Earthware of California

Selected Geological Cross Sections
In The Salinas Valley
Using
GEOBASE

Prepared by
PHILIP HALL

for
MONTEREY COUNTY WATER RESOURCES AGENCY
BASIN MANAGEMENT PLAN

MAY, 1992
MONTEREY COUNTY WATER RESOURCES PROJECT

Dr. Young Yoon,
Vice President and Water Department Manager,
James M. Montgomery, Consulting Engineers,
740 University Avenue #160,
SACRAMENTO, CA 95825

ATTENTION: Dr. Young Yoon,

Dear Dr. Yoon,

We are pleased to submit our final report on the geological cross sections created with the aid of GEOBASE.

Instructions are included for displaying the sections on computer and for adding features such as well construction details, chemistry and geophysical logs. We have also contoured the top and thickness of the 180-FOOT AQUIFER in the region of section 1 - 1'.

The Monterey County Water Resources Agency has copies of the database (approximately 40 megabytes in size).

The sections were created under GEOBASE version 6.0.

Should you have any questions, please do not hesitate to call.

Yours Truly,

Philip L. Hall M.Sc.
Principal Hydrogeologist

30100 TOWN CENTER DIVE #196, LAGUNA NIGUEL, CA 92677
TABLE OF CONTENTS

INTRODUCTION .......................... Page 1
REGIONAL HYDROGEOLOGY ............... Page 1
SUMMARY AND RECOMMENDATIONS ....... Page 14

LIST OF FIGURES

Figure 1  Water Supply Areas ...................... Page 2
Figure 2  Schematic Geology of the Salinas Valley Page 6
Figure 3  Schematic Diagram of a Meandering Channel Page 8
Figure 4  Section Lines ......................... Page 10
Figure 5  Comparison of Cross Section .......... Page 11
Figure 6  Schematic of the 180 Foot and 400 Foot Aquifers Page 14
INTRODUCTION

The Salinas Valley is located on California's Central Coast. The Monterey Water Resources Agency is responsible for the management and protection of the ground water supplies in this area.

This report was prepared as part of the Basement Management Plan and the objective was to demonstrate computer applications to data analysis in the Salinas valley. A number of geological cross sections were selected by Gene Taylor, of the Monterey County Water Resources Agency. This report presents the cross sections and provides a hydrogeological background to the cross sections. Recommendations are also made for future investigations.

REGIONAL HYDROGEOLOGY

The Salinas Valley is broken up into 5 hydrogeological provinces. The subdivision of the valley is based mainly on the source of replenishment or recharge.

The Areas are:-

<table>
<thead>
<tr>
<th>AREA</th>
<th>Area in Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Pressure</td>
<td>80,980</td>
</tr>
<tr>
<td>2) Eastside</td>
<td>36,477</td>
</tr>
<tr>
<td>3) Forebay</td>
<td>40,373</td>
</tr>
<tr>
<td>4) Arroyo Seco Cone</td>
<td>22,115</td>
</tr>
<tr>
<td>5) Upper Valley</td>
<td>59,073</td>
</tr>
</tbody>
</table>

The areas are shown in PLATE 1 and the main features are summarized on the following pages.
PRESSURE AREA

The area receives no direct replenishment from precipitation or from the river. The aquifers are overlain by a clay layer which prevents direct recharge from the surface. Replenishment of the aquifers occurs as groundwater flow from the FOREBAY area. The aquifers discharge into a submarine canyon off the coast.

EAST SIDE

This area receives recharge from channels and streams. The confining layer from the PRESSURE area is believed to be absent. The boundary between the East side and the PRESSURE area moves and is dependent upon the pumping from wells.

FOREBAY

This area receives recharge from the ARROYO SECO and UPPER VALLEY areas as well as the Salinas River.

ARROYO SECO

Recharge from rivers and streams replenishes the aquifers in this area. Recharge occurs from the Arroyo Seco River, Relize Creek and the Clark Canal.

UPPER VALLEY

This region receives recharge from the Salinas River and it's tributaries. Aquifers in this area are generally unconfined.

The groundwater characteristics of the major Formations in the Salinas Valley are shown in Table 1, from the report entitled "Sea Water Intrusion Lower Salinas Valley, Monterey County", by the State of California, The Resources Agency, Department of Water Resources, July 1973.
The major geological features will be reviewed and then the hydrogeology will be discussed in more detail.

