STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

In the Matter of the Petitions of the COUNTY OF SANTA CLARA, SANTA CLARA VALLEY WATER DISTRICT, CITY OF SAN JOSE, CITIZENS FOR A BETTER ENVIRONMENT AND SILICON VALLEY TOXICS COALITION To Review Issuance of Waste Discharge Requirements of Hazardous Materials Cleanup to International Business Machines Corporation by the California Regional Water Quality Control Board, San Francisco Bay Region. Our Files Nos. A-372, A-372(a) and A-372(b).	ORDER NO. WQ 86-8

BY THE BOARD:

On December 18, 1984, the California Regional Water Quality Control Board, San Francisco Bay Region, issued Order No. 84-90, waste discharge requirements for hazardous materials cleanup, to International Business Machines Corporation. On January 17, 1985, the County of Santa Clara and the Santa Clara Valley Water District, appealed this order. The City of San Jose separately appealed the order on January 17, 1985, as did Citizens for a Better Environment and the Silicon Valley Toxics Coalition. Although time for formal disposition of these petitions has now expired pursuant to Title 23, California Administrative Code, Section 2052(d), we have chosen to review the Regional Board action on our own motion (Water Code Section 13320).

I. BACKGROUND

A. General

International Business Machines (IBM) operates its General Products Division in the City of San Jose, in Santa Clara County. The facility

manufactures computer disk storage equipment and related products. Hazardous materials used on-site, both currently and historically, include 1,1,1-trichloroethane (TCA), 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113), isopropylalcohol (IPA), acetone, xylene, and other organic solvents. As part of an internal, corporate-wide ground water study program, stemming from chemical discharges and spills from other IBM sites throughout the country, IBM initiated its own ground water study at the site in 1978. In 1980 and 1981, IBM identified several industrial chemicals, including TCA, acetone, IPA, xylene, 1,1, trichloroethylene (TCE) and 1,1-dichloroethylene (DCE) in soil and ground water adjacent to an underground tank farm on its property.

In November 1981, additional investigation revealed more extensive ground water pollution. At that time, a comprehensive site-wide investigation program was initiated.

IBM reported the discovery of the subsurface contamination to the Regional Board. IBM was required to define the extent of all pollution, both in the soil and ground water for each source. Additionally, IBM undertook extensive remedial measures at the site, including removal of 7,000 cubic yards of soil, installation of 17 on-site extraction wells and extensive removal of underground facilities which handle hazardous materials.

To define the extent of the migration of chemicals in the underlying aquifer system, IBM installed over 300 ground water monitoring wells on-site and off-site. Subsurface investigations by IBM identified a principle plume of TCA, Freon 113 and DCE in the upper aquifers in the area. It has been determined that the plume extends approximately two-and-one-half miles from the IBM site northwest toward a natural hydrogeologic bottleneck or channel formed

TABLE 1

*Drinking Water Standards and Advisories for 1,1,1-Trichloroethane, 1,1-Dichloroethylene, and 1,4-Dioxane

Standards or Advisories	1,1,1-Trichlorothane (TCA)	1,1-Dichloroethylene (DCE)	1,4-Dioxane
1. EPA Maximum Contaminant Level (MCL)	Proposed MCL 200 ppb	Proposed MCL 7 ppb	No MCL
2. EPA Recommended Maximum Contamination Level (RMCL)	Final RMCL 200 ppb	Final RMCL 7 ppb	No RMCL
3. CDHS Action Level (AL) or Limit of Detection (LOQ)	AL 200 ppb	AL 6.0 ppb LOQ 0.1-0.4 ppb	No AL or LOQ
4. NAS or EPA Cancer Assessment Group (CAG) Risk Assessment Level	NAS Level 16.8 ppb CAG Level 22.0 ppb	No NAS level CAG Level 0.06 ppb	
5. NAS or EPA Suggested No Adverse Response Level(SNARL)	NAS and EPA SNARL's 140,000 ppb (acute) 20,000 ppb (subchronic) 1,000 ppb (chronic)	EPA SNARL 70 ppb NAS SNARL 100 ppb	EPA SNARL 568 ppb (subchronic)
6. EPA National Ambient Water Quality Criteria (NAWQC)	No NAWQC for health	NAWQC to protect health 0.033 ppb	No NAWQC for health

*There are no available drinking water standards or advisories for Freon-113.

by bedrock referred to as the "Edenvale Gap". This area, between the IBM facility and the Edenvale Gap is referred to as "Region I" or the "defined area". The area downgradient and beyond the Gap is referred to as "Region II", or the "undefined area."

In an attempt to contain the plume and to extract contaminated water, IBM is utilizing a ground water extraction system encompassing the plant site and the entire Region I area. There are three primary extraction locations. The first is at the plant site where a line of wells in the top two A & B aquifers are designed to create a ground water depression to prevent further movement of pollutants off the plant site. These wells are pumped at a rate of approximately 5.8 million gallons per day (mgd) and, untreated, the flow is discharged to Canoas Creek pursuant to National Pollutant Discharge Elimination System (NPDES) Permit Order No. 83-37 adopted by the Regional Board in 1983.

The second extraction system is approximately at the midpoint of the plume, where two extraction wells are operated. The third system is near the Edenvale Gap and close to the end of the defined portion of the plume. These wells are pumped at approximately 11.5 mgd, pursusnt to NPDES Permit Order No. 83-39, also adopted by the Regional Board in 1983, and discharged without treatment to Canoas Creek.

In December 1984, the Regional Board adopted waste discharge requirements for hazardous materials cleanup. The Regional Board order did not call for comprehensive examination of the degradation in Region II and allowed limited degradation of ground water in Region II. The order also called for continued monitoring and a comprehensive pollution technical report within two years evaluating cleanup alternatives for the Region I area.

The petitions we received in January 1985, raised issues relating to the adequacy of the Regional Board's monitoring and cleanup provisions for the

Region II area. We did not receive petitions relating to the NPDES permits for the Region I area. In August 1985, we requested additional information to supplement the record from the various parties on several specific topics. We received additional submittals and responses from petitioners and the discharger on the requested topics and several new issues. Further information and additions to the record were submitted by the petitioners, discharger and the Regional Board prior to and at our workshop on this matter of April 2, 1986. In order to allow parties to respond to this material, we gave all parties until April 17, 1986 to submit any other documents. We will address these issues raised as they relate to the Region II area. We recognize that the Regional Board is still reviewing cleanup alternatives in the Region I area. In our review of the record for the petitions before us, we have become concerned about certain issues in Region I and thus will address those on our own motion.

