Coalinga results and EPA's PLM results is open to several explanations. One possibility is that the small number of TEM samples and the small amount of soil examined in each sample did not fully characterize the on-site and off-site concentrations. Another possibility is that there is a significant variation in the characteristics of samples from Coalinga and Atlas.

Asbestos analytical techniques have inherent problems with accuracy and precision. These problems are discussed in detail in Appendix 1 of the ROD. Even if the concentrations of asbestos in

the mine surfaces and tailings piles of the Atlas Mine OU and nearby natural soils are similar, EPA has determined that the selected remedy is appropriate to protect human health and the environment. This is because the disturbed areas are more erodible and therefore more transportable than natural outcrops and serpentine rocks and the remedy requires implementation of standard mine reclamation techniques.

C.2.13. Soil Sampling and Analysis - QA/QC Procedures

C.2.13. Comment: "EPA has not released their approved QA/QC plan. Therefore, we are unable to evaluate the results of different analyses presented in Appendix D of the RI report. Appendix D consists of a loosely organized compilation of laboratory QC reports for EPA's stream water, soil, water, and air sampling data results. Problems with inadequate precision and accuracy has caused EPA to present various data as estimates and considered usable for limited purpose only. Appendix D does not explain the criteria used to classify the data this way nor does it explain what is meant by the term "limited purposes" as used to qualify certain data. In general, EPA's QC assessment of the data is unclear from the material presented in Appendix D and there appears to have been insufficient QC checks to justify interpretation of the data. Furthermore, there appears to have been no audit of the laboratories used in the RI at any time by EPA or its contractors." C.3, page IV-8.

C.2.13. Response: The EPA approved Quality Assurance Project Plan was made available to the public as Administrative Record Document Number 114. Appendix D sample data organization follows the same organizational format as is presented in the main body of the RI report text. All data have been collected, analyzed and validated according to this EPA approved plan. The only soil data which were tagged "for limited use only" were metals analyses; metals concentrations are unrelated to the primary concern of the RI which focused on asbestos. The laboratories performing the analyses were selected by EPA under their Contract Laboratory Program and met EPA standards. The soil asbestos analyses were performed to conform with the procedures specified in the Special Analytical Services (SAS) request.

C.3 Comments Regarding Water Studies

C.3.1. Water Sampling - Location of sampling stations

C.3.1 Comment: "...it was impossible to discern, based on the geologic map included in the RI report, where these sites (sampling locations) were located with respect to the natural asbestos producing geologic formations....Much more detailed geologic descriptions and more information on geologic outcrops

within the vicinity of locations of these drainage basins should have been provided." C.1.a, page V-5,6.

C.3.1 Response: EPA agrees that a more detailed geologic map showing sampling locations with respect to the local geologic formations would have been useful. However, the relationship of the sampling stations to nearby geologic formations can be discerned using: (1) the geologic map provided in the RI (Figure 3-17), (2) the discussion of the geology in the area (pages 3-35 to 3-48 in the RI), (3) Figures 2-10, 2-11 and 2-12 in the RI (which show locations of the sampling stations), (4) Soil Conservation Service maps, photos and soil surveys referenced in the RI and (5) generally available geologic maps of the area.

C.3.2. Water Sampling - Samples were not collected during peak flow

C.3.2 Comment: "EPA's approach to sampling stream waters during the RI was seriously flawed....a series of stream gauge measurements at one particular sampling location should have been taken to determine at what stage (rising limb, peak, or recession limb) a particular stream water sample was taken. The sampling schedule adopted by EPA called for sampling upper reaches or the more quickly responding streams first, followed by larger order streams downstream which respond more slowly. This approach is accurate; but it was not followed by EPA during the one stream water sampling event which reflects a random sampling sequence (page 8, RI report Appendix E-4). ...Samples were not collected at peak flow times; all samples appear to have been collected on the falling limb of the general stream hydrograph, because of a one day delay." C.1.b, page V-6 and C.2.d, page V-8.

C.3.2 Response: EPA agrees that stream gauge measurements to determine the stages of a particular rainfall event can be useful in conjunction with stream water sampling. Such measurements allow determination of a stream's carrying capacity during a storm event and can be used to calibrate watershed models.

However, the purpose of EPA's surface water sampling was to evaluate which streams within specific watersheds were contributing asbestos to the local drainage and to examine the amounts of asbestos that each of these streams were carrying. The surface water sampling also assisted EPA in defining subwatersheds for the watershed modeling. The surface water sampling was adequate for these purposes.

In addition, contrary to the commenter's assertion, EPA did perform sampling of the upper reaches of White Creek prior to sampling downstream stations. Further, the delay between the beginning of the rainfall event and the beginning of sampling was only a few hours and not a full day as indicated by the commenter. The start of rainfall for the March 5, 1987, storm began at ap-

proximately midnight on the night of March 4. Field crews began sampling shortly after first light the next morning, and continued sampling until after nightfall.

C.3.3. Water Sampling - No evaluation of depth integrated effects

C.3.3 Comment: "...EPA Final Sampling Plan specified that the second sampling event would be used to evaluate depth-integrated effects on water quality in the stream at Station SO1....There was no successful second sampling event. Therefore, no depth-integrated samples were ever collected and EPA has no basis to determine the accuracy or significance of their surface water samples." C.1.c, page V-6.

C.3.3 Response: The commenter is correct that EPA had planned a second sampling event. However, because of on-going drought conditions, no rainfall event occurred sufficient to allow a second round of sampling. As indicated in Table 3 of the Stream Water Sampling Data Report, the depth of the streams during the one rainfall event sampled was 13 inches or less. Such shallow stream depths do not allow the accurate use of depth integrated sampling. As noted in Response C.3.2., the sampling performed during the RI was adequate for the purposes of the surface water sampling program.

C.3.4. Water Sampling - Failure to collect key samples

C.3.4. Comment: "Samples were not collected at specified points...numerous stream measurements could not be taken...key sampling points were not reached. Therefore, EPA's sampling program was a failure." C.2.b, page V-8.

C.3.4. Response: EPA sampled all of the planned locations that were accessible during the rainfall event. In some locations, roads to sampling locations were slick, soft, slippery and dangerous to drive on during the rainfall event. Of the 25 originally identified sampling stations, 18 were successfully sampled on March 5, 1987. All key sample locations were either sampled or other locations providing equivalent information were substituted (see Appendix E-4, Surface Water Sampling Data Report, Administrative Record Document Number 358).

C.3.5. Water Sampling - Sampling station closest to Atlas not used

C.3.5. Comment: EPA contends the Atlas tailings generate large quantities of asbestos yet the sampling point closest to the Atlas tailings was not used. "This absence of data precludes EPA from substantiating such a claim." C.2.c, V-8.

C.3.5. Response: Station S14 was not sampled because of safety concerns. The large erosion gullies in the tailings piles

upstream of station S14 confirm that significant quantities of material had traveled downstream.

C.3.6. Water Sampling - Contribution of the New Idria Formation

C.3.6. Comment: "The asbestos concentrations in surface water samples were greatest above the Atlas and Johns-Manville Coalinga sites... the elevated asbestos concentrations in stream samples collected above the Atlas and Johns-Manville Coalinga sites clearly show that the erosion of the naturally occurring New Idria formation is a tremendous source of waterborne asbestos for streams that cross its outcrop. It is puzzling that EPA consistently failed to recognize the significance of releases of asbestos from the New Idria Formation to regional asbestos loading. The only plausible explanation for such failure is EPA's desire to attribute the cause of such regional loading to the Atlas site" C.3.a, page V-9, V-10.

