VOLUME II

REVISED
REMEDIAL INVESTIGATION REPORT
JASCO CHEMICAL CORPORATION
MOUNTAIN VIEW, CALIFORNIA

APPENDIX A - REFERENCES

APPENDIX B - BOREHOLE LITHOLOGIC LOGS

APPENDIX C - MONITOR WELL CONSTRUCTION DIAGRAMS

APPENDIX D - LABORATORY INVESTIGATION OF ENGINEERING PROPERTIES OF SOIL

APPENDIX E - AQUIFER TESTING REPORT

Prepared by:
OHM Remediation Services Corp.
Sacramento, California

On behalf of:
Jasco Chemical Corporation
Mountain View, California

February 1, 1991

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JASCO
CHEMICAL
CORP.

MOUNTAIN
VIEW,
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VOLUME
II

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APPENDIX A

REFERENCES

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In addition, monthly status reports documenting progress in the investigation and remediation of the site have been prepared by Jasco Chemical Corporation's environmental consultants and submitted to the California Regional Water Quality Control Board since March of 1987. Quarterly groundwater monitoring reports have also been submitted to RWQCB since this time.

APPENDIX B

BOREHOLE LITHOLOGIC LOGS

BORING LOG: V-1
LOCATION: 1710 Villa Street, Mountain View, California
ELEVATION: 62 feet (approximately) U.S.G.S. Datum
DATE & TIME DRILLED: May 24, 1984 (1500 to 1740 Hours)
WATER LEVEL: Free water encontered at 29 feet; at completion of drilling water level 24 feet below the ground surface.

DEPTH IN FEET	BLOWS/FOOT	DESCRIPTION
0 - 0.2		AC paving and base material
0.2 - 11		Grayish brown (5YR 3/2) silty clay (CL) medium stiff, damp. Some gravel at 8 feet.
11 - 12.5		Moderate brown (5YR 3/4) silty clay (CL) medium stiff, moist.
12.5 - 15		Medium gray (N 5) sandstone fragments (SP) angular, up to 1/2 inch dia.
15 - 20		Dark yellowish brown (10YR 4/2) silty clay (CL), stiff, moist.
15.5	50	Undisturbed soil sample. Grades gravelly and wet at 17 feet
20 - 25		Grayish olive (10Y 4/2) silty clay (CL) containing well preserved gastropods shells up to 0.3 inches long, stiff, damp.
20.5	37	Undisturbed soil sample.
25 - 35		Dark grayish green (5G 4/2) silty to sandy clay (CL to ML) with some peat and rock fragments, stiff, wet.
25.5	40	Undisturbed soil sample.
30.5	22	Undisturbed soil sample. Increase in rock fragments, up to 1 inch in dia., fragments appear to be composed of serpentine, soft, saturated.
35 - 50		Olive gray (5Y 3/2) silty to sandy clay (CL to ML) with occassional rock fragment, stiff, damp.
50.5	50 blows for 3"	Disturbed soil sample. Fine-grained sandy to silty gravel (SW), angular to subangular, up to 1/2 inch in dia. (average size 0.02"), loose, saturated.

BOTTOM OF BORING

Questa Engineering Corporation

Civil, Environmental & Agricultural Engineers

DRILL HOLE NUMBER VILLA #2

DATE DRILLED 8/22/86

WELL HEAD ELEVATION

DRILLING METHOD 8" HOLLOW STEM AUGER

WELL O.D. 2"

Moisture Content (%)	Dry Density	Blows / 6"	Groundwater Level	DEPTH (ft.)	Sample Interval	Graphic Log	CLASSIFICATION and Remarks
				0			Fill
							(CL) CLAY, Plastic, Med. Grey
		4 4 4		5			(CL) Silty CLAY, As Above, Faint Chemical Odor
		3 5 5		10			(CL) Silty CLAY, Olive Grey (5Y 5/2)
							Gravelly
		9 7 3		15			(SP) SAND & Fine GRAVEL, Faint Odor
							(ML) Fine Sandy, Clayey SILT, Olive Grey
		3 6 7		20			(CL) Silty CLAY, Olive Grey, Few Pores
				25			

logged by PNC

checked by

LOG of Drill Hole Number VILLA #2

at JASCO PAINT CO. Proj No. 8669

Fig 3

Questa Engineering Corporation
Civil, Environmental & Agricultural Engineers

DRILL HOLE NUMBER VILLA #2

DATE DRILLED 8/22/86

Moisture Content (%)	Dry Density	Blows / 6"	Groundwater Level	DEPTH (ft.)	Sample Interval	Graphic Log	CLASSIFICATION and Remarks
		3 4 8		25			(CL) Silty CLAY, with Trace Sand, Blue Grey, Few Roots, Few Pores
		3 4 7		30			(CL) Silty CLAY, Trace Fine Gravel, Olive Grey (5Y 3/1)
							(SP) SAND, Clean, Few Angular Gravel Clasts
		5 7 10		35		EOH	(CL) Silty CLAY, Gravelly

logged by PNC

checked by _____

LOG of Drill Hole Number VILLA #2

at JASCO PAINT CO. Proj No. 8669 2 of 2

Questa Engineering Corporation
Civil, Environmental & Agricultural Engineers

DRILL HOLE NUMBER V-3

DATE DRILLED 11-3-1986

DRILLING METHOD 10" HOLLOW STEM AUGER

WELL O.D. 5" DIA.

Moisture Content (%)	Dry Density	Blows / 6"	Groundwater Level	DEPTH (ft.)	Sample Interval	Graphic Log	CLASSIFICATION and Remarks
				0			Sand Backfill Around Piping
							(CL) Silty CLAY, Dark Brown, Dense
		4 5 6		5			(CL) Silty CLAY, Olive Grey, Trace Gravel, No Odor
		5 8 11		10			(CL) Silty CLAY, Reddish-Brown, Dense, No Odor, Few Small (<5 mm) Rock Clasts.
		1 6 10					(CL) CLAY, Med-Brown, Smooth, Plastic, Homogenous, Faint Mottles.
		8 9 7		15			(SP) Silty SAND & Fine GRAVEL, Sub Rounded to Sub-Angular Clasts, Crude Grading, No Odor.
		3 4 20		20			(CL) Silty, Sandy, CLAY with thin lenses of C. Sand & F. Gravel. Moisture on clasts. V. Faint Odor?
		8 5 3	▽				(CL) Silty CLAY, Olive, Dense, Trace Gravel, Numerous Fine Roots.
				25			—— Grading to Olive/Blue

Figure 3

logged by PNC

LOG of Drill Hole Number V-3

checked by _____

at JASCO

Proj No. 8669

1 of 2

Questa Engineering Corporation

Civil, Environmental & Agricultural Engineers

DRILL HOLE NUMBER V-3

DATE DRILLED 11-3-1986

WELL HEAD ELEVATION

DRILLING METHOD 10" HOLLOW STEM AUGER

WELL O.D. 5" DIA.

Moisture Content (%)	Dry Density	Blows / 6"	Groundwater Level	DEPTH (ft.)	Sample Interval	Graphic Log	CLASSIFICATION and Remarks
		4 4 2		25			(CL) Silty CLAY, Blue-Green, Smooth. Thin Sandy Lenses.
		5 4 3					Few Wood Chips & Rootlets Faint Odor.
				30			
		13 15 28					(SP) SAND & Fine GRAVEL with Silty Clay Lenses. Odor.
							Clay Lens
		4 6 5					Coarse SAND & Fine GRAVEL Lenses of Fine Sand.
				35			
						EOH	(CL) CLAY, Blue Grey. Stiff.

logged by PNC

LOG of Drill Hole Number V-3

checked by

at JASCO

Proj No. 8669

BORING LOCATION JASCO Chemical Corp. 8' SE of V-2			GROUND EL.
DEPTH/ELEV. WATER 25' 4/3/87 after Dev. 14	DRILL CONTRACTOR HEW DRILLING		TOTAL DEPTH 40'
DRILL RIG CME-75	BORING DIA. 10"	DATE DRILLED 4-2-87	LOGGED BY RGB

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
GP	FILL 0.0-3.0' SANDY GRAVEL, Light gray dry loose	0				HA	Begin 1340
		2	B-1	2 1 3	1.2 / 1.5	DR	2-3.5' Standard penetration test (SPT) 140 lb hammer 30" drop
CL	ALLUVIUM 3.0-5.0 CLAY, dark gray, damp, 5% coarse sand, highly plastic, very soft, slight sewage odor	4				HA	
CL	5.0-10.0 SANDY CLAY, olive-gray, damp stiff, 5% coarse sand, 15% fine sand, slight sewage odor	6	B-2	4 6 7	1.2 / 1.5	DR	5-6.5 SPT
		8				HA	
CL	10.0-14.4 CLAY, greenish black, 5% gravel, high plasticity, stiff, moist, slight sewage odor. 12-13' dark gray 13' increase in moisture	10	B-3	4 4 6	0.8 / 1.5	DR/P	10-11.5 SPT. SPT sample lost, 2nd SPT tube pushed with rig
		12				HA	
GP	14.4-15.5 SANDY GRAVEL greenish black, up to 1" clasts, medium dense, moist	14	S-4 / B-4	8 10 7	1.2 / 1.5	DR	14-15.5 rel. modified driven. Sample saved for EPA 8010 analysis. at 1425 both bigend tube samples taken with contacts of sand layer seen in sample
CL	15.5-28.0 SANDY CLAY greenish black, 10% sand very moist, soft, highly plastic	16				HA	
		18					
		20					NOTHING FOR CONTACTS

Wahler Associates	JASCO CHEMICAL CORP.	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCG-1641A	SHEET NO. 1 of 2	V-4

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	20-25.8 moderate plasticity very stiff, moist, sewer odor	20	S-5/B-5	10 12 12	1.4/1.5	DR	20-21.5 Cal modified driven 1440 Two samples taken, one for EPA 8010, one for vertical perm testing
		22				HA	increase in moisture
		24					
		▽					
SC-CL	25-8-26.2 CLAYEY SAND greenish black, 50-70% coarse sand, 30-50% clay	26	B-6	4 6 5	1.5/1.5	DR	25-26.5 SPT Static water rises to 25'
CL							
GP	28.0-34.8 SANDY GRAVEL greenish black, 20-60% sand 40-80% gravel.	28				HA	28' - driller says beginning of gravel - water encountered.
		30					
	dense, saturated	32	B-7	6 18 22	1.5/1.5	DR	31-32.5 SPT
							33.5-35 SPT
	34.0-34.4 SANDY CLAY greenish black, 30% sand, 70% clay	34	B-8	18 18 7	1.5/1.5	DR	gravel/clay contact seen at 34.8'
CL	34.8-40.0 CLAY, moderate yellow brown, very stiff, very moist, moderate plasticity, <5% sand	36				HA	
		38	S-9 B-9	8 12 12	1.4/1.5	DR	38.5-40 Cal modified 0-35 PVC 0-25 Grout 25-27 Bentonite 27-35 No. 2 sand 28-35 .010 screen 35-40 Bentonite.
		40					

Wahler Associates

JASCO CHEMICAL CORP.

