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Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R06-85/006
March 1985

EPA

Superfund Record of Decision:

South Valley, NM (IRM)

TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completing)

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16. ABSTRACT

The South Valley Site is located mostly in the inner valley of Albuquerque, New Mexico. Industrial development in South Valley began in the 1950s. Early industry included metal parts manufacturing. By the 1960s, organic chemicals were being handled in the area. Presently, petroleum fuels and various other organic chemicals are stored and handled within the area. South Valley has been designated as the State's highest priority site for cleanup due to the presence of potentially high concentrations of hazardous substances in the groundwater near the city of San Jose's wellfield.

The selected remedial action includes installing a new water supply well to replace the capacity of the contaminated well, San Jose No. 6. Total capital cost for the selected remedial alternative is estimated to be $775,000 with O&M costs approximately $12,000 per year.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision South Valley, NM (IRM) Contaminated Media: gw Key contaminants: VOCs		

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Record of Decision
Remedial Alternative Selection

SITE: South Valley, Albuquerque, N.M.

DOCUMENTS REVIEWED

I am basing my decision on the following documents describing the analysis of cost effectiveness and environmental soundness of initial remedial alternatives for the South Valley Superfund site:

- South Valley Focused Feasibility Study
- South Valley Focused Feasibility Study Amendment
- Summary of Remedial Alternative Selection
- Responsiveness Summary, including public comments

DESCRIPTION OF SELECTED REMEDY

A new water supply well is to be installed to replace the capacity of the contaminated well San Jose No. 6. The capacity of this well is currently required to provide the South Valley service area with adequate fire-protection water supply and to prevent possible contamination at the tap.

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 installation of a new water supply well as an initial remedial measure at the South Valley Superfund site is a cost effective, environmentally sound remedy and is necessary and feasible for protection of public health, welfare, and the environment from exposure or threat of exposure to a significant health or environmental hazard. The State of New Mexico requested this measure and has been consulted and agrees with the approved remedy. The action will require future operation and maintenance activities to ensure the continued effectiveness of the remedy. The City of Albuquerque has agreed to accept all operation and maintenance costs for the operating life of the well.

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. This measure is consistent with any permanent remedy to prevent or mitigate the migration of a release of hazardous substances into the environment.

The EPA is currently performing additional remedial investigations/ feasibility studies to evaluate the extent of off-site contamination and possible source control measures to remediate contamination at the South Valley site. If additional remedial actions are determined to be necessary a ROD will be prepared for approval of the future remedial action.

March 22, 1985
Date

Dick Whittington, P.E.
Regional Administrator
U.S. EPA Region VI

SUMMARY OF INITIAL REMEDIAL MEASURE ALTERNATIVE SELECTION

Albuquerque South Valley

March, 1985

Site Location and Description

The South Valley Site, shown in Figures 1 and 2, is located mostly in the inner valley of the Rio Grande River southwest of Albuquerque, New Mexico. It has been designated as the State's highest priority site for cleanup due to the presence of potentially high concentrations of hazardous substances in groundwater near the City's San Jose wellfield.

Site History

Industrial development in the South Valley began in the 1950s. Early industry included metal parts manufacturing. By the 1960s, organic chemicals were being handled in the area. Presently, petroleum fuels and various other organic chemicals are stored and handled within the area.

Although earlier problems with wells had been reported, groundwater contamination was first suspected in 1978 when tastes and odors were noted in a private well near facilities operated by a chemical distributing company. Subsequent sampling showed certain volatile organics were present in two municipal wells - San Jose No. 6 (SJ-6) and San Jose No. 3 (SJ-3). (See Figure 2.) These wells were subsequently taken out of operation by the City. SJ-6 was a very productive and economical source of potable water for the City and also played a key role in providing sufficient fire protection. The New Mexico Environmental Improvement Division conducted a monitoring program (during 1980 through 1982), which indicated groundwater contamination in South Valley may have a number of sources, including several industrial operations located in close proximity to the contaminated wells.

In June 1982 the New Mexico Environmental Improvement Division stated that the Albuquerque South Valley site is the State's number one priority Superfund site. The State requested the site be ranked for inclusion on the National Priorities List (NPL), under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42U.S.C.§9601 et seq., also known as "Superfund." The site made the NPL which was published in the Federal Register on December 30, 1982. On August 9, 1983, the Director of the New Mexico Environmental Improvement Division requested that EPA initiate Remedial Investigations and Feasibility Studies associated with the South Valley Superfund site including the resolution of immediate water supply problems resulting from the shut-down of the contaminated SJ-6 well.