B. Particular Chemical Constituents

1. Regulatory Criteria

As discussed above, the spill emanating from the IBM site contained several industrial chemicals. Those chemicals most widely distributed off-site and of greatest concern to the Regional Board are 1,1,1 trichloroethane (TCA) and Freon 113. Extensive monitoring has been conducted for TCA and Freon 113. Additionally, monitoring has been conducted for a range of other chemicals including TCE, DCE, 1,1-dichlorethane (DCA), 1,2-dichloroethylene, methylene chloride and chloroform. Of these chemicals, we have specifically looked at TCA and Freon 113 because of the relatively high concentrations, and, as regulating standards and guidelines have been established, we have also looked at DCE.

There are various types of standards and advisories which have been set by state and federal regulatory agencies to protect water quality. In order to evaluate tne possible effects of these chemicals in drinking water, we have reviewed these regulatory criteria. We will first discuss the type of criteria and then specific chemicals. We will then turn to specific contentions raised by petitioners. It should be kept in mind that these criteria are based upon different assumptions and may have differing applications depending upon their derivation. For the above chemicals, the standards are set forth in Table 1.

Pursuant to the Safe Drinking Water Act (42 USC §300f et seq.), the Environmental Protection Agency (EPA) is required to promulgate primary and secondary drinking water regulations. EPA first establishes recommended maximum contaminant levels (RMCLs) for contaminants which may have any adverse effect on human health. RMCLs are to be set at a level at which no known or anticipatead adverse human health effects will occur. RMCLs are strictly health based, being derived from toxicological data and including appropriate factors of safety. For carcinogens, the non-threshold assumption--i.e. that there is no absolutely "safe" level requires that the RMCL be set at zero, in accordance with Congressional guidance. RMCLs are health related goals, but are not enforceable drinking water standards. (See 42 USC, 300g-1 and 1-1 R. Rep. No. 93-1185, 92 Cong. 2d Sess. reprinted in (1974) U. S. Code Cong. and Admin. News 6454, 6472-6473.) Maximum Contaminant Levels (MCLs) are required to be set as close to RMCLs as feasible, after taking into account the best technology treatment techniques and cost of achieving the standard for drinking water (see 42 USC §300g-1(b)(3)).

Additionally, Health Advisories are also issued by the National Academy of Sciences (NAS) and EPA's Office of Drinking Water. (These were previously known as "Suggested No Adverse Response Levels" or SNARLs.) Health Advisories are considered guidance and are not enforceable drinking water standards.

The NAS is charged under the Safe Drinking Water Act to conduct various assessments and propose RMCLs. NAS nas not proposed RMCLs, but has provided guidance in the form of NAS Health Advisories.[1] EPA Health Advisories are determined by the Office of Drinking Water, of which the Cancer Assessment Group (CAG) is a part.[2] Due to the exposure assumptions used, the EPA Health Advisories tend to be more conservative or stringent than the NAS Health Advisories (unless the basic toxicological data are drastically different).[3]

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[1] These Health Advisories are listed in the five volumes of Drinking Water and Health published by the National Academy Press. They are calculated to reflect the lifetime exposure to a 70 kilogram adult consuming 2 liters of water per day. Health Advisories are reported in terms of three exposure levels: acute, subchronic, and chronic. In the NAS publications, cancer risks are reported in terms of excess (above background) lifetime risk per microgram/liter (ug/1), but in the accompanying table have been recalculated to reflect the concentration at which one would expect an excess risk of one cancer incident per one million people (10^{-6}).

[2] These EPA advisories reflect the exposure to a 10 kilogram child consuming 1 liter of water per day, and are reported at exposure levels of acute, subchronic, and chronic. For carcinogens, concentrations represent an excess lifetime cancer risk of 10^{-6}.

[3] For the purposes of Table 1, when no standard exists and more than one advisory exists for a particular chemical and a particular exposure duration, the following priority order is utilized in arriving at one figure:

1. EPA Health Advisories based on CAG data
2. EPA Health Advisories from the Office of Drinking Water

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EPA National Ambient Water Quality Criteria (NAWQC) are promulgated by EPA under the authority of the Clean Water Act. NAWQC are not mandatory standards, but states may adopt them as enforceable standards to protect the beneficial uses of water bodies.[4]

California Department of Health Services (DOHS) Action Levels are health-based criteria derived much in the same way as EPA and NAS Health Advisories.[5] An "Action Level" is not an enforceable standard but is intended as a guideline. Public water systems with water sources that contain chemicals in excess of an Action Level are encouraged to develop new supply sources, treat the water (i.e., carbon adsorption, air stripping) or dilute with clean sources. Where contaminants cannot be lowered below an Action

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[3] (FOOTNOTE CONTINUED)

3. EPA Health Advisories calculated from NAS data

4. NAS Health Advisories

[4] Three criteria are reported for each priority pollutant: for the protection of freshwater aquatic life, saltwater aquatic life, and human health. Table 1 utilizes only the human health criteria.

The following assumptions are used in the derivation of human health criteria: a 70 kilogram adult consuming 2 liters of water and 6.5 grams of aquatic organisms per day. For non-carcinogens, the level is calculated from the acceptable daily intake which in turn is based upon the toxicological "no observable adverse effects level". For carcinogens, the recommended concentration is zero (non-threshold model) but concentrations resulting in excess lifetime cancer risks of 10^{-5}, 10^{-6}, and 10^{-7} are reported. In Table 1, only the 10^{-6} concentration is shown.

[5] Assumptions have included a 70 kilogram adult consuming 2 liters of water per day, but more recent Action Levels have been based on the EPA assumptions of a 10 kilogram child consuming 1 liter of water per day. For carcinogens, the levels are set based upon an excess lifetime cancer risk of 10^{-6}. For non-carcinogenic pesticides, it is assumed that 20 percent of the daily intake is from drinking water, and the other 80 percent is from other sources.

Level, DOHS recommends that the public water system notify consumers indicating they should not use the water for drinking or food preparation.[6] While an Action Level may be set at the level of an RMCL or MCL, the State may be more restrictive than either of these levels set by EPA. The federal MCLs are enforceable drinking water standards for maximum contaminant levels. The state may choose, based on its own review, to set a more stringent level.

2. TCA

EPA has recently promulgated a final RMCL of 200 parts per billion (ppb) for TCA, with a proposed MCL of 200 ppb (50 Federal Register 46880, November 13, 1985) as shown on attached Table 1. (California Department of Health Services, relying on EPA's previously proposed RMCL of 200 ppb, had adopted an Action Level of 200 ppb). EPA conducted an extensive literature review of TCA effects and concluded that there is insufficient evidence to classify TCA as a probable or possible human carcinogen. EPA has classified TCA in "Group D" substances and in "Regulatory Category III". Group D substances are not classified as carcinogens due to inadequate animal evidence of carcinogenicity. Regulatory Category III includes those substances with inadequate or no evidence of carcinogenicity.