C.3.6. Response: EPA has acknowledged in the RI that erosion of the New Idria Formation contributes a significant portion of the asbestos being delivered by the Los Gatos Creek watershed. See Sections 4.2.1 and 5.2.2 of the RI. However, the high concentrations of asbestos in water samples taken above the Atlas mine Ou and the Coalinga Mine site do not establish this fact. In the case of the Coalinga Mine site, upstream disturbed areas including the Jensen and Butler Mines probably contributed to asbestos loading in the water samples. The water samples that are described as being taken above the Atlas Mine OU were taken close to the site boundary in areas which appear to have been influenced by the mining and milling activities at the site. As noted in prior responses, upstream samples unaffected by the Atlas Mine disturbance are unavailable because of the Atlas Mine's location at the top of a ridge.

C.3.7. Water Sampling - Data are insufficient to support watershed modeling

C.3.7. Comment: "EPA collected stream data from only one storm event. One rainfall event is wholly insufficient to define relative instream transport of chrysotile asbestos fibers. The hydraulic data developed by EPA is entirely insufficient to support realistic erosion modeling, comprehensive hydrologic modeling, and the resultant assessment of risks to human health and the environment. However, since ingested asbestos fibers have not been shown to be carcinogenic, further sampling is not suggested." C.3.b, page V-10.

C.3.7. Response: EPA did not rely on its rainfall event sampling in developing its watershed modeling. See Section 5.2.2 of the RI for the information used to generate EPA's watershed modeling. EPA agrees that one water sampling event would have been insufficient to provide detailed support for watershed modeling work.

C.3.8. Water Analysis - Increase in 10 micron length fibers upstream

C.3.8. Comment: EPA concludes...that concentrations of asbestos fibers, longer than 10 microns increase upstream toward the Atlas site. This is a misleading conclusion unsupported by the data. Waterborne asbestos concentrations (fibers greater than 10 microns in length) at locations S03, S07 and S09 (all downstream of the Atlas site) are generally equal to or higher than at the one sampling location on the Atlas site itself (S12)." The commenter then lists the following data (all in MFL): S03 - 1.3×10^5; S09 - 7.2×10^5; S07 - 8.8×10^5; S12 - 2.5×10^5; S21 - not sampled. C.3.c, page V-10.

C.3.8. Response: The commenter is incorrect. The concentration of fibers greater than 10 microns in length measured during EPA's surface water sampling was greatest close to the Atlas Mine OU and lower at downstream locations. The data are cited incorrectly in the comment. The correct data, presented in Table 4 of Appendix E-4 and discussed in Section 4.2.2 of the RI, are as follows (all in MFL): S03 - 1.3×10^6; S07 - 8.8×10^5; S09 - 7.2×10^5; S12 - 2.5×10^6; S21 - 4.4×10^6.

C.3.9. Water Analysis Results - Data show background levels

C.3.9. Comment: "The RI report Executive Summary, page 4 states that: "The highest concentrations were found in flows upstream of the Atlas site and the Johns-Manville mine pits. The two stations whose watershed did not include the New Idria serpentinite mass and were four to six miles from the sites showed much lower asbestos concentrations than the other stations. Based on the locations of these results, it appears that background concentrations are being reported. This leads to the assumption that all asbestos data derived are within the limits of background conditions." C.3.f, page V-12.

C.3.9. Response: The commenter appears to be suggesting that EPA's surface water sampling established that the Atlas and Coalinga Mine Sites did not contribute asbestos to surface water above background levels. EPA's review of the data available from the single rainfall event indicates that it was insufficient to determine the relative contribution of the sites. Other data indicate that the Atlas Mine OU is contributing significant quantities of asbestos to the local drainage. These data include field observations of steep gullying in tailings piles, watershed modeling results and information on the erodibility of the mine surfaces and tailings piles derived using the Soil Conservation Service method.

C. Comments Regarding Watershed Modeling

C.4.1. Erodibility Test - Failure to measure pre-existing soil moisture

C.4.1 Comment: "EPA indicated that one of the observations to be made during the erodibility test experiment was estimated antecedent (pre-existing) soil moisture; however, they failed to measure it. The relationship between runoff and rainfall includes a soil moisture variable. Antecedent soil moisture conditions are critical with respect to the threshold at which surface runoff or overland flow will occur. Therefore, antecedent soil moisture should have been determined to define the rainfall/runoff relationship and the erodibility relationship for these particular source areas." C.1.a, page VI-2.

C.4.1 Response: The erodibility test experiment, of which antecedent soil moisture measurement was a part, was only partially completed because of technical difficulties which are described in section 4.3.3 of the RI. As a result the erodibility test experiment was not relied upon in any of EPA's watershed modeling. Instead, the required erodibility factors were derived based on Soil Conservation Service (SCS) data and methods as described in section 5.2.2 of the RI.

C.4.2. Parameters for the Universal Soil Loss Equation (USLE)

C.4.2 Comment: "EPA does not indicate how all the data required for the universal soil loss equation were generated or estimated. There are specific variables in the universal soil loss equation, such as the cover management factor (C factor) and the erosion control practice factor (P factor) which must be identified." C.1.b, page VI-2.

C.4.2 Response: EPA documented its method for generating the C factor and P factor used in the Universal Soil Loss Equation in Section 5.2.2 of the RI.

C.4.3. Soil Erodibility - Source of data on naturally occurring materials

C.4.3. Comment: "EPA indicates that erodibility information was available on the naturally-occurring materials, and therefore, they concentrated their efforts on the mine tailings and mine surfaces. EPA does not identify in their Sampling Plan or in the RI report the information supposedly available on the naturally - occurring materials that would have made field testings/or verification unnecessary." C.1.d.1, page VI-3,4.

C.4.3. Response: EPA's source of information on the erodibility of the naturally occurring materials in the New Idria formation was published and unpublished information provided by the Soil

Conservation Service ("SCS"). This information is identified in the RI, sampling plans and data reports. See Sections 2.2.4, 3.4 and 5.2.2 of the RI report, Section 2.2 - Modifications to the SAPP and Addendum to the SAPP, 2.2.1 Rainfall Simulator Program and pages 2, 3 and 4 of the Soil Sampling Data Report.

C.4.4. Soil Erodibility - Failure to measure erodibility of other mines

C.4.4. Comment: "No attempt was made to test the erodibility of asbestos mine tailings of other mines in the area despite EPA attribution in the RI report that these contribute about 50 percent of the total quantity of asbestos to downstream transport...No erodibility studies were performed on extensive outcrops (about 6 square miles) of asbestos-rich serpentine soils in the study area despite EPA conclusions that asbestos laden runoff is being produced from them and that mass wastage potential and fluvial transport are high. The lack of erodibility data makes EPA's statements unsubstantiated and arbitrary."C.1.e.1, page VI-4.

C.4.4. Response: The commenter is correct that EPA did not test the erodibility of asbestos mine tailings at other mines in the area. However, the method used by EPA to derive the erodibility of the Atlas Mine tailings was equally applicable to these other mines. As noted in prior responses, EPA's efforts to directly measure the erodibility of the Atlas Mine tailings was unsuccessful and information obtained from the SCS was used to derive the erodibility factor.

C.4.5. Rainfall Simulation Program

C.4.5. Comment: The PRPs have questioned the validity of numerous aspects of EPA's rainfall simulation program. These comments are contained in Sections C.2 and C.3 pages V-9 and VI-4 to VI-8 of the PRP comments (Administrative Record Document Number 1244).

