WATER TESTING
AND
CONSULTING LABORATORY

3825 SANTA CLAUS LANE
CARPINTERIA, CA 93013
Telephone (805) 684-3301

November 29, 1988

Ms.Judy Jennings
Ramaldo Well co.
5593 W. Camino Cielo
Santa Barbara, CA 93105

WATER ANALYSIS
RE: 5593 W. Camino Cielo
Santa Barbara, CA 93105

Attention: Ms. Jennings

Enclosed are the analytical results of a set of water samples taken by the Water Testing & Consulting Lab on November 22, 1988 as authorized and witnessed by Judy Jennings at the well site located at 5593 W. Camino Cielo.

This well water failed to meet the standard for general mineral and general physical analyses due to high concentrations of manganese, iron, color and turbidity exceeding the Maximum Contaminant Levels(MCL) allowed by the State Health in drinking waters. Its radioactivity gross alpha and beta, and its inorganic chemical analyses passed the MCL. As such this water is demerited for drinking purposes until corrections are made to reduce the above parameters to within the acceptable levels.

Manganese and iron in water may be removed by filtration using a Manganese Zeolite Greensand filter. Color and turbidity of this water were due to the oxides of iron and manganese. Therefore, filtration of the water using the Greensand filter will simultaneously removed the color and turbidity of the water. An alternative treatment, is to use a conventional brine water softening unit. The latter treatment will however, produce high concentration of sodium which may not be good for drinking as well as for agricultural purposes.

If there are any questions regarding this report, please feel free to call or write me personally. Thank you.

SINCERELY,

Ray G. Orquiola

RAY G. ORQUIOLA, CHEMIST

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CALIFORNIA STATE HEALTH APPROVED LABORATORY

ANALYSIS

REPORT TO: JUDY JENNINGS
ROMALDO WELL CO.
5593 W. CAMINO CIELO STREET
SANTA BARBARA, CA 93105

LAB NO. 88973
DATE November 29, 198
PAGE 1 OF 1

ATTENTION: Ms. Judy Jennings
SOURCE: 5593 W. CAMINO CIELO, SANTA BARBARA, CA 93105
SAMPLE DESCRIPTION: RAW UNTREATED WELL WATER AT WELL SITE
DATE COLLECTED: NOVEMBER 22, 1988; 12:30 PM
SAMPLE COLLECTOR: RAY G. ORQUIOLA, CHEMIST WTCL
SAMPLE BOTTLE USED: WTCL 1-L plastic; 1/2 L plastic + 0.3 ml HNO_3(for Metals); 1/2 Liter + 0.3 ml H_2SO_4(for nitrate/fluoride).

TESTS REQUESTED: GENERAL MINERA GENERAL PHYSICAL, INORGANIC CHEMICAL ANALYSES AND RADIOACTI-VITY GROSS ALPHA & BETA.

1:40 PM
DATE RECEIVED: November 22, 1988
Date Completed: 11/28/88

GENERAL MINERAL ANALYSES	Results
Bicarbonate Alkalinity, mg/1 $CaCO_3$	240
Carbonate Alkalinity, mg/1 $CaCO_3$	<1
Hydroxide Alkalinity, mg/1 $CaCO_3$	<1
Calcium, mg/1 Ca	96
Chloride, mg/1 C1 (500)	40
Copper, mg/1 Cu (1.0)	0.07
Surfactant, mg/1 MBAS (0.5)	<0.02
Iron, mg/1 Fe (0.3)	0.38
Magnesium, mg/1 Mg	4
Manganese, mg/1 (0.05)	0.07
PH factor, unit	6.8
Sodium, mg/1 Na	57
Sulfate, mg/1 SO_4 (500)	177
Conductance, electrical, 25° C (1600)MMH/CM	700
Total Dissolved Solids, mg/1 TDS(at 180° C)(1000)	496
Total Hardness, mg/1 $CaCO_3$	256
Calcium Hardness, mg/1 $CaCO_3$	240
Magnesium Hardness, mg/1 $CaCO_3$	16
Zinc, mg/1 Zn (5)	0.75
GENERAL PHYSICAL ANALYSES	
Color, Unit (15)	35
Turbidity, NTU (5)	10
Threshold Odor Number at 60 C (3)	1.0
OTHERS: Theoretical TDS(Summation of Solids)	618
Total Anions, Milligram Equivalent/Liter	7.7
Total Cations, Milligram Equivallent/Liter	7.7
Standard Deviation, Anion-Cation Balance	± 0