Health advisories have also been issued by EPA's Cancer Assessment Group (CAG) and the National Academy of Sciences for TCA. The CAG performed a cancer risk estimate and, through modeling, determined that a concentration of 22 ppb TCA would increase the risk of one excess cancer incident per one million people. (49 Federal Register, 24346, 24341, June 12, 1984.) The NAS

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[6] See memorandum from Dave Spath, Sanitary Engineering Branch, DOHS to Adam Oliveri, Regional Board, January 3, 1984.

determined the same cancer risk value would occur at 16.8 ppb of TCA. (See 1983 Drinking Water and Health, Vol. 5.) The CAG and NAS cancer risk estimates are hypothetical calculations based on models which have some biological basis. These estimates typically give worst case numbers and are commonly not used to promulgate drinking water standards. EPA considered these advisories in promulgating its recent RMCL and proposed MCL. As EPA noted in setting the 200 ppb RMCL, the literature was suggestive, but not strong enough to warrant a more stringent guideline.

Turning to the monitoring data which is available for Region II, the average concentration of TCA for the wells sampled was below 3 ppb. The maximum concentration found at a Region II well was 6 ppb. This level is far below the RMCL of 200 ppb and also well below any health advisories.

3. Freon 113

Freon 113 is the other chemical found in comparatively high concentrations in Regions I and II. Freon 113 is a halogenated chlorofluorocarbon and as such has been banned by EPA and the Food and Drug Administration as a propellant in aerosols. It may be used as a solvent. The available literature indicates that while Freon 113 may be of concern as an air pollutant, it is not a health concern in drinking water.

No health advisories or RMCLs or MCLs have been set for Freon 113 in drinking water. Some guidelines for exposure to Freon 113 in air concentrations have been suggested between 1,000 parts per million (ppm) and 2,000 ppm.[7] There is presently inadequate published information to assess

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[7] A Threshold Limit Value of 1,000 ppm was established by the American Conference of Government and Industrial Hygienists in 1981. The literaturae (CONTINUED)

the carcinogenic potential of Freon 113. It has been reported by EPA to be non-mutagenic. EPA has stated further testing is needed before definitive conclusions can be drawn.

Looking at the monitoring data from Region II, the average concentration of Freon 113 is below 2 ppb, with a maximum concentration of 5 ppb. These concentrations are insignificantly low as compared to concentrations suggested by the literature to be necessary to cause adverse health effects.

4. DCE

Monitoring and extraction well data indicates the presence of DCE in Region I. The record indicates that DCE may also be present in Region II. DCE is a volatile synthetic organic chemical, as is TCA. EPA has recently classified DCE in Group C and Regulatory Category II (50 Federal Register 46880, November 13, 1985). Group C substances are regarded as possible human carcinogens based on limited evidence of carcinogenicity in animals. Regulatory Category II classifies a substance based on equivocal evidence of carcinogenicity. Prior to developing this classification system, EPA classified DCE as a carcinogen and accordingly had a proposed RMCL of zero (Federal Register, June 12, 1985).

As shown on attached Table 1, EPA has set a final RMCL and a proposed MCL for DCE at 7 ppb (Federal Register 46880, November 13, 1985) based upon its literature review and review of available Health Advisories, including

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[7] (FOOTNOTE CONTINUED)

also suggests a NOAEL (no observed adverse effect level) for short-term Freon 113 exposure situations in the range of 1,500 to 2,000 ppm in air. (EPA Health Assessment Document for 1,1,1-Trichloroethane 600/8-82-102 F, 1983.)

the EPA Cancer Assessment Group cancer risk estimate of .06 ppb. There is no National Academy of Sciences cancer risk estimate for DCE.

The California Department of Health Services' (DOHS) Action Level for DCE has recently been revised upward. The old action level was 0.2 ppb, largely based on a study indicating that DCE is a possible cancer-causing agent in animals. Because of doubts about the reliability of this study, DOHS has now decided to treat DCE as a non-carcinogenic, although still toxic, agent. Accordingly, the new Action Level for DCE has been set at 6.0 ppb. This action was taken on April 10, 1986.

DCE has been detected in Region II. Since IBM began monitoring in Region II in 1984, two samples have exceeded the old DOHS Action Level. These DCE levels were reported at 2.2 ppb and 1.1 ppb. Other samples have detected the presence of DCE at lower levels. IBM disputes the accuracy of the two samples, indicating that the 1.1 ppb figure was a transcription error and that the 2.2 ppb result was a "laboratory artifact" which could not be verified by subsequent analysis. DOHS, in a letter to us dated April 8, 1986, indicates that they do not recognize positive levels of DCE reported by IBM on a single sampling basis in any of the public water supply wells in Region II without confirmation from following sampling. In the letter, DOHS indicates that it does not consider that there are positive levels of DCE in the City of San Jose wells. Finally, as pointed out in more detail below, existing monitoring in Region II is from water supply wells in the area. Such monitoring may not be indicative of actual levels of degradation.

The presence of DCE in the IBM plume could be due to several factors: DCE may have been present as a low level contaminant in virgin TCA; DCE may have resulted from chemical transformation in industrial processes

and/or waste treatment before the leak occurred; or DCE may be present as a low level ground water transformation product of TCA.[8]

II. CONTENTIONS AND FINDINGS

1. Contention: The Regional Board did not require the discharger to fully define the chemical plume in Region II. The petitioners allege that the sampling program at the existing wells in Region II may be inadequate.

Finding: We do not believe that the record supports the contention that the existing monitoring network in Region II is adequate to determine the maximum chemical concentrations and the extent of possible degradation. In fact IBM agrees that the monitoring of existing water supply wells in Region II will not provide a complete picture of water quality conditions. Rather, IBM's position is that present monitoring in Region II is adequate given existing data on Region II degradation.

The effectiveness of any monitoring and cleanup strategy is controlled by the distinctive hydrogeologic characteristics of the area. Accordingly, we will first review the hydrogeologic setting.

A. Hydrogeologic Setting

The IBM facility is located in an alluvium-filled valley approximately seven miles southeast of the central business district of San Jose. The ground water basin is approximately 400 feet deep (thickness of alluvial materials) and is underlain by rocks of the Franciscan formation. The Franciscan formation is termed "basement rock" and is, for the most part, non-

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[8] Letter from June Anderson, IBM Project Manager to State Water Resources Control Board, September 24, 1985.

water bearing. The alluvium rests on the basement rock and is composed of at least four sand/gravel aquifers separated by layers of silty to clayey materials of low permeability (aquitards). The aquifers are hydraulically connected vertically by unspecified pathways that could be manmade or natural. This basin is informally called either the defined region or Region I. Ground water in Region I flows beneath the IBM site in a northwesterly direction toward Edenvale Gap, a narrow notch through a range of low hills (Franciscan formation) that the north of the IBM facility. These hills separate the Region I basin from another basin informally called either the undefined region or Region II. Ground water flows through Region I into Region II through Edenvale Gap.