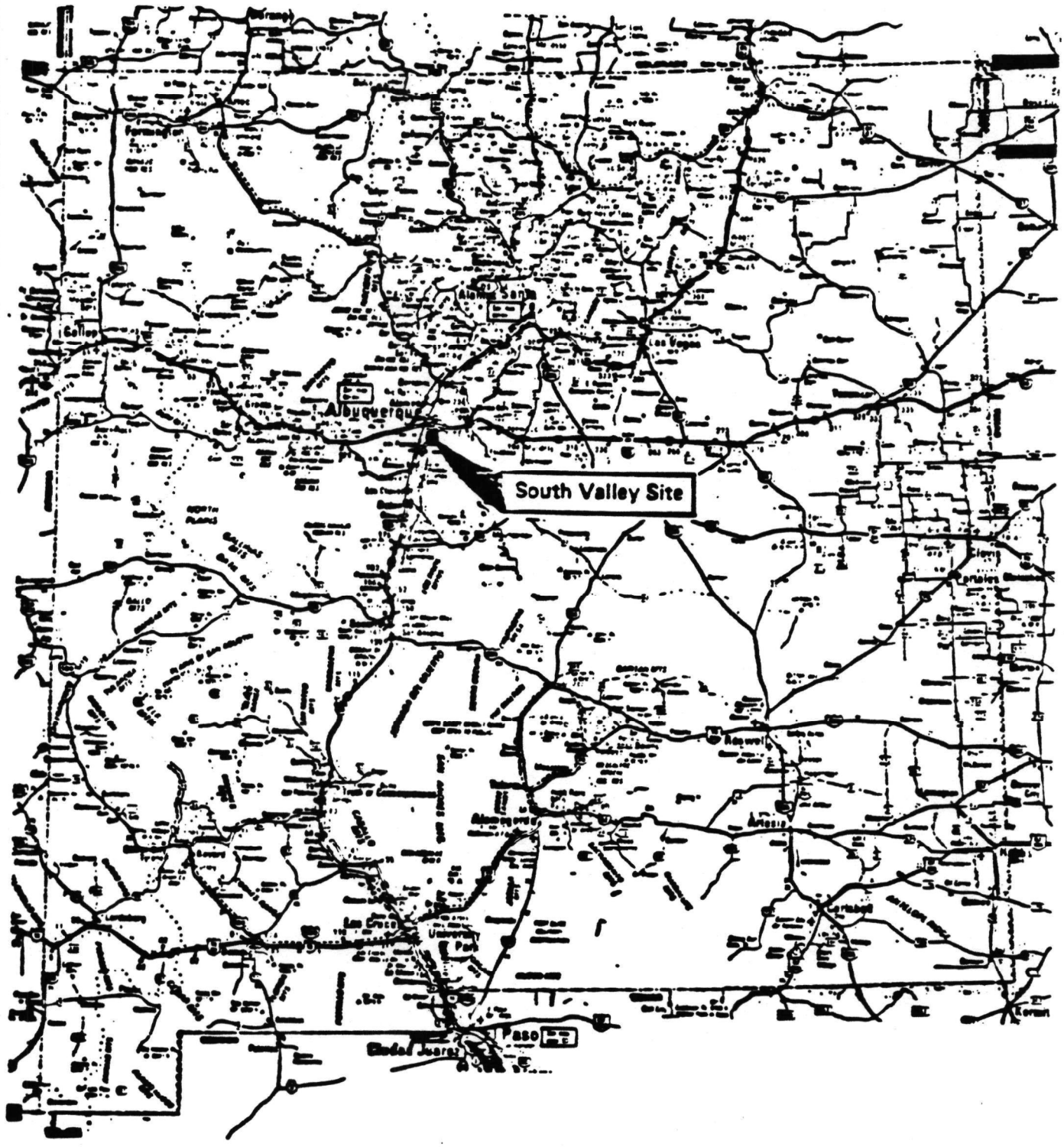

Figure 1
New Mexico and South Valley Site Location

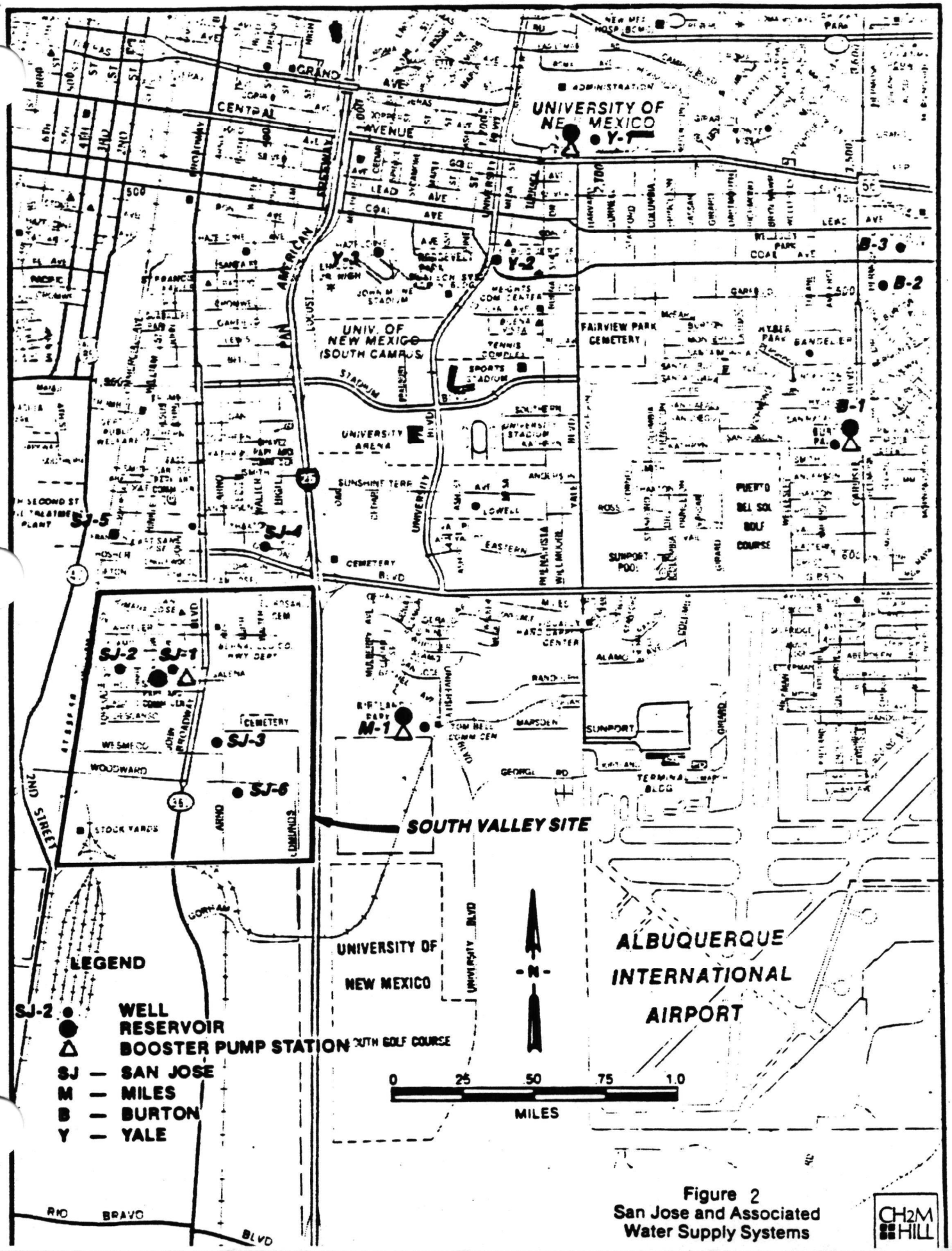

Figure 2
San Jose and Associated
Water Supply Systems

The Environmental Protection Agency (EPA) is currently conducting 2 studies in the Albuquerque South Valley area pursuant to Section 104 of CERCLA and one study pursuant to Section 3013 of the Resource Conservation and Recovery Act (RCRA). The EPA studies, which were requested by the Director of the New Mexico Environmental Improvement Division (NMEID) are as follows:

- Offsite Remedial Investigation (104 CERCLA)
- Source Control Remedial Investigation (3013 RCRA)
- Focused Feasibility Study (FFS) (104 CERCLA)

The purpose of the CERCLA offsite remedial investigation is to determine the nature and extent of the contaminated groundwater at the South Valley site and to gather necessary data to support a study of remedial measures and to provide long-term monitoring of the contaminated groundwater system. The objectives of the offsite investigation are:

- Determine the general extent of contamination at the site.
- Determine the direction and velocity of contaminant migration (i.e., groundwater flow direction).
- Determine the future environment/human health impacts that may be caused by the contaminated aquifer.
- Develop a plan for a long-term monitoring well and testing program to assess any long-term impacts on the aquifer.

This investigation is part of the overall effort to identify and control groundwater contamination in the South Valley area. The offsite remedial investigation and the FFS are being conducted independently but are closely related, since SJ-6 draws its water from the same aquifer being studied in the offsite Remedial Investigation. Phase I of this study is scheduled to be completed in March 1985.

The primary goal of the source control remedial investigation is to identify the source or sources which have caused or have the potential for causing the groundwater contamination at the South Valley site. This investigation is being accomplished through the implementation of five RCRA 3013 Orders and one CERCLA Consent Agreement (with the U.S. Air Force) which were issued during the period of August to October 1984. The information gathered during this study will eventually result in the development of remedial measures needed to control releases or potential releases from contaminant source(s). First phase remedial investigation results are expected to be submitted for EPA review by June 1985.

The contamination and subsequent shut-down of well SJ-6 has had a drastic impact upon the production of the San Jose well field. Concern was expressed

by officials representing the City of Albuquerque that water system reliability and fire-protection water supplies were inaequate to serve the needs of the South Valley service area as a result of the shut-down of SJ-6. This concern was part of the impetus for the NMEID Director's request for EPA assistance filed August 9, 1983. In response to the Director's request, a Focused Feasibility Study was conducted by EPA contractor CH_2M Hill to determine if an initial remedial measure (IRM) was required to mitigate potential threats or endangerment to human health, welfare, or the environment resulting from the shut-down of SJ-6. Appropriate remedial measures would be developed to rectify any adverse impacts identified. The completion date (including public input) for the FFS including an amendment was March 1985. This Record of Decision addresses only the results of the FFS associated with initial remedial measures which must be implemented at the South Valley site.

Current Site Status

A review of the existing data base indicated that samples were taken and analyzed from private and municipal wells and from monitoring wells installed by the New Mexico Environmental Improvement Division in and near the South Valley site. The wells from which these samples were taken varied in location, depth, and type of installation. Variations in contaminant concentrations were observed among the wells that were sampled and were also noted in wells that have been repeatedly sampled. Generally, contaminants found have been volatile organic compounds. A more detailed description of these sampling efforts and the results of the analyses are presented in the Remedial Action Master Plan for the South Valley hazardous waste site dated July 25, 1983.

The results of samples taken from SJ-6 thru February 1982 are presented in Table 1. Although these data are limited, they indicate that detectable levels of volatile organics existed in the wellwater. Also, one sample analysis detected, but did not quantify, some base neutral compounds in the wellwater.

In order to develop a strong statistical base within acceptable confidence limits, additional sampling and analyses were deemed necessary. Therefore, in April and May 1984, as part of the FFS, a 2 week continuous pump test with daily sampling was performed on SJ-6. The results of the analyses of these samples are shown in Table 1.

For the most part, samples collected during the FFS are consistent with previously collected samples in the types and concentrations of contaminants. (See Table 1.) Although the limiting contaminant for air-stripping treatment alternatives, 1, 2-dichloroethane, was not detected in these most recent samples, it should be noted that the two week pump test conducted upon SJ-6 in 1984, during which the samples were taken, followed a period of two years when the well had been shut down. It is possible that the contaminant had not been fully drawn into the well's cone of influence during the 1984 pump test and was, therefore, not detected in recent samples analyzed. The laboratory analytical results which were reported

Tabl

ANALYTICAL RESULTS OF SOUTH VALLEY GROUNDWATER SAMPLES FROM SAN JOSE WELL No. 6

Contaminant	Date of Sample Collection, µg/L													
	8/80	9/17/80	11/80	11/26/80	12/80	2/19/81	2/19/81	2/19/81	2/19/81	2/81	10/81	2/82	2/82	2/82
VOLATILE ORGANICS														
Benzene	X	X												
methyl-	X	X											4	
dichloro-	X												3	
trichloro-	X							10					1	1
tetrachloro-	X													
Ethane														
1,1-dichloro-		X				6	10	10	10		X		3	13
1,2-dichloro-													1	4
1,1,1-trichloro-													1	
Ethene														
1,1-dichloro-	X				11	7	11	10	10	10			3	10
1,2-trans-dichloro-					1		10			X				
trichloro-	X	X			10	6	10	10	10	10	X		6	21
tetrachloro-	X	X				4	10	10	10	10	X	X	4	16
BASE NEUTRAL COMPOUNDS														
Di-N-Butylphthalate				X										
Dibutyl phthalate				X										
3-chloro-2-butanol														
1,1-dibromo-2-chloro-2fluoro-cyclopropane				X										
(octyloxy) methylbenzene				X										
5-phenyl-1,3-dioxolane				X										
1-bromo-1,2-dichloro-cyclopropane				X										
Diethylphthalate														

Contaminant	Date of Sample Collection, µg/L													
	4/23/84	5/24/84	5/25/84	5/26/84	5/27/84	5/28/84	5/29/84	5/30/84	5/1/84	5/2/84	5/3/84	5/5/84	5/5/84	5/6/84	5/7/84
VOLATILE ORGANICS															
Benzene															
methyl-															
dichloro-															
trichloro-															
tetrachloro-															
Ethane															
1,1-dichloro-	11	11	[4]	[4]		[4]	[4]	[4]	[5]	[5]	[5]	[5]	[7]	[6]	
1,2-dichloro-															
1,1,1-trichloro-															
Ethene															
1,1-dichloro-	16	13	11	10	12	[6]	[7]	[6]	[8]	[8]	[7]	[7]	[7]	[8]	
1,2-trans-dichloro-	12	10	[5]	[5]	10	[6]	[6]	[6]	[7]	[7]	[6]	[6]	[7]	[7]	
trichloro-	7	6	[5]	[6]	[5]	[4]	[4]	[4]	[5]	[5]	[4]	[5]	[5]	[5]	
tetrachloro-															
2-butanone															
hydrofuran															
BASE NEUTRAL COMPOUNDS															
Di-N-Butylphthalate												[6]			
Dibutyl phthalate															
3-chloro-2-butanol															
1,1-dibromo-2-chloro-2fluoro-cyclopropane															
(octyloxy) methylbenzene															
5-phenyl-1,3-dioxolane															
1-bromo-1,2-dichloro-cyclopropane												[4]			
Diethylphthalate															

[a] Detected, but below quantifiable limit.

