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Office of
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Superfund Record of Decision:

McColl Site, CA

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16. ABSTRACT

The McColl site is located approximately 20 miles southeast of Los Angeles in a residential area of Fullerton, California. The site was previously used as a disposal area for acid sludge wastes from the production of high octane aviation fuel during World War II. Oil field drilling muds were later disposed of on the acid sludge. The waste is characterized by low pH and high sulfur content. Arsenic, benzene, and organic sulfur dioxide (SO_2) and tetrahydrothiophene were also identified in the waste and soil. Gases produced from the material include benzene, SO_2, hydrogen sulfide and various odorous hydrocarbons.

The cost-effective remedy for the McColl site is excavation and redisposal of the wastes. Total capital costs are estimated to be $21,500,000.

Key Words: Cleanup Criteria, RCRA On-Site Disposal Requirements, Seismic Activity, Ground Water Contamination, Public Exposure, Off-site Disposal

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision McColl, CA Contaminated media: gw, sw, soil, air Key contaminants: acidic sludges, aviation fuel wastes, oil drilling muds, VOCs, arsenic, sulfur dioxide, hydrogen sulfide		

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RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION

SITE: McColl Site, Fullerton, California

DOCUMENTS REVIEWED

I have reviewed the following documents describing the analysis of cost-effectiveness of remedial alternatives for the McColl site:

- McColl Site Remedial Investigation
- Environmental Assessment of the Remedial Action Alternatives for the McColl Site, Fullerton, California
- Cost-Effectiveness Evaluation of Remedial Action Alternatives for the McColl Site, Fullerton, California
- Review of Feasibility Study at the McColl Site, Fullerton, California, CH_2M Hill
- Summary of Remedial Alternative Selection

DESCRIPTION OF SELECTED REMEDY

All waste will be excavated and disposed of at an approved RCRA disposal facility. Any hazardous soil up to a depth of one foot below the waste will be removed to a RCRA disposal facility.

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR Part 300), I have determined that the excavation and redisposal alternative at the McColl site is a cost-effective remedy and provides adequate protection of public health, welfare, and the environment. The State of California has been consulted and agrees with the approved remedy.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites. In addition, the off-site transport and redisposal is more cost-effective than other remedial action, and is necessary to protect public health, welfare, or the environment.

Lee M. Thomas
Assistant Administrator
Office of Solid Waste and Emergency Response

4/11/84
Date

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

MCCOLL SITE
Fullerton, California

I. SITE LOCATION AND DESCRIPTION

The McColl site is located approximately 20 miles southeast of Los Angeles in Fullerton, Orange County, California. The site is south of Rosecrans Avenue and west of Sunny Ridge Drive. The site is divided into two parcels: the 7-acre Ramparts parcel to the east and the 3.5-acre Los Coyotes parcel to the west. Homes border the Ramparts site to the east and south. This residential area of approximately 1,200 people contains homes directly adjacent to the site. The Los Coyotes parcel underlies the Los Coyotes Country Club Golf Course. There are six sumps on each parcel containing an estimated 85,000 cubic yards of waste (Figure 1). This site is located in an earthquake zone 4, denoting the highest level of earthquake activity.

II. SITE HISTORY

The site was created as a disposal area for acid sludge wastes from the production of high octane aviation fuel during World War II. In 1942 Eli McColl had 12 pits constructed in what was then a rural area of Orange County. North of the site were oil fields; a hog farm operated to the south; and the area to the southeast was devoted to agriculture. Mr. McColl arranged to haul away acid wastes of refiners producing high octane fuel in the area. From 1942 to 1946, these wastes were dumped in the McColl sumps.

Following the war, Mr. McColl wanted to improve the property by covering the sumps so that the land could be developed for other future uses. At that time drilling muds from oil production activities in the area were plentiful. He received the necessary local permits and arranged with several oil companies to dispose of drilling muds. From 1951 to 1962 drilling muds were deposited on-site, mainly in the lower Ramparts sumps. The acid sludge and drilling mud combination was not stable; the drilling muds sank into and combined with the sludge.

In 1957, the Los Coyotes Golf Course and Country Club was constructed over the western six sumps. In the 1960's, developers began to build homes in this area of Orange County. In the mid-1970's, homes were built immediately adjacent to the eastern and southern borders of the Ramparts parcel. In July 1978, Orange County received the first complaint of odors from McColl area residents.

In November 1980, the EPA Field Investigation Team (FIT) conducted a background investigation of the McColl site which identified potential responsible parties based on the types of waste in the sumps. In December 1981, EPA, the State, local agencies, and four oil companies (Shell, Union, ARCO, and Texaco) signed a memorandum of agreement to study the McColl site. On-site work commenced in March 1982 and a final report was received in November. This remedial investigation was funded by the oil companies, which contributed $800,000, and the State of California which contributed $150,000.

In September 1982 the same participants entered into a memorandum of agreement to conduct a feasibility study. This feasibility study was funded by the State at a cost of $350,000. In addition, Shell Oil Co. funded a pilot excavation project which took place during May 1983, and demonstrated that excavation was feasible without great inconvenience to area residents. The feasibility study began in October 1982, and a final report was published in June 1983. Based on this study, the State selected excavation and redisposal of the waste and contaminated soil as the cost-effective alternative. They immediately contracted for the design of an excavation and redisposal project. The project was opened for bidding on October 17, 1983; bids were received by December 2, 1983; and a contractor will be selected by the State in April or May 1984.