At Edenvale Gap, basement rock is much shallower than in Regions I or II, and the thickness of the alluvium through which ground water flows is much less than in either of the two regions. Because the basement rock is shallower, it forms a partial barrier and ground water from Region I must flow up and over the basement rock in order to exit Region I and enter Region II. As a consequence, most if not all of the ground water in Region I is conveniently constrained to flow through this constricted area before it enters Region II.

The hydrogeologic characteristics of Region II are not well known. Region II is composed of interbedded aquifers and aquitards similar to those found in to Region I; however, the alluvial materials in Region II are reported to be over 800 feet thick in some parts of the basin. In the immediate vicinity of Edenvale Gap, aquitards in both basins are absent, thereby creating essentially one unconfined aquifer that connects Region I with Region II through Edenvale Gap.

Within each basin, intesecting faults subdivide the basins into blocks in which there can be several hundred feet difference in the elevation of the basement rock from one side of the fault to the other. It is also reported that some of these faults extend into the overlying alluvium, offsetting aquifers and thereby producing the possibility of at least a partial compartmentalization of the basins. This could affect the way in which ground water flows through the basins.

There are conflicting interpretations of some aspects of the subsurface conditions in the area. The California Department of Water Resources (DWR) determined in its 1967 and 1975 reports that the aquifers in Region I are primarily buried stream channel deposits created by meandering streams that coursed the area thousands of years ago. On the other hand, the IBM consultants appear to treat individual aquifers as though they are tabular aquifers of broad lateral extent. In the former case, the path taken by a plume of contamination could be highly variable.

In addition, the 1967 DWR report concluded that the bulk of the subsurface flow exits Region I around the south end of Oak Hill while the IBM consultants assume that Region I discharges through Edenvale Gap. Based on more recent information, this conclusion does not appear accurate. Additional wells have been installed since that time. This subsequent information indicates the bulk of the Region I subsurface flow exits through Edenvale Gap. It should be noted that Santa Clara Valley Water District staff and the Regional Board staff believe that most of the ground water exits through Edenvale Gap.

B. Particular Chemicals of Concern

In order for a monitoring network to be effective, the behavior of the chemical in an aqueous medium must be considered. We first look at the chemicals as they were spilled.

In this case, the primary contaminants of concern are trichloroethane (TCA), Freon 113 and DCE. These liquids are substantially denser than water and do not mix with water (immiscible). Because they are more dense than water, they tend to sink through the sand and gravel. A portion of the descending liquid can become trapped in dead-end pores within the sand and gravel aquifers while the remainder descends until it accummulates on low permeability zones such as aquitards or basement rock. If the surface upon which it comes to rest is inclined sufficiently, the immiscible liquid will tend to migrate down the sloping surface. If the surface is uneven, the liquid can become entrapped in depressions. On the other hand, if vertical passage ways through the aquitard(s) exist it is possible for the chemicals to migrate through successively lower aquifers. In addition, TCA has been shown to produce cracks in clay thereby allowing the TCA to migrate through the clay. The fact that the chemicals are found in several of the Region I aquifers indicates that such passage ways do exist and that any monitoring strategy should encompass this contingency.

Although TCA, DCE and Freon 113 are considered immiscible in a relative sense, they are soluble to a certain degree. Therefore, the bulk of the liquid will behave as described in the previous paragraph, but a small proportion will dissolve into the surrounding ground water and will be transported downgradient. The plume of dissolved TCA, Freon 113 and DCE would be expected to become broader as it moves downgradient due to lateral dispersion, but the thickness (vertical dimension) of the plume would be expected to remain relatively constant.

Based on the preceding discussion, it is possible that much of the TCA and Freon 113 initially spilled at the IBM plant remains beneath the ground in the discrete liquid phase unmixed in the groundwater. The failure to detect free TCA or Freon 113 in the monitoring and extraction wells lends credence to this supposition. This means that the plumes within the aquifers downgradient of the IBM plant probably only represent the small dissolved fraction of the total volume of the spill and that the plumes will continue to be generated for as long as the discrete liquid phase remains in the ground, which could be a great many years. Any attempt to delimit the problem at this site is severely restricted by the absence of information concerning the volume, duration, and time of onset of the spill.

C. Monitoring in Region II

The monitoring approach in Region II is radically different from the approach used in Region I. In Region I, the monitoring network is designed to delimit the area of plume and to collect the data necessary to predict the behavior of the plume. By contrast, the Region II monitoring system consists of thirteen preexisting drinking water supply wells. These wells were not designed to monitor chemicals, but to produce water. As such they do not provide essential information pertaining to the magnitude, extent or future behavior of chemicals within Region II. As discussed in detail below, the Region II wells provide only information on the quality of water being provided at each wellhead.

Part of the Regional Board rationale for this difference in monitoring programs between Region I and Region II is because of the extremely low chemical concentrations detected in the Region II wells, and that the sampling of these domestic supply wells gives an accurate picture of drinking

water quality that is actually being consumed. We do not agree that the current sampling provides an accurate picture of water quality conditions in Region II. The record does not show that the data generated by the existing Region II network is representative of the entire Region II aquifer. The Region II network only provides information on the quality of water being produced by each well. As discussed below, we believe it is inappropriate to interpret the monitoring data as though it is representative of the true magnitude of any degradation within Region II and then conclude that beneficial uses have not been unreasonably impaired.

The present monitoring network is not capable of providing an accurate picture of conditions in Region II for several reasons:

1. The thirteen wells being used to monitor Region II were designed for production and not monitoring. There are no well logs or construction details available for many of these wells, and it is impossible to interpret the samples in terms of the magnitude and extent of any degradation. The eight wells for which logs are available are perforated in multiple aquifers that occur at depths much deeper than the presumed base of major contamination in Region I and the lowest estimated elevation of the basement rock barrier at the Edenvale Gap. Consequently, if there is limited vertical dispersion of the plume as it passes through Edenvale Gap and beyond, the most concentrated portion of the plume would be above the perforated portion of the wells with aquitards intervening between the plume and the perforated portions of the wells. This would preclude detection of the most concentrated part of the plume.

2. Wells perforated in more than one aquifer, such as those in Region II, may produce samples containing lower concentrations of chemicals

than samples taken exclusively from individual aquifers. This occurs because water from an unaffected aquifer or an aquifer containing a low concentration of a chemical(s) dilutes the chemical(s) in the portion of the sample that comes from a more severely degraded aquifer. Composited samples so obtained never are representative of the most highly degraded aquifer.