Notes: X = Parameter identified but not quantified.
Blank = Not available or contaminant not analyzed for.

through 1982 can not be easily discounted. Two indpendent laboratories detected 1,2-dichloroethane (which has a Recommended Maximum Contaminant Level (RMCL) of zero in drinking water) in well SJ-6 samples collected on the same day. One of the laboratories has been audited by the EPA since 1978 and has always performed well. For these reasons, it was assumed, when setting design criteria for certain treatment alternatives, that 1,2-dichloroethane, may be present.

Table 2 presents a summary of statistical information for the data which were collected on SJ-6. The data in Table 1 show a possible downward trend with time in contaminant concentrations during the first week of the most recent sampling period. This trend, as opposed to random scatter, is largely responsible for the standard deviations of these data. Currently, there is no known explanation for this apparent trend. Samples collected and analyzed during the second week of the 1984 pump test of SJ-6 demonstrated consistency both with respect to types of contaminants identified and the concentrations of contaminants detected.

Three of the four contaminants detected during the 1984 pump test of well SJ-6, are suspected carcinogens. EPA RMCL's for these three contaminants are zero (Table 3). Table 3 also summarizes the excess lifetime cancer risk associated with ingestion of various carcinogenic contaminants. The goal of most CERCLA remedial actions is to reduce potential carcinogen contaminant concentrations to between the 10^{-4} and 10^{-8} risk levels. A 10^{-6} excess lifetime cancer risk level is typically used. Contaminant concentrations of three of the four primary compounds detected during the April/May sampling effort exceed the 10^{-6} excess lifetime cancer risk levels shown in Table 3 even if dilution by other wells in the San Jose Jose well field is considered. Therefore, the water quality of SJ-6 would pose a threat to public health if consumed prior to treatment. Most of the substances, including the chlorinated ethanes, ethenes, and methanes, which have been detected during the various analyses of SJ-6 well water to date, are hazardous substances as defined in Section 101(14) of CERCLA.

The fact that SJ-6 had been taken out of service due to contamination problems has had a serious impact upon the available fire-protection water supply in the South Valley service area. Fire protection equipment purchases and fire-protection strategy development have been based upon the availability of three million gallons of reserve storage capacity. Serious fire-protection water supply shortages occurred during the summer of 1980 when water dedicated to fire-protection was utilized to satisfy daily demands. Fortunately, no major fires occurred during these conditions. Similarly severe water shortages did not occur during the period 1981 through 1984 due, almost certainly, to the fact that greater amounts of precipitation were received during the summer months relative to 1980. Statistics prepared by the Middle Rio Grande Council of Governments of New Mexico indicate that population increases were projected for the South Valley area during this same period of time. A year of similar dryness to that of 1980 would not be unlikely, and it is anticipated that the magnitude of fire-protection water supply shortfalls would be more severe than the shortfalls experienced in 1980. If a major fire were to occur in the South Valley area, public health would be threatened by the danger of fire, as well as the posiblity that SJ-6 would be pressed into service to meet the emergency, producing contaminated water at the tap.

Table 2
SUMMARY OF QUANTIFIED CONTAMINANT DATA FOR SAN JOSE WELL NO. 6

Volatile Organic Contaminant	Sampling Prior to Focused Feasibility Study (6/80-2/82) Contaminant Range (µg/L)	Samples with Quantified Analyses Data	Mean (µg/L)	Standard Deviation (µg/L)	Sampling During Focused Feasibility Study (4/23/84-5/2/84) Contaminant Range (µg/L)	Samples with Quantified Analyses Data	Mean (µg/L)	Standard Deviation (µg/L)	Proposed EPA Standards (µg/L)
Methane									
Dichloro	ND-4	1	4	N/A					--
Trichloro	ND-10	2	6.5	5					--
Tetrachloro	ND-1	1	1	N/A					0
Ethane									
1,1-Dichloro	ND-13	6	8.7	3.6	11-11	2	11	0	--
1,2-Dichloro	ND-4	2	2.5	2.1					0
1,1,1-Trichloro	ND-1	1	1	N/A					200
Ethene									
1,1-Dichloro	ND-11	8	9	2.7	10-16	5	12.4	2.3	0
1,2-Transdichloro	ND-1	1	1	N/A					--
Trichloro	ND-21	7	10.4	5	10-12	3	10.67	1.15	0
Tetrachloro	ND-16	7	9.1	4.1					0

Notes: ND = Not detected.
N/A = Not applicable.

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Table 3
WATER QUALITY STANDARDS CRITERIA AND DETECTION LIMITS
FOR CONTAMINANTS FOUND IN SAN JOSE WELL No. 6

Contaminant	EPA Recommended Maximum Contaminant Levels[a] (ug/L)	Excess 10^{-6} Lifetime Cancer Risk (ug/L)[c]	NMWQCC Regulations Discharge Onto or Below the Ground[b] (ug/L)
VOLATILE ORGANICS			
Benzene	0	0.68	10
Methylbenzene (Toluene)	--	--	15,000
Methane			
Dichloro	--	--	--
Trichloro	--	--	--
Tetrachloro	0	--	10
Ethane			
1,1-Dichloro	--	--	--
1,2-Dichloro	0	0.95	20
1,1,1-Trichloro	200	--	--
Ethene			
1,1-Dichloro	0	0.25	5
1,2-Transdichloro	--	--	--
Trichloro	0	2.8	100
Tetrachloro	0	0.9	20

[a]Federal Register, June 12, 1984 page 24352.

[b]New Mexico Water Quality Control Commission (NMWCC) Regulations, as amended through September 20, 1982.

[c] U.S. EPA Carcinogen Assessment Group

Enforcement

Notice letters have been sent to all of the identified potentially responsible parties (PRPs) for the site. The PRPs were offered the opportunity to conduct Remedial Investigation/Feasibility Studies (RIFS) and the remedy. An administrative order for conducting the RIFS was drafted and presented to the PRPs, but all declined to enter on consent. EPA then determined to pursue a three pronged strategy to accomplish remedial objectives at the South Valley Site. As stated previously, those three approaches were the off-site remedial investigation, source control investigations under RCRA 3013, and the FFS which supports initial remedial measures (IRM).

EPA contractor CH_2M Hill is in the process of conducting the offsite remedial investigation. EPA has issued negotiated or unilateral administrative orders for onsite Source Control investigations pursuant to RCRA §3013. These individual source control investigations for each PRP are to be conducted and funded by the PRPs, and the results are to be integrated with the results of the offsite remedial investigation.

An FFS and an amendment thereto have been performed by CH_2M Hill to investigate remedial alternatives which would mitigate the immediate endangerment to public welfare posed by the shut-down of SJ-6. EPA has selected the appropriate IRM from those alternatives evaluated in the FFS and plans to contact the PRPs and offer them an opportunity to implement the IRM. If the PRPs decline to implement the IRM and fund moneys are used, EPA will take cost recovery actions to recover these expenditures.

Alternatives Evaluation

Background

The FFS and FFS Amendment, which are considered as part of the ROD, address potential remedial action alternatives which will mitigate fire-protection water supply shortfalls that have resulted from the shut-down of contaminated well SJ-6, and prevent contaminated water from reaching the tap.

This action is being conducted in conformance with the National Contingency Plan (NCP) Part 300.68 as published in the Federal Register on July 16, 1982. Sufficient fire-protection water supply has not been available on a reliable basis in the San Jose service area since well SJ-6 was taken out of service due to contamination by hazardous substances. Part 300.68 (e)(1) of the NCP states:

> "In some instances, initial remedial measures can and should begin before final selection of an appropriate remedial action if such measures are determined to be feasible and necessary to limit exposure or threat of exposure to a significant health or environmental hazard and if such measures are cost effective. ... The following factors should be used in determining whether initial remedial measures are appropriate:
>
> ...
>
> (iii) Contaminated drinking water at the tap. (Measures might include the temporary provision of an alternate water supply).

...
(vi) Serious threat of fire or explosion or other threat to public health or the environment...."