III. CURRENT SITE STATUS

There are approximately 139,000 cubic yards of waste and contaminated soil at the site. The waste is characterized by low pH (as low as 0.7), high sulfur content, and high organic content. Levels of benzene, sulfur dioxide and tetrahydrothiophene were found in the waste and soil. Gases produced from the material include benzene, sulfur dioxide (SO_2), hydrogen sulfide (H_2S), and various odorous hydrocarbons. In addition, arsenic has been found in one of the lower Ramparts sumps. The major pathways for exposure are through direct contact and inhalation.

The data indicate the corrosivity of the waste, and that pH is less acidic (higher) in the soil than in the waste. Direct contact with the highly acidic material can cause burns to eyes and skin. The State has applied a temporary cover of synthetic material and soil to the Ramparts portion of the site. While this has temporarily mitigated some of the threat, waste seeping to the surface, especially on the golf course, continues to create a direct-contact hazard.

The main ground water body at the McColl site is 150 to 250 feet below the land surface. Perched water at 15 to 42 feet has been found underlying the Ramparts site. However, this perched zone is not used and no connection to the regional aquifer has been demonstrated. Ground water flow is generally to the south.

The perched ground water has been sampled by the State, and shows very low pH, and high sulfates and arsenic. These constituents may be attributable to the waste deposited on-site. However, water samples of the regional aquifer from one ground water monitoring well and four city wells south of the site, show neutral pH and no elevated levels of contaminants that could be traced to the site.

The State analyzed soil samples below the waste to a depth of over 100 feet in two cores. Soil below the waste showed a pH greater than 2. Trace amounts of metals and sulfur-containing compounds were found in the soils. However, these are not in concentrations that would pose harm to the public or the environment. If the waste is properly controlled to prevent future leaching, there should be little or no threat of ground water contamination from the site.

Arsenic in most areas of the McColl site does not exceed background levels. However, surface sampling from one of the Ramparts sumps revealed an arsenic concentration of 10,100 ppm. Arsenic enters the body primarily by ingestion or inhalation. The California Department of Health Services has estimated that ingestion of a few grams of arsenic-contaminated soil at concentrations found on a portion of the McColl site (10,100 ppm) could produce acute poisoning, especially in children. Arsenic in concentrations of 0.35 mg/l has been measured in storm water runoff from the site. This is seven times the Federal drinking water standard of 0.05 mg/l. However, since runoff does not enter any drinking water supplies, this is not presently a health threat.

The most obvious problem from the McColl site are its odors and toxic air emissions. Sulfur-containing hydrocarbons are emitted from the site at levels detectable to the residents. Because odors prompt public complaints, air samples have been analyzed for odorous compounds such as SO_2 and tetrahydrothiophene. The following table indicates the concentrations of gases that have been measured from the site.

Contaminants	Undisturbed (On-site)	Disturbed (On-site)	Disturbed (Community)
Benzene	2500 ppb	42,000 ppb	170 ppb
SO_2		thousands of ppm	up to 1000 ppm

The State Department of Health Services conducted a health survey of the McColl site from July 1981 to March 1982. The symptoms reported by area residents (headaches, nausea, dizziness and respiratory irritation) increased with the proximity of the residence to the site. These symptoms could be attributed to the types of air emissions coming from the site.

Ambient levels of benzene in the McColl area are no higher than benzene levels in other parts of the Los Angeles Basin. However, the potential for exposure exists should the site or the cap be disturbed. Chronic benzene poisoning is manifested by symptoms such as fatigue, headache, dizziness and loss of appetite.

Sulfur dioxide (SO_2) gas is emitted from the McColl site, especially during site disturbance. This gas classified is an eye and respiratory irritant in low concentrations (6-12 ppm) and can be fatal in high concentrations. In combination with other air pollutants, such as particulate matter and ozone, SO_2 has caused an increase in the death rate during smog incidents. As expected, the elderly and those with heart and lung disease are more susceptible. Orange County has not reached attainment with National Ambient Air Quality Standards for particulate matter and ozone, although it is in attainment with SO_2 standards.

In sum, the major pathways for exposure are air and direct contact. Disturbance of the site can cause the release of benzene and SO_2 in high concentrations. Although the site has been fenced, children are attracted to the area to search for golf balls. The fence has not deterred this activity. The temporary cover applied by the State to the Ramparts parcel has reduced the danger from direct contact and air emissions. However, the cover is only a temporary measure. Waste seeping to the surface, especially on the golf course, still creates a hazard.

IV. ENFORCEMENT

In 1980, EPA sent RCRA section 3007 letters to seven potentially responsible parties (PRP's). In 1981, further section 3007 letters were sent to nine PRP's requesting additional information. As a result of that effort, a Participants Committee was formed of EPA, the State, local agencies and PRP's. Under this Committee's oversight the remedial investigation and feasibility study were conducted. On July 22, 1983, 16 additional section 104/3007 letters were sent in an attempt to identify other PRP's. Notice letters were sent to eight PRP's on August 12, 1983.