EXPLORATION BORING LOG

PROJECT NO. JCO-1044

SHEET NO. 2 OF 2

BORING NO. V-4

BORING LOCATION JASCO CHEMICAL CORPORATION			GROUND EL.
DEPTH/ELEV. WATER 32.0'	DRILL CONTRACTOR . HEN DRILLING		TOTAL DEPTH 40.5'
DRILL RIG CME-75	BORING DIA. 8"	DATE DRILLED 4-27-87	LOGGED BY RGB

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	0.0-1.0 - Excavation - completed during utilities search.	0	CC-1		1.5/2.5	CC	Continuous sampling used for sample collection.
GP	1.0-2.0 FILL SANDY GRAVEL: light brown up to 1" clasts interbedded with sandy clay laminae; dry; loose	2					
CL	ALLUVIUM 2.0-8.6 SANDY CLAY: dark brown; damp; 5% coarse sand, poorly graded. 5.0-8.6 - color change to light brown; The sand content varies from 5 to 30%	4	CC-2		2.5/2.5	CL	
		6	CC-3		2.5/2.5	CC	
		8	CC-4		2.5/2.5	CC	
SC	8.6-12.0 CLAYEY SAND: light brown 50% sand; 30% clay; 20% gravel, clasts up to 1" diameter; damp. 10.5: increase in gravel content	10	CC-5		2.5/2.5	CC	
SP/GP	12.0-23.5± Gravely Sand: light brown, 40-60% sand; 35-55% gravel, clasts up to 1"; 0-5% fines; slightly damp, loose 14.5 - increase in clay content	12	CC-6		0.5/2.5	CC	
		14					
		16	CC-7		2.5/2.5	CC	
		18	CC-8		0/2.5	CC	CC-8 and CC-9 not recovered due to large gravel clasts impeding removal of sampler. 2.5 feet of CC-8 recovered on second try - not reliable stratigraphically
		20					

Wahler Associates	JASCO CHEMICAL CORP.	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET NO.	V-5
		[illegible]	1 OF 3	

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SP/GP	12.0-23.5 - Gravely sand (Cont.)	20	CC-9		0/2.5	CC	CC-9 not recovered.
		22					Gravely sand at bottom of core cutter.
CL	23.5-31.75 - SANDY CLAY: medium brown, at contact: 50% clay; 25% gravel; moist 24.0 - decrease in gravel content increase in clay content.	24	CC-10		2.0/2.5	CC	small clay layers interbedded with gravel.
		26	CC-11		2.5/2.5	CC	
		28	CC-12		2.5/2.5	CC	
CL	31.75 - increase in water content contact is gradational. 31.75-33.5: SILTY CLAY; blue-green, <2% sand, moderate plasticity, moist	30	CC-13		2.5/2.5	CC	
		32					32.5' standing water.
GP	33.5 - contact is gradational 33.5-36.5 - CLAYEY GRAVEL, greenish black; 60% gravel; 20% sand, 20% fines, wet.	34	CC-14		2.5/2.5	CC	standing water at 34.1', <1 foot of standing water
CL	36.5-39.5 - Silty Clay; greenish black, 0-5% sand; moderate plasticity; stiff.	36	CC-15		2.5/2.5	CC	
CL	39.5-40.5 - SANDY CLAY: light brown, 20-40% very fine sand, 60%-80% fines; moderate plasticity	38	CC-16		1.0/2.5	P	CC-16 pushed, not drilled, hard clay encountered, not all recovered, standing water at 32.0'
		40					

Wahler Associates	JASCO CHEMICAL CORP	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. [illegible] / SHEET NO. 2 OF 2	V-5

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	39.5-40.5= SANDY CLAY (CONT.)	40					39.5 - 40.5 - recovered, at 40.5 the sampler could not be pushed further because of stiff clays so boring was stopped at 40.5'
	40.5' END OF BORING	42					
		44					well construction info. 0.0-31.0' - GROUT 31.0-32.0 - Bentonite 32.0-36.5 - Sand 33.5-36.5 - Screen. 36.5-40.5 - Bentonite
		46					
		48					
		50					
		52					
		54					
		56					
		58					
		60					

DATA ON THIS LOG ARE AN APPROXIMATION OF THE GEOLOGIC AND SUBSURFACE CONDITIONS BECAUSE THE INFORMATION WAS OBTAINED FROM INDIRECT, DISCONTINUOUS, AND POSSIBLY DISTURBED SAMPLING NECESSITATED BY USE OF SMALL-DIAMETER HOLES. ROTARY AND WASH BORING HOLES HAVE FURTHER COMPLICATIONS IN THIS REGARD BECAUSE OF THE NEED TO USE DRILLING FLUID AND/OR CASING IN ADVANCING HOLES.

THIS LOG INDICATES CONDITIONS IN THIS HOLE ONLY ON THE DATE INDICATED AND MAY NOT REPRESENT CONDITIONS AT OTHER LOCATIONS AND ON OTHER DATES. ANY WATER LEVELS SHOWN ARE SUBJECT TO VARIATION.

THIS HOLE WAS LOGGED IN SUCH A WAY AS TO PROVIDE DATA PRIMARILY FOR DESIGN PURPOSES AND NOT NECESSARILY FOR THE PURPOSES OF SPECIFIC CONTRACTORS.

THE STRATIFICATION LINES OR DEPTH INTERVALS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES, AND THE TRANSITIONS MAY BE GRADUAL.

SOIL CLASSIFICATIONS SHOWN ON LOGS ARE FIELD CLASSIFICATIONS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

Wahler Associates	JASCO CHEMICAL CORP	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. 520-1044	SHEET NO. 3 of 3	V-5

BORING LOCATION JASCO CHEMICAL CORPORATION			GROUND EL.
DEPTH/ELEV. WATER 24.5'	DRILL CONTRACTOR HEW DRILLING		TOTAL DEPTH 17.5'
DRILL RIG CME-75	BORING DIA. 8"	DATE DRILLED 4-28-87	LOGGED BY RGB

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	FILL 0.0-4.5: GRAVELY CLAY: dark brown; low plasticity; 60% clay, 20% sand, 20% gravel, up to 1" diameter, loose, dry, earthy odor.	0	CC-1		2.5/2.5		
		2	CC-2		1.5/2.5		
CL	ALLUVIUM 4.5-13.0 - LEAN CLAY: dark brown; <2% coarse material, iron staining within cracks, moderate plasticity, slightly damp. 7.5 - fine sand content increases to 10% 8.0 - Color change to yellow brown 9.0 - color change to greenish-black, sand content decreases to <5%, low to moderate plasticity.	4					
		6	CC-3		2.5/2.5		
		8	CC-4		2.5/2.5		
		10	CC-5		2.5/2.5		
		12					
CL/SC	13.0-14.5 - SANDY CLAY: yellow brown, sand content increases with depth from 13 to 14.5 feet, slightly damp, caliche mottling	14	CC-6		2.0/2.5		
SP/SC	14.5-16.0 Gravely Sand: yellow brown, gravel content increases with depth towards 16.0 feet, 40-60% gravel, 40-60% sand 0-10% fines	16	CC-7		2.5/2.5		Contacts are gradational
GP/SP	16.0-17.5 - Sandy Gravel: Yellow brown. 40-60% gravel, clasts up to 1" long; 40-60% sand, medium 0-5% fines, dry, loose, caliche mottling	18	CC-8		2.5/2.5		
SC/CL	17.5-19.5 - Clayey Sand: yellow brown, 50-60% sand; 40-50% clay, damp.						
CH	19.5-21.5 - Clay: yellow brown; <5% fine gravel; high plasticity.	20					

Wahler Associates	JASCO CHEMICAL CORP.	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO-104H	SHEET NO. 1 OF 3	V-6

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CH	19.5-21.5 - CLAY (cont.)	20	CC-9		2.5/2.5	CC	
SC/CL	21.5-26.5 - Clayey Sand; medium brown; 40-50% Clay, 40-50% Sand, 0-10% gravel up to 1" long, damp, 0.25" diameter oxidized Clay nodules dispersed in Clay. 22.5 - gravel content increases to 20-40%. 25.0 - water present in 3" gravel lens: very moist.	22	CC-10		1.0/2.5	CC	
		24	CC-11		2.5/2.5	CC	
CL	26.5-35.5 - GRAVELY CLAY: blue; 5-15% fine gravel; moderate plasticity, rootlets present, caliche mottling, damp	26	CC-12		2.5/2.5	CC	
		28	CC-13		2.5/2.5	CC	
	32.5 - moderate to high plasticity, 10% gravel clasts up to 0.25" diameter	30	CC-14		2.5/2.5	CC	
GC	35.5-38.0 - Clayey Gravel: blue 30-40% Clay, 10-20% Sand, 40-60% gravel, very moist	32	CC-15		2.5/2.5	CC	
GC	38.0-39.0 - CLAYEY GRAVEL: yellow brown, 40-50% gravel, 30-40% Clay 10-20% Sand, very moist.	34	CC-16		1.0/2.5	CC	
SP	39.0-42.7 - Sand; Gravel: yellow brown, 40% coarse sand, 40% fine gravel, 20% gravel, clasts up to 0.5" long, [illegible]	36					
		38					
		40					