It should be noted as well that 40 CFR 300.65 (b)(2) provides that provision for alternative water supplies is an acceptable action to prevent or mitigate danger to public, health welfare, or the environment. Further, Section 300.65(a) specifically spells out the threat of contamination of a drinking water supply, and fire and explosion, as dangers which warrant immediate response action under 300.65(b). Although these provisions govern immediate removal actions under CERCLA, and are not rules governing remedial actions such as initial remedial measures (IRM's), the circumstances and rationale are similar since IRM's are generally addressed in situations with a degree of immediacy. Additional support for the implementation of IRM's in the circumstances of this case is found in 40 CFR 300.70(d)(3) which spells out the "provision of new wells in a new location or deeper wells" as a proper remedial method of providing alternative water supplies.

The lack of sufficient fire-protection water supply due to the contamination and subsequent shut down of SJ-6 satisfy the conditions for initial remedial meassures set forth in Parts 300.68 of the NCP. If Well SJ-6 were conceivably pressed into service to supplement the fire-protection water supply during peak demand periods to counter possible fire danger to the public health and welfare, then there is a likelihood that contaminated water would flow to the taps of South Valley residents and be consumed. Based upon the concentration of contaminants identified in well SJ-6 and proportioning the flow capacity of SJ-6 to the total San Jose well field capacity, it was determined that consumption of water delivered to the tap would pose a threat to human health. As noted above, contaminated drinking water at the tap satisfies the conditions for conducting an immediate remedial measure set forth in Part 300.68 (e)(1)(iii) of the NCP.

Alternatives Development

The alternatives which were developed in the FFS and FFS Amendment considered treating the water from the well, taking no action, replacing SJ-6 with a new well at another location, constructing additional storage facilities and transferring excess capacity to the South Valley service area from other parts of the Albuquerque water system. Listed below are the treatment and nontreatment alternatives which were considered as potential remedial actions at SJ-6 prior to the initial screening:

- Treatment Alternatives
  - Physical/Chemical
  - Oxidation
  - Air Stripping
  - Activated Carbon Adsorption
  - Synthetic Resin Adsorption

- Nontreatment Alternatives
  - No Action
  - Reactivation of Existing Well
  - New Well
  - Rehabilitation of Aquifer
  - Construction of Additional Storage Facilities
  - Transfer of excess capacity from other parts of the Albuquerque water system

A complete description of the above alternatives can be found on pages 19 through 37 of the FFS and pages 4-1 through 4-14 of the FFS Amendment and will not be discussed here.

The alternatives mentioned above were subjected to an initial screening process aimed at reducing the number of alternatives to those that are most suited to meeting the project objective. The criteria used for this screening process are the following:

- Environmental Effectiveness. Alternatives must not pose significant adverse environmental effects and must contribute to the protection of the public health and environment.

- Engineering Feasibility. Alternatives should rely on proven technology and should be able to be implemented effectively for this specific project.

- Cost. Both capital and operation and maintenance costs must be considered for each alternative. An alternative which far exceeds the cost of other alternatives evaluated without providing substantially greater public health or environmental benefit should be eliminated from further consideration.

Alternative Selection Summaries

The following short summaries explain the major reasons why an alternative was eliminated or retained for further development:

Physical/Chemical Treatment - Physical/Chemical treatment was eliminated because studies have shown that it would not be effective in removing the volatile organic compounds found in SJ-6.

Oxidation - All of the developed oxidation processes were eliminated. The two primary reasons for the elimination of these alternatives, are: oxidation is not effective in removing the volatile organics and the costs are very high.

Air Stripping - Air stripping by packed stripping towers was retained for further development. The cost for this alternative is moderate, and its effectiveness for removing volatile organics has been demonstrated.

Steam Stripping - Steam stripping was eliminated because of the extremely high energy costs that would be required, and because air stripping accomplishes the same objective at a much lower cost.

Activated Carbon Treatment - The activated carbon adsorption alternative was retained for further evaluation. Even though this alternative appears relatively costly it has been proven very effective in removing the types of organic compounds detected in SJ6.

Synthetic Resin Adsorption - Synthetic resins were eliminated from further consideration because of process uncertainties. Synthetic resins may have some potential advantages over activated carbon, but little information and experience are available on the effectiveness of removing the volatile organic compounds found in SJ6.

No Action - If no action was chosen, the City of Albuquerque would continue to serve the area of the South Valley with a less than adequate fire-protection water supply. In addition, stand-by well capacity in the San Jose well field has been determined to be inadequate. Occurence of a major fire in the South Valley area during a period of peak demand would result in an insufficient firefighting response and a serious threat to human health, welfare, and the environment. Additionally, there is the possibility that SJ-6 might be pressed into service to meet such an emergency with a resulting endangerment of contaminated water at the tap. Supplying water to the San Jose system with only the existing wells (excluding SJ-6) would result in a system reliability, which is less than that recommended in the City Master Plan.

Reactivation of Existing Well - This alternative consists of using SJ-6 without treating the water and operating it to maximize dilution from the other wells supplying the system. Contaminant concentrations in well SJ-6 would pose a threat to human health if consumed. Therefore this alternative was eliminated.

New Well - The alternative for constructing a replacement well for SJ6 was retained for further evaluation. A new well would mitigate water quality concerns, and its cost appears comparable to several treatment alternatives.

Rehabilitation of Aquifer - Rehabilitation of the aquifer by eliminating the source or sources of contamination and removing the existing contaminants is a very desirable long-term solution. Determining the nature and extent of groundwater contamination, identifying the sources of contamination, and subsequently mitigating the problems are goals of the Remedial Investigation, Remedial Feasibility Study and Final Remedial Action to be conducted during 1984-1987. Since aquifer rehabilitation cannot be implemented in the short term to get SJ6 or its capacity back into service, this alternative was eliminated.

Construction of Additional Storage Capacity - This alternative consists of the construction of additional storage capacity in the Ridgecrest Trunk such that a sufficient fire-protection water supply would be available even during periods of peak demand. Based upon Albuquerque water system records pertainig to the South Valley service area, an estimated 16 MG of additional storage capacity would be required to overcome production shortfalls experienced during the peak week in 1980 and still maintain the necessary 3 MG fire-protection water supply. Due to growth which had been projected to have occurred in the South Valley service area over the past four years, even larger storage requirements would be anticipated for another year having similar rainfall conditions to that of 1980. The estimated present worth cost of providing an additional 16 MG of storage in the Ridgecrest Trunk exceeds $3,000,000. This alternative was eliminated since installation of a new well could just as effectively accomplish the same objective but at a substantially lower cost.

Intersystem Transfers of Excess Capacity - This alternative considers the possibility of diverting excess capacity from other regions of the Albuquerque water system to the South Valley service area. The availability of excess capacity in the upstream zones of the Ridgecrest Trunk, which is served by the San Jose well field, as well as excess capacity of other trunk lines was investigated. Analysis of past water system records indicate that upstream regions of the Ridgecrest trunk and trunk lines adjacent to the Ridgecrest trunk possess no excess capacity and are, at present, unable to produce an acceptable level of firm capacity (well field capacity with the largest well out of service for stand-by). An apparent excess water supply does appear to be present in the northern Montgomery trunk. This apparent excess capacity could conceivably be transmitted to the South Valley service area through an existing bypass line. The apparent capacity of the Montgomery trunk is only superficial in that peak demand does not exceed the capacity of all available units operating simultaneously. An integral part of any water system design is the provision of standby capacity to be employed in the event of system component failure. Utilizing a reasonable assumption that the largest well in a particular well field is dedicated to stand-by (as per the City Master Plan), no true excess capacity is available in the Montgomery Trunk. It would not be prudent to jeopardize the balanced water supply network of the Montgomery trunk in order to counterbalance present fire protection water supply shortages in the Ridgecrest trunk. This alternative was, therefore, eliminated.

Following the screening process, two treatment alternatives (activated carbon and air stripping) and one nontreatment alternative (new well) remained. These alternatives were developed in more detail which included a discussion of the following factors:

- Description of each remedial action alternative;
- An assessment of its effectiveness in removing contaminants found in SJ-6;
- Operating, maintenance, and monitoring requirements;

- Environmental, safety, and institutional considerations; and

- Cost (capital and operation/maintenance costs).

After the three remaining alternatives were developed addressing the above factors, they were each evaluated using the following criteria:

Monetary Evaluation

- Cost - capital, operation/maintenance, salvage values and present worth costs.

In regard to the operation and maintenance costs calculated for the air-stripping and new well alternatives, two schemes were utilized. The first scheme considered that the selected alternative would be operated on a schedule similar to that of SJ-6 when the well was in service. No wells in the San Jose field would be utilized preferentially over the design life of the facility. Operating within this non-preferential scheme allows cycling of the component wells so that mechanical wear is evenly distributed among the components. The second operational scheme considered that the selected alternative would be operated on a preferential basis and would only be utilized to supply peak demands. Utilization of this preferential operational scheme transfers the burden of mechanical wear to the other component wells within the San-Jose field.