C.4.5. Response: A number of problems were encountered during EPA's rainfall simulation program. These problems are discussed in the Section 4.3.3 of the RI report and data are presented in Appendix E-1. None of the data were used in any calculations, modeling, assessment of human health risk or the selection of the remedy for the Atlas Mine OU.

C.4.6. Use of the Rational Formula and failure to consider infiltration in assessing the need for drainage control

C.4.6. Comment: "With respect to characterizing the runoff characteristics of the watershed, it appears that EPA has attempted to calculate runoff coefficients on the basis of the Rational Formula, $Q = CIA$, where C is a runoff coefficient, I = rainfall intensity, A = area and Q = peak discharge...the rain-

fall simulator test attempts indicate that significant infiltration has occurred...this infiltration invalidates the use of the Rational Formula as used, the data produced and the conclusions drawn from these data. Lack of attention to infiltration has caused EPA to overemphasize the need for drainage control at the site. In addition, EPA does not show their calculations at any point in the Atlas RI Report." C.4.b, page VI-8,9.

C.4.6. Response: EPA did not use the Rational Formula as part of its watershed modeling. Infiltration is accounted for in the watershed model by the erodibility factor used for each of the different soil types.

C.4.7. Asbestos content of serpentinite soils and disturbed areas

C.4.7. Comment: "EPA arbitrarily assigned asbestos contents of 100 percent to mine surfaces and tailings and 1 percent to New Idria (serpentinite) soils for their sediment transport model efforts. Such asbestos concentrations are not supported whatsoever by the PLM data EPA collected... the bulk of these analytical data (PLM) results were not used as input for EPA's Watershed Modeling. It appeared that EPA relied on the very limited TEM analyses performed on EPA soil samples. The justification for this approach is unsubstantiated and seems largely arbitrary." C.4.c, VI-10.

C.4.7. Response: EPA's initial sediment transport modeling efforts did utilize EPA's limited TEM analyses of composite soil samples and provided a "worst case scenario" view of the Site's contribution to asbestos in the Los Gatos Creek Watershed. Subsequently EPA conducted additional sediment transport modeling based on PLM values for on-site and off-site asbestos concentrations derived from work performed on the Coalinga Mine Site and information concerning soils in this area in the geologic literature. See "Addendum to Additional Analysis for SEDIMOT II Model Atlas Asbestos (Atlas and Coalinga Mine Sites) Fresno County, California", October 23, 1989 (AR Document Number 354). The results of the sensitivity analysis were considered, along with the results of the initial sediment transport modeling effort, in selecting the remedy for the Atlas Mine OU..

C.4.8. Assumption that asbestos remains in suspension during transport

C.4.8. Comment: "EPA's assumption that 'all asbestos entering the surface water pathway would remain in suspension until physical degradation or chemical coagulation allows it to settle into the sediment layer' is not supported by the facts. Levine-Fricke's field observations... indicate that much of the asbestos eroded from upland source areas is in the form of coarse chips, grains and platelets as opposed to clay sized fibers...these larger sized particles are transported as bedload material...the

actual asbestos concentration of surface water in the Arroyo Pasajero Watershed would be much less than would exist if all the asbestos was transported in suspension (i.e., as part of the stream's wash load)." C.4.d, VI-10,11.

C.4.8. Response: The commenter is correct that some of the serpentine eroded from natural and disturbed areas occurs as larger-sized particles and is transported as bedload. However, the impact of EPA's assumption concerning asbestos remaining in suspension on EPA's calculation of the relative contribution of the Mill Area to total asbestos yield was minimal. This is because the assumption was applied equally to natural and disturbed materials. In addition, because the asbestos in the Atlas Mine OU tailings piles had already been milled and therefore were more likely to be small and remain in suspension, any error as a result of this assumption may have minimized EPA's estimate of the site's contribution to downstream asbestos yield.

C.4.9. Incorrect characterization of subbasin drainage patterns

C.4.9. Comment: "As identified by L-F, EPA incorrectly notes that subbasin LG-3 (consisting of 15 sub-watersheds) drains into Pine Canyon Creek, which subsequently flows into Los Gatos Creek. Since in truth, Pine Canyon Creek flows into White Creek, it is highly possible that the EPA's flow network used for modeling is in error." C.4.e, VI-11.

C.4.9. Response: Pine Creek drains to White Creek and White Creek drains to Los Gatos Creek. Therefore the statement that Pine Creek subsequently flows into Los Gatos Creek is correct. The commenter has not identified any errors in the structure of EPA's flow network that supports the commenter's assertion that the flow network is in error.

C.4.10. Derivation and use of erodibility factors

C.4.10. Comment: "K factors for asbestos source materials derived by different methods, may not be directly comparable, and therefore, relative asbestos contributions which are calculated by EPA's watershed modeling may be highly inaccurate." C.4.f, VI-11.

C.4.10. Response: The commenter is incorrect. All K factors used in EPA's watershed modeling were derived using the Soil Conservation Service ("SCS") method found in the document titled Guides for Erosion and Sediment Control in California, U.S. Department of Agricultural, Soil Conservation Service, Davis California, September 1977. Of the six K-factors utilized by EPA in this study, four were calculated by the SCS and two were calculated by EPA using the SCS method. See AR Document Number 129 and Sections 4.3.4 and 5.2.2 of the RI.

February 14, 1991

C.4.11. Model Calibration

C.4.11. Comment: "The RI report notes that the hydrology and sediment yield portions of the SEDIMOT II model were calibrated prior to running the model for sediment erosion simulations...However, the report provided no further description or discussion of the calibration method or results...Insufficient information is provided to assess the procedures or results of the model calibration." C.4.h, VI-12.

C.4.11. Response: Section 5.2.2 of the RI provides information concerning the calibration of the hydrology and sediment yield portions of the SEDIMOT II model. EPA provides the following additional information concerning these calibrations:

1) Hydrology - The hydrology portion of the SEDIMOT II model was calibrated by comparing the peak runoff generated for each sub-basin with sub-basins in the regional watershed model for Los Gatos Creek Basin. The regional watershed model is a HEC-1 computer model which simulates the runoff from Los Gatos Creek upstream of the confluence with Warthan Creek. The results of the HEC-1 simulation were compared with the 100-year flood hydrograph for Los Gatos Creek at the dam site presented in the Corps of Engineers' hydrology study for the area entitled "Coalinga Stream Group California Hydrology" dated October 1971. The 8257 cfs peak runoff simulated by HEC-1 modeling compares with 8900 cfs peak runoff presented by the Corps of Engineers Study in order of magnitude.

2) Sediment - The sediment portion of the SEDIMOT II model was calibrated by comparing the sediment yield simulated by SEDIMOT II for the 2-year, 6-hour storm with the historical average sediment yield from the upland areas of the Arroyo Pasajero watershed and the previous studies conducted by others for the area.

The major tributaries in the Arroyo Pasajero watershed are Los Gatos, Warthan, Jacalitos and Zapata-Chino Basins with a total of 387.3 square miles of drainage area. Records of sediment deposition in the settling basin since 1968 indicate that approximately 534 acre-feet per year have been deposited in the basin. Simons and Li conducted a study in 1985 and estimated an average annual sediment yield of 200.4 acre-feet from the four watersheds, which is approximately 37.5% of the total sediment deposited in the basin. According to the Simons and Li study, the remaining portion derives from the channel bank and bank erosion in the lower portion of the Arroyo Pasajero basin. Based on this study, the Los Gatos basin, with a drainage area of 145.5 square miles, yields an average annual sediment yield of 73.1 acre-feet (bulk sediment yield). To account for bulking, the deposited sediment volume increases 1.67 times. The bulking factor (BF) is defined as:

BF = 1/1-P where P = porosity (assumed to be .4).