In June 1983, a negotiating committee (composed of EPA, the State, local agencies, several oil companies, and landowners) was formed to discuss implementation of the feasibility study recommendation. During the initial meetings, the committee agreed to an additional effort to locate other PRP's. In addition, it was agreed that no dollar offer could be made until the State refined the cost of the project during design. The State's final design was made public in October 1983. On November 8, 1983, the PRP's made a tentative settlement offer of $10 million, less than 50 percent of the estimated total cost of the cleanup. EPA and DOHS jointly rejected that offer.

In addition, EPA and DOHS clarified their position on the amount of an offer necessary to allow negotiations to continue (no less than 80 percent of the total cleanup cost) and on settlement issues raised by the PRP's. This position was conveyed to the PRP's at a meeting on January 31, 1984. The PRP's were informed that negotiations would be terminated on March 8, 1984, unless significant progress was being made. On February 16, 1984, the PRP's submitted a written offer of $15 million. EPA and DOHS are currently evaluating that offer.

At the same time, EPA, the State, and PRP's have met to discuss language for a proposed consent decree. Although there has been progress toward settlement, Region 9 is preparing a Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) section 106 order to be issued to the PRP's should settlement not be reached. It is anticipated that the order will be issued in early May giving the PRP's an opportunity to respond before the cooperative agreement is awarded.

V. STATE'S COST-EFFECTIVENESS EVALUATION

A. Background

EPA and the State investigated the site and sent Resource Conservation and Recovery Act (RCRA) section 3007 letters in late 1980, prior to the passage of CERCLA in December 1980. An initial meeting with PRP's and other interested parties was held in April 1981. From that point, the State took the lead in the remedial action with EPA remaining as a member of the Participants Committee. In December 1981, the Participants Committee entered into a memorandum of agreement for remedial investigation of the site. The remedial investigation commenced in March 1982, at the same time as the National Contingency Plan revisions for Superfund were proposed. After completion of the remedial investigation, the Participants entered into another memorandum of agreement to conduct a feasibility study. The feasibility study recommended excavation to be the cost-effective alternative for cleaning up the site.

In June 1983, when the final feasibility study report was published, the State considered the need for Federal Superfund money to fund the cleanup. At that time, EPA asked CH2M Hill to review the State's feasibility study to determine compliance with the NCP.

Concurrent with our review of the State's feasibility study, the State contracted for design of the excavation and redisposal alternative. The design was completed by Black and Veatch and the project was opened for bidding on October 17, 1983. Bids were received December 2, 1983, but a contract has not yet been awarded.

Throughout the process of remedial investigation, feasibility study and design, the State held numerous public meetings and sent letters and bulletins to the McColl area residents to keep them informed of activities at the site. EPA remained a member of the Participants Committee and reviewed all remedial investigation and feasibility study documents produced by the State.

During the feasibility study, 82 potential technologies for site cleanup were considered. These technologies fall into the following categories: excavation/waste handling, emission control during remedial alternative, long-term emission control, treatment of solids/semi-solids, treatment of liquids/runoff, in situ treatment/pretreatment, redisposal, transportation, surface water control, containment, recovery/recycle/reuse, and dust control. Using the State's selection criteria, technologies were assessed to eliminate those not appropriate for the McColl site: applicability to the McColl site; ability to meet DOHS cleanup criteria; environmental, health, and safety impacts; time and/or cost requirements; usefulness with intermingled wastes; technology status; reliability and implementability; and usefulness as part of a system of technologies.

In the State's evaluation, technologies that were applicable to the McColl situation were incorporated in the development of six remedial alternatives (three involving containment and three involving removal). These six alternatives were further refined to one containment scenario and one removal scenario. A combination of containment of waste on one parcel and removal of wastes on another was also considered. Thus, three alternatives were evaluated in detail.

Before the State evaluated the cost-effectiveness criteria, the State considered any environmental impacts imposed by the remedial alternatives. All three alternatives were considered by the State to have long-term positive impacts. The containment alternative had the greatest long-term potential risk of failure and also the lowest short-term impact for community exposure. While the potential for short-term community exposure was greatest with the excavation alternative, the potential for long-term impacts was to be eliminated.

There were three phases to the State's cost-effectiveness determination. The initial rating was conducted in April 1983. Alternatives of containment, excavation and a combination were developed for the following variables: 2-hour and 8-hour round trip to disposal site; 2 feet, 5 feet and 10 feet excavation of soil below the waste.

B. Evaluation of Alternatives

Based on this initial cost-effectiveness rating, the State eliminated the Combination Alternative as least cost-effective because the effectiveness ratios for this alternative were lower than the excavation and containment cases that would best mitigate the hazard. Excavation and redisposal appeared to be the cost-effective alternative. To verify that excavation without undue community impacts was feasible, a pilot excavation project was undertaken. After the pilot project demonstrated that excavation was safe, the designs of Alternatives containment and excavation and redisposal were slightly modified and the alternatives were again rated for cost-effectiveness.

For this second evaluation, a short schedule was evaluated and costs estimated for each alternative. Minor cost revisions were incorporated for both alternatives. In addition, disposal and transportation costs, the cost of the excavation enclosure, and the cost of the foams based on information gathered during the test excavation were evaluated. The evaluation committee found that excavation was cost-effective.

The State's final cost-effectiveness rating was completed in June 1983. The effectiveness scores did not change from the May version, but costs were refined based on new estimates. The major change in cost was the addition of construction management costs. These items were not included in earlier estimates.

The State selected excavation and redisposal as the cost-effective alternative.