Wahler Associates	JASCO CHEMICAL CORP.	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. JCO-104H / SHEET NO. 2 of 3	V-6

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
GP	39.0-42.7 Sandy Gravel (cont.)	40					
			CC-17		2.5/2.5	CC	
		42					
CL	42.7-47.3: Clay: yellow brown; 0-10% medium to coarse sand, moderate plasticity, occasional rootlets, caliche veinlets. 43.7- color change to mottled olive green/brown.						
		44	CC-18		2.5/2.5	CC	4.8' aquitard.
		46	CC-19		2.5/2.5	CC	
	46.9- Color change to yellow brown						Well Construction Info
SC	47.3-47.5 - CLAYEY SAND: Yellow brown; 80-90% Medium Sand, 10-20% fines, very moist.						0.0-34.5 - Grout 34.5-35.5 - Bentonite 35.5-42.7 - Sand 37.5-42.7 - Screen 42.7-47.5 - Bentonite
	END OF BORING 47.5'	48					
		50					
		52					
		54					
		56					
		58					
		60					

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SOIL CLASSIFICATIONS SHOWN ON LOGS ARE FIELD CLASSIFICATIONS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

Wahler Associates	JASCO CHEMICAL CORP.	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET NO.	V-6
		JCO-104.1	3 OF 3	

BORING LOCATION JASCO CHEMICAL CORPORATION			GROUND EL.
DEPTH/ELEV. WATER 24.0' final	DRILL CONTRACTOR HEW DRILLING		TOTAL DEPTH 42.5
DRILL RIG CME-75	BORING DIA. 8"	DATE DRILLED 4-29-87	LOGGED BY RGB

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / ROD	REC.	MODE	REMARKS
CL	FILL 0.0-1.7: SANDY CLAY: dark brown 60% clay, 40% sand; moderate plasticity, earthy odor, twig and leaf fragments, dry, loose	0	CC-1		2.5/2.5	CC	
CL	ALLUVIUM 1.7-10.5: LEAN CLAY: dark brown 0-5% gravel, fine; organic odor twig fragments, moderate plasticity caliche veinlets, slightly damp, stiff.	2	CC-2		2.5/2.5	CC	
		4	CC-3		2.5/2.5	CC	
		6	CC-4		2.5/2.5	CC	
		8	CC-5		2.5/2.5	CC	
CL	10.5-22.0: LEAN CLAY: yellow brown; 0-5% coarse sand; caliche veinlets; moderate plasticity, moist. 13.0 - Color change to mottled blue-green / yellow brown 13.8 - Color change to yellow-brown. 16.5 - increase in gravel content to up to 20% gravel, clasts 0.25"-0.75" long	10	CC-6		2.5/2.5	CC	
		12	CC-7		2.5/2.5	CC	
		14	CC-8		2.0/2.5	CC	
		16					
		18					
		20					

Wahler Associates	JASCO CHEMICAL CORP	EXPLORATION BORING LOG PROJECT NO. 870-1044 / SHEET NO. 1 of 3	BORING NO. V-7

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	10.5-22.0 : LEAN CLAY (CONT)	20	CC-9		2.5/2.5	CC	
GP	22.0 - 26.0: Sandy Gravel: yellow brown; 60% Gravel, 40% coarse sand; Gravel clasts up to 0.5" long; very wet to saturated, gravel clasts subangular to subrounded	22	CC-10		0/2.5	CC	22.5' water encountered - CC-10 not recovered
Sp	26.0-26.9: Gravely Sand; yellow-brown saturated	24	CC-11		2.0/2.5	CC	
Cl	26.9-27.1: Clay: mottled blue/yellow brown	26					
CL/GC	27.1-27.3 - Gravely sand: yellow-brown 27.3-28.3 - Gravely clay: yellow-brown 40-60% clay, 40-60% fine gravel very wet to saturated	28	CC-12		2.5/2.5	CC	
CL	28.3-29.8 - Sandy Clay: yellow-brown 60% Clay, 30% sand, 10% gravel; very wet						
CL	29.8-30.8 - Clay; blue-green; <5% coarse sand; moderate to high plasticity; moist	30	CC-13		2.5/2.5	CC	
SC	30.8 - 33.25 - Clayey Sand: yellow-brown; 70% medium sand, 30% clay, occasional gravel clasts; very moist to saturated	32					
CL	33.25-35.25 - Sandy Clay: blue-green; 70% Clay, 30% sand; medium to plasticity - saturated.	34	CC-14		2.5/2.5	CC	
SC	35.25-35.5 - Sandy Gravel: greenish-black;	36	CC-15		2.5/2.5	CC	
CL	35.5-39.6 - GRAVELY CLAY: greenish black; 60-80% clay, 20-40% gravel up to 0.5" diameter, moderate plasticity, moist. 39.6 Clay percent increases to 80-90%	38	CC-16		2.5/2.5	CC	
CH	39.6-42.5 - CLAY: yellow brown, 95-99% clay, 0-4% medium sand, high plasticity, moist.	40					

Wahler Associates	JASCO CHEMICAL CORP.	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. 320-10014 / SHEET NO. 2 of 3	V-7

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CH	39.6-42.5 - CLAY (cont.)	40	CC-17		2.5/2.5	CC	
		42					standing water at 24.0', 8 feet of standing water
	END OF BORING 42.5'	44					Well Construction Info 0.0-21.0 - GROUT 21.0-22.0 - BENTONITE 22.0-35.5 - SAND 24-35.5 - SCREEN 35.5-42.5 - BENTONITE
		46					
		48					
		50					
		52					
		54					
		56					
		58					
		60					

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Wahler Associates	JASCO CHEMICAL CORP.	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET NO.	V-7
		370-1004	3 of 3	

BORING LOCATION JASCO CHEMICAL CORPORATION			GROUND EL.
DEPTH/ELEV. WATER ~23.5' 2-24	DRILL CONTRACTOR PC Exploration		TOTAL DEPTH 49.2
DRILL RIG Acker Soil Max	BORING DIA. 8"	DATE DRILLED 2-24-98	LOGGED BY RGB/PS

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	ALLUVIUM						
CL-CH	0.0-6.2 - SANDY CLAY: dark brown, 0-5% fine sand, occasional coarse sand clast, damp.	0				HA	Begin drilling on x-way at 925 AM after Health and Safety briefing. Drilling performed with tower down. Sampler pushed with hydraulic system.
		2	R-1	—	0.5 / 1.5	P	2.0-3.5' - 2.5" diameter California Modified Sampler (Calmod) pushed using hydraulics
		4				HA	-drilling is slow due to drilling with tower down
			R-2	—	0.5 / 1.5	P	5.0-6.5 CALMOD
CL	6.2-13.0 SANDY CLAY: Mottled yellow brown / medium brown. Caliche veinlets; 10-15% fine sand. Low to moderate plasticity	6					
		8				HA	
		10	R-3	—	0.5 / 1.5	P	10.0-11.5' CALMOD
	11.4 - increase in sand content to 30%, color change to mottled light brown/yellow brown moderate plasticity	12					
CL-CH	13.0-15.0 - Sandy Clay; dark brown; occasional 3/4" fine gravel clasts; drilling tougher, ~5% fine sand, damp	14				HA	13' - drilling tougher, stiff clay with gravel fragments.
CL	15.0-31.5 - Sandy Gravelly Clay: yellow brown, 25% fine to medium sand, 20% fine gravel, 55% clay; low plasticity, slightly damp	16	R-4	—	0.5 / 1.5	P	15.0-16.5' CALMOD
		18				HA	
		20					

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. JCO-1041H / SHEET NO. 1 of 3	V-8

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	15.0-31.5: Sandy Gravelly Clay (Continued)	20					20.0-21.5 CALMOD
			R-5	—	0.5/1.5	P	
		22				HA	23.0 - Drilling easier - softer material.
		24					▼ H_2O 23.7' (10:00AM 2-25)
							25.0-26.5 CALMOD
CL	26.2 - decrease in sand and gravel content to 10-15%. Increase in moisture to most moderate plasticity; occasional wood fragments; slight mottling.	26	R-6	—	1.5/1.5	P	
		28				HA	
		30					30.0-31.5 CALMOD
			R-7	—	1.2/1.5	P	
	31.5-42.0: CLAYEY SAND/SANDY CLAY: Yellow brown; 50% medium sand, 10% fine gravel, 40% clay; moderate plasticity; dark; moisture increases with depth.	32				HA	▼ 32.0 - H_2O ENCOUNTERED
SC-CL		34					35.0-36.5 CALMOD
		36	R-8		1.2/1.5	P	
	37.0 - grading more clayey	38				HA	~37.0 - Drilling Action Gets Hard.
	40.0-41.0 very clayey	40					40.0-41.5 CALMOD

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO-104H	SHEET NO. 2 OF 2	V-8

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SC-CL	31.5-42.0 CLAYEY SAND/SANDY CLAY (cont.) ~41.5' grading more sandy.	40	R-9		1.5/1.5	P	40.0-41.5 Cal mod. 2:00 2-24
SP	~42.0'-49.2' SAND: Hel. brn.; <10% fines; >90 sand, fine- to coarse-grained, mod grading (mostly fine & med), coarse grains are rounded; no organics; hard; saturated	42				HA	10:15 2-25 42.0 Drilling hard Having difficulty keeping hollow stems open while advancing augers. Very time consuming
		44	B-1		.2/.2	P	44.0' Attempted to sample at 44' Unable to advance sampler (pushed with entire weight of rig). Shoe's jammed very hard w/ gravelly SAND.
		46				HA	46.0' Drilling gets easier Driller thinks clay or fine sand (No coarseness feeling)
		48					
	Bottom hole 49.2'		B-2		.2/.2	P	49.0' Cal Mod.
		50					Again attempted to sample and was unable to advance sampler. Terminated boring at 49.2'. Began well construction.
		52					WELL CONSTRUCTION 0.0-32.0' Solid (2.0" SCH 40 PVC pipe) 32.0-37.0' Slotted (0.020 Factory slots)
		54					SAND & SEAL 0.0-28.5' Grout 28.5-31.0' Bentonite 31.0-37.0' SAND (#3) 37.0-49.2' Bentonite
		56					
		58					
		60					

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Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. / SHEET NO. 3 OF 3	V-8

BORING LOCATION Jasco Corner of Meridian & Beatrice		GROUND EL.
DEPTH/~~ELEV.~~ WATER ~21.0' 2-29-88	DRILL CONTRACTOR P.C. Exploration	TOTAL DEPTH 33.0
DRILL RIG ACKER "Soil-max" BORING DIA. 8.0"	DATE DRILLED 26 Feb. 88	LOGGED BY G.F.Z.