For example, the monitoring wells, for which drill logs are available, penetrate several aquifers. However, these wells do not draw from all of these aquifers because some are sealed off. Therefore, the samples from these wells cannot provide any information about the excluded aquifers. On the other hand, each well draws from more than one aquifer. Consequently, a particular sample represents a mixture of water from each of the aquifers within the perforated portion of the well, but the proportionate contribution from each aquifer is unknown. This means that if a given constituent is detected in the sample, there is no way of knowing which or how many aquifers are affected. Furthermore, it is certain that the reported concentration is always less than the magnitude of the most severely degraded aquifer except in the case wherein all aquifers are degraded to the same concentration. For the wells for which there are no logs, there is no way of determining what an individual sample represents.

3. There appears to have been no attempt to correlate aquifers between the various wells in Region II. Consequently, it is impossible to compare water quality data between wells. Without such correlations, generalizations concerning the water quality conditions in Region II are unjustified and it is impossible to determine whether the real extent of the monitoring network is adequate.

4. Although the Region II monitoring network consists of 13 wells, they are concentrated in four areas of the region. In three of these

areas, the wells are in relatively tight clusters of four wells. In the absence of any justification for the selection of these particular wells, it is questionable whether the monitoring network provides adequate areal coverage.

5. Water supply wells often draw from a single aquifer; therefore, each aquifer currently or potentially used for water supply must be monitored individually in order to determine whether the water in the aquifer is suitable for any given benefical use. Further, the quality of water within a given aquifer ordinarily varies throughout its lateral and vertical extent. When specific numerical criteria are at issue, it is extremely difficult to select a few of the total number of wells in a basin and thereafter predict the quality of water being produced from the unmonitored wells. Of course, for the aquifers that are not monitored, it is impossible to determine threats to health.

6. As discussed above, we need additional information as to the chemicals present in the Region II aquifers. Although detected levels for DCE, TCA and Freon 113 in the wells being monitored are currently well below levels of concern, such levels probably do not represent the maximum concentrations which are in the aquifer for the reason discussed above. Furthermore, other wells perforated in a degraded aquifer could show higher levels and, for existing wells, proportionate contributions from degraded aquifers may change.

Having concluded that the present monitoring system in Region II is not adequate to fully determine the extent of degradation, we must next address the question of whetner more extensive monitoring is reasonable given the low levels of degradation currently being found. In this regard, Water

Code Section 13267 requires that the burden of requiring monitoring reports, including costs, must bear a reasonable relationship to the need for the report and the benefits to be obtained from it. On the one hand, IBM contends that the present monitoring is adequate. Petitioners contend otherwise. Although a close question, we conclude, based on the balancing test set forth in Water Code Section 13267, that the Regional Board's decision not to require more monitoring in Region II is appropriate. In this regard, we note that the Regional Board can always reevaluate the need for monitoring based on its review of the comprehensive report IBM is scheduled to provide in December of 1986. We further note that our requirement for additional monitoring at the Edenvale Gap, discussed below, may provide information that would require additional monitoring in Region II.

Another issue that has been raised regarding Region II monitoring is the possibility of other sources of chemicals in addition to the IBM plume. The Regional Board recently submitted documents for the record showing that there may be other sources of pollutants. For example, the Regional Board identified the Hellyer (Eastside) landfill, the Senter Road fillsite, and the Singleton landfill. In the case of Singleton, onsite monitoring wells reveal the presence of several chemicals, including volatile organics. Singleton landfill is located just south of one of the drinking water well clusters which has been monitored by IBM.

The Regional Board has also provided us information about a diesel fuel leak from the County Transit District on Tully Road, and the Lorents Drum and Barrel site. However, these may be downgradient of the well clusters in question.

We take note of new regulatory programs which may assist us and the Regional Board in evaluating the scope of degradation in Region II. Water

Code Section 13273 (from the "Calderon bill") directs Regional Boards to undertake a comprehensive analysis of solid waste disposal sites based upon the threat which they may pose to water quality. We note that the Singleton landfill site is currently in rank 1 of those sites, with a thorough technical report and monitoring program due by January 1, 1987. Because of the possibility this site may be contributing to the chemicals recorded in the nearby wells, the Regional Board will be thoroughly reviewing such a report submitted by the landfill owner or operator and to taking appropriate remedial action. In particular, the Regional Board should evaluate whether Freon 113, TCA or DCE (associated with the IBM plume) are emanating from the Singleton site.

Further, while the Singleton site is currently in the first rank of solid waste disposal sites to be reviewed, the other landfills are either not ranked (Senter) or in rank 5 (Hellyer). We urge the Regional Board to use its additional authority under Porter-Cologne Act to require some preliminary monitoring at these sites to determine what sort of chemicals may be present or leaking from these sites. Depending upon the results of this monitoring, these sites may need to be elevated in the "Calderon" review.

The Regional and State Boards are currently engaged in an "AB 1803" follow-up program wherein we are attempting to determine sources of chemicals in drinking water systems throughout the state. Many of the Region II wells discussed earlier appear on a list developed by the Department of Health Services of wells with chemical contaminants. These wells, while not showing the highest contaminant levels in the San Francisco Region, do have significant levels of contaminants. Accordingly, the Regional Board should put

a very high priority on reviewing these wells as a part of its AB 1803 program.

Finally, because of the possibility that other chemicals of concern may exist in the Region II ground water, we note that IBM has been screening all samples for a wide range of compounds. We further note that IBM has monitored chromatographic peaks for trace amounts of all such compounds. IBM should continue this practice. Results should be reported to the Regional Board on a regular basis and included within the report due to the Regional Board.

D. Monitoring at the Edenvale Gap

The management of the plume in Region I ultimately affects Region II. The general premise is that the extensive pumping and extraction system in Region I, particularly at the Edenvale Gap, should prevent additional chemicals from entering Region II. In order to assure that this is correct, intensive ground water monitoring at Edenvale Gap is indispensable.

If current interpretations of ground water flow are correct, all ground water entering Region II from Region I must pass through this natural constriction. Because of the relatively small area involved, comprehensive monitoring at Edenvale Gap is feasible and would provide data which would measure the effectiveness of IBM's efforts to prevent contaminated ground water from passing from Region I into Region II.

To assure the effectiveness of the "Gap-strategy" requires a carefully designed monitoring system that takes the unique hydrogeologic features of the gap into consideration. The existing monitoring network does not provide the coverage needed. The alluvial aquifer in the gap rests on an irregular basement rock surface that has been reported to be deeply notched at

two places. While there are four monitoring wells downgradient from the last two extraction wells in the plume, they are not located in the gap proper. Monitoring wells 38BC, 39BC and 39D furnish the only coverage at the gap. These three wells are closely spaced in the southeasterly portion of the gap and are situated near the shallower of the two ancient channels in the basement rock. Wells 38BC and 39BC only penetrate about one-half of the saturated thickness of the aquifer, leaving the lower half of the aquifer monitored only at one point, 39D.