VI. CH_2M HILL'S REVIEW OF STATE-CONDUCTED FEASIBILITY STUDY

CH_2M Hill was tasked by EPA to evaluate the remedial investigation and feasibility study managed by the State. Part of their task was the review of the State's assumptions and the development of independent cost estimates. CH_2M Hill concluded that the process followed by the State to screen alternatives and relate effectiveness to cost is consistent with the NCP. The State's study thoroughly characterizes the site and the waste. Danger to public health via direct contact and air emissions is documented.

TABLE 3-8. COMPARISON OF AVERAGE CHEMICAL COMPOSITIONS BETWEEN SAMPLE TYPES

Matrix Class / Variable	W4	M2	M3	M4	S2	S3	S4
Number of Samples	n=8	n=1	n=1	n=3	n=1	n=1	n=4
Carbon, %	16	34	1.6	25	0.16	0.19	1.1
Hydrogen, %	3.7	7.3	1.8	4.8	0.70	2.0	1.7
Oxygen, %	23	24	15	17	3.6	16	14
Nitrogen, %	0.17	0.20	0.10	0.17	0.10	0.10	0.11
Sulfur, %	9.5	8.7	0.24	7.5	0.73	0.27	1.2
Chlorine, %	0.12	0.10	0.10	0.13	0.11	0.10	0.10
Ash, %	48	10.	79	35	90.	80.	80.
BTU/lb	2900	7580	175	5700	100	100	650
Volatile matter, %	44	77	23	56	11	22	20
Total fixed carbon, %	8.6	13	0.00	9.9	0.00	0.00	1.7
Density, g/cm^3	1.1	0.96	1.7	0.95	1.5	1.4	1.2
pH, pH units	0.69	0.90	7.0	1.2	3.6	3.9	6.0
Conductivity, μmho/cm	88100	60000	35000	79000	8000	4900	8900

Type

Consistency	S	M	D	W
1	S1	M1	D1	W1
2	S2	M2	D2	W2
3	S3	M3	D3	W3
4	S4	M4	D4	W4

Type

S - Soil/Sand - Material from the site that appears to be background soil, sand, overburden, etc. No visible signs of contamination from the wastes.

M - Soil/Waste Mixture - Material that looks like a mixture of soil and waste. Visible signs of waste. Waste material can be black asphaltic (liquid or solid), white powder, dry black/brown dusty powder, or other non-sediment material.

D - Drilling Mud Waste - Grey/brown, mud-like material. Drilling mud usually is a thick sludge with a wet appearance.

W - Black Asphaltic Waste - Black waste material that can have a variety of consistencies.

Consistency

1 - Liquid - Light fluids with a low weight percent solids character (i.e., perched groundwater).

2 - Low Viscosity Sludge - Fluid sludge material that flows easily. Liquid tar is included at this consistency class (i.e., molasses-type).

3 - High Viscosity Sludge - Very high weight percent solids character. Will not support weight (i.e., oatmeal-type consistency).

4 - Solid - Structural integrity like that of background soil.

Figure 3-1. Matrix Class System.

However, CH_2M Hill determined that the extent of the problem at the site has not been fully defined in two respects. The first is ground water contamination. Only one downgradient well exists for this site. Though limited sample data from this well indicate that it is not contaminated, insufficient data exist to conclude that the waste has not yet contaminated the ground water. The State has undertaken a study to investigate the ground water. However, the existence of contaminated ground water would not alter the selection of the source control remedy.

The second area of concern to CH_2M Hill was the extent of soil excavation required using the State's cleanup criteria. Very limited data have been collected on the extent of soil contamination. The State bored five cores in five different sumps. A total of 11 samples from varying depths were analyzed for volatiles, base/neutrals, priority pollutant metals, and pH. Substances such as tetrahydrothiophenes, cycloparaffins, and organic sulfides were measured in the ppm range. Heavy metals and phenols were also detected. In calculating the total density of waste, CH_2M Hill recommended that the density figure used by the State (0.88 tons/yd^3) be revised upward to 1.35 tons/cubic yard, based on an assumption that the State's analysis was based on estimates rather than empirical data.

CH_2M Hill subsequently reexamined its recommendations in light of density measurements of the soil and wastes conducted by Radian. They concluded that the weighted average of the waste was 1.04 grams per cubic centimeter. This is equivalent to the 0.88 tons/cubic yards (see attached Radian summary of density analysis). CH_2M Hill confirmed this estimate. Therefore, based on these data, EPA accepts the density figure used by the State.

VII. EPA'S COST-EFFECTIVENESS EVALUATION

EPA decided, based on the findings of CH_2M Hill, that an independent cost-effectivess evaluation was necessary. Cost estimates developed by the State's contractor and CH_2M Hill were evaluated. Based on the cleanup criteria described below, EPA redefined the scope of the excavation and redisposal alternative. In addition, EPA also developed alternatives for upgraded containment (designed to protect against earthquake damage) and a RCRA on-site facility. EPA cost estimates for four key alternatives (see Table 1). The four alternatives are: 1) containment, 2) upgraded containment, 3) excavation and redisposal, and 4) a RCRA on-site disposal facility.

A. Cleanup Criteria

Because there is no evidence that hazardous substances have migrated from the site except via the air pathway, a source control remedial action as described in the NCP is the appropriate cleanup method. These criteria address both short-term and long-term protection of public health and the environment.