GRANITE BASEMENT

This occurs at depths up to 2600 feet in the Salinas Valley. Outcrops of the granite occur along the San Andreas Fault. A ridge of granite occurs in the North County Area.

The upper 100-200 feet of the granite surface is weathered and fractured. Limited quantities of water are available from this zone. This is not generally seen as a viable groundwater supply due to the low yields, great depths and consequent expense required to reach this zone.

The granite is generally considered to be the base of groundwater exploration.

PURISMA FORMATION

This formation is composed of siltstones and sandstones and is not an important source of groundwater.

PASO ROBLAS FORMATION

A conglomerate marks the base of this formation. The formation is composed mainly of fine to course sandstones, largely of fluvial origin.

QUATERNARY/RECENT ALLUVIUM

The PASO ROBLAS FORMATION passes upward into the AROMAS FORMATION. The sands and gravels of this group supply most of the groundwater to the valley. The geology is known to be complex with rapid changes occurring both vertically and horizontally. The complexities are apparent, in part, because of the large number of well logs from this zone.
<table>
<thead>
<tr>
<th>Geologic Unit</th>
<th>Thickness (in feet)</th>
<th>Hydrologic Properties</th>
<th>Permeability</th>
<th>Well Yield</th>
<th>Water Quality</th>
<th>Ground Water Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recent sand dunes</td>
<td>100+</td>
<td>Above water table</td>
<td>Excessive</td>
<td>Nil</td>
<td>Good to poor</td>
<td>None</td>
</tr>
<tr>
<td>Stream channel deposits</td>
<td>50+</td>
<td>Recharge area</td>
<td>High</td>
<td>High</td>
<td>Good</td>
<td>None</td>
</tr>
<tr>
<td>Basin deposits</td>
<td>50+</td>
<td>Aquiclude</td>
<td>Low</td>
<td>Nil</td>
<td>Poor</td>
<td>None</td>
</tr>
<tr>
<td>Younger alluvium</td>
<td>50+</td>
<td>Thin aquifers</td>
<td>Low to medium</td>
<td>Low</td>
<td>Brackish to fair</td>
<td>None</td>
</tr>
<tr>
<td>Intermediate alluvium</td>
<td>50+</td>
<td>Thin aquifers</td>
<td>Low to medium</td>
<td>Low to moderate</td>
<td>Good</td>
<td>None</td>
</tr>
<tr>
<td>Floodplain deposits</td>
<td>100+</td>
<td>Thin aquifers</td>
<td>Medium</td>
<td>Moderate</td>
<td>Good</td>
<td>None</td>
</tr>
<tr>
<td>Alluvium fan deposits</td>
<td>100+</td>
<td>Discontinuous aquifers</td>
<td>Low to medium</td>
<td>Low to moderate</td>
<td>Good</td>
<td>None</td>
</tr>
<tr>
<td>Older sand dunes</td>
<td>250</td>
<td>Perched ground water</td>
<td>High</td>
<td>High</td>
<td>Good to poor</td>
<td>None</td>
</tr>
<tr>
<td>Older alluvium</td>
<td>150</td>
<td>Salinas aquiclude</td>
<td>Low</td>
<td>Low to nil</td>
<td>Good</td>
<td>None</td>
</tr>
<tr>
<td>Valley terraces</td>
<td>50 - 250</td>
<td>Discontinuous aquifers</td>
<td>Medium</td>
<td>Moderate</td>
<td>Good to brackish</td>
<td>None</td>
</tr>
<tr>
<td>Marine terraces</td>
<td>150</td>
<td>Discontinuous aquifers</td>
<td>Medium</td>
<td>Moderate</td>
<td>Good to brackish</td>
<td>None</td>
</tr>
<tr>
<td>Valley fill materials</td>
<td>500+</td>
<td>&quot;180-foot&quot; aquifer &quot;400-foot&quot; aquifer Other unnamed aquifers and aquicludes</td>
<td>Low to high</td>
<td>Low to high</td>
<td>Saline to excellent</td>
<td>Vergeles fault</td>
</tr>
<tr>
<td>Pleistocene</td>
<td>1,000</td>
<td>Thick aquifers</td>
<td>High</td>
<td>High</td>
<td>Good</td>
<td>Vergeles and other faults</td>
</tr>
<tr>
<td>Eocene</td>
<td>2,500</td>
<td>Bedded aquifers and aquicludes</td>
<td>Low to moderate</td>
<td>Moderate</td>
<td>Fair to good</td>
<td>Vergeles, Gabilian and other faults</td>
</tr>
<tr>
<td>Miocene</td>
<td>10,000</td>
<td>Bedded aquifers with thin aquicludes</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Good</td>
<td>Vergeles and other faults</td>
</tr>
<tr>
<td>Pliocene</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Miocene rocks</td>
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<td></td>
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<td></td>
<td>Nonwater-bearing</td>
</tr>
<tr>
<td>Eocene</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Nonwater-bearing</td>
</tr>
<tr>
<td>Metamorphic rocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Nonwater-bearing</td>
</tr>
<tr>
<td>Granitic rocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Nonwater-bearing</td>
</tr>
</tbody>
</table>
There are several types of alluvium in these formations.