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	ALLUVIUM 0.0-6.1 SANDY CLAY: Black; ~60-70 % fines, high plastic; ~30-40 % sand, poorly graded, angular; slight organics; firm to stiff; damp. ~2.9-3.1 clean sand 3.5' roots ~5.0 more clean sand (fill)	0.0 2.0 4.0	R-1		1.5/1.5	HA P HA	Advancing hole with 8.0" hollow stem augers. Sampling with a 2.0" JD split spoon (S.S.) sampler. Advancing sampler by pushing with system hydraulics. Drilling with tower down. Mike Ybarra - Driller Mike - Helper Begin setup 1:30, Drilling 2:15 2.0-3.5 Pushed S.S. 5.0-6.5 Pushed S.S.
CH	~6.1-13.0 CLAY: Olive gray with brown mottling; >90 % fines; high plastic; <10 % sand, fine-grained; some cementation; rnx to HCL; Fe staining; slight wht ppt.; stiff; damp. ~11.0 increase in wht ppt., slight charcoal ~13.0' hard	6.0 8.0 10.0 12.0	R-2 R-3		1.1/1.5 0.5/1.5	P HA P	Drilling action is smooth and stiff 10.0-11.5 Pushed S.S.
SW-CL	~13.0'-22.0 GRAVELLY SILTY SAND: Lt. olive gray to brownish, ~30 % fines, slightly plastic; ~60 % sand, fine- to coarse-grained; mod. grading angular to sub rounded; hard; dry to damp. ~15.5-16.1 Blk clay (sluff?) ~19.0-20.0 CLAYEY lens (by cuttings)	14.0 16.0 18.0 20.0	R-4		1.1/1.5	HA P HA	~13.0' Drilling action gets hard but still smooth. ~14.0' cuttings get slightly gravelly 15.0-16.5 Pushed S.S. ~18.5' Drilling gets super hard, bound augers tight and almost broke the gears. ~19.0 20.0-21.5 Pushed S.S.

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO104H	SHEET NO. 1 OF 2	V-9

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SW-CL	13.0-22.0 GRAVELLY SILTY SAND: (cont.)	20.0			1.0/1.5	P	20.0-21.5 Pushed S.S.
			R-5				4:30 2-26-88 21.5'
CL-SC	22.0-28.0 CLAYEY SAND - SANDY CLAY: Mod. yel. brn.; ~40-60 % fines, med. plastic; ~40-60 % sand, fine- to coarse-grained, mod grading, rounded to angular; abundant small holes; wht ppt.; Fe staining; shell frags; charcoal; soft to firm, wet. - occasional rounded fine gravel, lenses of coarser & finer material	22.0				HA	10:15 2-29-88 ~22.0' Drilling action gets very easy. H_2O @ ~21.5 after well complete. - H_2O @ ~24.0' after sampling at 25.0'.
		24.0					
					1.5/1.5	P	25.0-26.5 Pushed S.S.
		26.0	R-6				
CH	~28.0-33.0 CLAY: Bluish gray with Fe mottling; >90 % fines, high plastic; <10 % sand, fine-grained (sporadic coarse); slight wht ppt.; slight root hairs; stiff; damp.	28.0				HA	~28.0' Drill gets harder but smooth.
		30.0			1.5/1.5	P	30.0-31.5 Pushed S.S.
			R-7				31.5-33.0 Pushed S.S.
	32.0-33.0 color slightly brn, slight increase in sand. Bottom hole 33.0'	32.0	R-8		1.3/1.5	P	Terminated boring at 33.0'. Began well installation
		34.0					WELL CONSTRUCTION 0.0-23.0' Solid (2" SCH 40 PVC) 23.0-28.0 Slotted (0.020 factory slots)
		36.0					SAND & SEAL 0.0-20.0 Grout 20.0-22.0 Bentonite 22.0-28.0 Sand (#3) 28.0-33.0 Bentonite
		33.0					

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Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO 104 H	SHEET NO. 2 OF 2	V-9

BORING LOCATION JASCO, East side of main building			GROUND EL.
DEPTH/ELEV. WATER ~24.5' (5 March)	DRILL CONTRACTOR HEW DRILLING		TOTAL DEPTH 38.0
DRILL RIG CME 55	BORING DIA. 3.0"	DATE DRILLED 4 MAR. 88	LOGGED BY G.J. 2.

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	0.0-0.4 ASPHALT	0.0					Advancing hole with 3.0" hollow-stem augers.
AC	0.4-1.2' SILTY SANDY GRAVEL: sub-base material; greenish-gray					HA	Sampling with a 2.5" ID split spoon (S.S.) sampler driven by a 140 lb rope line hammer, free-falling 30 in per blow.
CH	ALLIVIUM 1.2-4.8' CLAY: Black; >90% fines, high plastic, high toughness; <10% sand, fine-grained; slight wet pat; slight rootlets; very stiff to hard; damp.	2.0	R-1	5, 15, 20	1.2, 1.5	DR	Driller - Jeff Helper - John
						HA	Rig arrived 1:00 Drilling 1:45
		4.0	R-2	8, 20, 22	1.0, 1.5	DR	2.0-3.5 Drove S.S. 3.0-3.5 OVA=12 4.0-5.5 Drove S.S. 5.0-5.5 OVA=14
CH	~4.8-11.3 CLAY: Greenish brown with Fe mottling; >90% fines, med. to higher plastic, med toughness; <10% sand, fine-to med.-grained; slight wet pat.; very stiff to stiff; damp to slightly moist. - slightly crumbly ~8.0' color to mostly brn, gray clay stringers, some cemented, slight increase in sand %. ~10.5' grading sandy and gravelly.	6.0				HA	Regional Board observer on site. (Liz Cammon)
		8.0	R-3	7, 16, 22	1.5, 1.5	DR	7.0-8.5 8.0-8.5 OVA=10
						HA	
		10.0	R-4	5, 12, 22	1.0, 1.5	DR	10.0-11.5 Drove S.S. 11.0-11.5 OVA=12
SC	11.3-13.5 CLAYEY SANDY GRAVEL: Med yel. brn.; ~20-40% fines; ~20-50% sand, fine-to coarse-grained, sub-angular to rounded, well graded; ~40-60% gravel, fine, sub to rounded; Fe staining; dense to very dense; damp to slightly moist. 16.0-16.5 clean sand, med- to fine-grained	12.0				HA	~12.5' Drilling action gets hard and jumpy.
		14.0	R-5	17, 30	0.9, 1.0	DR	13.0-14.0 Drove S.S. 13.5-14.0 OVA=8
						HA	
		16.0	R-6	15, 15, 12	1.2, 1.5	DR	15.0-16.5 Drove S.S. 16.0-16.5 OVA=3
	~13.5-32.5' SANDY CLAY/CLAYEY SAND: Med. yel. brn.; ~40-60% fines, med. plastic; ~40-60% sand, fine- to coarse-grained,	18.0				HA	~18.5' Drilling action gets easy
SC-CL		20.0					20.0-21.5 Drove S.S.

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO 104H	SHEET NO. 1 OF 2	V-10

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SC-CL	18.5-32.5 SANDY CLAY/CLAYEY SAND (cont.) subangular to subrounded, mod. grading; slight fine gravel; Fe mottling; stiff to medium dense; damp to moist.	20.0		4	1.3 / 1.5	DR	20.0-21.5 Drove S.S.
				4			21.0-21.5 OVA = 3
			R-7	7			
		22.0				HA	SAND & SEAL 0.0-22.0 Grout 22.0-24.0 Bentonite 24.0-32.0 SAND (#3) 32.0-38.0 Bentonite
		24.0					▽ H_2O @ -24.5' after well completed.
	~25.0-26.5 more sandy heavy Fe staining, very moist			7	1.3 / 1.5	DR	25.0-26.5 Drove S.S.
				10			26.5 OVA = 2
		26.0	R-8	14			
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	28.0' Wet (saturated)	30.0		11	1.3 / 1.5	DR	30.0-31.5 Drove S.S.
				23			31.0 OVA = 2
			R-9	50			
CH	~32.5-38.0 CLAY: Red brn.; >95% fines, high plastic, high toughness; <10% sand, fine-grained, Fe staining; stiff to very stiff; damp.	32.0				HA	~32.0' Drilling return gets smooth but hard. Driller thinks clay (very good aquitard)
	sporadic sand with slight gravel.	34.0					
				8	1.3 / 1.5	DR	35.0-36.5 Drove S.S.
				17			35.5' OVA = 4
		36.0	R-10	21			
				15	1.2 / 1.5	DR	36.5-38.0 Drove S.S. 38.0 OVA = 3 Terminated boring at 38.0' installed well.
				20			
	Bottom hole 38.0'		R-11	22			
		38.0					WELL CONSTRUCTION 0.0-25.0 solid (2" PVC) 25.0-32.0 slotted (0.020) SAND & SEAL - see above
		40.0					