1. Water

a. Ground Water

° minimize standing water

b. Surface Water

° short-term criteria for benzene, toluene, xylene, arsenic, sulfates and pH

° over the long-term, no run-off from the site may contain satistically significant levels of any constituents attributed solely to the site above background levels.

2. Air

a. Odor: The South Coast Air Quality Management District (SCAQMD) has developed an odor monitoring plan for the McColl site. During the cleanup distinct, easily noticeable odors will not be allowed beyond the site perimeter. Over the long-term, faint odors will be allowed directly over the site, but no detectable odor is allowed beyond the site perimeter. A SCAQMD inspector will assess odor intensities during cleanup.

b. SO_2: 24-hour, 1-hour and 5-minute standards have been set. The 24-hour standard is the same as EPA's 24-hour National Ambient Air Quality Standard. The 1-hour and 5-minute standards are approximately half of similar standards set by the Puget Sound Air Pollution Control Agency (one of the few regulatory agencies with similar standards). Because the Orange County area is nonattainment for particulate matter and ozone, and because the health effect of SO_2 is exacerbated in combination with particulate matter and ozone, stringent standards are warranted. The long-term standard requires no statistically significant SO_2 concentration increase across the site.

c. Benzene: The fence-line standard is 2 ppm under the most stable (or worst case) meteorological conditions - no wind and low solar radiation. The standard provides protection below the one-in-one-million cancer risk level.

d. Soil and Waste: Excavation or containment of waste and all obviously contaminated soil up to one foot below the sump.

The State's cleanup criteria used during development of the feasibility study were far more stringent regarding soil removal than those detailed above, if literally applied. These criteria included: removal of all soils with pH less than or equal to 2, and all soil with arsenic at or above hazardous concentrations. Soils meeting California definitions of hazardous waste were also to be removed, as well as soils with chemical concentrations above those specified in the California Assessment Manual.

Soil sampling below the sumps indicate there is minimal contamination of soils, extending approximately 50 to 70 feet below the sumps. These contaminants have migrated approximately one to two feet per year and are not expected to pose a threat to the ground water. The States's remedial investigation showed a distinct break between the waste and underlying soils. Excavation of the wastes would remove 99 percent of all site contaminants. Soil removal under the sumps would not provide additional protectic

EPA's cleanup criteria have been presented to the State. The State has agreed that these criteria are acceptable.

B. Description of Alternatives

1. No-Action Alternative

Selection of the no-action alternative is not acceptable for several reasons. First, there is the threat of emissions to residences adjacent to the McColl site. The entire community has been subjected to odors primarily from uncovered wastes in the lower Ramparts area. Significant potential exists for air contaminant emissions (e.g., SO_2 and benzene) during site disturbances. A health effects study conducted by the State indicated that proximity to the site was linked to adverse responses of the residents.

Direct contact is the second concern at the site. Waste materials have seeped to the surface in the Los Coyotes and Ramparts areas. Arsenic has been found at high concentrations (up to 10,000 ppm) which can cause acute poisoning. Also direct contact with the acidic waste can cause eye and skin burns.

The third area of concern is the long-term threat of ground water contamination. Should the site be left in its current condition, contaminant migration would continue, at the rate of approximately one foot per year.

Each of these threats would be compounded as a result of seismic activity. Disruption of the waste material resulting from an earthquake could cause substantial emissions of benzene, SO_2 and other hazardous constituents.

2. Containment Alternative

The State developed the containment alternative which left the waste and contaminated material in place on both portions of the site (Ramparts and Los Coyotes). Containment walls of acid and sulfate resistant concrete would be placed around both areas of the site. Reinforced concrete would be put in the "downhill" portion of the walls for structural integrity and seismic protection. The remaining portions of the structure would be standard slurry construction. Emissions control during trenching would include: mechanical collection and dispersion, foams, sprays and deodorants. A cover would prevent rain infiltration, surface run-off, and would contain gaseous emissions. A gas collection system would be installed below the cover in a gravel bed and emissions captured with a treatment system. The containment system would not tie into an impervious layer.

A monitoring system would be installed to monitor air quality during construction. A seismic monitoring system would also be installed and water quality monitoring would be conducted at the rate of four samples per year per well.

All trenching materials and contaminated overburden would be removed and sent to a Class II-1 landfill. The total to be removed is estimated to be 20,650 cubic yards. The synthetic cover would be overlaid by sand and top soil and seeded. Below these, two layers of construction fabric, a layer of gravel would be installed. The reinforced concrete would have an average depth of 45 feet and would be 3 feet wide. The slurry wall would have an average depth of 40 feet and be 1.5 feet wide. A synthetic membrane would be installed as an additional barrier to the reinforced wall.

In evaluation of the seismic risk to the containment alternative, the State's consultant predicted that the construction of the walls buried in place would not result in collapse in the event of an earthquake. However, displacement or separation of the walls could occur, resulting in some release of materials near the surace. In steeply sloping areas, small scale slumping and near surface rotational displacement could also take place. The State's consultant stated that it would be unlikely that large scale slumping or large scale releases of waste would occur.

3. Upgraded Containment Alternative

As a result of the threat of an earthquake at the site, EPA developed an upgraded containment option to approach the same protection afforded by excavation and redisposal off-site. The upgraded containment remedy would be improved in two respects. First, a second liner would be placed in the cap to increase the reliability of the gas control system. Should there be a failure, the second liner would capture emissions. The cost of this component is $360,000.