1) Old alluvium associated with streams running from the hills into the valley.
2) Old alluvium in the valleys and lowlands.
3) Modern alluvium in the stream beds.
4) Debris flow from flood waters.
5) Dune sands.

At any one time in geologic history, sands and gravels would be deposited along the river channels. Alluvial fans and cones would develop on the valley sides where rivers and streams discharged into the valley. In addition to the sands and gravels, finer materials such as silts and clays, would be deposited as overbank deposits during flooding of the floodplain. Torrential floods would gouge out channels or cut access meanders and deposit mixtures of clay, silt, sand, gravel and boulders.

There is thus an interfingering of different geological conditions along the valley.

As relative sea level fluctuated with the ice ages melting and freezing cycles and isostatic uplift of the land, this complex cycle would be repeated many times.

Added to the complexity of the geology is our imperfect set of data points. If we consider that a typical meander channel contains water-bearing sands and gravels overlain by clay and if we then drill through the clay to locate the gravel, we would have a situation shown in the following diagrams.

Figure 3 shows a meandering buried channel and some cross sections along and across the valley. Section A-A' and B-B' figure show the section lines along the length of the channel. These are based upon a complete understanding of the extent of the buried channel.
SCHEMATIC DIAGRAM SHOWING A BURIED MEANDERING RIVER CHANNEL WITH SECTION LINES

Figure 3
SECTION A-A'

1. AQUIFER
   CLAY
   GRAVEL

MISINTERPRETED SECTION BASED ON LIMITED TEST HOLES OR WELLS COMPLETED IN THE BURIED CHANNEL

2. AQUIFER IS ASSUMED TO BE CONTINUOUS GRAVEL
   CLAY

MISINTERPRETATION BASED ON TEST HOLES MISSING GRAVEL

3. CLAY
   CLAY

SECTION B-B'

Figure 4
Sections 1 and 2 are based on limited drill hole data.

In Section 2, all of the drill holes encountered gravel and so it would be reasonable to join up the gravel zones into one continuous layer.

In section 3, the drill holes missed the gravel and so it would be reasonable to assume that the gravel only has a very limited extent. In both cases, the interpretations are wrong due to the placement of the boreholes.

Sections C-C', D-D' and E-E' are taken across the channel and show how the width and nature of the channel, in the cross section, depends upon the position of the cross section.

In the PRESSURE AREA, there are two main aquifer units:-

1) 180-foot aquifer
2) 400-foot aquifer

There are fluvial sands and gravels associated with the old Salinas River channel and also possible delta conditions. Above and between the two aquifers are deposits of blue clay. These clays are quite distinctive and have marine fossils in them. It appears that the clays represent periods of marine encroachment due to periods of glacial melting. The environment is believed to have been similar to San Francisco Bay and encroachment seems to have been at least twice the rate that the river could re alluviate it's channel. (Tinseley, 1975)

The base of the 180 foot aquifer (-145 ft) and the base of the 400 foot aquifer (-270 ft) are in the same range for evaluation estimates for sea level lows in late Wisconsin times.
SECTION C-C'

GRAVEL

CLAY

GRAVEL

SECTION D-D'

GRAVEL

CLAY

SECTION E-E'

GRAVEL

CLAY

COMPARISON OF CROSS SECTIONS

Figure 5
SCHEMATIC SHOWING THE NATURE OF THE 180-FOOT AND 400-FOOT AQUIFERS
MONTERY COUNTY WATER RESOURCES AGENCY
Discussion of the 180 and 400 FOOT AQUIFER

The blue clay, overlying the 180 foot aquifer, ranges from 25 feet thick at Salinas to more than 100 feet thick at the Nashua Road. It is known as the Salinas Aquitard and is composed mostly of blue marine clays with some silts. The clay is overlain by more recent river sands and gravels. It has a low permeability and greatly reduces river seepage and recharge to the 180 foot aquifer. The clay pinches out in the EAST-SIDE Area and has been believed to stop at Gonzales, down the valley. This present study shows this formation to be present as far south as Township 22.