Based on the above estimate, the average annual sediment per acre for the Los Gatos Basin is given by the following equation:

$$(73.1 \text{ acre-ft})(1/1.67)(43560 \text{ ft}^3/\text{acre-ft})(163.36 \text{ lb/ft}^3)(1/145.5 \text{ mile}^2)(1 \text{ mile}^2/640 \text{ acre})(1 \text{ ton}/2000\text{lb}) = 1.69 \text{ tons/acre/yr}$$

The rate of annual sediment yield/acre for the entire Arroyo Pasajero watershed is 1.74 tons/acre/yr. Furthermore, the Simons & Li studies estimated the sediment yield for 2, 5, 10, 25, 50 and 100-year storms for the different sub-basins in the Los Gatos Basin. The estimated 2-year sediment yield for sub-basin LG7 is 16,630 tons (1.11 tons/acre). Sub-basin LG7 covers a large area, including EPA's sub-basins LG2A, LG2B and LG2C.

A 1981 report by Munn, Busacca and Trott titled "California Aqueduct Sedimentation Study of the Arroyo Pasajero and Tributaries Watershed" estimated 166 acre-feet/yr contribution from the upland watershed into the floodwater basin for the time period 1968 through 1980. Substituting 166 acre-feet into the above equation yields 1.44 tons/acre/year.
Assuming the sediment yield for a 2-year, 6-hour storm is equivalent to the average annual sediment yield, the 2-year, 6-hour sediment yields simulated by SEDIMOT II were compared with the above rates and the C values (control practice factors) were slightly adjusted to calibrate the model. The average 2-year,6-hour sediment yield for sub-basins LG2A, LG2B and LG2C for the pre-mine condition was 1.74 tons/acre and for the existing condition was 1.97 tons/acre, which are consistent with previous studies. Sub-basin LG3 with the same C values generated a higher rate of sediment yield. This is due primarily to the predomination of sedimentary soils, combined with the steepness of the sub-basin, which creates a higher runoff peak and subsequently a higher rate of sediment yield.

C.4.12. Use of modeled asbestos concentrations

C.4.12. Comment: "EPA's subsequent use of these calculated asbestos concentrations is unclear, since to our knowledge, the intermittent flow of Los Gatos Creek near the town of Coalinga is not used as a drinking water supply. Thus it is not clear what human receptors, if any, would be exposed to asbestos from ingestion of Los Gatos Creek water at this point." C.6.c, page VI-14.

C.4.12. Response: The asbestos concentration in the surface water is significant because asbestos that is deposited, resuspended by vehicular and other disturbances and then inhaled poses a threat to human health. The selected remedy is not designed to address ingestion exposure because this pathway was not judged to represent a significant public health threat.

C.4.13. Relative contributions of the New Idria Formation and the Atlas Mine Area

C.4.13. Comment: "EPA has been unable to differentiate between asbestos and target heavy metals contributed from the Atlas Mine site and the New Idria Formation on which the mine is located. Consequently, any conclusions drawn about mass wastage or postulated fluvial transport from the Atlas site, are highly suspect. Our analyses, as presented in Appendix C, show that the Atlas site's contribution to offsite asbestos is less than 0.8 percent over that which would occur naturally in the White Creek drainage basin" C.7.a, page VI-14.

C.4.13. Response: The commenter's statement is unclear. EPA is not certain what is meant by the term "differentiate". With respect to asbestos, EPA calculated the Atlas Mine OU's contribution by considering parameters including soil erodibility factor, slope length, control practice factor, area, particle size distribution, land use and an adjustment for steep slopes in estimating total asbestos yield from the Atlas Mine OU and the rest of the Los Gatos Creek drainage basin.

With respect to heavy metals, EPA did not find elevated levels of these metals in areas of Los Gatos Creek drainage basin.

With respect to the commenter's contention that the Atlas Mine OU only contributes 0.8% asbestos to the total asbestos yield, EPA is unable to evaluate the commenter's model because insufficient information is provided in the comments to allow an evaluation.

C.4.14. RI Report is a Qualitative Assessment

C.4.14. Comment: "EPA presented this report as a qualitative assessment of the asbestos problem in the region, but the report is relied upon as a baseline for cleanup objectives and to quantitatively apportion regional asbestos contributions from sources which is unjustified by the quality and quantity of data developed in the RI Report." C.7.c, page VI-16.

C.4.14. Response: The commenter has mischaracterized the use that EPA has made of its watershed modeling results.

1) Cleanup Objectives: The watershed modeling helped to establish that there are other major sources of contributing asbestos to the Los Gatos Creek Drainage Basin in addition to the Atlas Mine OU. EPA's selected remedy has, as one of its cleanup objectives, minimizing the release of asbestos from the Atlas Mine OU into the local drainage. If EPA's model had indicated that the Atlas Mine OU was the major source contributing asbestos to the local drainages, EPA might have selected a remedy such as capping, which would have prevented release of asbestos.

2) Apportionment of Contribution: EPA used the results of the watershed modeling as an indication of the relative contribution of the Atlas Mine OU to local drainages but not as a precise quantitative apportionment, which was not necessary to select an appropriate remedy.

C.5. Comments regarding the Public Health Evaluation ("PHE")

C.5.1. Insufficient information to reconstruct exposure estimates

C.5.1 Comment: "The RI report does not provide sufficient information to reconstruct EPA's exposure estimates... for example, dust emission equation and associated parameters employed in the risk assessment are different from those employed in the contaminant fate and transport analysis section. These inconsistencies would introduce an overestimation of approximately 6 fold." C.1, VII-4.

C.5.1. Response: The commenter appears not to have realized that the dust emission equations used in the risk assessment and in the contaminant fate and transport sections were used in evaluating different activities. Sections 6.3 and 6.5 of the RI report provide a detailed discussion of how EPA's exposure estimates were developed. Appendix C-2 provides information on the models used to develop the activity related concentrations of airborne asbestos used in the risk assessment. See Response C.1.7. for an explanation of why different equations and parameters were used to estimate associated with different activities.

C.5.2. Asbestos Carcinogenicity - Ingestion pathway

C.5.2. Comment: The commenter provides a detailed discussion of why the risk assessment should not consider asbestos exposure via the ingestion pathway to be carcinogenic. These comments are found in Section C.2, pages VII-8 to VII-15.

C.5.2. Response: Neither the risk from ingestion of California Aqueduct water nor the risk from ingestion of Atlas Mine OU soils were relied on in choosing the remedy for this Operable Unit. This is because, the cancer risk values calculated for exposure to asbestos via the ingestion pathway for this site were below CERCLA action level.

EPA's PHE also acknowledged that the evidence suggesting that ingested asbestos is carcinogenic is limited. Although the risk assessment assigns an oral unit risk factor of 1.4E-13 (/fiber/liter) to ingested asbestos, it notes a number of uncertainties in assigning a quantitative cancer risk estimate to exposure from ingested asbestos. These uncertainties included inadequate human data and the induction of only benign tumors in

laboratory animals using asbestos greater than 10 microns in length. Some studies referenced in Appendix C-1 (AR Document Number 356) found equivocal results linking asbestos ingestion to tumor formation.