Wahler Associates	JACO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO 104 H	SHEET NO. 2 OF 2	V-10

PART 1

JOB NO.	7403
BORE HOLE NO.	V-11
PROJECT	Jasco Chemical Corp
LOCATION	Mountain View, CA
DRILLING CONTRACTOR	ASE Drilling
DRILLING EQUIPMENT	Mobile B-61 Hollow Stem
HYDROGEOLOGIST	Scott Rice
DRILLER	Chris
DATE START/TIME	6/20/90 0900
DATE FINISH/TIME	6/20/90 1515
SURFACE ELEVATION	
TOTAL DEPTH	41.5 feet
WELL CASING	4" Sched 40 PVC
SCREEN TYPE	4" Sched 40 PVC
LENGTH	10 feet
SLOT	0.010-inch

BORE HOLE LOG

DEPTH	SAMPLE NUMBER	BLOW COUNT PER 6'	RECOVERY	LITHOLOGIC DESCRIPTION	REMARKS
				cuttings - sandy clay and clayey sand, dark gray, moist, low plasticity	PID (background) 2-4
	V11-2	4/5/11	13"	CL/SC - sandy clay and clayey sand, very dark gray (10YR 3/1), 40-60% sand, 40-60% clay, moist, poorly sorted, subangular, particles to 1 mm diameter, firm, low plasticity	PID (sample) - 3
5				CL/SC - as above	
	V11-5	3/5/8	14"	SM - silty sand, grayish brown (10YR 5/2), 30-40% silt, slightly moist, moderately well sorted, medium sand, particles to 2 mm diameter, friable	PID (sample) - 7 PID (borehole) - 0
10	V11-10	3/5/8	16"	SM/SC - clayey and silty sand, dark brown (10YR 3/3), 30% clay, 20% silt, 50% medium sand, moist, poorly sorted, subrounded, particles to 1 mm diameter, firm but friable, low plasticity	PID (sample) - 4
				cuttings - light gray gravel between 13 and 15 feet	
				ML - fine sandy silt, dark brown (10YR 4/3), moist, low plasticity	
15	V11-15	7/8/7	18"	SW - medium sand, dark brown to black, <10% clay and silt, slightly moist, poorly sorted, loose	PID (sample) - 3
				SM - silt and fine sand, olive brown (2.5Y 4/4), 40-60% silt, 40-60% fine sand, slightly moist, soft, not plastic	Driller notes softer sediments at 16 feet
				SW - sand and gravel, dark grayish brown (2.5Y 4/2), trace silt, dry, poorly sorted, friable	
20	V11-20	3/5/8	16"	SC - clayey sand, olive brown to black (2.5Y 4/4 to 2.5Y 3/0), 40% clay, slightly moist to moist, poorly sorted, particles to 4 mm diameter, lenses of hard clay, abundant decayed rootlets	PID (sample) - 2 PID (borehole) - 1
25	V11-25	3/6/9	18"	SM - silty sand, olive (5Y 4/3), 40% silt, 10% clay, moist, poorly sorted, medium to coarse sand to 2 mm diameter, low plasticity	PID (sample) - 1
				GM - silty sand and gravel, 20% silty, moist, very poorly sorted, subangular, friable	
30	V11-30	8/24/33	18"	Cl - slightly sandy clay, dark olive gray (5Y 3/2), 10-15% fine to medium sand, moist, moderately plastic, firm	PID (sample) - 1
				GM - sand and gravel, 20% gravel, wet to saturated, very poorly sorted, subangular, particles to 10 mm diameter, loose, friable, zones of iron oxidation throughout	Driller notes difficult drilling at 32 feet, then easier drilling at 32.5 feet
35	V11-35	12/9/14	NA	GM - sand and gravel, 20-25% silty and clay, saturated, very poorly sorted	Sample collected for sieve analysis.

GRAPHIC LOG

PART 2

JOB NO. 7403

BORE HOLE NO. V-11

PROJECT Jasco Chemical Corp

LOCATION Mountain View, CA

BORE HOLE LOG

DEPTH	SAMPLE NUMBER	BLOW COUNT PER 6'	RECOVERY	LITHOLOGIC DESCRIPTION	REMARKS	GRAPHIC LOG
				cuttings - sand and gravel		
40						
					Total Depth - 41.5 feet	
45						
50						
60						
65						
70						
75						

PART 1

JOB NO.	7403
BORE HOLE NO.	V-12
PROJECT	Jasco Chemical Corp
LOCATION	Mountain View, CA
DRILLING CONTRACTOR	ASE Drilling
DRILLING EQUIPMENT	Mobile B-61 Hollow Stem
HYDROGEOLOGIST	Scott Rice
DRILLER	Chris
DATE START/TIME	6/20/90 1555
DATE FINISH/TIME	6/21/90 1545
SURFACE ELEVATION	
TOTAL DEPTH	42 feet
WELL CASING	4" Sched 40 PVC
SCREEN TYPE	4" Sched 40 PVC
LENGTH	10 feet
SLOT	0.010-inch

BORE HOLE LOG

DEPTH	SAMPLE NUMBER	BLOW COUNT PER 6'	RECOVERY	LITHOLOGIC DESCRIPTION	REMARKS
					PID (background) - 0
				cuttings - (ML) sandy silt, dark gray, 30% sand, slightly moist, firm	
				color change from dark gray to light tan	
5				cuttings - (SM) fine sand and silt, tan, 40% silt, <10% clay, well sorted, loose	PID (borehole) - 0
10				cuttings - (CL) sandy clay, dark gray, 25% medium sand, slightly moist, firm but friable, low plasticity	Driller notes difficult drilling 10 to 12 feet
				cuttings - (CL) sandy clay, light gray, 25% medium sand, slightly moist, firm but friable, low plasticity	
				cuttings - (GW) sand and gravel, < 20% clay and silt, poorly sorted, rounded	
15	V12-15	16/19/23	18"	SM - sandy silt and silty sand, dark brown (10YR 3/3), trace clay, slightly moist, hard	PID (sample) - 1
				SW - sand and gravel, dark grayish brown (10YR 4/2), <10% clay and silt, slightly moist, very poorly sorted, subangular, particles to 10 mm diameter, loose	PID (background) - 1
20	V12-20	NA	18"	SM - sandy silt and silty sand, dark brown (10YR 3/3), 20% clay, firm, moderate plasticity	PID (sample) - 1
25	V12-25	3/5/8	18"	ML - sandy clay, dark grayish brown (2.5Y 4/2), moist, stiff, moderately plastic, sand replaces decaying rootlets, abundant iron oxidization	PID (sample) - 1
30	V12-30	10/5/6	18"	SW - coarse sand, olive brown (2.5Y 4/4), trace silt, wet, very poorly sorted, subangular loose, grades finer to 20.75 feet	PID (sample) - 1
				CL - clay, dark gray (2.5Y 4/0), trace sand in decayed rootlet zones, moist, stiff	
					First Water - 32 feet
35	V11-35	12/9/14	NA		Sample collected for sieve analysis.

GRAPHIC LOG

PART 2

JOB NO. 7403

BORE HOLE NO. V-12

PROJECT Jasco Chemical Corp

LOCATION Mountain View, CA

BORE HOLE LOG

DEPTH	SAMPLE NUMBER	BLOW COUNT PER 6'	RECOVERY	LITHOLOGIC DESCRIPTION	REMARKS	GRAPHIC LOG
				cuttings - sand and gravel		
40					Total Depth - 41.5 feet	
45						
50						
60						
65						
70						
75						

BORING LOCATION JASCO CHEMICAL CORPORATION		GROUND EL.
DEPTH/ELEV. WATER 25.0 (A) 26.8 (B1)	DRILL CONTRACTOR HEN DRILLING	TOTAL DEPTH 62.5
DRILL RIG CME-75	BORING DIA. 8" / DATE DRILLED 4/27-5/11/87	LOGGED BY RGB

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
GC	FILL 0.0-2.0- SANDY GRAVEL: Light brown; 60% Gravel, clasts up to 1.5" diameter, 40% Sand, dry, loose	0	CC-1		0.6/2.5	CC	
CL	2.0-11.5: LEAN CLAY: dark brown 98% fines, <2% Medium to Coarse Sand, moderate plasticity, damp.	2	CC-2		2.5/2.5	CC	
	6.5- Color change to greenish-black, increase in non-plastic fines	4	CC-3		2.5/2.5	CC	
	8.5- further increase in non-plastic fines	6	CC-4		2.5/2.5	CC	
	11.5- Color change to mottled greenish black/light brown.	8	CC-5		2.5/2.5	CC	
		10	CC-6		2.0/2.5	CC	
GP	14.5-17.0- SANDY GRAVEL: greenish black; alternating Sandy Gravel / Gravely Sand Layers. 10-80% Gravel, 20-90% medium Sand, moist, loose to very loose.	12	CC-7		2.5/2.5	CC	
CL	17.0-17.5- SANDY CLAY: medium brown	14					
GP	17.5-19.8- Sandy Gravel: Mottled medium brown/Greenish black	16	CC-8		2.0/2.5	CC	
CL	19.8-20.8: Sandy Clay: Medium brown	18					
		20					

Wahler Associates	JASCO CHEMICAL CORP.	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. [illegible] / SHEET NO. 1 OF 4	I-1