In places, the clay layer may have been removed by channel erosion from more recent fluvial deposits.

The first major aquifer is called the 180 FOOT AQUIFER (DWR, 1946). The name refers to the average depth to the center of the aquifer. The aquifer varies in thickness from 50 to 150 feet and its top lies at depths of 100 to 150 feet. Salt water intrusion is a problem in this aquifer near the coast.

The 180 FOOT AQUIFER is separated from the 400 FOOT AQUIFER by a series of discontinuous aquifers and aquitards which reach a total thickness of 10 to 70 feet. One of the aquitards is a marine blue clay which is easily recognized. This aquitard acts as a leaky confining bed for the 400 FOOT AQUIFER. The leaky nature of the aquitard could be due both to leakage through the aquitard materials and to possible gaps or "holes" in the aquitard.

400 FOOT AQUIFER

The 400 FOOT AQUIFER at Salinas is a single bed, 200 feet thick, occurring at depths from 270 to 470 feet. At Castroville, the aquifer is broken up into two 25-foot-thick units and one 100-foot-thick unit.

The 400 FOOT AQUIFER appears to be much less uniform than the 180 foot aquifer. This may be due in part to the smaller number of wells penetrating this zone.

In places, it is believed that the uppermost beds of the 400 FOOT AQUIFER merge with the lowermost beds of the 180 FOOT AQUIFER.
Both the 180 FOOT AQUIFER and the upper part of the 400 FOOT AQUIFER may correlate with the AROMAS SANDS. The lower part of the 400 FOOT AQUIFER may correlate with part of the PASO ROBLES FORMATION.

Beneath the 400 FOOT AQUIFER is a thin discontinuous layer of blue marine clay which is about 50 feet thick. Beneath this lies an alternating sequence of sands/gravels and clays. These zones are as yet, largely undeveloped.

The base of the groundwater basin is reported to be at a depth of approximately 800 feet near Castroville and 1050 feet at Salinas.

**Barriers to Groundwater Movement**

A buried clay-filled gorge occurs in the vicinity of Elkhorn Slough. This was at one time a terrestrial canyon formed as part of the present Monterey Canyon. It was 400 feet deep, 2500 feet wide and at least 4 miles long. It became filled with tidal muds. This barrier reduces north-south groundwater flow in the area.

On the South, the Gabilian Fault runs along the southwest side of the valley. This may form a barrier between the seaside groundwater basin and the Salinas Valley.
SUMMARY AND RECOMMENDATIONS

The hydrogeology of the Salinas Valley is extremely complex. To understand and manage the groundwater resources will require in-depth studies on each of the hydrogeological provinces.

There are up to 12 marine blue clay layers (14S/2E-6L1) and some of them extend as far south as township 22 (22S/10E-29J50). These clays are good marker zones and should be studied in more detail. Samples should be collected by drillers and the foraminifera should be analyzed to determine age and correlation. At this time it is not clear how the correlation extends down the valley as there is a significant change in ground elevation down the valley.

Drillers logs vary in quality, depending upon the drilling method and the driller's own ability. Reference logs need to be established in all areas. These may be existing logs or new ones may need to be drilled.

The cable tool logs are generally of good quality, samples are collected every 2 feet and so both contacts and sample descriptions are good. Cable tool logs are often more detailed, giving alternating layers of sands and clays on 1 to 5 foot intervals. A similar rotary log would report sandy clay over the entire interval. In some of the sand-gravel deposits, the finer materials may be lost due to surging action of the bit in the casing.

Rotary logs can be much less reliable than the cable tool logs. It is harder for the driller to measure the depths of formation changes due to the lag time in the samples arriving at the surface in the drilling mud. Samples tend to be small and there can be separation out of sands/gravels and clays in the ascent up the borehole. If the mud velocity is not high enough, then gravel can stay at the bottom of the hole, misleading the driller into thinking that he is drilling through gravel. Alternating layers of clay, sand and gravel can be mistaken for mixtures of the same materials. The first situation can yield significant groundwater flows, while the second one does not. These problems can be overcome by a good driller. The good driller notes depth changes in penetration rates and sounds from the Kelly and then collects samples to fit these changes.