C.5.3. Asbestos Carcinogenicity - Use of incorrect inhalation cancer potency factor

C.5.3. Comment: "The RI report does not take into consideration the fact that the inhalation cancer potency factor is based on occupational epidemiology studies where exposure occurred to different types and lengths of asbestos. Occupational exposure to these fibers exhibit much greater carcinogenic potential than those to which potential receptors may be exposed from the Atlas Site. The result is an arbitrary overestimation of risk posed by the inhalation of asbestos fibers possibly originating from the Atlas Site" C.3, page VII-15.

"...because the inhalation cancer potency value for asbestos is based on longer fibers than those originating from the Atlas site and based on exposure frequencies and levels much higher than those anticipated to occur at the Atlas site..." C.3, page VII-18.

C.5.3. Response: It is EPA's policy, at this time, to use one cancer potency factor for all asbestos types. EPA believes there is insufficient evidence at this time to develop different cancer potency factors for specific types and lengths of asbestos. The statement that occupational exposures "exhibit much greater carcinogenic potential" than those from the Atlas site is misleading. Cancer potency factors are used in conjunction with exposure estimates. Resulting risk calculations such as those in the Atlas RI reflect the difference between occupational exposures and those that are likely to occur at or downstream of the Atlas site.

C.5.4. Asbestos Carcinogenicity - Potency of chrysotile

C.5.4. Comment Several pages of comments summarize arguments to the effect that chrysotile asbestos is not as potent as other asbestos forms and that therefore the risks as presented in the RI report are overestimated:

"Since the of form asbestos at the Atlas Site is chrysotile..., it would appear that basing health risk estimates on all asbestos types (as has been done by EPA) is arbitrary and capricious, and severely overestimates the potential cancer risks to the local receptors....This approach is inappropriate since a number of investigators have shown that chrysotile asbestos fibers retained by the lungs are significantly metabolized by cellular elements, and undergo considerable degradations and detoxification over time. There is considerable evidence that chrysotile per se sel-

dom causes mesothelioma in man, and that most cases are due to amphibole fibers." C.3.c, pages VII-18 to VII-20.

C.5.4. Response: EPA has determined that the use of a single cancer potency factor for the inhalation of asbestos is still appropriate given the state of scientific evidence at this time. EPA's Integrated Risk Information System ("IRIS") is EPA's database compiled by EPA based on a review of the scientific literature which summarizes risk information available concerning a variety of substances. IRIS notes that there is some evidence which suggests that the different types of asbestos fibers vary in carcinogenic potency relative to one another, and to the type of cancer involved. For example, it concludes from the studies available that the risk of mesothelioma appears to be greater with exposure to crocidolite (an amphibole asbestos type), than with amosite (an amphibole asbestos type) or chrysotile (a serpentine asbestos type) exposure alone. IRIS states, however, that "this evidence is limited by the lack of information on fiber exposure by mineral type. Other data indicate that differences in fiber size distribution and [other factors] may contribute at least as much to the observed variation in risk as does the fiber type itself." IRIS Asbestos File, CASRN 1332-21-4.

The commenter is correct that some recent studies have indicated that chrysotile asbestos appears to be retained in the lungs to a lesser extent and to degrade more quickly than other forms of asbestos. It should be noted that it is unclear whether tissue damage occurs prior to degradation or whether it is the result of the degradation process. As the commenter notes, these studies have also indicated that mesothelioma appears to have been associated more frequently with exposure to amphibole asbestos than with exposure to chrysotile. However, EPA has viewed this information as only a preliminary indication that chrysotile may be less carcinogenic than other forms of asbestos.

C.5.5. Asbestos Carcinogenicity - Cancer potency as a function of fiber length

C.5.5. Comment: Because the airborne asbestos fibers derived from the Atlas site are short fibers and because the potential carcinogenic activity of asbestos increases with fiber length, the excess lifetime cancer risks presented in the RI report would be overstated. C.4.a(3), page VII-23.

C.5.5. Response: While there is limited evidence suggesting a relationship between asbestos fiber dimension and carcinogenic potential, as noted in prior responses EPA has determined that this evidence is not sufficient to calculate separate cancer potency factors for specific types and lengths of asbestos.

C.5.6. Exposure assessment - use of maximum exposure scenario

C.5.6. Comment: The use of maximum exposures is inappropriate for calculating risk in the PHE and should not be considered in selecting the remedy. C.4.a(1), page VII-22.

C.5.6. Response: In the PHE, EPA calculated the risk related to both an average exposure scenario and a maximum plausible ("reasonable maximum" or "maximum") exposure scenario. Both exposure scenarios were considered in selecting a remedy for the Atlas site. The use of a reasonable maximum exposure scenario to evaluate risk and to select a remedy is clearly stated as Agency policy in the preamble to the NCP: "EPA will continue to use the reasonable maximum exposure scenario in risk assessment, although EPA does not believe it necessary to include it as a requirement in the rule". (FR 55 No. 46, page 8710, March 8, 1990). EPA has determined that giving some consideration to the maximum plausible exposure scenario is a reasonable method of ensuring the protection of public health.

C.5.7. Exposure assessment - Unrealistic exposure scenarios

C.5.7. Comment: The exposure scenarios presented in the RI report for onsite hikers, campers, hunters and OHV users are highly improbable...EPA's duration assumptions alone have inflated the on-site risk values by 2 to 10 times."

"...it appears that EPA's study entitled Environmental Asbestos Roads Study: Field Work Report used highly improbable exposure scenarios in which off road vehicles would travel some 2 to 3 feet apart stirring up asbestos laden dust. As several off-road vehicle operators pointed out in the May 9, 1990 public meeting ...such a travel interval is totally unrealistic...we were unable to assess the appropriateness of other assumptions in this report because EPA could not produce a copy even after we made repeated requests at the EPA's headquarters and regional offices." C.4.a(5), page VII-25.

C.5.7. Response: EPA's Administrative Record confirms that the exposure scenarios for OHV use in the PHE are realistic. Information received by EPA at the May 30, 1990 public meeting in Sunnyvale, CA indicates that the duration assumptions used for average and reasonable maximum OHV use in the PHE are very close to actual use by OHV riders. See AR Document Number 801. Even if the calculated risk values were reduced by a factor of 2, 4 or even 10, these risks would remain well above the range of 10^{-4} to 10^{-6} promulgated by the NCP as the acceptable exposure level for known or suspected carcinogens.

EPA provided a copy of the Environmental Asbestos Roads Study report to the commenter's representative before the close of the public comment period.

C.5.8. Background Risk Level

C.5.8. Comment: "...the sampling and modeling results indicate that the contribution by the Atlas site to potential off-site asbestos exposures ... is insignificant when compared to the natural contribution by the New Idria Formation. Any exposure to which those receptors are currently subject would not be significantly reduced by any of the remedial alternatives being considered by EPA."

"By not properly apportioning the contribution from the Atlas Site ... it becomes impossible for EPA to evaluate the effectiveness of any remedial alternative selected." C.4.b.5. pages VII-34,35.

C.5.8. Response: Asbestos is a known human carcinogen for which no level of exposure is believed to be safe. In addition, there is no incremental level of exposure which is known to be insignificant. Based on the evidence available concerning inhalation risks from disturbed asbestos-bearing soils and the level of risk produced by this pathway at the Atlas Mine Area, EPA has determined that significant risk will result if large quantities of asbestos continue to leave the Atlas site and are subsequently disturbed and inhaled at downstream locations. EPA's RI for the Atlas site indicates that large quantities of asbestos have been released and continue to be released as a result of the Atlas Mine operators' failure to maintain stream diversions and sediment trapping dams. These methods are an industry standard for preventing the off-site movement of mining waste. EPA has determined that the implementation of these standard mining reclamation techniques to prevent the continuation of substantial off-site transport. EPA's analysis and conclusions concerning this remedy selection are not dependent upon a determination of the relative significance of the contribution of the Atlas Mine Area and the New Idria Formation.