Estimated present worth costs for the air-stripping alternative using the preferential operational scheme could be reduced 24 to 27 percent compared to using the same alternative and a non-preferential operational scheme. Only a 6 to 7 percent present worth cost reduction would be realized if the preferential operational strategy were utilized for the new well alternative due to the fact that annual O & M costs associated with the new well alterntive are low relative to the air-stripping alternative. The cost estimates for the preferential operational scheme do not consider the reduced service life and associated cost for the other component wells in the San Jose field which must operate for increased periods.

EPA had requested that their contractor, CH_2M Hill, investigate the preferential operational scheme for air stripping SJ-6. For a limited period, the selected IRM could be operated on a preferential scheme. At present, however, it appears likely that the over-all site remediation will be a lengthy process. Under these circumstances the preferential operational scheme could not be utilized. The remaining wells in the San Jose well field would be subjected to unusual wear due to long-term preferential operation of the air-stripping well. Therefore, for cost comparison purposes, EPA has evaluated all of the remaining alternatives utilizing the non-preferential operational scheme.

Nonmonetary Evaluation

- Environmental effectiveness - Examples of these criteria include a positive or negative impact on land use, public health and environment, public acceptability and safety.

- Engineering feasibility - Examples of this criteria include technical feasibility and effectiveness, reliability, operability, ease of implementation and compatibility with existing facilities, and constructibility.

A detailed discussion of the development and evaluation of the remaining alternatives can be found in Section 3 of the FFS. Rough cost estimates (1984 dollars) for the alternatives which appear to be both feasible and effective are presented in Table 4. Portions of the discussions regarding the development and evaluation of the alternatives will be explained in the section entitled "Recommended Alternative."

Community Relations

The community relations activities associated with the selected IRM are included in Attachment 1.

Consistency with other Environmental Laws

A discussion of other environmental laws which could conceivably impact the remaining three alternatives for this CERCLA initial remedial action follows:

- Safe Drinking Water Act - All three alternatives are in compliance with the Safe Drinking Water Act. However, no Maximum Contaminant Levels (MCL) currently exist for the contaminants detected in well SJ-6. Recommended Maximum Contaminant Levels (RMCL) have been set at zero for three of the four contaminants detected during the 1984 pump test of SJ-6. It is not known, at present, whether the zero based RMCLs will be adopted as MCLs, or if the RMCLs will be modified before being adopted. For this reason, it is difficult to evaluate the treatment efficiency of the two treatment alternatives or to ascertain compliance of the two treatment alternatives with MCLs which may be adopted at some future date.

- Resource Conservation and Recovery Act (RCRA) - The new well alternative will not be impacted by RCRA. RCRA hazardous waste treatment standards must be met for both treatment alternatives in that the contaminants identified in well SJ-6 may be listed RCRA wastes. RCRA storage and disposal requirements may also have to be met for the air-stripping and carbon adsorption treatment alternatives.

- Clean Air Act (CAA) - The new well and carbon adsorption alternatives will not be impacted by the CAA. Air emmissions of volatile organic constituents would be associated with an air stripping facility utilized

Table 4
MONETARY EVALUATION OF ALTERNATIVES

Alternative	Capital Cost	Annual Operation and Maintenance Cost	Salvage Value[b]			Alternative Present Worth[a] and (Rank)		
			5 yr	10 yr	20 yr	5 yr	10 yr	20 yr
Air Stripping	499	36	374	250	0	403 (1)	624 (1)	805 (1)
Carbon Adsorption	1,806	329	1,354	903	0	2,212 (3)	3,479 (3)	4,607 (3)
New Well	775	12	581	388	0	460 (2)	699 (2)	877 (2)

[a] Based on an interest rate of 10 percent.
[b] Assumes a composite service life of 20 years for all alternatives.

Notes: All costs are in 1,000's of dollars.
All costs are presented for comparative purposes only. Actual costs will vary depending upon final project scope, actual labor and materials costs, competitive market conditions, schedule, and other variable factors.

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to treat contaminated SJ-6 waters. Compliance with emission control standards may be required should the air stripping alternative be the selected IRM.

Recommended Alternative

Section 300.68 (j) of the National Contingency Plan (NCP) states that the appropriate extent of remedy shall be determined by the lead agency's selection of the remedial alternative which the agency determines is cost-effective (i.e., the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare, or the environment). Based upon our evaluation of the Focused Feasibility Report, EPA has determined and the State has agreed, that the new well alternative meets the NCP criteria. The following discussion describes the recommended alternative and the reasons for its selection.

The carbon adsorption treatment alternative was not included in the following discussion because it is about 600 percent more costly than the air stripping treatment alternative with no measureable advantages. (see Table 4.) For a complete discussion of this alternative please refer to sections titled "Development of Alternatives and Initial Screening and Evaluation of Alternatives" in FFS.

The recommended alternative consists of constructing a new well to replace SJ-6. A specific location for the new well cannot be determined at this time. A site for the new well will be carefully selected using the extent of contamination assessment developed during the remedial investigation and site specific hydrogeological data. The new well would be chlorinated at the wellhead and would discharge directly into the distribution system.

Based on the well siting survey to be performed, the agency expects that the new well will be productive and would not introduce contaminants into the Albuquerque water distribution system. This alternative does not depend on a treatment process and, therefore, has a very low risk of failure.

Environmental impacts of the new well alternative would be essentially nonexistent. The alternative would be consistent with approximately 80 other existing water supply wells in the Albuquerque water supply system. In addition, the recommended alternative would be easily implemented since it is compatible with the existing Albuquerque water supply system and does not require additional sampling and/or pilot testing to implement. However, a siting investigation will need to be performed. This will consist of reviewing City files on existing wells, gathering and evaluating available geohydrology data, and preparing a well-siting report.

Cost information is shown on Table 5. The operation and maintenance cost (annual costs) of the new well is estimated at $12,000 annually. This cost is primarily associated with the operation and maintenance of the

Table 5
New Well Construction Cost[a]

Item	Estimated Cost
Land (100 x 100 ft)	$ 10,000[b]
Drilling and Casing (1,200 ft deep)	212,000[b]
Pump Building and Pump	200,000[b]
Automatic Controls	25,000[b]
Chlorination System	25,000[b]
Drain Line (1,600 ft)	40,000[b]
Collector Line (300 ft)	10,000[b]
Well Siting Investigation	20,000
Subtotal	$542,000
Contingency (30%)	163,000
Subtotal	$705,000
Administrative, Legal, and Engineering	70,000
Total	$775,000

Estimated Annual Cost - New Well

Item	Estimated Cost
Labor	$ 8,000
Materials	$ 4,000
Total	$12,000

[a]Costs shown are for a new well at the location shown in the City's Water Supply Master Plan for Yale Well No. 7; i.e., just northwest of Gibson Boulevard and University Boulevard.

[b]City of Albuquerque Water Resources Division, December 1983.

chlorination system at the new well and not at SJ-6. The $12,000 annual cost does not include the electric power needed to run the new well since it would be essentially the same as the power costs for running SJ-6 in the treatment alternatives.

The evaluation of the air stripping alternative is limited to the use of packed towers. Other stripping methods - namely, stripping ponds or basins, have been screened from further consideration because of the larger land area required, relative cost, and higher risk of contamination.

Based on contaminant concentrations presented in Table 1, two towers, 12 feet in diameter, with a packing depth of approximately 13 feet appear to be needed. All new components would be located at the existing San Jose storage reservoir site.

The tower size depends on several factors, such as temperature and ambient air quality. However, the influent contaminant concentration is the most important factor. With only two influent data points on the most difficult contaminant to air strip (1,2-dichloroethane), rationally judging future influent concentrations is not possible. Therefore, the need exists for additional sampling and analysis, in order to develop a sound data base prior to design, if this alternative were to be implemented.

Studies referenced in the FFS have shown that air stripping is an effective means of lowering the concentration of volatile organic compounds and should be capable of treating the water from SJ-6 to concentrations below the levels associated with a 10^{-6} cancer risk.

Air quality should not be seriously impacted by implementing this alternative. For a packed tower installation in which influent volatile organic concentrations were near 1,000 ug/l, a concentration 15 times greater than what is found in SJ-6, computer modeling found ground level concentrations several orders-of-magnitude less than Occupational Safety and Health Administration (OSHA) and National Institute of Occupational Safety and Health (NIOSH) standards.

The air stripping alternative could not be as easily implemented as the new well alternative since it is an unfamiliar technology relative to current Albuquerque water supply system operations. Special controls and warning devices will need to be part of this alternative along with special training of city personnel.

Noise will be associated with the operation of the air stripping system which may be objectionable to area residents. Also under certain weather conditions, water vapor emitted from the stripping towers may form localized fog or icing conditions which may also be a objectionable to area residents.