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	19.8-20.8: Sandy Clay (Cont.)	20	CC-9		2.5/2.5	CC	
GP	20.8-21.8 - Sandy Gravel: Mottled greenish black/medium brown						
CL	21.8-22.5: Lean Clay: Mottled greenish black/medium brown	22					
CL	22.5-32.5 Sandy Clay; greenish brown; sand content decreases with increasing depth	24	CC-10		2.5/2.5	CC	
	25.0 - Color change to greenish-black	26	CC-11		2.5/2.5	CC	
	27.5 - Strong sewer odor	28	CC-12		2.5/2.5	CC	
	30.0 - <2% Coarse Sand	30	CC-13		2.5/2.5	CC	
		32					32.0 - water encountered.
GC/SC	32.5-35.0: SANDY GRAVEL: greenish black, 40% gravel, 40% Sand, 20% Clay, strong sewer odor	34	CC-14		0.8/2.5	CC	
SP	35.0-39.8: Gravely Sand: greenish-black; 80-90% Medium Sand; 10-20% gravel.	36	CC-15		2.5/2.5	DR	
		38	CC-16		1.5/1.5	CC	
CL	39.8-46.3: CLAY: Light brown 95% fines, 5-10% fine sand; moderate plasticity	40					

Wahler Associates	JASCO CHEMICAL CORP	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO-1041	SHEET NO. 2 OF 4	I-1

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	39.8-46.3 - CLAY (cont.)	40	CC-17		1.0/1.0	CC	bentonite from 39.8-41.0 at end of day 4-27-87 41.0 END OF BORING 4/27/87, work continued 5/1/87; casing pushed to 46.0; 46.0; END OF BORING 5/1/87, work resumed 5/11/87.
		42	CC-18		0.8/2.5		
		44	CC-19		1.0/2.5		
		46	B-1		2.5/2.5	CC	46.3-47.8: Extremely rough drilling; core tubes broken; material recovered placed in plastic bags.
SP/GP	46.3-57.5 - GRAVELY SAND greenish black, 25-75% medium sand, 25-75% gravel, very dense, very moist, possibly partially cemented 47.2 - Color change to yellow-brown 47.8 - material not cemented, saturated 50.0: Gravel clasts up to 1" diameter.		B-2		2.5/2.5	CC	
		48	CC-20		2.5/2.5	CC	
		50	B21A B21B		2.5/2.5	CC	Tube broken - sample placed in plastic bag.
		52	B-22		2.5/2.5	CC	
		54					55.0 - Sand in hollow stem - Sampler jammed. CC-22 broken, sample placed in bags
	56.0 - Iron staining in sand matrix surrounding gravel clasts	56	CC-23		1.5/2.5	CC	56.0 - drills like sand. 57.0 - drills like clay
CL/SC	57.5-62.5 - SANDY CLAY: yellow-brown: 30-50% clay; 30-50% fine sand; soft, very moist.	58	CC-24		0/2.5	CC	CC-24 - no recovery
		60					

Wahler Associates	JASCO CHEMICAL CORP	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. SCO-104H	SHEET NO. 3 OF 4	I-1

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / ROD	REC.	MODE	REMARKS
	57.5-62.5 SANDY CLAY (Cont.)	60	CC-25		2.5/2.5	CC	
		62					water at 26.8'
	62.5' END OF BORING	64					Well Construction Info 0-40'-GROUT 40-46.3 BENTONITE 46.3-57.5 SAND 48.3-57.5 SCREEN 57.5-62.5: BENTONITE well installed 5/11/87 GROUT SEAL PLACED 5/12/87

DATA ON THIS LOG ARE AN APPROXIMATION OF THE GEOLOGIC AND SUBSURFACE CONDITIONS BECAUSE THE INFORMATION WAS OBTAINED FROM INDIRECT, DISCONTINUOUS, AND POSSIBLY DISTURBED SAMPLING NECESSITATED BY USE OF SMALL-DIAMETER HOLES. ROTARY AND WASH BORING HOLES HAVE FURTHER COMPLICATIONS IN THIS REGARD BECAUSE OF THE NEED TO USE DRILLING FLUID AND/OR CASING IN ADVANCING HOLES.

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THIS HOLE WAS LOGGED IN SUCH A WAY AS TO PROVIDE DATA PRIMARILY FOR DESIGN PURPOSES AND NOT NECESSARILY FOR THE PURPOSES OF SPECIFIC CONTRACTORS.

THE STRATIFICATION LINES OR DEPTH INTERVALS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES, AND THE TRANSITIONS MAY BE GRADUAL.

SOIL CLASSIFICATIONS SHOWN ON LOGS ARE FIELD CLASSIFICATIONS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

Wahler Associates	JASCO CHEMICAL CORP	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. 300-104H / SHEET NO. 4 OF 4	I-1

BORING LOCATION	JASCO CHEMICAL CORP. (In median of Central Exp.		GROUND EL.
DEPTH/ELEV. WATER	23.5' (8-11-87)	DRILL CONTRACTOR HEW Drilling	TOTAL DEPTH 48.0
DRILL RIG CME 75	BORING DIA. 8.0"	DATE DRILLED 11 AUG 87	LOGGED BY D.J.S.

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	0.0-1.0' SANDY CLAY: Top soil, Blackish brown (5YR 2/1); some gravel; slight organics.	0.0				HA	Cacto - Driller 9:20 Anibal - Helper Advancing hole with 8.0" hollow stem augers. Sampling with a 3.0" continuous core sampler, lined with clear plastic tubes (3.0" x 2.5') (samples termed T-1, T-2, etc.).
SP-SM	1.0-3.4' GRAVELLY SAND: Dk. yel. brn. (10YR 4/2); ~10% fines, non plastic; ~60% sand, fine-to coarse-grained, mod. grading, angular; ~30% fine gravel, angular; med. dense to dense; damp. (probable road base)	2.0	T-1		1.6/3.0		
CL	3.4-11.0' SANDY CLAY: Olive Blk. (5Y 2/1); ~90% fines, mod. to high plastic, no dilatancy, med to high toughness; ~10% sand, fine-grained, rounded; abundant caliche (heavy rxn to HCl); damp.	4.0	T-2		2.5/2.5		0.0-3.0 Run #1 3.0-8.0 Run #2
		6.0	T-3		2.5/2.5		~7.0' slight auger grinding.
	~6.0-7.5 slight brn color	8.0	T-4		2.5/2.5		9:51 8.0' 8.0-13.0 Run #3
CL	11.0-20.6' SANDY CLAY: Lt. olive gray (5Y 5/2); ~70-80% fines, med. plastic, slight dilatancy, slight to med toughness; ~20-30% sand, fine-to coarse-grained (mostly fine with rounded coarse), sub angular to rounded; some Fe staining and coatings; no cement; no odor; damp.	10.0					
		12.0	T-5		2.5/2.5		10:04 13.0'
		14.0	T-6		2.5/2.5		13.0-18.0 Run #4
	15.8-17.2' more clayey, less sand.	16.0	T-7		2.5/2.5		
CL	17.8-18.7' gravelly clay	18.0	T-8		1.0/1.0		18.0 10:30 18.0-21.5 Run #5
CL		20.0	T-9		2.5/2.5		Ernest Salomon CEG #350

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO 104H	SHEET NO. 1 OF 3	I-2

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	11.0 - 20.6' SANDY CLAY: (cont.)	20.0	T-9 (cont)		2.5 / 2.5	HA	
SP	20.6 - 24.2 GRAVELLY SAND: Dusky yel. brn (10YR 2/2); ~5% fines; ~75% sand, fine- to coarse-grained, poorly to mod. grading (lenses of very poorly graded); sub rounded; Fe staining; saturated.	22.0	T-10		1.5 / 1.5		~21.0 augers grinding 21.5 - 23.0 Run #6 22.5 ground water while drilling
	24.2 - 25.5 clay lens	24.0	T-11		2.5 / 2.5		23.0 - 28.0 Run #7 ▼23.5 standing H_2O when augers removed
CL	25.5 - 29.5 SILTY SAND:						25.5
SM	Dusky yel. brn. (10YR 2/2); ~30% fines, non plastic; ~70% sand, fine-grained, poorly graded; (occational rounded gravel); no odor; saturated.	26.0	No sample		0.0 / 2.5		sampler blocked off at 25.5 and assumed sand from 25.5 - 28.0' but not recovered.
	- some thin (~0.1-0.05) lenses of clay.	28.0	T-12		2.5 / 2.5		11:00 28.0 11:10 28.0 - 33.0 Run #8
SM	29.5 - 35.3 SILTY SAND/ GRAVELLY SILTY SAND: Dusky yel. brn (10YR 2/2); ~20% fines, non plastic; ~50-80% sand, fine- to coarse-grained, mod grading, sub rounded, sub angular; ~0-20% gravel; abundant Fe staining and coating; wet. (Gravel is confined to lenses)	30.0					25.5 - Drilling very soft
		32.0	T-13		2.5 / 2.5		
		34.0	T-14		2.5 / 2.5		33.0' 11:27 33.0 - 38.0 Run #9
CL	35.3 - 42.5 SANDY CLAY: Dk. greenish gray (5G 4/1); ~60-80% fines, med. plastic (some zones of high plastic), slow dilatancy, med. toughness; ~20-40% sand, fine- to medium-grained (some angular coarse frags); no cement; low perviousness; wet.	36.0	T-15		2.5 / 2.5		
	35.7 - 37.2 zone of gradation from above material	38.0	T-16		2.5 / 2.5		11:31 38.0' 38.0 - 43.0 Run #10
		40.0					

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO 1044	SHEET NO. 2 OF 3	I-2

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER		DRILL CONTRACTOR	TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	35.3 - 42.5 SANDY CLAY: (cont.) 38.0 - 39.5' more sandy 38.0 - 38.5 sand lens 40.9 - 42.5' ~95% clay	40.0	T-16 (cont.)		2.5 / 2.5	HA	
		42.0	T-17		2.5 / 2.5		11:55
CL CH CL	42.5 - 47.0' SANDY CLAY: Dk. yel. brn. (10YR 4/2); ~80-90% fines, med to high plastic, slow dilantancy to none, med. to higher toughness; ~10-20% fine-to medium-grained sand (occasional coarse), poorly graded, rounded; Fe coatings + stains; no odor; slight rxn. to HCL; low to non pervious; stiff; wet.	44.0	T-18		2.5 / 2.5		43.0 1:00 43.0-48.0 Run #11 0.0-46.0 cutting coming up clean (no slop)
		46.0	T-19		2.5 / 2.5		~46.0' water coming up with cuttings. (slop)
SC SP	43.0 - 43.3' possible slutt. 43.3 - 44.7' clay, very slight sand 44.7 - 47.0 sandy clay with slight gravel	48.0					48.0' Terminated drilling.
	47.0 - 48.0' CLAYEY SAND: Dk. yel. brn with red staining; as above with ~60% sand and 40% fines; 47.7 - 48.0 sand with no fines.						Following termination; Tremie grout to boring, filled hole with grout to surface.
	Bottom Hole 48.0'						

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Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET NO.	I-2
		JCO 104 H	3 OF 3	

BORING LOCATION JASCO CHEMICAL CORP. / In Central Expressway Median			GROUND EL.
DEPTH/~~ELEV.~~ WATER 23.67 / 0.95 stick-up	DRILL CONTRACTOR WEEKS DRILLING		TOTAL DEPTH 59.5
DRILL RIG FAILING 1500	BORING DIA. ~14.0"	DATE DRILLED 14 AUG. '87	LOGGED BY P.F.L.