C.6. Comments Regarding the Regional Study

C.6.1. Ranking Criteria - Use of mine status

C.6.1. Comment: "EPA states on page 7-1 of the Regional Disturbances Report that all criteria were used in establishing a ranking order for the sites. However, in examining the ranking order presented in Table 7-1 of the Regional disturbances report, this appears not to be the case. For example, Ranking Criterion number 7: Status of mining, had no apparent impact on any of the rankings and may have been added for simply informational purposes. Since this criterion was never used in establishing the ranking order of the sites, it is superfluous and should be eliminated." C.1, page VIII-3.

C.6.1. Response: Status of the mine was an important factor to consider and research, because (for instance), sites having active and extensive surface operations would provide larger off-site transport potential than inactive mines having minimal surface workings.

As the data were compiled it became apparent that all mines except one (King City Asbestos Mine) were inactive and had been inactive for a long time; and many mines had minimal surface workings. Therefore, this criteria had a very small impact on site ranking. However, having a small impact on the final ranking is not a rationale for eliminating a criterion.

C.6.2. Ranking criteria - Use of linear distance calculation

C.6.2. Comment: "Because of inappropriate simplifying assumptions, EPA predicted significant exposures at a receptor location when the wind was in reality blowing from the receptor location toward the mine and asbestos from the mine was migrating in the opposite direction of the receptor location. If such problems exist in predicting airborne asbestos transport even in light of EPA's detailed analysis, then using a linear distance calculation to predict the severity of exposure from a site is clearly inappropriate. Therefore, Ranking Criterion No. 5 should be eliminated." C.2.b, page VIII-4,5.

C.6.2. Response: EPA used the linear distance calculation, as one of several secondary criteria, in evaluating which mine sites were appropriate for further investigation, in addition to the Atlas Mine Site and the Coalinga Mine Site. The three primary ranking criteria were (1) net area of disturbance, (2) slope instability and (3) fluvial transport potential. The assumption that exposure decreased with distance away from a given site was appropriate for the purposes of evaluating this secondary criterion because detailed meteorological information was not available for most of the disturbed areas being evaluated. In addition, it should be noted that due to a diurnal wind pattern at the Atlas Mine Site, although the wind does blow airborne asbestos away from the majority of receptors during some parts of the day, it blows towards the majority of the receptors during other parts of the day.

C.6.3. Ranking Criteria - Distance to stream receptors

C.6.3. Comment: "Distance to stream receptors is a ranking criterion that initially seems intuitively appealing; however, the complexity of the local hydrologic system and the lack or evidence that asbestos causes any risk when ingested makes the use of this criterion problematic....This criterion should be eliminated." C.2.c, page VIII-5.

C.6.3. Response: The significance of this criterion is not the potential for the ingestion of asbestos but rather the potential for resuspension of asbestos following fluvial transport. It should be noted that distance to stream receptors is a secondary criterion which did not change the relative ranking of any sites.

C.6.4. Ranking Criteria - Potential for fluvial transport away from a site

C.6.4. Comment: "The potential for fluvial transport of asbestos away from a site (Ranking Criterion No. 3) is inappropriate as a ranking criterion. Firstly, EPA has taken an indefensible position with respect to the carcinogenicity of ingested asbestos...the current body of scientific thought supports the conclusion that asbestos when ingested is not carcinogenic...In light of this, the Regional Disturbances report's emphasis on fluvial transport of asbestos away from the mine seems misplaced. We believe that Ranking Criterion No. 3 should be eliminated altogether." C.2.d, VIII-5.

C.6.4. Response: As noted above, the significance of fluvial transport of asbestos downstream from disturbed areas is the potential for this asbestos to be resuspended in the air and inhaled.

C.6.5. Ranking criteria - Onsite recreational use

C.6.5. Comment: "Onsite recreational use should be the primary ranking criterion used to prioritize the sites for potential remediation." C.2.f, page VIII-6.

"We suggest that EPA reconsider disregarding sites with such high recreational uses and instead focus their efforts on appropriate remedial measures such as restricting access to those sites." C.2.h, page VIII-8.

C.6.5. Response: EPA agrees that recreational use on asbestos-bearing surfaces presents the highest risk for the disturbed area studied. This risk is being addressed by the Bureau of Land Management's revision of their land use plan at all of the disturbed areas except for (1) the Atlas Mine OU, (2) the Coalinga Mine Site, (3) the Butler Mine, (4) the Christy Mine, and (5) the Jensen Mine. These latter four areas are not within BLM's CCMA.

C.6.6. Disturbed area versus total area at the Atlas Mine OU

C.6.6. Comment: "Page 5-2 of the Regional Disturbances report states that the disturbed area of the Atlas site is 106 acres; however, the RI report apparently assigned a much greater disturbed area to the Atlas site for the sediment transport modeling. Figure 5-6 of the RI report shows the Atlas site to cover some 300 acres. On page 1-2 of the FS report, EPA states that

the Atlas site is situated on approximately 435 acres. The apparently arbitrary assignment of an elevated amount of disturbed area to the Atlas site during sediment transport modeling has resulted in a large overestimation of the sediments and asbestos originating from the Atlas site."

C.6.6. Response: The horizontally-projected disturbance area for the Atlas site of 106 acres quoted in the Regional Disturbance report was determined from scaled aerial photographs. This was also the area used in the FS report for development of remedial alternatives. The Atlas site area of 435 acres was cited as the total area of the Atlas site including disturbed and non-disturbed portions. Figure 5-6 in the RI report is a map of soil type and subwatersheds for the SEDIMOT II model and is not detailed enough to give an accurate estimate of the Atlas site area.

C.6.7. Ownership of land beneath the mill at the Atlas Mine OU

C.6.7. Comment: "Page 5-3 of the Regional disturbances report states that the State of California owns 10 acres in the vicinity of the mill facility of the Atlas site. Consequently, the State of California should be named as a responsible party by EPA and included in any Section 106 action or Section 107 cost recovery actions." C.4, page VIII-8.

C.6.7. Response: This comment relates to liability and not to remedy selection. Therefore, EPA will not respond to this comment at this time.

C.6.8. Erosion of landslide deposits will negate erosion control at the Atlas Mine OU

C.6.8. Comment: "Figure A-10 of Appendix A of the Regional disturbances report shows some 19 different head scarps for naturally occurring landslides around the Atlas site. This dramatic presentation of the overall instability of the region suggests that large sediment yields will continue to be generated from the New Idria formation and that local erosion controls on the Atlas site will prove wholly ineffectual in controlling or even reducing the massive natural erosion of the New Idria formation...The increased weight and moisture from proposed sediment retention dams may actually increase the likelihood of landslides in the areas remediated. Furthermore, any reduction in sediment yields downstream from the Atlas site resulting from onsite remediation will be undetectable in the face of the large sediment yields that will continue from the New Idria Formation. These observations suggest that erosion control at the Atlas site is not warranted." C.5, page VIII-9.