Table 6 presents the estimated capital and annual operation and maintenance costs for this alternative. Influent and effluent dichloroethane concentrations were assumed to be 4 and 0.6 ug/L respectively. Table 4 summarizes the results of the monetary evaluation, and the alternatives are ranked as follows:

Table 6

ESTIMATED CAPITAL COST-PACKED TOWER AIR STRIPPING

Item	Estimated Cost[a]
Bond, Insurance, Mobilization	$ 12,000
Stripping Towers	180,000
Piping, Plumbing	10,000
Pump and Wet Well	21,000
Blowers	17,000
Samplers and Meter	12,000
Sampling Program	12,000
Instrumentation and Control	40,000
Pre-design	30,000
Subtotal	$334,000
Contingency (30%)	100,000
Subtotal	$434,000
Administrative, Legal, Engineering	65,000
Total	$499,000

ESTIMATED ANNUAL COST-PACKED TOWER AIR STRIPPING

Item	Estimated Cost
Labor	$ 5,000
Electric Power	16,000
Laboratory Testing	6,000
Parts, Supplies	1,000
	$28,000
Contingency (30%)	8,000
Total	$36,000

[a]1983 dollars

(1) Air Stripping

(2) New Well

(3) Carbon Adsorption

It should be noted that the present worth costs for the air stripping and new well alternatives are very similar. The air stripping alternative is low in capital costs but high in operation and maintenance costs where the reverse is true for the new well alternative.

Table 7 summarizes the advantages and disadvantages between the air stripping and new well alternatives with regard to nonmonetary considerations.

The advantages of the air stripping alternative are: It is an effective means of lowering the concentration of volatile organic compounds to the required concentrations; it does not require the purchase of additional land; and it does not significantly impact the environment. At one time, it had been assumed that the air-stripping of well SJ-6 could lead to the rehabilitation of the contaminated aquifer. Based upon preliminary remedial investigation results associated with the off-site study, it appears that the intermediate aquifer overlying SJ-6 is contaminated. The source of lower aquifer contamination appears to be the intermediate aquifer. The pumping of SJ-6 may provide a major driving force which would facilitate the transfer of contaminated water from the intermediate aquifer to the lower, water-supply aquifer. Insufficient data are currently available with which to formulate aquifer remediation strategies. The data in-hand do suggest that well SJ-6 would not be a suitable location for a rehabilation well designed to reclaim contaminated waters in the intermediate aquifer. At present, the impact of the air-stripping IRM upon the long-term rehabilitation of contaminated aquifers in the South Valley appears to be marginal.

One of the more significant disadvantages of an air-stripper is that this alternative would be an unfamiliar technology to the City's operational staff and would have to be integrated into the City's existing water supply and distribution facilities. Controls would have to be provided to assist in minimizing operator attention. In addition to the above, intensive sampling and testing likely to be required by the local health department make this alternative undesirable with regard to operational considerations. Also of significance would be the fact that air-stripper effluent quality deteriorates as influent contamination concentrations increase. Off-site investigations have indicated surface aquifer and intermediate aquifer contamination. Therefore, the potential for increased contamination concentrations reaching the lower aquifer and SJ-6 exists. Also a disadvantage of the air-stripping alternative is that RCRA hazardous waste treatment standards would be required and associated record-keeping and reporting requirements would have to be implemented. Compliance with air pollution emission standards may also be required. These procedures are all currently unfamiliar to water treatment personnel and an increased level of effort would be required to insure compliance with applicable environmental regulations.

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NON-MONETARY COMPARISON OF AIR STRIPPING VERSUS NEW WELL ALTERNATIVES

Air Stripping	New Well
Advantages	
Lower present worth cost than a new well.	Lower operation and maintenance cost than air stripping.
Lower capital cost than a new well.	Less risk of the introduction of contamination into the water distribution system assuming uncontaminated water at the new site.
Can be located on the San Jose Resevior site to avoid purchases of additional land.	Not sensitive to qualitative or quantitative variations in contamination, because it does not require treatment.
	More acceptable to the general public and water system operating staff.
	Compatible with the existing water supply system.
Disadvantages	
Higher operation and maintenance cost than a new well.	Higher present worth cost than air stripping.
Is sensitive to qualitiative and quantitative variations in contamination.	Higher capital cost than air stripping.
Would require additional sampling.	No guarantee that the new well will not become contaminated in the future.
Would require water system operating personnel to become familiar with and operate a process with which they have no prior experience.	No assurance that the new well will be as productive and efficient as SJ-6 was historically.
Would require ongoing sampling and testing to monitor treatment efficiency.	Would require the purchase of additional land.
Could result in seasonal fogging/misting problems in vicinity of air stripping towers.	
Could result in minor nuisance to residents in the immediate vicinity of the site because of added noise.	
Would require compliance with RCRA and, possibly, CAA. Associated record-keeping and reporting procedures would need to be implemented.	

Other disadvantages of the air stripper alternative include localized minor environmental impacts immediately adjacent to the site. The site where the air stripper would be located is in a residential area, and it is anticipated that noise from blowers and occasionally mist, fog and/or ice from the stripping towers could cause a minor nuisance to residents in the the immediate vicinity of the site.

The are several advantages to the new well alternative. It easily integrates into the City's current water supply and distribution facilities. Operators are accustomed to this type of system, and it involves much less operator attention than would air stripping. This is important since with a new well, water quality is not nearly as dependent on the precise operation of the facility, as with an air stripping system. These advantages are very significant, since the City of Albuquerque would own and operate whatever system is installed and would not be required to train operators or alter their normal mode of operation, in order to insure required water quality. With a new well, the possible variance of influent contamination levels is not an issue since a well siting survey will be performed to insure that it is located in an uncontaminated aquifer zone. Other than chlorination facilities, operational controls are not necessary to produce the required water quality. Additionally, a new well does not require the application of RCRA generator, treatment, storage, or disposal standards, or other extraordinary regulatory standards, and the attendant resources and costs associated with such regulation. With a proper well siting survey, there should be no potential negative impacts on the deeper drinking water aquifer. A new well provides a soundly engineered, environmentally safe and reliable water source to meet peak fire-protection demand needs.

Disadvantages of the new well alternative include the possiblity that it might not be as productive and efficient as SJ-6. Additonally, it would require the purchase of land. A new well is more costly than an air stripper on SJ-6, mainly due to its higher capital cost.

Recommendation

Although the packed tower air stripper alternative appears to be less costly in terms of capital outlay and marginally less costly in terms of present worth over a twenty year life, this alternative is not deemed to be as environmentally sound as the new well alternative. The unfamiliar technology of the equipment to the Albuquerque water system is considered to be of major significance as an indicator of reliability. Personnel must be specially trained and maintained to operate this system, and the system would require ongoing sampling and testing of water quality to constantly ensure and monitor treatment efficiency. As indicated previously, air stripper effluent (treated water) quality deteriorates significantly as influent or intake contamination levels increase. If levels of contaminants were to increase, costs can rise sharply and treatment efficiency is reduced. Water quality and with it public health, would be dependent on the successful operation of this "add-on" system. A new well would require no treatment "add ons", other than chlorination,

and a well siting survey would help to insure that it is located in an uncontaminated zone of the aquifer. It has been noted that the new well alternative does nothing to purge or treat the aquifer, yet it cannot be said with any degree of certainty that an air stripper placed on SJ-6 would be useful for such a purpose either. Simply not enough is yet known about the geohydrology of the aquifer at this time to determine a remedial remedy. On the other hand, there are preliminary indications that air stripping operation of SJ-6 may produce a driving force that would facilitate the transfer of contaminants to the deeper aquifer. This should not be the case with a new well following a well siting survey. A new well provides an environmental margin of safety that overcomes any cost advantage of an air stripper. It is more environmentally sound and protective of public health. This is very important, since the hazardous substances now contaminating the SJ-6 drinking water supply are an endangerment to public health and environment. Further, possible costs of RCRA regulatory compliance and of compliance with other environmental statutes, could add substantial costs to the air stripper alternative that are presently unquantified.

Based on the above evaluation of alternatives and the administrative record for this proposed initial remedial measure, it was determined that initial remedial measures are necessary and feasible to limit exposure or threat of exposure to a significant health or environmental hazard. It was further determined that the new well alternative is the most cost-effective, environmentally sound initial remedial measure to address such exposure, or threat of exposure. It is therefore the recommended alternative. This measure is consistent with any permanent remedy to prevent or mitigate the migration of a release of hazardous substances into the environment. The capital cost of this alternative is $775,000, with annual operation and maintenance costs estimated at $12,000 (1984 dollars).

Operation and Maintenance

The operation and maintenance cost of the new well is estimated at $12,000 annually. Of this $8,000 is for labor and $4,000 is for materials. This cost is primarily associated with the operation and maintenance of the chlorination system at the new well and not currently at SJ-6. The $12,000 does not include the electric power needed to run the new well since it would be essentially the same as the power cost for running SJ-6 in the treatment alternatives.

The City of Albuquerque has agreed to accept all operation and maintenance costs for the operating life of the well.

Schedule

- Approve remedial action (sign ROD) March 1985

- Complete enforcement negotiations March 1985

- HQ tasks the Corps. of Engineers to begin design	March 1985
- Start design (includes well siting survey)	May 1985
- Complete design	February 1986
- Start construction	May 1986
- End construction	November 1986

ATTACHMENT 1

Community Relations Responsiveness Summary
Initial Remedial Measure
Albuquerque South Valley

Introduction

The purpose of this responsiveness summary is to document for the public record concerns raised by the public in regard to the proposed initial remedial action of installing a new water supply well at the South Valley Superfund site in Albuquerque, N.M. EPA consideration of or response to concerns raised will also be documented in this section.