More importantly, the ancient buried channel at the northwesterly end of Edenvale Gap is much larger than the southeasterly channel, and the bulk of the ground water flowing through Edenvale Gap would be expected to pass through this channel. Indeed, monitoring well 38BC, the most northwesterly of the two wells, consistently produces water that is significally more degraded than water from 39BC. This implies that the most concentrated portion of the plume is located northwest of well 38BC, closer to the largest channel.

If this implication is accurate, the existing monitoring of Edenvale Gap is inadequate to measure the quality of ground water flowing from Region I into Region II. This is a serious deficiency to the extent that the approach proposed by the discharger to mitigate the impact on Region II is wholly dependent on preventing degraded ground water from passing through the Edenvale Gap. It is critical that the existing monitoring network be capable of monitoring the most critical part of the gap.

In addition, the northern boundary of the plume in the gap has not been defined because there area no wells northwesterly of 38BC from which the northern plume boundary can be identified. Because of this deficiency, the full extent that the plume may be passing through the gap cannot be determined.

Furthermore, monitoring well 39D is the only well in the gap that extends to bedrock. Monitoring well 36BC, which is located upgradient of the gap near the extraction wells, also extends to bedrock, but because it is perforated in the B, C, and D aquifers, it cannot be used to determine water quality in any individual aquifer including the D aquifer. Monitoring of well 39D has revealed that contaminated water was passing undetected below monitoring well 39BC. Moreover, while detectable concentrations of contaminants are being measured by well 39D in the lower portion of the aquifer, no contaminants are detectable in well 39BC in the upper portion of the aquifer. This may indicate that the most concentrated portion of plume is deeper than the depth of well 38BC.

Confirmation of degradation in the lower portion of the aquifer at the gap points up the fact that, except for well 39D, which is located on the southern edge of the plume, none of the wells in the gap nor any of the four wells upgradient of the gap near the extraction wells are capable of monitoring degradation below the C aquifer. Because of this deficiency, the existing monitoring wells are incapable of providing data on either the amount or the path of degraded water that may be passing through the gap in the lower portion of the aquifer.

To remedy these deficiencies, we direct that additional monitoring wells should be established at or near the Edenvale Gap. These stations should be capable of obtaining samples at discrete depths at appropriate vertical intervals throughout the entire saturated thickness of the aquifer including the alluvium/basement rock contact. At least one well should be located, to the extent possible, at the deepest portion of each of the basement rock channels. To allow for the possibility that these channels are

manifestations of faults, these wells should penetrate at least 20 feet into basement rock in order to sample ground water that could be flowing in the fault zone. These wells should be sealed so as to exclude water from the overlying alluvium from being drawn into the portion of the well that is below the basement rock/alluvium contact. Monitoring data from these additional wells should be reviewed by the Regional Board to determine if further plume definition or additional monitoring in Region II is necessary.

E. Monitoring and Management of Region I

Our review of the record to address issues in Region II raised by petitioners required us to look at the extent of the monitoring conducted in Region I. We have several comments on the current monitoring and management program occurring in Region I. We note at the outset that while several of our recommendations regarding Region I are not specifically required by Regional Board order, they are in fact being carried out.

1. The various aquifers in the Region I area have been labeled A, B, C, D, etc., with the shallowest aquifer regarded as the "A" aquifer.

Hardly any information is provided concerning the existence or hydrogeologic characteristics of aquifers below the "D" aquifer. The apparent reason for the initial decision not to monitor deeper aquifers was that little or no degradation was discovered in the "D" aquifer, and therefore, it was assumed the contaminants had not migrated below the "C" aquifer to any significant extent. There are a variety of conditions that could exist that would explain the absence of degradation in the "D" aquifer but would not necessarily preclude degradation of aquifers below the "D" aquifer.

Therefore, we will direct that all aquifers down to basement rock should be investigated and monitored to some minimal degree. Monitoring of the "D" aquifer and aquifers below it should continue even though initial results prove negative. Because of the longer pathways, it may take longer for the chemicals to reach the deep aquifers. Moreover, TCA and Freon 113 are now being measured in significant concentrations in the "D" aquifer.

2. The absence of free product (undissolved TCA or Freon 113) from monitoring and extraction wells indicates that free product may remain in the aquifers. If true, this means that the time required to complete the cleanup in Region I is dependent on the rate of dissolution of the chemicals into the ground water as it flows past the areas in which any free product may reside. Given the extremely low solubilities of the chemicals, it could be many decades before a permanent reduction in chemicals can be achieved, even if the volume of the initial spill was small. We note that IBM has studied the free product issue and has concluded that free product has not been located. Given our recommendation regarding a more thorough exploration of deep aquifers, we feel that additional investigation for free product should take place and be discussed in the December 1986 report.

3. Changes in hydrogeologic conditions caused either by the extraction program or by natural processes may cause an initial reduction in chemical concentrations as long as extraction continues but which could revert to pre-extraction levels if the extraction processes are interrupted or terminated before all of the free product is dissolved. Consequently, any consideration of terminating the extraction program should be preceded by a temporary curtailment of extraction activities for an extended period in order to determine whether contaminate levels rise as pre-extraction hydrologic conditions are reestablished.

Furthermore, we are particularly concerned about the large quantities of ground water which are being pumped and discharged in Region I. The two applicable NPDES permits authorize a total of 5.8 million gallons per day (mgd) from ground water extractions on-site, and 11.5 mgd for the off-site extraction wells for a total of up to 17.3 mgd of ground water. We note that the water levels in Region I have declined as much as 16 feet since the extraction program began.

The ground water being pumped is not being treated prior to its discharge to Canoas Creek. In some instances, the concentrations of DCE and TCA have been quite high.[9] Although not a part of the petition before us at this time, we take notice of the concern that Canoas Creek may be in hydraulic continuity with adjacent wells. We direct the Regional Board and the discharger to investigate the possibility that the water discharged to Canoas Creek may affect ground water supplies. Such possibilities should be discussed in the investigative and remedial action plan for the defined area to be submitted by the discharger to the Regional Board. Further, we are concerned that such large amounts of ground water being pumped, not treated and discharged into a creek, could constitute a waste and unreasonable use of water. We encourage the Regional Board and discharger to evaluate alternatives which would lessen the amount of ground water being extracted and discharged to surface water.

2. Contention: The waste discharge requirements adopted by the Regional Board allow for "limited degradation" of ground water in the

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[9] Well A-22 exceeded the NPDES requirements for DCE and TCA on two occasions: On November 21, 1984, DCE measured 1,200 ppb, and TCA 5,300 ppb; and on November 24, 1984, DCE measured 1,400 ppb and TCA 13,000 ppb.