The wall of the containment system would not tie into an impervious layer. Therefore, a ground water control system, comprised of six wells, approximately 80 feet deep, also would be added to the upgraded containment remedyto prevent migration below the cut-off walls. The wells would pump ground water whenever necessary to insure that the contained waste was not saturated. The possibility of future migration of waste would be further minimized. The protection and reliability of upgraded containment closely approaches that of excavation and redisposal. However, reliability of the system nonetheless would be less because of the inability to predict the itensity and effects of seismic activity.

4. Excavation and Redisposal Alternative

The State also developed the "excavation and redisposal" alternative, involving removal of all waste and obviously contaminated material from both parcels. Waste includes the black or dark-covered tar-like asphaltic material disposed in the 12 pits, and obviously contaminated material up to one foot below the sumps.

The quantities of waste material in the sumps to be excavated are estimated to be 85,000 cubic yards. Berm materials between the sumps to be excavated are estimated to be 25,000 cubic yards. Contaminated overburden to be excavated are estimated to be 21,000 cubic yards. Clean overburden of 13,650 cubic yards would be excavated and then replaced on-site. The one foot of soil to be excavated below the sumps is estimated to total 9,000 cubic yards. Redisposal of waste is to take place at a RCRA Class I facility. The site would be regraded with soil available on-site.

Emissions will be monitored during excavation and will be controlled using foams, sprays and mechanical collection.

5. RCRA On-Site Disposal

The RCRA on-site disposal alternative entails the excavation and temporary storage of waste material and contaminated soil. Lined disposal cells would then be constructed and the wastes and soils placed into the cells. The cap over the cells would be lined and a gas collection system installed.

C. Evaluation of Costs

The net present value of the original containment option developed by the State is estimated by EPA to be $17,392,000. The upgraded containment, which is considered to provide protection approaching that of excavation and redisposal has a present value cost of $18,937,000 compared to that of excavation and redisposal of $18,306,000.

Cost estimates for the excavation and redisposal option are more highly refined than figures for the remaining options due to the completion of design and bidding of that design by the State. Cost estimates for the remaining three options have varying degrees of refinement as reflected in the range estimates on Table 1.

The State's containment option costs are expected to reflect the reliability of a feasibility study estimate. The upgraded containment option shows additional costs for ground water protection and adding the cost of a double liner to the cap. These cost estimates have similar reliability to the State's containment option. The estimates for a RCRA on-site facility are far less refined because the original State feasibility study did not consider this option. Further analysis would be required to refine this estimate.

The EPA confidence level is highest for the cost estimates developed for the excavation and redisposal alternative. Should containment be selected, wider cost variations would be expected.

D. Evaluation of Effectiveness

The effectiveness of the four alternatives is discussed below.

1. During Construction

a. Containment

Construction of the containment structure would entail trenching and removal of a limited amount of hazardous material prior to installation of the barrier walls, liner and cap. A very limited amount of air emissions would be expected and control of these emissions would occur by the use of foams. No exposure of the adjacent community would be expected.

A shorter construction time compared to excavation and redisposal is anticipated due to the more limited scope of the work. However, time for design and procurement would add considerably (i.e., 9-12 months) to the anticipated schedule. EPA estimates that actual construction would not commence before early 1985.

COSTS OF PROPOSED REMEDIES AT MCCOLL

	Containment	Upgraded Containment	Excavation and Relisposal	RCRA On-Site Disposal
Design:	750,000	750,000	336,000	750,000
Oversight:				
Rollan:	930,000	930,000	1,500,000	1,000,000
State:	120,000	120,000	120,000	120,000
Site Preparation:	-0-	-0-	731,000	731,000
Cleanup Costs:	13,355,000 [1]	13,355,000	15,543,000	19,722,000 [3]
Double Cap:		360,000		
Ground Water Control:		500,000		

[2]

Excavation	tons	unit price	subtotal
Overburden	13,650	5.00	68,250
Waste & Soil	130,620	15.10	1,972,362
Soil	32,028	14.85	475,616
			2,516,228

Transportation	tons	miles	unit price	subtotal
Waste	130,620	190	0.146	3,623,399
Soil	32,028	190	0.138	839,774
On-Site	13,650		2.50	34,125
				4,497,298

Relisposal	tons	unit price	subtotal
Waste (liquid)	1,500	15.48	23,220
(solid)	130,620	15.48	2,021,998
Soil (liquid)	2,000	12.10	24,200
(solid)	32,028	12.10	387,539
			2,456,957

Other	6,073,000

Total Capital Costs:	15,155,000		16,015,000		18,230,000		22,323,000
O&M:							
Annual:	237,000		310,000		20,000		406,000
Present Value:	2,237,000		2,922,000		76,000		3,825,000
Total Present Value:	17,392,000		18,937,000		18,306,000		26,148,000
Ranges: -10%	15,653,000	-10%	17,043,000	-10%	16,475,000	-35%	16,996,0
+35%	23,479,000	+35%	25,565,000	+20%	21,967,000	+75%	45,759,0

1/ S[illegible] of these estimates is CH_2M Hill evaluation of [illegible] feasibility study estimates.
2/ S[illegible] of these figures are the Radian feasibility [illegible] and bid documents to the State.
3/ Source of these rough estimates is CH_2M Hill.

b. Upgraded Containment

To afford increased protection to the containment option, EPA considered two additional components to the State's containment remedy. A second liner would be installed and a ground water interceptor system would be installed around the site. EPA expects that these additional components would extend the schedule for construction by at least two months.