In addition to the proposed IRM action, contamination source control and offsite aquifer reclaimation actions may be required at some future date pending completion of associated Remedial Investigations and Feasibility Studies. This responsiveness summary addresses only those concerns associated with the initial remedial measure (IRM) comprising the installation of a new well in the Albuquerque South Valley.

Concerns and Responses

On August 21 and 22, 1984, public meetings were conducted in Albuquerque on the proposed IRM. Additional comments were received and follow-up meetings were held through January of 1985. Significant concerns and EPA responses to those concerns follow.

1. Several comments were received which questioned whether there was an immediate need for the water supply capacity lost due to the contamination of SJ-6. Further concern was expressed that proper documentation was not provided pertaining to the Governor of New Mexico's request for the IRM (40 CFR Part 300.67[b]) nor was it demonstrated that the prerequistites for an IRM (40 CFR 300.68[e]) were met.

   The fact that SJ-6 had been taken out of service due to contamination problems has had a serious impact upon the available fire-protection water supply in the South Valley service area. Fire-protection equipment purchases and fire-protection strategy development have been based upon the availability of three million gallons of reserve storage capacity to be maintained in system storage tanks. Serious fire-protection water supply shortages occurred during the summer of 1980 when system water demand exceeded well supply for sustained periods and storage volume dedicated to fire-protection was utilized to satisfy daily demands. Fortunately, no major fire occurred during these conditions. Similarly severe water shortages did not occur during the period 1981 through 1984 due, almost certainly, to the fact that higher amounts of precipitation were

received during the summer months relative to 1980. Statistics developed by the Middle Rio Grande Council of Governments of New Mexico indicate that population increases were projected for the South Valley area during this same period of time. A year of similar dryness to that of 1980 would be relatively likely and the magnitude of fire-protection water supply shortfalls are anticipated to be more severe than the shortfalls experienced in 1980 due to industrial and population growth.

As required by 40 CFR Part 300.67(b), the Director of the New Mexico Environmental Improvement Division has requested EPA assistance in implementing the IRM at the South Valley Superfund site. The proposed initial remedial action is being conducted in conformance with the NCP Parts 300.68 as published in the Federal Register on July 16, 1982, 40CFR 300.68. Sufficient fire-protection water supply has not been available on a reliable basis in the South Valley service area since well SJ-6 was taken out of service due to contamination by hazardous substances. Parts 300.65(a) and (b) of the NCP, which are relevant to IRM's although addressed to removal action, state that immediate action such as providing alternate water supplies shall be deemed appropriate in acute situations which pose a significant risk to human life or health or to the environment. Part 300.68 (e)(1)(vi) of the NCP states that an IRM is appropriate if there exists a serious threat of fire or explosion or other serious threat to public health or the environment. The lack of sufficient fire-protection water supply due to the contamination and subsequent shut down of SJ-6 satisfy the conditions for immediate action set forth in Parts 300.68 of the NCP. Well SJ-6 could conceivably be pressed into service to supplement the fireprotection water supply during peak demand periods. However, based upon the concentration of contaminants identified in well SJ-6 and proportioning the flow capacity of SJ-6 to the total San Jose well field capacity, it was determined that water delivered to the tap would pose a threat to public health if consumed. Contaminated drinking water at the tap satisfies the conditions for conducting an IRM as set forth in Part 300.68 (e)(1)(iii) of the NCP.

2. Several comments were submitted which asserted that the objective of the FFS should have been to alleviate the fire-protection water supply shortfall resulting from the shut-down of contaminated well SJ-6 until the future of the San Jose well field was known. As originally stated, the purpose of the FFS was to evaluate remedial action alternatives for putting SJ-6 back into service or replace the capacity of SJ-6.

   The purpose of the proposed IRM is to mitigate any immediate endangerment to the public welfare which resulted from the shutdown of contaminated well SJ-6. A Focused Feasibility Study (FFS) was

performed with the stated objective of putting SJ-6 back into service or replacing the capacity of SJ-6. This objective was set based upon the City of Albuquerque's current need for the total capacity of SJ-6 to provide adequate fire-protection water supply and system reliability. Documentation of this need was provided in a City report included as Appendix A of the FFS. An amendment to the FFS was commissioned to consider additional alternatives which would mitigate the City's fire/peak demand shortfall. Further documentation of the City's immediate need for the water supply capacity formerly supplied by SJ-6 was provided in the FFS Amendment. The FFS Amendment also considered other alternatives such as construction of additional storage capacity and transfers of excess capacity to the South Valley service area from elsewhere within the Albuquerque water system. These alternatives were eliminated from further consideration, however, due to excessive costs or infeasibility. Thus, the objective of the FFS, to determine a cost effective method for supplying a potable source of water equal in quantity to that previously supplied by SJ-6, is the only cost-effective approach to alleviating the fire-protection water supply shortfall which exists in the South Valley service area.

3. One comment received strongly argued that results of water samples analyzed from well SJ-6 during the period 1980 to 1982 were not consistent with results of water samples analyzed during the two week pump test of SJ-6 which occurred in April and May of 1984. Further, concern was expressed that adequate QA/QC procedures were not employed for samples analyzed during the period 1980 to 1982 and that a critical contaminant, 1,2-dichloroethane, was never present at concentrations of concern in SJ-6 water samples analyzed.

   For contaminants identified at concentrations exceeding 5 ug/L, excellent agreement was noted between samples analyzed from 1980 to 1982 and those samples analyzed in 1984. Mean values, ranges, and relative number of times the contaminant was found to occur were comparable for the two sampling periods for 1,1-dichloroethane, 1,1-dichlorethene, trichloroethene and tetrachloroethene. Several volatile organic constituents (dichloromethane, trichloromethane, tetrachloromethane, 1,2-dichloroethane, 1,1,1-trichloroethane and 1,2-transdichloroethene) were detected at concentrations less than 5 ug/L during the sample analyses performed over the 1980 to 1982 period. Each of these contaminants was detected at quantifiable concentrations on only one or two occasions. In contrast, none of these contaminants were detected in the 1984 samples which were analyzed. Although the rigorous QC procedures required for present day analyses were not fully employed for samples analyzed from SJ-6 during the 1980 to 1982 period, there are several reasons to suspect that 1,2-dichloroethane, in particular, was indeed present. First, a review of the New Mexico Environmental Improvement Division (NMEID) Laboratory results of February 25, 1982, indicated that 4 ug/L of 1,2-dichloroethane was detected in the SJ-6 sample analyzed by

GC/MS while no 1,2-dichloroethane was detected in the laboratory blank. In addition to the sample and blank, a low level standard of 10 ug/L 1,2-dichloroethane was also analyzed by the NMEID laboratory. This laboratory has been audited yearly by the EPA since about 1978 and has always performed well. Secondly, another independent laboratory, Anachem, Inc., analyzed a sample collected from well SJ-6 on the same day as the NMEID sample. Again, 1,2-dichloroethane was found to be present in the sample, albeit, at a lower concentration.

The compound 1,2-dichloroethane is a carcinogen with a Recommended Maximum Contaminant Level for drinking water of zero. In performing a prudent assessment of the data available, EPA considers that the 1980 through 1982 analytical results are consistent with the 1984 results. Further, EPA has agreed with the conclusions of its contractor, CH_2M Hill, that 1,2-dichloroethane is a contaminant of well SJ-6 and may be present at concentrations up to 4 ug/L.

4. Several comments were received which questioned the use of Recommended Maximum Contaminant Levels to assess the impact of well SJ-6 contamination upon human health.

Recommended Maximum Contaminant Levels (RMCLs) are defined, in the Federal Register date June 12, 1984 on page 24352, as "the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of person would occur and which includes an adequate margin of safety". Therefore, RMCLs are related to health levels. Although RMCLs are not enforceable standards, they do serve as goals for the Agency in the course of setting Maximum Concentration Limits (MCLs) which are enforceable standards. RMCLs are, therefore, initial steps in the MCL rule making that will follow. In some cases MCLs will be very similar to the RMCLs; in other cases control processes and economic considerations may dictate an MCL that is not similar to the RMCL.

In regards to the South Valley site, there are no published MCL standards for the four contaminants which were detected during the April and May 1984 sampling effort. In accordance with above mentioned Federal Register, there are RMCLs for three of the four contaminants detected during April and May 1984. The RMCLs for the following three compounds are zero:

(1) 1,1-dichloroethylene
(2) trichloroethylene
(3) tetrachloroethylene

The goal of most CERCLA remedial actions where suspected carcinogens have been detected is to reduce the concentrations of potential carcinogens to between the 10^{-4} and 10^{-8} risk level. A 10^{-6} excess

lifetime cancer risk is typically used. Concentrations of three of the four primary compounds detected during the April/May sampling effort exceed the 10^{-6} excess cancer risk level even if well-field dilution is considered.

Therefore, a threat to public health would be associated with human consumption of untreated water produced from well SJ-6.

5. Several commentors urged that any remedial action taken to restore capacity lost by the contamination of SJ-6 be postponed until the overall site clean-up strategy was developed. The point was made that the City of Albuquerque has been able to operate the water system effectively and avert any water supply shortages since the time SJ-6 was taken out of service.