The use of electric logs helps considerably in the identification contacts and lithology types. This can be seen in the logs of Appendix B.
Reverse circulation has similar problems to normal rotary drilling. These are often made worse by the fact that the reverse circulation hole is larger in diameter and the drilling fluid is less viscous.

There is a lack of good pumping test data in the valley. Pumping tests are essential to managing the groundwater resources. In addition to providing information on transmissivity, permeability and storativity, tests also provide information on leakage coefficients and boundary conditions.

Groundwater studies should concentrate on smaller areas, all records should be entered into the database, logs should be plotted up and cross sections drawn. Tops, bottoms and thickness's of aquifers should be plotted up on maps and this should be used with cross sections to create a 3-dimensional picture of the aquifer systems.

Groundwater chemistry data can be used to identify related aquifers. Piper, Stiff and other diagrams can be used to identify similar groundwaters.

The stratigraphy nomenclature should be set up for each hydrogeological province. The 180 - FOOT and 400 - FOOT aquifer systems may need to be broken down into smaller units.

The existing monitor wells should be reviewed. The logs should be plotted up together with logs from surrounding wells.

The hydrogeological environment should be evaluated. The value of the monitor well data can then be assessed and decisions can be made as to whether monitoring should be continued.

**RECOMMENDATIONS**

[1] Future investigations should concentrate on smaller geographic areas. All records in these areas should be entered into the database and should be plotted up graphically to aid in interpretation.

[2] Groundwater chemistry should be used to aid in geological interpretations. The major anions and cations should be analyzed, together with TDS, conductivity and Nitrates.
[3] Samples should be collected from drillers in some areas. The samples to be collected should include the blue marine clays for stratigraphic correlation and sands and gravels for sieve analyses. These analyses would help in well design, leading to more efficient wells.

[4] Pumping tests should be carried out on new wells. This need only require that new wells be run at a constant rate for a period of 8 to 24 hours. Water levels could be measured using transducers. At the present time, there is an inadequate number of tests available for realistic modeling of the groundwater system. Transducers could also be used in existing wells to obtain short-term test results.

[5] Aquifer data should be plotted up in cross sections and maps. Contour and isopach maps should be made up for each map sheet, as the data becomes available. This information should be made available to drillers to assist in selecting zones of completion for new wells.

TEST DRILLING PROGRAMS

If test drilling programs are to be implemented, the following should be taken into consideration:

[i] Before drilling, logs should be plotted up in the area of interest. The objectives of the drilling should be defined, i.e. to extend correlation beyond a known area or to resolve conflicting interpretations of existing data.

[ii] Rotary drilling is probably the fastest and most economical way of getting data. Clay samples can be collected by a tube or split spoon. Electric logs can identify lithology changes and their signatures can be used for correlation.

The logs to be run should include:

- Spontaneous or Self Potential (SP)
- Resistance or Short normal
- Natural Gamma (for clays and percent of clays)

The Long and Short normal logs are less useful than the Resistance log.
[iii] The test hole could be drilled at 6 to 8 inch diameter and completed as an observation well, using PVC casing and screen. A short test could be carried out and water samples could be taken. The well could then serve as a permanent monitoring well.

GUIDELINES FOR WELL DRILLERS

The Water Resources Agency should provide reporting guidelines for drillers, these should include:

[i] Location information ... accurate sketch maps or locations by G.P.S.

[ii] Standardized lithology descriptors... color (using color charts), lithology names, grain size (using sample charts).

[iii] Collection of samples... blue clays... noting depths , sand and gravel for grain size.

[iv] Use of electric logs in rotary and reverse circulation drilling, the logs to include:
   Resistance
   Spontaneous Potential
   Natural gamma

The logs should then be entered into the database as soon as possible.

RECOMMENDATIONS FOR MODELING

[i] A groundwater model is only as good as it's input data. The recommendations above are aimed at improving this data.

[ii] As the geology is so complex, it may not be realistic to model the entire valley in one model, smaller models, for specific areas, could be used to break down the complexity and and then be merged into a larger regional model. The hydrogeological provinces may form natural units for modeling.