INORGANIC CHEMICAL ANALYSES	Results
Arsenic, mg/1 As (0.05)	<0.005
Barium, mg/1 Ba (1.0)	<0.050
Cadmium, mg/1 (0.01)	<0.001
Chromium, mg/1 Cr (0.05)	<0.005
Lead, mg/1 Pb (0.05)	<0.005
Mercury, mg/1 Hg (0.002)	<0.0002
Nitrate as Nitrogen, mg/1 NO_3N (10)	0.8
Nitrate as NO_3, mg/1 NO_3 (45.0)	3.5
Fluoride, mg/1 F (2.0)	0.49
Selenium, mg/1 Se (0.01)	<0.002
Silver, mg/1 Ag (0.05)	<0.002
ORGANIC CHEMICAL ANALYSES	
Chlorinated Hydrocarbons:	
Endrin mg/1 (0.0002)	
Lindane, mg/1 (0.004)	
Methoxychlor, mg/1 (0.1)	
Toxaphene, mg/1 (0.005)	
Chlorophenols:	
2,4-D, mg/1 (0.1)	
2,4,5-TP Silvex, mg/1 (0.01)	
MISCELLANEOUS	
Boron, mg/1 B	
Potassium, mg/1 K	3.5
Sodium Adsorption Ratio (SAR)	1.6
Per Cent Sodium	32.5
Gross Alpha Radioactivity, pCi/L	1.0 ± 1.1
Gross Beta Radioactivity, pCi/L	13.3 ±10.6

LEGEND: Mg/ℓ means milligrams per liter and is also equivalent to parts per million (ppm). "Less than" (<) means less than the detectable limits by the instruments or methods used in testing. Numbers in parenthesis are the Maximum Contaminant Levels (MCL) established by the State of California Department Health Services in drinking waters.

All data presented here were obtained by following the EPA or State of California standard laboratory procedures. The liability of this laboratory shall not exceed the amount paid for in this report.

REMARKS: This well water failed to meet the standards for general mineral and general physical analysis due to high concentrations of manganese, iron, color and turbidity exceeding the Maximum Contaminant Levels(MCL) allowed by the State Health in drinking waters. Its inorganic chemical and radioactivity analysis passed the MCL. Test reference is attached in this report.

If there are any questions, please call or write me personally. Thank you. Sincerely,

Ray G. Orquiola

Ray G. Orquiola, Chemist and Owner

WATER TESTING AND CONSULTING LABORATORY

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REFERENCE METHODS OF ANALYSIS USED BY THE WATER TESTING & CONSULTING LABORATORY
(BASED FROM EPA 1983 METHODS FOR CHEMICAL ANALYSIS OF WATER & WASTES, AND 1985 STANDARD METHODS FOR THE EXAMINATION OF WATER & WASTEWATER, 16th EDITION).