Region II, undefined, area. Petitioners believe such limited degradation is inconsistent with state law. Accordingly, petitioners argue that wells in Region II should have levels of pollutants reduced to the maximum extent practicable.

Finding: The State Board adopted Resolution No. 68-16 "Statement of Policy with Respect to Maintaining High Quality of Waters in California."[10] (Hereafter statement or Resolution No. 68-16). This statement sets forth the circumstances under which change to existing high quality water will be allowed. Specifically, the statement provides:

> "1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.
>
> "2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."

This policy does not absolutely require that existing high water quality be maintained; rather, any change must be both consistent with maximum

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[10] Petitioners and others have referred to this policy as the "Nondegradation Policy." Although the applicable Basin Plan discusses Resolution No. 68-16 under the caption of "Nondegradation", we decline to term Resolution No. 68-16 as the "Nondegradation Policy" as the term "nondegradation" does not appear in the policy's title.

public benefit and not unreasonably affect beneficial uses. Resolution No. 68-16 was adopted in response to a requirement by the federal government that all states adopt an antidegradation policy for surface waters (40 Code of Federal Regulations, Section 131.12). Resolution No. 68-16 is not a "zero-discharge" standard but rather a policy statement that existing quality be maintained when it is reasonable to do so. The resolution is consistent with state statutes. Water Code Section 13000 states in part:

> "[A]ctivities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible."

Water Code Section 13241 provides in pertinent part:

> "It is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. Factors to be considered by a regional board in establishing water quality objectives shall include, but not necessarily be limited to, all of the following:
> (a) Past, present, and probable future beneficial uses of water.
> (b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.
> (c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.
> (d) Economic considerations.
> (e) The need for developing housing within the region."

The Basin Plan for Regional Water Quality Control Board, San Francisco Bay Region, incorporates these provisions.

In order to determine whether the allowance of limited degradation is consistent with these provisions, we must first see if existing water quality is better than water quality established in policies. In any event we note

that there are no specified limitations or objectives for TCA, Freon 113, or DCE in the Basin Plan. Accordingly, we must address the two questions of what levels of TCA, Freon 113 or DCE will unreasonably affect beneficial uses and what is consistent with the maximum benefit. To the extent that beneficial use of drinking water or domestic supply is affected, it is appropriate to consider levels established by state and federal health authorities in our evaluation of what is "reasonable".

In the case before us, we do not fully know the extent of any chemical contamination of the aquifer in Region II. The data in the record shows that the chemical concentrations from the existing 13 wells are generally well below levels of concern set by DOHS and EPA. However as discussed earlier, this data suffers from some deficiencies. If higher levels of chemicals are found in Region II, the Regional Board may have to reassess the impacts on beneficial uses, evaluate what various cleanup and treatment costs would be and consider that information in its determination as to the extent of any cleanup and treatment required. This approach would be similar to the approach being used by the Regional Board in evaluating the Region I area.

We find that Resolution No. 68-16 does not mandate that wells in Region II should have nondetectable levels of pollutants. Rather, State Board policy is to only allow changes or "limited degradation" of water quality which will not unreasonably affect beneficial uses, will be consistent with the maximum benefit to the people of the State of California and with the factors listed in Water Code Section 13241. In the absence of additional information, we cannot find that the degradation in Region II is in violation of state law. We base this finding on the fact that monitoring to date indicates that existing water quality does not exceed any established water quality policies,

the fact that existing data regarding water quality is well below applicable health criteria, the fact that the degradation nas already occurred and has not unreasonably affected beneficial uses, the fact that we are not dealing with a situation where a change to existing water quality is being asked for but rather to a question of whether a cleanup should be mandated, and the fact that it appears that the Regional Board properly analyzed the issue.

3. Contention: Petitioners allege that the Regional Board failed to follow its own guidelines in adopting the December 1984 order.

Finding: Specifically, petitioners point to the Regional Board's guidelines and policies for handling ground water cleanup cases. The two documents in question are "Regional Board Staff Guidelines with Respect to Establishing a Procedure to Identify Water Quality Objectives for Hazardous Material Site Clean-Up", Marcn 9, 1983, and "Internal Memo: Regional Board Consideration of Groundwater Contamination Cases", March 6, 1984. Petitioners allege that these documents require consideration of a cost-benefit analysis for at least three alternative approachs to clean-up and that tne Regional Board considered only two options for the undefined area.

We find that the two documents in question are not binding on the Regional Board since they are staff documents that we never adopted by the Regional Board itself. Therefore, we need not reach the issue of whether the guidelines were followed.[11]

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[11] Of course the Regional Board has the ability to establish cleanup policies (Water Code Section 13224). In this regard, we take notice of the fact that the Regional Board has adopted a resolution which authorized its Executive Officer to execute an enforcement agreement with EPA and DOHS for certain ground water contamination cases. (Regional Board Resolution No. 85-010,June 19, 1985.) That agreement in turn contains a purported policy statement that (CONTINUED)

4. Contention: All petitioners have requested a hearing before the State Board to submit additional evidence.

Finding: We do not believe a hearing is necessary at this time, for several reasons. First, we have supplemented the record, as discussed earlier, with submittals from all parties. The Regional Board must evaluate the additional information it receives from the added monitoring concerning the extent of any degradation in Region II in light of the factors discussed herein. Petitioners may properly bring any additional information before the Regional Board at that time.

III. SUMMARY AND CONCLUSIONS

1. Additional monitoring is not needed to augment IBM-'s existing Region II monitoring network. If monitoring at the Edenvale Gap or at the existing Region II monitoring locations discloses increased levels of contaminants, the Regional Board should reevaluate the need for additional monitoring in Region II.

2. IBM should continue its practice of monitoring for chromatographic peaks for a full range of volatile synthetic organic chemicals and report such results to the Regional Board.

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11 (FOOTNOTE CONTINUED)

"[T]he Regional Board intends to use waste discharge requirments as the primary mechanism for routine regulation of investigation and cleanup at ground water contamination sites where extended investigation and cleanup activities are necessary." This policy statement was never approved by us as required by our Resolution No. 73-42. Therefore, we would ask the Regional Board to provide us with this and any other documents which they intend to use as cleanup policies. Before forwarding any policies, the Regional Board should modify them to make clear that the proper action to effectuate cleanup in most cases is adoption of cleanup and abatement orders rather than issuance of waste discharge requirements.

3. The Regional Board should investigate other possible sources of contamination in Region II as discussed herein.

4. We must be sure that the extraction program at or near the Edenvale Gap is working as designed. Additional ground water monitoring at or near the Gap is indispensable. The existing monitoring should be expanded to get adequate lateral and vertical coverage of the ground water flowing from Region I into Region II. Depending on results of this monitoring, additional wells may be needed in Region II.