The remaining advantages and disadvantages during the construction period are identical to those discussed above for the State's containment option.

c. Excavation and Redisposal

This alternative entails excavation, handling, transportation and redisposal of 85,000 cubic yards of waste material. Substantial emissions are expected to result during this operation. The State has designed an extensive program for emissions control, using foams, special enclosures, and monitoring systems. In addition, large quantities of contaminated overburden and soil would be removed from the site. A lesser degree of air emissions are expected from these materials.

A higher temporary risk of exposure to the residents, compared to the containment alternative, would be anticipated for this alternative due to the large quantities of waste to be removed.

Construction of this alternative would be expected to extend to 19-20 months. However, design and procurement for this alternative have already been completed by the State.

d. RCRA On-Site Disposal

This alternative would require excavation followed by short-term storage of wastes and contaminated materials, during liner installation. The advantages and disadvantages during contruction are similar to the excavation and redisposal option with a few exceptions. An increased risk of exposure to the adjacent community would result because waste would be stored above ground on-site, remaining until installation of the liner is complete.

EPA estimates that construction time would extend 4-6 months beyond that estimated for excavation and redisposal. No design or procurement for this alternative has been developed.

2. Post Construction

a. Containment

Waste materials would remain on-site permanently. Barrier walls would not be tied to an impervious layer. Vertical migration of some contaminants at low levels has occurred to a depth of 50-100 feet. Although installation of the cap would be expected to limit migration and the barrier walls would be expected to prevent any horizontal migration, they would not stop all vertical migration of contamination. Minimal risk to this aquifer would occur with selection of this option.

A gas collection system would be installed below the cap to collect gases below the waste. This system would be connected to a caustic scrubber and carbon absorption unit above the cap. Seismic activity could disrupt the unit causing mechanical failure, liner or containment wall failure, or failure of the collection system. Gaseous emissions could occur as a result of these failures. The community adjacent to the site would immediately be exposed to these toxic emissions.

The design life of the containment structure is approximately 30 years. Without significant seismic activity, an evaluation of this structure at the end of this period would be conducted and major renovation of the structure may be required. With seismic activity, damage to the structure could cause repairs of varying extents. Repair of small cracks are estimated to cost $50,000. Although unlikely, major failure could cost up to $9,000,000 to repair.

Land use post-construction of the containment alternative would be restricted to passive uses (e.g. golf course).

b. Upgraded Containment

The addition of a second liner to the cap would be expected to provide further protection against possible gas emissions. This would not, however, prevent all such migration. The gas collection system would be the same as that envisioned under the original containment option. However, the possible disruption and gas escape caused by seismic activity would be more limited by the second liner. Disruption of the scrubber system, however, would remain the same as that detailed above. The additional ground water interceptor system would, however, avoid ground water contact with contaminants in the soil, providing a much higher level of protection.

Risks to the barrier walls from seismic activity would also be the same as discussed in the basic containment option.

c. Excavation and Redisposal

Removal of all waste and obviously contaminated materials afford the highest level of protection to the adjacent community. More than 99 percent of the waste would be removed in this option leaving minimally contaminated soils.

The likelihood of significant migration of contaminants toward the ground water aquifer is minimized by the removal of the source of such contaminants.

With this option, the threat of direct contact or exposure to gaseous emissions would be eliminated. In addition, seismic activity would not increase the threat of exposure to emissions or direct contact with this option.

The likely redisposal facility is located in a zone with lower levels of seismic activity than the zone in which McColl is located.

d. RCRA On-Site Disposal

The RCRA on-site facility would be expected to present a much lower risk of vertical and horizontal migration of contaminants to the aquifer because of the placement of a double synthetic liner below the wastes. The installation of a leachate collection system would also provide additional protection to the possible migration of contaminants to the ground water. Some periodic evaluation of the synthetic liners integrity might prove necessary.

Seismic activity affecting the functioning of a gas collection and treatment system would be expected to be the same as the effects detailed in the containment option discussion.

VI. COMMUNITY RELATIONS

A. Background

The State has taken the lead on community relations throughout this project. It developed a process for relaying information to the public in early 1982 when the remedial investigation began. Using census data and door-to-door canvassing, a mailing list of approximately 950 area residents was developed. The State notified these residents by letter and bulletin of meetings, and also of any upcoming activities at the site. DOHS chaired the numerous public meetings. Local newspapers were notified of meetings at the same time as area residents. While the State did not place formal "public notice" advertisements in the papers, the papers frequently ran articles announcing the upcoming meetings.

The first meeting was held February 4, 1982, to inform the residents that an agreement had been reached with the oil companies for remedial investigation of the site. In March 1982 a Residents' Committee was formed of area residents who wanted more involvement than the general public. This committee met several times with the State independently of the general public meetings.

At each phase of the project DOHS held a public meeting to inform the residents of progress (e.g. to discuss remedial investigation, health studies, give general status). Meetings were on the record. At each meeting the public was given the opportunity to make oral and written comments. The early meetings were held at the Fullerton Main Library. On February 24, 1983, the meeting location changed to Parks Junior High School. At this meeting three remedial alternatives were presented and described to the approximately 200 residents in attendance. The State informed the public that it would determine the cost-effective remedy following evaluation of public comment. On April 7, 1983, the State met with the residents to inform them that it had selected excavation as cost-effective. At the same time the residents were informed that a test excavation would be conducted during May to ensure that DOHS emissions control criteria could be met. The final meeting on this phase of the project was held June 2 when the results of the test excavation were discussed.