PARAMETER & UNIT	METHODS	REFERENCE
A. PHYSICAL PROPERTIES		
[X] Color, Unit	Colorimetric, Platinum-Cobalt	EPA Method 110.2
[X] Conductance, Micromhos/Cm 25°C	Specific Conductance, Wheatstone Bridge	EPA Method 120.1
[X] Hardness, Total(mg/l as $CaCO_3$	Titrimetric, EDTA	EPA Method 130.1
[X] Odor, Theshold Odor	Comparison with odor-free water at 60°C	" " 140.1
[X] pH, Unit	Electrometric Measurement	" " 150.1
[ ] RESIDUE: mg/l		
[X] Total Dissolved (Filterable)	Gravimetric dried at 180°C	" " 160.1
[ ] Total Suspended(Non-fiterable)	Gravimetric dried at 103°C-105°C	" " 160.2
[ ] Total Solids	Gravimetric dried at 103°-105°C	" " 160.3
[ ] Volatile	Gravimetric, Ignited at 550°C	" " 160.4
[ ] Settleable Matter	Volumetric, IMHOFF Cone	" " 160.5
[ ] Temperature, °C	Thermometric	" " 170.1
[X] Turbidity,NIU	Nephelometric	" " 180.1
B. METALS: All Units in mg/l		
[ ] Aluminum, Al	AA Furnace	" " 202.2
[X] Arsenic, as As	AA Furance	" " 206.2
[X] Barium, as Ba	AA Furnace	" " 208.2
[ ] Beryllium, as Be	AA Furnace	" " 210.2
[ ] Boron, as B	Colorimetric, Curcumin	" " 212.3
[X] Cadmium, as Cd	AA Furnace	" " 213.2
[X] Calcium, as Ca	Titrimetric, EDTA	" " 215.2
[ ] Calcium, as Ca	AA, Direct Aspiration	" " 215.1
[X] Chromium, as Cr	AA Furance	" " 218.2
[ ] Hexavalent Chromium(Cr+ 6)	Chelation Extraction	" " 218.4
[ ] Chromium(Dissolved)	AA Furnace	" " 218.3
[ ] Cobalt, as Co	AA Furnace	" " 219.2
[ ] Gold, as Au	AA Furnace	" " 231.2
[ ] Iridium, as Ir	AA Furnace	" " 235.2
[X] Iron, as Fe	AA Direct Aspiration	" " 236.1
[X] Lead, as Pb	AA Furnace	" " 239.2
[X] Magnesium, as Mg	AA Direct Aspiration	" " 242.1
[X] Manganese, as Mn	AA Direct Aspiration	" " 243.1
[X] Mercury, as Hg	Cold Vapor, Manual	" " 245.1
[ ] Mercury, as Hg (in sediments)	Cold Vapor, Sediments	" " 245.5
[ ] Molybdenum, as Mo	AA Furnace	" " 246.2
[ ] Nickel, as Ni	AA Furnace	" " 249.1
[ ] Osmium as Os	AA Furnace	" " 252.2
[ ] Palladium, as Pd	AA Furnace	" " 253.2
[ ] Platinum, as Pt	AA Furnace	" " 255.2
[ ] Rhodium, as Rh	AA Furnace	" " 265.2
[X] Selenium, as Se	AA Furnace	" " 270.2
[X] Silver, as Ag	AA Furnace	" " 272.2
[X] Sodium, as Na	AA Direct Aspiration	" " 273.1
[ ] Thallium, as Tl	AA Furnace	" " 279.2
[ ] Tin, as Sn	AA Furnace	" " 282.2
[X] Copper as Cu	AA Direct Aspiration	" " 220.1

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Cont. on back page

PARAMETERS & UNIT	METHODS	REFERENCE
METALS [X] Potassium	AA Direct Aspiration	EPA Method 258.1
[ ] Titanium, as Ti	AA Furance	EPA Method 283.2
[X] Zinc, as Zn	AA Direct Aspiration	" " 289.1
C. INORGANIC, NON-METALLICS (All Units in mg/l)		
[ ] Acidity as $CaCO_3$	Titrimetric	" " 305.1
[X] Alkalinity as $CaCO_3$	Titrimetric, pH 4.5	" " 310.1
[ ] Bromide as Br	Titrimetric	" " 320.1
[ ] Chloride as Cl	Titrimetric, Mercuric Nitrate	" " 325.3
[X] Chloride as Cl	Argentometric Method	1985 Std. Method 407 A
[ ] Chlorine as Cl_2	DPD-Spectrophotometric	EPA Method 330.5
[ ] Cyanide as CN (Total)	Colorimetric, Spectrophotometric	" " 335.2
[X] Fluoride as F	Colorimetric, SPDNS with Distillation	" " 340.1
[ ] Iodide as I	Titrimetric	" " 345.1
[ ] Nitrogen- Ammonia	Colorimetric; Titrimetric Distillation	" " 350.1
[ ] Nitrogen-Kjeldahl (Total)	Colorimetric; Titrimetric(Distillation)	" " 351.3
[X] Nitrate-N	Colorimetric, Brucine	" " 352.1
[ ] Nitrate-N	Colorimetric-Chromotropic Acid	1985 Std. Method 418 D
[ ] Nitrate-N	Cadmium Reduction	1985 Std. Method 418 C
[ ] Nitrate-Nitrite	Colorimetric, Cadmium REduction	EPA Method 353.3
[ ] Nitrite	Spectrophotometric	" " 354.1
[ ] Oxygen, Dissolved	Modified Winkler(Full Bottle Technique)	" " 360.2
[ ] Phosphorous(All Forms)	Colorimetric, Ascorbic Acid(Single Reagent)	" " 365.3
[ ] Silica as SiO_2(Dissolved)	Colorimetric	" " 370.1
[X] Sulfate as SO_4	Turbidimetric	" " 375.4
[ ] Sulfide as $S^=$ (high H_2S)	Titrimetric, Iodine	" " 376.1
[ ] Sulfide as $S^=$(Low H_2S)	Colorimetric, Methylene Blue	" " 376.2
[ ] Sulfite as SO_3	Titrimetric	" " 377.1
D. ORGANICS(All units in mg/l)		
[ ] BOD 5 day, 20°C)	Winkler Azide	" " 405.1
[ ] Chemical Oxygen Demand(COD)	Titrimetric, Mid-Level	" " 410.1
[ ] Chemical Oxygen Demand(COD)	Titrimetric, Low Level	" " 410.2
[ ] Chemical Oxygen Demand(COD)	Titrimetric, High Level for Saline Waters	" " 410.3
[ ] Oil and Grease(Total Recoverable)	Gravimetric, Separatory Funnel Extraction	" " 413.1
[ ] Organic Carbon(Total) - TOC	Combustion-Infrared	" " 414.1
[ ] Petroleum Hydrocarbons, Total	Freon Extraction- Silica Gel	1985 Std. Methods 503 E
[ ] Phenolics, Total Recoverable	Spectrophometric, Manual 4-AAP-Distillation	EPA Method 420.1
[X] Methylene Blue Active Substances(MBAS)	Colorimetric, Methylene Blue	" " 425.1
[ ] Pesticides	Gas Chromatographic	1985 Std. Method p.538
[ ] Herbicides	" "	" " " p.550
E. RADIOLOGICAL:		
[X] Gross Alpha, pCi/l	Proportional Counter	" " " p. 640
[X] Gross Beta, pCi/l	" "	" " " p. 640
F. TOXICITY BIOASSAY		
[ ] Lethal Concentration LC50	96-Hr. Static Bioassay	" " " p. 690