[iii] The database should be used to control the physical data. Any changes in the input arrays to the model should be done through the database and not the input files. This will ensure that any changes made can be looked at in cross sections , maps and
contours. This is good data management and allows for realistic changes in hydrogeological data. Without this control data can be changed to produce desired results but the changes may not have any realistic hydrogeological basis.

[v] Leakage from the river is a major problem and should have field tests to make more reliable estimates of leakage from cr to the river.

[v] In the Pressure aquifer system, the 180 foot and 400 foot aquifers are considered to be separate. The 400 foot aquifer is one aquifer in some places and 3 aquifers in others. Are these all considered to be separate aquifers with varying vertical hydraulic conductivity or are they simulated as one aquifer?

[vi] Are the leaky beds assumed to be continuous or are there "holes" in them where high leakage rates have been found.

[vii] In the Forebay and East side, areas there are layers of alternating sands, gravels and clays. Are these layers treated as separate aquifers? If so, how are permeability and leakage factors assigned to each unit.

Two other options are available for these conditions:

(a) The thickness’s of the permeable beds can be summed and one aquifer can be assumed. This representation has problems when part of the aquifer becomes dewatered.

(b) The same total thickness can be retained but the permeability values can be averaged.

The results from both methods should be compared.
The cross sections can be loaded from the cross section program (GSEC).

Select the options, in the examples the only change from the default settings is to set the well labels to VERTICAL.

The LEGEND is set to LITHOLOGY 10%, this makes the lithology boxes the active means of selecting the symbol to be worked on.

To load in a file choose Data and the X, use the directory to view available cross section files. Press <ENTER> to select a file and then <L> to <L>oad the file.

The files are labeled FF1.SEC, GG1.SEC...which are the basic files with boreholes only. The files FF2..SEC...GG2.SEC are the completed cross section files.

The label files are F1.LBL...G1.LBL etc. They can be loaded just after the cross section files.

The well construction details can be shown on the cross sections by choosing BOTH in the options menu.

The polygons are not filled, for the purposes of clarity. The EDITOR can be used to turn them on.

The cross sections for F - F" are shown as logs only, completed cross sections, sections with well construction and chemistry. One example is also shown with the impermeable polygons filled in.

The plots may be sent to a variety of printers or plotters and can be converted to *.DXF format for Autocad.
APPENDIX A

GEOLOGICAL CROSS SECTIONS
# LIST OF FIGURES OF APPENDIX A

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIGURE 1</td>
<td>Geological Cross Section Map</td>
</tr>
<tr>
<td>FIGURE 2</td>
<td>Geological Cross Section Map B - B'</td>
</tr>
<tr>
<td>FIGURE 3</td>
<td>Geological Cross Section Map D - D'</td>
</tr>
<tr>
<td>FIGURE 4</td>
<td>Plate M #1 Map of Area I</td>
</tr>
<tr>
<td>FIGURE 4A</td>
<td>Plate M #1A Map of Area I</td>
</tr>
<tr>
<td>FIGURE 5</td>
<td>Cross Section F - F'</td>
</tr>
<tr>
<td>FIGURE 6</td>
<td>Cross Section F - F'</td>
</tr>
<tr>
<td>FIGURE 7</td>
<td>Cross Section G - G'</td>
</tr>
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<td>FIGURE 8</td>
<td>Cross Section H - H'</td>
</tr>
<tr>
<td>FIGURE 9</td>
<td>Cross Section B1 - B1'</td>
</tr>
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<td>FIGURE 10</td>
<td>Cross Section D1 - D1'</td>
</tr>
<tr>
<td>FIGURE 11</td>
<td>Plate No. M2</td>
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<tr>
<td>FIGURE 11A</td>
<td>Plate No. M2A</td>
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<td>FIGURE 12</td>
<td>Cross Section I - I'</td>
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<tr>
<td>FIGURE 13</td>
<td>Contours I - I'</td>
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<td>FIGURE 14</td>
<td>Contours of 180 Foot Aquifer of I - I'</td>
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<td>FIGURE 15</td>
<td>Contours of 180 Foot Aquifer of I - I'</td>
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<td>FIGURE 16</td>
<td>Contours of 180 Foot Aquifer of I - I'</td>
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<td>FIGURE 17</td>
<td>Mesh Diagram of Section I - I'</td>
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<tr>
<td>FIGURE 18</td>
<td>Cross Section J - J'</td>
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<tr>
<td>FIGURE 19</td>
<td>Cross Section B2 - B2'</td>
</tr>
<tr>
<td>FIGURE 20</td>
<td>Cross Section D2 - D2'</td>
</tr>
<tr>
<td>FIGURE 21</td>
<td>Plate No. M3</td>
</tr>
<tr>
<td>FIGURE 21A</td>
<td>Plate No. M3A</td>
</tr>
<tr>
<td>FIGURE 22</td>
<td>Cross Section L - L'</td>
</tr>
<tr>
<td>FIGURE 23</td>
<td>Cross Section B3 - B3'</td>
</tr>
<tr>
<td>FIGURE 24</td>
<td>Cross Section D3 - D3'</td>
</tr>
<tr>
<td>FIGURE 25</td>
<td>Plate No. M4</td>
</tr>
<tr>
<td>FIGURE 25A</td>
<td>Plate No. M4A</td>
</tr>
<tr>
<td>FIGURE 26</td>
<td>Cross Section M - M'</td>
</tr>
<tr>
<td>FIGURE 27</td>
<td>Cross Section N - N'</td>
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<tr>
<td>FIGURE 28</td>
<td>Plate No. M5</td>
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<tr>
<td>FIGURE 28A</td>
<td>Plate No. M5A</td>
</tr>
<tr>
<td>FIGURE 29</td>
<td>Cross Section P - P'</td>
</tr>
<tr>
<td>FIGURE 30</td>
<td>Cross Section Q - Q'</td>
</tr>
<tr>
<td>FIGURE 31</td>
<td>Cross Section D4 - D4'</td>
</tr>
<tr>
<td>FIGURE 32</td>
<td>Cross Section B4 - B4'</td>
</tr>
<tr>
<td>FIGURE 33</td>
<td>Cross Section B5 - B5'</td>
</tr>
</tbody>
</table>
Monterey County Water Resources Agency
Basin Management Plan