At every meeting the public was encouraged to comment on the State's planned activities. Under the State's procedures copies of each report developed during the feasibility study were sent to two local libraries (the Fullerton Main and Hunt Branch) at the same time the documents were submitted to DOHS and EPA.

Articles published in the Daily News Tribune and the Daily Star Progress following the June 2, 1983, public meeting described the residents' reaction to the State's announcement. The overwhelming community consensus was an endorsement of the excavation alternative. No written comments were received by the State. State Community Relations staff telephoned individual members of the community advisory committee to solicit written comments. Members contacted stated that they felt the public's oral comments in favor of excavation were clearly stated during the public meeting. The residents primary concern was focused on removal of the waste to eliminate the threat of hazardous emissions. No concern was expressed regarding removal of the soil.

B. Responsiveness Summary

All meetings were recorded. These records and newspaper articles clearly indicate that the public favors excavation. Because no written comments on the alternatives were received, no formal summary is required.

VIII. CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

There are two environmental regulations with which the McColl cleanup is required to comply: Clean Air Act and Resource Conservation and Recovery Act (RCRA).

As required by the Clean Air Act, EPA has promulgated National Ambient Air Quality Standards for criteria pollutants such as SO_2, particulate matter, and ozone. Primary standards are designed to protect the public health. Secondary standards are designed to protect the public welfare. Under the Clean Air Act, States have the authority to set standards which are stricter than national standards. The State of California in conjunction with the South Coast Air Quality Management District, has set ambient air standards for SO_2 that must be met during the McColl excavation. The excavation has been designed to use foams and a containment structure to ensure that the standards are met. However, should the standards be exceeded, excavation could be delayed.

Authority to implement RCRA has been delegated to the State of California with the exception of permitting for surface impoundments, incineration and land disposal. Since the State is acting as the generator during cleanup, they will comply with their own regulations. RCRA generator standards will apply to the excavation. The State will comply with all regulations, including manifesting, recordkeeping, and reporting.

IX. RECOMMENDED ATERNATIVE

Section 104 (c) (4) of CERCLA states that EPA shall select the most "cost-effective" remedy. In addition, Section 101(24) of CERCLA states that off-site transport of hazardous substances is not appropriate unless it is "more cost-effective than other remedial actions" or "necessary to protect public health or welfare or the environment from a present or potential risk which may be created by further exposure to the continued presence of such substances." These provisions are explained futher in the National Contingency Plan. See sections 300.68(j) and 300.70(c).

EPA has carefully reviewed the State's cost-effectiveness evaluation and the CH_2M Hill review of the State's feasibility study, as discussed above. Based on EPA's independent cost-effectiveness evaluation, excavation and redisposal is the most cost-effective remedy.

Both containment options provide greater protection of public health during construction. However, the excavation and redisposal alternative provide the highest degree of protection after construction.

Estimates of the cost of containment range from $15,653,000 to $23,479,000; excavation costs range from $18,306,000 to $21,967,200. Costs estimated for an upgraded containment alternative range from $18,937,000 to $25,565,000. For comparison, costs for a containment facility designed to comply with RCRA range from $16,996,000 to $45,759,000.

The upgraded containment option is rejected because it is six percent more expensive than excavation and redisposal and does not provide the same level of long-term protection as excavation. Similarly, the RCRA on-site alternative is significantly more expensive than excavation and similarly provides the long-term protection of upgraded containment. In this case, EPA's evaluation indicated that excavation is cost-effective for the following reasons.

1. Although there is no evidence of an earthquake fault directly under the site, the Fullerton area is in the highest risk earthquake zone in California (Zone 4) as designated by the Uniform Building Codes. While the precise degree of risk is unclear, there is some risk of public exposure to hazardous substances, especially gases, should an earthquake disturb the containment system. Because the community is adjacent to the site, exposure would be rapid and without attention. The likely redisposal site (Casmalia) is in a lower risk earthquake zone (Zone 3).

2. The containment system is not tied to an impervious layer beneath the site. Thus, the potential for ground water contamination from leachate from the site remains. Available data indicate that several constituents from the waste have migrated approximately 50 feet or more below the land surface. While the concentration found at these depths are not hazardous, their presence indicates the vertical mobility of the waste.

3. The public has been informed of the short-term risks of excavation, and it supports the selection of excavation. The containment alternative would not have a high level of acceptance, because it would be difficult to guarantee such a system against possible failure. The State supports excavation, has designed the remedy, accepted bids for the cleanup, and is ready to award the cleanup contract.

All of the alternatives evaluated in detail were designed to be protective of health, welfare and the environment. The EPA therefore rejected the highest cost alternatives -- an on-site RCRA disposal facility and upgraded containment. Although the basic containment option was slightly less expensive than excavation, EPA's evaluation concluded that the long-term risks of containment and the long-term benefits of excavation justify the small cost differences (4 percent) between containment and excavation. The State, and EPA staff recommend the selection of excavation and redisposal as the cost-effective remedy. Total capital costs are expected to be $21,500,000, which includes a 20 percent construction contingency.