   The fact that SJ-6 had been taken out of service due to contamination problems has had a serious impact upon the available fire-protection water supply in the South Valley service area. The most serious recent fire-protection water supply shortages occurred during the summer of 1980 when water dedicated to fire-protection was utilized over a sustained period to satisfy daily demands even with SJ-6 still in service. Fortunately, no major fires occurred during these conditions. Similarly severe fire-protection water shortages did not occur during the period 1981 through 1984, although shortages did occur. Statistics prepared by the Middle Rio Grande Council of Governments of New Mexico indicate that population increases have occurred in the South Valley area over the period 1980 to 1984. Relative to the summer of 1980, higher amounts of rainfall were recorded during the summer months of 1981 through 1984. A year of similar aridity to that of 1980 would be likely in the Albuquerque area, and the magnitude of fire-protection water supply shortfalls are anticipated to be more severe that the shortfalls experienced in 1980. It is also anticipated that the over-all remedial strategy for the South Valley site will not be fully developed until 1987. This would most likely result in the City having insufficient fire-protection water supply for, at least, the next three years. Due to the immediate endangerment to the public welfare posed by insufficient fire-protection water supply in the South Valley service area, the IRM should be implemented at this time. The NCP regulations at 40 CFR 300.68 are clear that IRMs are authorized in such circumstances.

6. A number of comments were critical of the orginial FFS in that alternatives such as construction of additional storage facilities and/or the transfer of excess capacity from other regions of the Albuquerque water system to the South Valley service area were not considered.

   The FFS Amendment considered such alternatives as inter- and intra-system transfers as well as the construction of additional storage capacity to potentially alleviate fire-protection supply shortfalls.

Allowing for a stand-by capacity of one well per well field, no excess capacity was found to exist in the northerly Montgomery trunk. Other trunks do not possess adequate stand-by capacity and in some cases, do not have sufficient capacity to meet peak demands even with all wells in service. Likewise, the upper zones of the Ridgecrest trunk do not have sufficient well supply capacity to meet peak demands. The cost of constructing additonal storage capacity sufficient to offset production shortfalls experienced in 1980 (which was not an exceptionally dry year) would exceed the cost of the selected alternative by a factor of three.

7. One comment asserted that in developing cost estimates, a cost credit should have been considered for the air stripping alternative in that the long-term remedial measure would be less expensive due to the fact that an air-stripping IRM would lead to the reclamation of the contaminated aquifer. Further, the use of a twenty year design life was challenged. The writer also considered it inappropriate to include analytical monitoring costs of SJ-6 since these costs would be a component of the long-term remedial measure.

   The NCP (40 CFR Part 300) requires that a cost effective evaluation rather than a cost/benefit analysis be performed upon the alternatives considered. At the present time, it might be very difficult to determine what level of cost savings, if any, would be realized for the long-term remedial measure by implementing the SJ-6 air-stripping IRM. Even with the results of the initial phase of the off-site investigation in-hand, it is not yet possible to speculate upon what the long-term clean-up strategy will be for the South Valley site especially with regard to the potential recommission of well SJ-6. Pumping and treating of the deep aquifer may or may not be a component of the long-term remedial measure. Should the pump and treat alternative be included as part of the over-all clean-up strategy, more than one treatment station may be required to accomplish the reclamation of the deep aquifer. Whether SJ-6 would be selected as one these treatment stations and just what portion of the aquifer clean-up would occur at SJ-6 can not be determined at present. Present indications are that the bulk of any aquifer rehabilitation program would occur in the intermediate aquifer. Due to the uncertainties previously discussed, the FFS considered cost comparisons for 5, 10 and 20 year design lifes when evaluating the cost-effectiveness of the new well and air-stripping alternatives. In regard to the inclusion of monitoring costs as a component of the air-stripping IRM, it must be restated that pumping and treating of the deep aquifer may or may not be a component of the long-term remedial measure. In additon, any deep aquifer waters withdrawn and treated as a component of any long term remedial measure may or may not be utilized directly as a potable source. Therefore, in a prudent evaluation of the new well alternative (where no unusual level of water quality sampling was anticipated) and the air-stripping

alternative (where additional sampling efforts would be required in order to monitor the quality of treated water from a contaminated source), it was necessary to include the costs of this increased analytical effort for the air-stripping initial remedial alternative.

8. A comment was received which stated that capital cost estimates developed for the air-stripping alternative were excessive. The commenter had requested that U.S. EPA, Office of Water, Technical Support Division generate a cost estimate for the air-stripping alternative considered as a South Valley IRM. Upon receipt of the Office of Water cost estimate, the commentor submitted these findings to U.S. EPA Region VI Superfund Branch.

   Utilizing a model developed by the US EPA, Office of Water, Technical Support Division and similar input data to that used by EPAs contractor in the development of the FFS, a present worth value of $579,000 was calculated for air-stripping of well SJ-6. This figure is thirty-percent lower than the present worth cost presented in the FFS. Several key differences should be noted when comparing the two estimates, however. First, EPA's contractor developed the present worth cost estimate presented in the FFS based upon bid-tabulation data derived from installations of similar air-stripping units. The Office of Water model, on the other hand, was developed primarily to specify design criteria and, secondarily, to estimate cost. The cost estimating function had not been updated for several years. Second, the treatability rate constant utilized in the Office of Water model is based upon a Henry's Law constant for the removal of 1,2-dichloroethane and not a value derived from field investigations. A conservative designer would be justified in utilizing a reasonable factor of safety based upon the lack of suitable field verification for the air-stripping of 1,2-dichloroethane.

   This justifiable conservatism resulted in the air-stripping system described in the FFS being larger and requiring operation at higher air to water ratios than the design specified by the Office of Water. This difference in design philosophy is also reflected in the higher cost of the air-stripping system described in the FFS.

   The air-stripping cost estimates presented in the FFS appear to be based upon sound engineering judgement and are believed to adequately reflect those costs which would be incurred to satisfy FFS objectives.

9. Several comments questioned the validity of the subjective concerns cited as disadvantages to the air-stripping alternative presented in the FFS.

   CH_2M Hill, the EPA contractor responsible for performing the South Valley Focused Feasibility Study, has had considerable experience with projects involving the air-stripping of volatile organic com-

pounds. As a component of the FFS report, the following subjective concerns were considered as disadvantages to the air-stripping alternative:

1. Sensitivity to quantitative and qualitative variations in contaminants.

2. Requirement for water system operating personnel to become familiar with and operate a process with which they have had no prior experience.

3. Requirement for ongoing sampling and testing to monitor treatment efficiency.

4. Potential for seasonal fogging, misting or icing problems in the vicinity of the stripping towers.

5. Potential for a minor nuisance to residents in the immediate vicinity of the air-stripper due to added noise.

The treatability of air-stripped contaminants is a function of Henry's Law and mass transfer coefficients. Field verification of these assertions for various contaminants has been performed by numerous researchers. It is a fact that influent contaminant concentrations and/or flow rate will significantly influence the treatability and subsequent effluent concentrations of the strippable, volatile organic contaminants. Off-site investigations have indicated surface aquifer and intermediate aquifer contamination in the vicinity of well SJ-6. Therefore, the potential for increased contaminant concentrations reaching SJ-6 exists. It is also a fact that an air-stripper would be an unfamiliar technology to the City's operational staff. Staff training would need to be conducted. The system would also need to be integrated into the existing water supply and distribution facilities. Controls would be required in order to minimize operational attention while monitoring the vital operating parameters of the air-stripping facility.

The air stripping alternative will also require more sampling simply because it is a treatment process which depends upon certain operating parameters. If the air stripper is not operating properly, immediate adjustments may be required in order to insure that water discharged from the treatment system is of sufficient quality for human consumption.

Under suitable conditions, and in the vicinity of the air-stripper fogging, misting or icing problems could occur as a result of air-stripping operations. Likewise, dependent upon the selected location of the air-stripper, localized noise problems may result which could create a minor nuisance to residents.

Implementation of the air-stripping alternative would require compliance with RCRA and, possibly, CAA. Associated record-keeping and reporting procedures would need to be implemented by the City.

10. One comment received suggested that the inclusion of a chlorination facility with the new well alternative should not be considered due to the fact that this action would constitute a betterment of the existing facility.

    Water produced by SJ-6 is presently chlorinated at the San Jose reservior. It is quite likely that the location of the new well will not permit economical discharge to an existing chlorination facility of appropriate capacity. To satisfy the IRM objective of providing sufficient fire-protection water supply lost by the contamination of SJ-6, it was determined that the full capacity of SJ-6 must be restored. Therefore, should an existing chlorination facility of appropriate capacity not be available in the vicinity of the new well, provision of such chlorination facilities would not constitute a betterment in that the project objective is to replace capacity, not replace equipment.

11. Several comments were received which noted risks involved with implementation of the new well alternative in regard to producing water of equivalent quality and quantity to that of SJ-6.

    Prior to installation of the new well IRM, a well-siting survey will be conducted and the results of the off-site investigation especially with regard to deep aquifer sampling and analysis will be reviewed. These measures are intended to provide the necessary background information which would lead to the selection of a well site with yield equivalent to that of SJ-6 and a water quality which would not pose an unacceptable health risk to consumers.