C.6.8. Response: The numerous head scarps alluded to in the comment are evidence of slope instability in the long-term, geologic

time scale (several hundred thousand to several million years in the case of these land slides). The intent of remediation is to retard erosion of anthropically disturbed areas for the relatively much shorter time scale. It appears unlikely that these large ancient landslides would completely reactivate in the near-term. It is possible that smaller portions of the landslide masses could reactivate during the service life of remedial civil engineering structures and this possibility will be evaluated during remedial design. The effect of water retained behind sediment and flood control dams on foundation stability will be considered during design.

C.6.9. Inconsistent proposals for remedial action

C.6.9. Comment: "With onsite inhalation of asbestos posing the greatest health concern, some proposed remedial actions in the Regional disturbances report appear to be inconsistent. For example, on page 5-2 in discussing remediation for the Tirado mine, EPA states that 'An extremely high density of motorcycle tracks was observed at the site. The site is accessible by numerous trails. Intensity of recreational use is high...Suggested remedial measures are re-establishment of vegetation to retard further erosion and site closure.' The apparent appropriate remedial measures at this site would be to eliminate public access to the site. Any revegetation efforts will be devastated by off-road vehicle use." C.7, page VIII-10.

"EPA's proposed remedial action recommendations for each of the sites appear to neglect the most severe risk posed by the site, i.e., use of the site by recreational vehicles generating asbestos-laden dust that may be inhaled by persons on or near the site. This lack of attention to the greatest sources of risk were also reflected in the inappropriate ordering of the sites presented in Table 7-1 of the Regional Disturbance report." C.8, page VIII-10.

C.6.9. Response: The commenter appear not to have understood that "site closure" referred to in the report and quoted in the first paragraph of the comment, would include access restriction. In addition, as noted in the Regional Report, access restriction would be included in any remedial actions taken at the other disturbed areas.

C.6.10. Remedial action recommendations are inappropriate

C.6.10. Comment: The Regional Disturbances report is not a remedial investigation or feasibility study; therefore, to present recommended remediation measures, as was done in Appendix F - "Selected Conceptual Plans for Possible Remediation Measures", is inappropriate. There is insufficient data or technical analysis to present even conceptual plans. C.9, page VIII-10.

C.6.10. Response: EPA did not and does not have any intention of using the Regional Disturbances report as an RI/FS. It was designed to characterize other disturbed areas in the New Idria/Coalinga study region. Appendix F was written to present ideas for possible remediation at other disturbed areas. EPA has not used the Regional Disturbances report to select the remedy at the Atlas Mine OU.

C.6.11. Location of the sediment retention dam

C.6.11. Comment: "Figure F-1A of the Regional disturbances report identifies a 'conceptual sediment retention dam to contain eroded material on-site'. This dam is located directly above a landslide head scarp identified on Figure A-10. Assuming that Figure A-10 is correct, and given the seismic and tectonic activity of the region, the proposed dam placement could result in increased localized mass wasting and possibly even a catastrophic failure of the proposed sediment retention dam."

"Figure F-1C of the Regional Disturbances report identifies in note 3 that the proposed construction of sediment retention dams is above a landslide head scarp downslope from the Rover Pit as identified in Figure A-10....Increasing soil moisture content and soil loading in these areas, coupled with active seismic and tectonic influences, may destabilize these areas rather than attaining the EPA's desired results of sediment control." C.10, page VIII-11.

C.6.11. Response: The issues raised in this comment will be addressed during the remedial design phase for the Atlas Site. Information collected during the RI indicates that it will be possible to construct diversion structures and sediment retention structures in locations that minimize the possibility of failure. In addition, the volume of water to be impounded by these retention dams is not expected to be large given the arid climate.

C.7. Comments Regarding the Feasibility Study

C.7.1. Remedial Action Objective - Reduction of exposure to ambient levels of asbestos

C.7.1. Comment: "Remedial Action Objective (RAO): Lifetime exposure of individuals by inhalation of ambient air. The site-specific remedial action objective for this pathway is to prevent to the extent practical future migration by wind, water, and anthropic processes of onsite asbestos towards potential residential receptors in the vicinity....EPA has not shown any unacceptable risk levels associated with lifetime asbestos inhalation exposures attributable to the Atlas site and has arbitrarily ignored the significance of other source areas in the analysis of airborne exposures. ENVIRON's studies (Appendix A of our com-

ments) have shown that the Atlas site's contribution to inhalation exposures at the nearest receptor location to be immeasurable when all other source areas are considered....The natural occurrence of elevated asbestos concentrations in this region, consisting of one of the largest and richest deposits of asbestos ladened rock in the world does not warrant remedial actions at the Atlas site. Hence, this RAO should be deleted from further consideration and no response actions should be developed to address this RAO." C.1.a, page IX-6.

C.7.1. Response: The commenter appears to confuse the risk levels associated with inhalation of ambient levels of asbestos with the risk associated with the levels of asbestos which are produced when asbestos-bearing surfaces are disturbed. The risk associated with ambient levels refers to risk from inhalation of air not affected by any disturbances in the immediate vicinity. The selected remedy is designed to reduce exposure from airborne asbestos generated by disturbance of asbestos-bearing surfaces. See RI chapter VI, Baseline Risk Assessment and responses in Sections C.1 and C.5. for more detailed explanations.

C.7.2. Remedial Action Objective - Remedial action in the Ponding Basin

C.7.2. Comment: "...EPA conducted a sediment transport modeling study that attributed a large percentage of asbestos found in the ponding basin to the Atlas site. However, they arbitrarily neglected all pre-mine contributions, made unfounded assumptions regarding asbestos contents of mined materials and the New Idria Formation, and made arbitrary assumptions on the erodibility of mined materials....Careful re-analysis of EPA's efforts by both Levine-Fricke (1989) and Western Technologies show that EPA's results are erroneous....When the minor increase in sediment transport rate resulting from mining operations is coupled with the very low asbestos concentrations detected in soils of the ponding basin (undetectable by EPA's preferred analytical technique, PLM), we can only conclude that EPA's proposed RAO to address occupation hazards in the ponding basin resulting from tilling asbestos containing soils is wholly inappropriate." C.1.c, Page IX-8.

C.7.2. Response: The selected remedy does not include any remedial action in the Ponding Basin. EPA has deferred at this time to the U.S. Bureau of Reclamation and the California Department of Water Resources to investigate and address EPA's concerns regarding asbestos levels in the ponding basin.

C.7.3. Position of state agencies regarding remedial action at the Atlas Mine OU

C.7.3. Comment: "On page 3 of the Executive Summary within the FS report, EPA states that California State agencies have indicated that onsite and possibly offsite corrective actions should be undertaken at the Atlas site to prevent asbestos from entering drainage courses. This is in conflict with a 1985 memorandum from the Regional Water Quality Control Board which concluded unequivocally that any remedial activities taken on the Atlas site would have little or no impact to regional asbestos levels. The written record appears to directly contradict EPA's statement within the FS report." C.2, page IX-11.

C.7.3. Response: This comment distorts the RWQCB memo of March 15, 1985 (AR Document Number 90), and ignores other documents in the Administrative Record. In fact, three different California agencies have made statements contained in the Administrative Record which support EPA's selected remedy.

1) Regional Water Quality Control Board (RWQCB): The March 1985 RWQCB memo states: "...[T]he analyses indicated that significant amounts of asbestos were being carried down from all areas of the watershed and not specific to the drainages where the mines were located. Staff concluded that control of the point source (the mines) would not eliminate the asbestos problem." Note that this conclusion was based only on sampling conducted in March 1983.

The staff report attached to the 1985 memo states: "Staff's investigation of the Atlas site in 1980 found the storm drainage control structures at the site had not been maintained nor were they adequate to control storm drainage."