5. Additional information, much of which IBM is currently preparing, is needed from the monitoring system in Region I.

a. All aquifers down to basement rock should be investigated and monitored to some degree, including investigation for possible free product.

b. Before any termination of the extraction program is approved, there should be a temporary curtailment of the extraction program for an extended period to determine whether chemical levels begin to rise under non-pumping conditions.

6. We are concerned that water levels in Region I have declined as much as 16 feet since the extraction program began. The Regional Board and discharger should continue to evaluate cleanup alternatives which would lessen the long-term impacts on ground water supplies in Region I and II.

7. The Regional Board should continue to address the concern that discharges into Canoas Creek may affect ground water.

8. Resolution No. 68-16 does not mandate that wells in Region II should have nondetectable levels of pollutants. However, if additional monitoring indicates that chemical levels are higher than thought, the Regional

Board must evaluate whether such levels are unreasonable and if so determine an appropriate cleanup strategy.

9. The Regional Board's action in this matter need not follow staff guidelines. However, any cleanup policies adopted by the Regional Board should be forwarded to us for approval, as specified herein.

10. A hearing is not needed at this time, as additional information will be forthcoming.

IV. ORDER

IT IS HEREBY ORDERED THAT:

1. The discharger shall prepare as part of the technical report to be submitted pursuant to Order 84-90 of the California Regional Water Quality Control Board, San Francisco Region by December 1, 1986, the following information, some of which it is already in the process of preparing:

a. Results from additional ground water monitoring at or near the Edenvale Gap. The existing monitoring shall be reviewed and expanded as necessary to obtain adequate lateral and vertical coverage of the ground water flowing from Region I into Region II.

b. Results from additional monitoring wells in Region I. All aquifers down to basement rock should be considered for investigation in a step-wise manner and monitored. During installation of additional wells, the presence of free product should be determined.

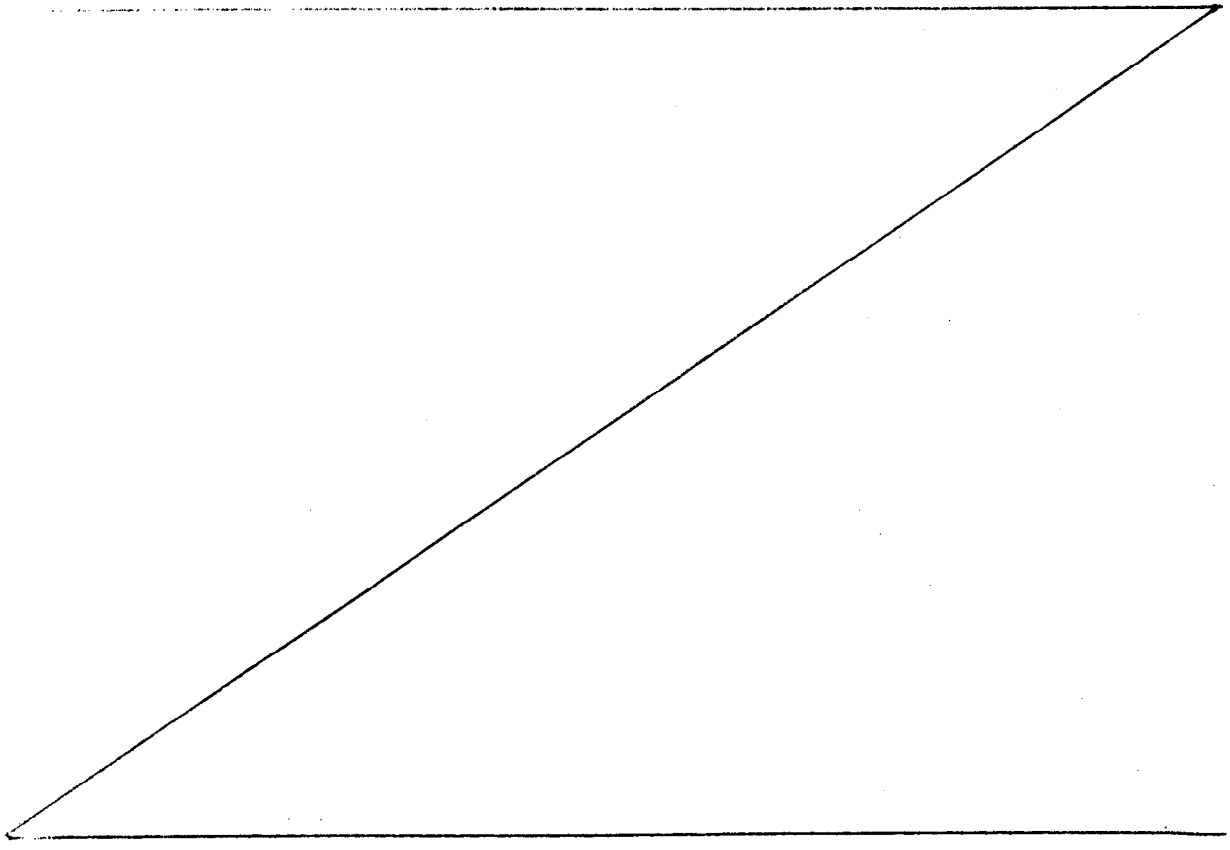
c. The discharger shall evaluate cleanup alternatives which would lessen long term impacts on groundwater supplies in Region I and II.

d. The discharger shall investigate whether the chemicals in the pumped water discharged to Canoas Creek may affect groundwater supplies.

e. The discharger shall submit a monitoring plan which is acceptable to the Regional Board Executive Officer within two months of the date of our Order. The plan must outline how the additional monitoring called for in a and b above shall be conducted. This plan shall contain a time schedule for implementation of such monitoring. Implementation of the additional monitoring shall begin no later than August 1, 1986. Reports shall be submitted to the Regional Board on a regular basis.

2. The discharger shall report all chromatographic peaks for the purgeable halocarbons and/or volatile organics.

3. Before the Regional Board approves any termination of the extraction program currently underway in Region 1, the extraction program shall be temporarily curtailed for an extended period to determine whether contaminant levels begin to rise under non-pumping conditions.



4. The Regional Board shall evaluate all additional data received as a result of this Order and in the technical reports submitted by the discharger to determine any additional remedial actions for Region I and Region II. Such determinations shall be consistent with State Board policy on maintaining existing high quality waters.

CERTIFICATION

The undersigned, Executive Director of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on May 5, 1986.

Aye: Darlene E. Ruiz
E. H. Finster
Eliseo M. Samaniego
Danny Walsh

No: None

Absent: None

Abstain: None

for Walt Pettit
Raymond Walsh
Interim Executive Director