OTHERS:

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MAXIMUM CONTAMINANT LEVELS(MCL)

The Maximum Contaminant Levels(MCL) presented here are in accordance with the State of California Health and Safety Code, Title 22. When your water contains constituents exceeding Maximum Contaminant Levels as indicated below, local or state health authourities should be notified.

I. GENERAL MINERAL ANALYSIS

Bicarbonate Alkalinity	None
Carbonate Alkalinity	None
Hydroxide Alkalinity	None
Calcium	None
Chloride, mg/l Cl	500
Copper, mg/l Cu	1.0
MBAS(Foaming Agent), mg/l	0.5
Iron, mg/l Fe	0.3
Magnesium, mg/l Mg	None
Manganese, mg/l Mn	0.05
pH value, Unit	None
Sulfate, mg/l	500
Conductance, micromhos/cm 25°C	1600
Total Dissolved Solids(180°C), mg/l	1000
Total Hardness, mg/l	None
Zinc, mg/l Zn	5

II. GENERAL PHYSICAL ANALYSIS:

Color, Unit	15
Turbidity, NTU	5
Odor Number(Threshold), 60°C	3

III. INORGANIC CHEMICAL ANALYSIS

Arsenic, mg/l As	0.05
Barium, mg/l Ba	1.0
Cadmium, mg/l Cd	0.010
Chromium, mg/l Cr	0.05
Lead, mg/l Pb	0.05
Mercury, mg/l Hg	0.002
Nitrate as N, mg/l NO_3N	10.0
Nitrate as NO_3, mg/l NO_3	45.0
Selenium, mg/l Se	0.01
Silver, mg/l Ag	0.05
* Fluoride, mg/l F	1.4 -2.4

(For Santa Barbara County, MCL for Fluoride is 2.0 ppm)

IV. ORGANIC CHEMICAL ANALYSIS

Chlorinated Hydrocarbons(Pesticides)

Endrin, mg/l	0.0002
Lindane, mg/l	0.004
Methoxychlor, mg/l	0.1
Toxaphene, mg/l	0.005

Chlorophenoxys(Herbicides)

2,4-D, mg/l	0.1
2,4,5-TP(Silvex), mg/l	0.01

VI. NATURAL RADIOACTIVITY **

GROSS ALPHA, pCi/l	5.0
GROSS BETA, pCi/l	50.0

*NOTE: Dependent on the annual average of maximum daily air temeperature: 1.4 mg/l for 79.3 - 79.5°F; 1.6 mg/l for 70.7 - 79.2 °F; 1.8 mg/l for 63.9 -70.6°F; 2.0 mg/l for 58.4-63.8°F; 2.2 mg/l for 53.8 - 58.3 °F and 2.4 mg/l for 53.7°F and below.

**NOTE: Gross Alpha for combine Radium 226 and Radium 228; Gross Beta for gross alpha particle acitivity including Radium 226 but excluding Radon and Uranium.