2) California Department of Water Resources: A California Department of Water Resources ("DWR") document titled Maintenance Program for Arroyo Pasajero Flood retention Basin and dated July 29, 1983, (Administrative Record Document Number 63) states: "...several abandoned asbestos mines in the White Creek watershed are significant sources of the asbestos entering the aqueduct."

A DWR memo reviewing the abandoned asbestos mines in the White Creek and Cantua Creek watersheds, dated November 4, 1985 (Administrative Record Document Number 111) describes the Atlas Asbestos Mine as follows: "...[T]he property includes a few small catch basins to control localized drainage but run-off into White Creek is essentially unrestricted." The Summary and Conclusion section of this memo lists: "sites ... which would be most benefited by remedial action." The Atlas Asbestos Mine is included in the list of mines in the White Creek watershed which would benefit from remedial action.

3) California Department of Health Services: In addition, the California Department of Health Services has informed EPA that they support the selected remedy even though they would prefer a

more costly and more fully engineered remedy (Alternative 4 in the Propose Plan). Administrative Record document No. 1610.

C.7.4. EPA should not address a natural phenomenon under CERCLA

C.7.4. Comment: "As our comments on the Regional Disturbances report (Section VIII) illustrate, the New Idria Formation and surrounding areas are highly unstable and are currently being actively eroded by natural processes. EPA's proposal to attempt to halt a naturally occurring geomorphic process by implementing sediment control features runs contrary to the intent of the National Contingency Plan (NCP). 40 CFR Section 300.400 (b). On a more practical basis, implementing local erosion control methods will be wholly ineffective in the face of the massive erosion occurring on the large expanses of the New Idria Formation." C.8, page IX-14.

C.7.4. Response: EPA's selected remedy does not address a naturally occurring geomorphic process. Rather it addresses the accelerated erosion caused by mining and milling of asbestos and, as noted above, the failure to implement standard mine reclamation practices.

C.7.5. Remedial Alternative - Hazards associated with capping

C.7.5. Comment: "EPA's Remedial Alternative 5 includes capping the site with soil and establishing vegetation together with diverting stream water at the Atlas site...EPA has ignored the risks associated with...capping the site with imported soil...[t]he importation of large volumes of soil would generate great plumes of asbestos laden dust...and also incur physical hazards by the numerous trucks that would be required to move to and from the Atlas site during capping...The severe health and safety risks that would be generated during the implementation of soil capping at the site, not to mention subsequent degradation and erosion from off-road vehicles, and the extreme costs, make this a most undesirable Remedial Alternative. C.9, page IX-15.

C.7.5. Response: The commenter is correct that there are potential hazards associated with capping including generation of asbestos laden dust but is not correct that EPA has ignored these risks (see page 3-48 in the FS). The FS explicitly states that generation of airborne asbestos in the course of construction would be prevented by paving primary haul routes, moistening asbestos material during earthworking, equipping remedial workers with protective respirators and clothing and implementing appropriate decontamination measures. EPA agrees that these measures would be extremely expensive and this high cost was listed in the FS as one of the disadvantages of this alternative.

C.7.5. Feasibility of revegetation

C.7.5. Comment: "On page 2-24 of the FS report, EPA discusses the implementability of establishing a vegetative cover on the Atlas site....The worker exposure risks that would be incurred through generation of asbestos-laden dust in implementing such a remedial alternative using hand labor on the asbestos piles and massive regrading would appear to far outweigh any marginal benefit gained from the revegetation of such a remote location as the Atlas site....We believe that revegetation is not a viable remedial option for the Atlas site in any manner." C.10, page IX-15.

C.7.5. Response: EPA staff have observed vegetation growing on the tailings piles at the Atlas Site. Revegetation is a standard mine reclamation technique. The ROD provides for the implementation of a revegetation pilot project in order to evaluate the feasibility of this method of erosion control at this site.

C.7.6. Implementability of chemical fixation

C.7.6. Comment: "Implementation risks to workers are similarly ignored in Remedial Alternative 6 which calls for chemically fixing the asbestos materials onsite...such fixation would require the handling of essentially all loose material on the Atlas site and the potential for dust generation would be extremely large...slope stability considerations would make implementation...extremely problematic. We disagree with EPA's assessment that this alternative is implementable. To the contrary, we conclude that this Remedial Alternative is not realistic in light of the volumes and topographic relief that exists at the Atlas site." C.11, page IX-16.

C.7.6. Response: Although EPA has determined that this alternative is technically feasible, EPA agrees with the commenter that this alternative would be an undesirable choice for remediation of this site. See page 3-75 of the FS.

C.7.7. Remedial Alternative - Offsite Disposal

C.7.7. Comment: "EPA's Remedial Alternative 7 calls for the removal of asbestos from the Atlas site to an offsite landfill. We agree with EPA's assessment that such an activity would be of no benefit since the bulk of the mountain upon which the Atlas site resides is also asbestos bearing rock." C.12, page IX-16.

C.7.7. Response: Comment noted.

C.7.8. Remedial Alternative - Dam on White Creek

C.7.8. Comment: "Remedial Alternative 8 which calls for the construction of a dam along White Creek, to contain all flood

waters, is not a viable remedial alternative....Acknowledging the rapid erosion and sedimentation rates would indicate that a dam constructed along White Creek to retain all waters and sediments would rapidly fill, loosing its ability to retain future flood waters. Once the reservoir behind the dam was filled with sediments it would require extensive excavation of sediments that would then be stockpiled in an unknown location to be potentially re-eroded and redeposited behind the dam. Such a laborious process of deposition, excavation, stockpiling, and subsequent transport seems to be a vicious circle properly avoided in a remedial response. Considering the known seismic activity of the region, a dam on White Creek would be generally inadvisable. This Remedial Alternative is entirely ineffectual and should be deleted from any consideration in the FS." C.13, page IX-17.

C.7.8. Response: The FS cited seismic activity as a concern. EPA agrees that the accumulation of sediments behind a dam along White Creek would be more extensive and burdensome than the accumulation that will occur behind the sediment trapping dams at the Atlas Site as part of the selected remedy. EPA has not selected this alternative.

C.7.9. Remedial Alternative - Enlargement of the Ponding Basin

C.7.9. Comment: "The last Remedial Alternative, Number 9, proposed by EPA is the enlargement of the ponding basin adjacent to the California Aqueduct. There is no conclusive data to show that the Atlas site contributes sufficient asbestos to the ponding basin to warrant this as a remedial response for the Atlas site. Since this connection does not exist between the Atlas site and the ponding basin, a remedial alternative to remediate a situation in the ponding basin is not appropriate in a Feasibility Study focused on the Atlas site. This alternative should be given no consideration in the FS report." C.14, page IX-17.

C.7.9. Response: Alternative 9 in the FS was not included in the Proposed Plan for the Atlas Mine OU. At this time, EPA is not proposing to take any action in the Ponding Basin. EPA is currently deferring to the Department of Water Resources and United States Bureau of Reclamation the issue of the Ponding Basin near the California Aqueduct and will reevaluate this portion of the site in 1992.

C.7.10. Drinking Water Standard as an ARAR

C.7.10. Comment: "ARARs presented on page 2-5 of the FS report that include drinking water standards for asbestos are not supported by current scientific literature and should be deleted from the FS report." C.21, page IX-21.

C.7.10. Response: Section 9.0 of the ROD discusses all ARARs. Drinking water standards for asbestos, even if appropriate for drinking water systems, are not ARARs for this operable unit.