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	0.0 - ~2.5' GRAVELLY CLAY	0.0	B-3			RD	Arrived on site 7:00 set-up rig & equip. Begin Drilling 9:30 Doug - Driller Richard - Helper Jim - Helper Drilling with mud rotary, 13½" tri-cone bit. Boring is 7.0" at 1700 from Well V-7.
CI	~2.5 - 11.0 SANDY CLAY: Grayish	2.0					
		4.0					
		6.0					
		8.0					8.0' 10:00 AM
		10.0					
		12.0	B-2				
	~11.0 - 20.0 SANDY CLAY						13.0' 10:17
CI		14.0					
			B-3				
		16.0					
		18.0					
			B-4				Ernest Solomon CEG #350
	~20.0 - 24.0 SAND	20.0					

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO 104 H	SHEET NO. 1 OF 3	I-2A

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	20.0-24.0 SAND	20.0				RD	
SP		22.0	B-5				
		24.0					24.0 11:00
		26.0	B-6				
	24.0-47.0 - CLAYEY SAND						
SC		28.0	B-7				
		30.0					Drilled to 40.0' Installed 8.0" steel casing to 40.0' and pushed to 42.0'. Installed grout pipe to 38' and pumped hole full of grout. (used 18 bags cement & ~200 gals H_2O) 2:40pm
		32.0	B-8				
		34.0					
		36.0	B-9				Note: Arrived Monday (17 Aug.) and casing was still full of H_2O, meaning that the seal was good.
		38.0	B-10				
		40.0					12:10

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO_104H	SHEET NO. 2 OF 3	I-2A

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SC	24.0 - 47.0 - Clayey Sand (Cont.) DATA ON THIS LOG ARE AN APPROXIMATION OF THE GEOLOGIC AND SUBSURFACE CONDITIONS BECAUSE THE INFORMATION WAS OBTAINED FROM INDIRECT, DISCONTINUOUS, AND POSSIBLY DISTURBED SAMPLING NECESSITATED BY USE OF SMALL-DIAMETER HOLES. ROTARY AND WASH BORING HOLES HAVE FURTHER COMPLICATIONS IN THIS REGARD BECAUSE OF THE NEED TO USE DRILLING FLUID AND/OR CASING IN ADVANCING HOLES. THIS LOG INDICATES CONDITIONS IN THIS HOLE ONLY ON THE DATE INDICATED AND MAY NOT REPRESENT CONDITIONS AT OTHER LOCATIONS AND ON OTHER DATES. ANY WATER LEVELS SHOWN ARE SUBJECT TO VARIATION. THIS HOLE WAS LOGGED IN SUCH A WAY AS TO PROVIDE DATA PRIMARILY FOR DESIGN PURPOSES AND NOT NECESSARILY FOR THE PURPOSES OF SPECIFIC CONTRACTORS. THE STRATIFICATION LINES OR DEPTH INTERVALS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES, AND THE TRANSITIONS MAY BE GRADUAL. SOIL CLASSIFICATIONS SHOWN ON LOGS ARE FIELD CLASSIFICATIONS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.	40.0				RD	Arrived on site ~10:34 AM (17 Aug '87) Start drilling 12:25pm Now drilling with 7½ tri-cone bit. Sampling with 3.0" split spoon sampler, line with 2.5" x 6.0" brass tubes (samples termed R-1, R-2, etc.). Sampler is driven by a 140 lb. slide hammer, free falling 30.0" per blow.
		42.0	R-1	6	1.5 / 2.0	DR	
			R-2	10			
			R-3	19			
			R-4	33			
		44.0	R-5	8	1.8 / 2.0	DR	42.0 - 44.0 Drove sampler * R-1 - no recovery (slotted) not saved
			R-6	10			
			R-7	9			
			R-8	12			
		46.0	B-1			RD	44.0 - 46.0 Driller screwed up - should not have sampled
			B-2				
SM-SW	47.0 - 54.5 SILTY GRAVELLY SAND Dk. yel. brn. (10YR 4/2); ~10% fines, non plastic; ~60% sand, fine-to coarse-grained, mod to well graded, sub rounded to sub angular; ~30% gravel, fine-grained, angular; heavy Fe. coatings and staining; no odor; med. to high pervious; dense to very dense; saturated.		R-9	24	1.1 / 1.5	DR	47.0 - 48.5 Drove sampler Note: Gravel will drilling from 46.5 - 47.0'. 48.5' sampler refusal * note: R-9 not saved
		48.0	R-10	39			
			R-11	80			
		50.0	B-3			RD	WELL CONSTRUCTION 2.0" ID PVC 0.0 - 49.0 solid 49.0 - 54.5 slotted (0.010) Install locking well cover. SEAL 0.0 - 45.0 grout 45.0 - 47.0 Bentonite 47.0 - 54.5 Sand (#3) 54.5 - 59.5 Bentonite
		52.0					
		54.0					
CL-CH	54.5 - 59.5 SANDY CLAY: Med. blue gray (5B 5/1); ~90% fines, highly plastic, high toughness; ~10% sand, fine-to med.-grained (mostly fine); heavy rx to HCL; non pervious; slight organics (root like brown spots); no odor; hard; damp. 59.0' slight increase in sand. Bottom Hole 59.5		R-12	20	2.0 / 2.0	DR	55.0 - 57.0 Drove sampler * grout seal pumped 18 Aug 8:30 AM
		56.0	R-13	34			
			R-14	44			
			R-15	40			
		58.0	B-4			RD	Terminated boring at 59.5'
		60.0					2:15 Water truck left 59.5' 4:15 Water truck return

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET NO.	I-2A
		JCO 104H	3 OF 3	

BORING LOCATION	JASCO CHEMICAL CORP., CENTRAL EXP. MEDIAN		GROUND EL.
DEPTH/ELEV. WATER	24.0' (standing)	DRILL CONTRACTOR HEW Drilling	TOTAL DEPTH 33.5
DRILL RIG CME 75	BORING DIA. 8.0"	DATE DRILLED 12 Aug. 87	LOGGED BY P.J.S.

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	0.0 - 1.0' SANDY CLAY: Brownish black; Topsoil; mod. organics; worms; wood; etc.	0.0	T-1		0.5 / 1.0	HA	Casto - Driller 8:30 Sal - Helper Boring is advanced using 8.0" hollow stem augers. Sampling is done by a CME Continous Core Sampler with 3.0"x2.5' clear plastic liners. (T) 0.0 - 3.5 Run # 1 3.5 - 8.5 Run # 2
CL	1.0 - 5.3' SANDY CLAY: Brownish black (5YR 2/1); ~85% fines, high plastic, no dilatancy, high toughness; ~15% sand, fine-to coarse-grained, poorly graded (mostly fine), rounded to subangular; abundant carbonate ppt.; slight roots; non pervious; damp.	2.0	T-2		2.5 / 2.5		
		4.0	T-3		2.3 / 2.5		
CH	4.2 - 4.6 zone of heavy wht. ppt. 4.6 - 5.3 gradation zone 5.3 - 12.1' CLAY: Mod. to dark yel. brn. (10YR 5/4 & 4/2); >95% fines, high plastic, high toughness; <5% sand, fine-grained; mod. rnx. to HCL; Fe staining (mottling); no odor; damp. (sporatic wht. ppt. throughout)	6.0	T-4		2.5 / 2.5		
		8.0					9:04 8.5'
		10.0	T-5		2.5 / 2.5		8.5 - 13.5 Run # 3
CL	12.1 - 16.3' GRAVELLY SANDY CLAY: Lt. olive gray (5Y 5/2); ~70% fines, mod. plastic, slight dilatancy, med. toughness; ~15% sand, fine-to coarse-grained, mod grading, sub round to angular; qtz. frags; heavy rnx to HCL; no odor; damp.	12.0	T-6		2.5 / 2.5		9:15 13.5 9:26
		14.0	T-7		0.8 / 2.5		13.5 - 18.5' Run # 4 ~15.0' augers chattering.
SW	16.3 - 18.7' GRAVELLY SAND: Dk. yel. brn. (10YR 4/2); <5% fines; ~65% sand, fine-to medium-grained, well graded, sub rounded, subangular; Fe staining; saturated (but drained)	16.0	T-8		2.5 / 2.5		Ernest Solomon CEG # 350
		18.0					18.5
SM	18.7 - 24.1' SILTY SAND:	20.0	T-9		2.1 / 2.5		18.5 - 23.5 Run # 5 No dripping water on sampler.