Geological Cross Section Map
Salinas Valley, California

Figure 1
Water Resources Agency
Management Plan

Southeast

Geological Cross Section B - B'

Figure 2
Geological Cross Section D - D'

Figure 3
PLATE No. M1
LOCATION OF GEOLOGICAL CROSS SECTIONS
IN AREA #1

WELL I.D.

1 IN = 10000 FT

Figure 4
PLATE No. M1A

LOCATION OF WELLS CURRENTLY IN GEObASE

IN AREA # 1

FIGURE 4A
PLATE No. M2

LOCATION OF GEOLOGICAL CROSS SECTIONS

IN AREA #2
PLATE No. M2A
LOCATION OF GEOLOGICAL CROSS SECTIONS
IN AREA #2
Figure 12

MONTEREY COUNTY WATER RESOURCES AGENCY
CONTOUR INTERVALS IN FEET

CONTOURS OF TOP OF 150-FOOT AQUIFER
AROUND SECTION LINE I - I'

USING STRATIGRAPHY AND TRIANGULATION

MONTEREY COUNTY WATER RESOURCES AGENCY

Figure 14
TOP OF 180 FOOT AQUIFER
NEAR SECTION I - I'
MONTEREY COUNTY WATER RESOURCES AGENCY

Figure 18
PLATE No. M3

LOCATION OF GEOLOGICAL CROSS SECTIONS

IN AREA #3

Figure 21
PLATE No. M3A
LOCATION OF WELLS CURRENTLY IN GEOBASE
IN AREA #3

FIGURE 21A
The diagram illustrates geological layers and their distribution across the Salinas Valley, highlighting differences between the pressure and east side areas. The legend provides a key to the various lithological units, such as soil, clay, and sand, which are represented in the horizontal sections along the 165/4E - 301 and 175/4E - 302 lines. The diagram is a section of the Monterey County Water Resources Agency's geological study, with Figure 24 indicating its placement in the report.
PLATE No. M4
LOCATION OF GEOLOGICAL CROSS SECTIONS
IN AREA #4

Figure 25
PLATE No. M4A

LOCATION OF WELLS CURRENTLY IN GEOBASE

IN AREA # 4

Figure 25A
PLATE No. M5
LOCATION OF GEOLOGICAL CROSS SECTIONS
IN AREA #5

Figure 28
PLATE No. M5A

LOCATION OF WELLS CURRENTLY IN GEOBASE IN AREA #5
APPENDIX B

ELECTRIC LOGS
The contents of Appendix B have been removed from this version of the document due to the inclusion of confidential information.