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO104H	SHEET NO. 1 OF 2	I-3

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SM	18.7 - 24.1 SILTY SAND: OK. yel. brn. (10YR 4/2); ~40% fines; slight to med. plastic (grading more or less), quick dilatancy, low toughness; ~60% sand, fine- to coarse-grained (mostly fine, sporatic coarse), sub. angular; Fe staining; mod. pervious; moist.	20.0	T-9 (cont.)		2.1 / 2.5		No water coming to surface
		22.0	T-10		2.5 / 2.5		
							23.5
CL	- occasional gravel frags 23.0 - 24.1 grading less sandy	24.0	T-11		2.5 / 2.5		23.5 - 28.5 Run # 6; 24.0' H_2O level when augers removed.
	24.1 - 33.5' SANDY CLAY: OK. greenish gray (5G 4/1); ~85% fines, mod to high plastic, med. to high toughness; ~15% sand, fine-grained, poorly graded; no organics; no odor; moist.	26.0	T-12		2.5 / 2.5		
		28.0					28.5
	29.0 - 32.5 less sandy, almost fat clay	30.0	T-13		2.5 / 2.5		28.5 - 33.5 Run # 7
	33.2 - 33.5 grading yel. brn sandy clay.	32.0	T-14		2.5 / 2.5		11:15
	Bottom Hole 33.5						33.5
		34.0					Terminated boring at 33.5'. Pulled augers, hole open to 33.5'; installed grout pipe to bottom hole, filled hole with grout. Cuttings and displaced H_2O removed from site.

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Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO 104H	SHEET NO. 2 OF 2	I-3

BORING LOCATION JASCO CHEMICAL, Behind building in Central Expressway Median			GROUND EL.
DEPTH/~~ELEV~~. WATER	DRILL CONTRACTOR WEEKS		TOTAL DEPTH 71.0
DRILL RIG Failing 1500	BORING DIA. 13.5	DATE DRILLED 18 Aug '87	LOGGED BY R.J. L.

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	As log of boring I-3	0.0				RD	Start setting up ~ 12:00 Drilling 1:58 pm Drilling with a 13.5" tri-cone bit. Drilling mud is POLY-GEL with H_2O. Doug - Driller Richard & Jim - Helpers
		2.0					
		4.0					
		6.0					
		8.0					
		10.0					
		12.0					
		14.0					
	16.0	16.0					
SP/SW			B-1				
		18.0					2:53 18.0
	18.5						Ernest Solomon CEG #350
		20.0					

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO 1044	SHEET NO. 1 OF 4	I-3A

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER		DRILL CONTRACTOR	TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
		20.0				RD	
		22.0					
	24.0 - SANDY CLAY: As log of boring I-3	24.0					Drilled to 29.0' with 13½ tricone, stopped at 29.0' and installed 8 5/8" steel casing. Pushed casing to 31.0' with rig.
		26.0					
		28.0	B-2				3:18 18 AUG. '87 29.0'
		30.0				PUSH	19 AUG Arrived on site 8:00AM Switched to 7.0" tricone Start drilling 11:03 AM
			R-1	8	1.8 / 2.0	DR	11:21 31.0 - 33.0' Drove 3.0" split spoon sampler w/a 140 lb slide hammer Free Falling 30.0" per blow. Sampler is lined with 2½" x 6.0" brass tubes (termed R-1, R-2, ..., etc).
		32.0	R-2	15			
			R-3	24			
			R-4	30			
		34.0	B-3			RD	11:38
		36.0					
		38.0	B-4				
	~39.0 grading more sandy (rounded).	40.0					

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCQ104-4	SHEET NO. 2 OF 4	I-3A

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	24.1 - 47.5 SANDY CLAY: (cont.)	40.0				RD	
		42.0	B-4 (cont)				WELL CONSTRUCTION 2.0" SCH 40 PVC 0.0 - 49.0 solid 49.0 - 55.0 slotted Install locking well cover SEAL 0.0 - 43.5 grout 43.5 - 46.5 bentonite
		44.0					12:20 45.0'
	47.0 - 47.5' grades to sandy	46.0	B-5				46.5 - 55.5 SAND (#3) 55.0 - 59.5 Bentonite 59.5 - 71.0 SAND
SW	47.5 - 71.0 GRAVELLY SAND: DK yel. brn. (10YR 4/2); ~5-10% fines, non plastic; ~60-70% sand, fine- to coarse-grained, mod to well graded, sub rounded; sandstone fragments, Fe coatings; ~20-35% gravel, fine, rounded, Fe coatings; non cemented; soil is highly pervious no odor; very dense; saturated.	48.0	B-6				12:30 49.0 - 49.6 Drove 3.0" OD split-spoon sampler with 140 lb slide hammer. Refusal.
			R-5 (8-7)	135	0.4/0.6	DR	49.6
		50.0				RD	
		52.0	B-8				
	54.5 some brn clay in cuttings.	54.0	R-9				
		56.0					
CL	56.5 - 57.5 Sandy CLAY Blueish gray, roots, damp.						1:25 57.0 - 58.2 Drove split-spoon sampler Refusal @ 58.2'
SW			R-6	18		DR	
		58.0	R-7 (2:10)	45 50			
						RD	
		60.0	B-11				

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO 104 H	SHEET NO. 3 OF 4	I-3A

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SW	47.0- 71.0 GRAVELLY SAND: (cont.) 60.0-71.0 no changes	60.0				RD	
		62.0	B-11 (cont.)				
		64.0					
		66.0					
		68.0					
			—	36			69.0' - 71.0' Drove split spoon sampler
		70.0	R-8	51	1.3 / 2.0	DR	
			R-9	54			
	Bottom Hole 71.0'		R-10	70			2:40
		72.0					Terminated boring at 71.0'. Flushed hole, backfilled to 59.0' with #3 sand, to 56.0 with bentonite and installed well. Pumped seal after well was in place and placed locking steel cover pipe.
		74.0					

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Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO 104-H	SHEET NO. 4 OF 4	I-3A

Chuck Solomon
CEG # 350 7/2/87

BORING LOCATION JASCO CHEMICAL CORPORATION			GROUND EL.
DEPTH/ELEV. WATER NOT ENCOUNTERED	DRILL CONTRACTOR HEW DRILLING		TOTAL DEPTH 21.5'
DRILL RIG CME-75	BORING DIA. 6"	DATE DRILLED 6-9-87	LOGGED BY RGR

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	ALLUVIUM	0					
CL	0.0-5.0: SANDY CLAY; dark brown 80% clay, 20% sand, dry, moderate plasticity, very stiff.					AD	DRILL with 6" Auger
		2	R-1	7 7 10	1.5 / 1.5	DR	2.5-2.5" California modified sampler (CMS) driven by 140 lb Hammer falling 30"
	3.0 caliche Mottling					AD	3.0-4.5 CMS
		4	R-2	7 15 20	1.5 / 1.5	DR	
SC	5.0-6.5 CLAYEY SAND: LIGHT brown, 60% medium sand, 40% clay, dry to slightly damp, low - moderate plasticity; very stiff.					AD	5.0-6.5 CMS
		6	R-3	7 10 14	1.5 / 1.5	DR	
CH	6.5-15.0 - CLAY; mottled yellow-brown/greenish brown; 95-98% clay 2-5% fine sand; very stiff, moist; high plasticity.	8				AD	
		10	R-4	8 12 17	1.5 / 1.5	DR	10.0-11.5 CMS
		12				AD	
		14					
SP	15.0-16.5 - GRAVELLY SAND: medium brown; 80% medium sand; 20% gravel (subangular) medium size; dry to slightly damp.		R-5	27 20 7	1.5 / 1.5	HA	15.0-16.5 CMS
CH	16.5-20.2 - SANDY CLAY: yellow brown, 70% clay, 30% fine sand; moderate plasticity; damp;	16					
		18				AD	
		20					

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO-104H	SHEET NO. 1 of 2	B-1

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	ALLUVIUM	20					20.0-21.5 CMS
SC	16.5-20.2 - Sandy clay (cont.) 20.2-21.5 CLAYEY SAND: Light brown; 80% fine sand, 20% clay, low plasticity; moist; dense.		R-6	7 16 24	1.5 / 1.5	DR	21.5 Terminate hole - Boring backfilled with cement grout
	21.5' Total Depth	22					
		24					
		26					
		28					
		30					
		32					
		34					
		36					
		38					
		40					

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Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. JCO-104H / SHEET NO. 2 of 2	B-1

Ernest Galvan
CEG #350 7/2/87

BORING LOCATION JASCO CHEMICAL CORPORATION			GROUND EL.
DEPTH/ELEV. WATER NOT ENCOUNTERED	DRILL CONTRACTOR HEW DRILLING		TOTAL DEPTH 21.5'
DRILL RIG CME-75	BORING DIA. 6"	DATE DRILLED 6-9-87	LOGGED BY RGB

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
							Drill with 6" Auger
SC	ALLUVIUM 0.0-1.2 - CLAYEY SAND: dark brown 65% medium sand, 35% clay; low to moderate plasticity; earthy odor; medium dense	0				AD	
CL	1.2-5.4 - SANDY CLAY: dark brown 90% clay, <10% fine sand; moderate plasticity; twig fragments, some iron staining; very stiff	2	R-1	5 8 17	1.5 / 1.5	DR	1.0-2.5 2.5" California Modified Sampler (CMS) driven by 140lb hammer falling 30"
						AD	3.0-4.5 CMS
		4	R-2	4 8 16	1.5 / 1.5	DR	
						AD	5.0-6.5 CMS
SC-CL	5.4-7.5 - CLAYEY SAND - SANDY CLAY: light brown; 50% sand, fine, 50% fines, low plasticity; medium dense; damp, slight odor	6	R-3	7 12 14	1.5 / 1.5	DR	
CL	7.5-14.0 - SANDY CLAY: light brown; 70% clay; 25% sand, 5% gravel; no odor; moderate plasticity; Hard.	8				AD	
		10	R-4	9 13 20	1.5 / 1.5	DR	10.0-11.5 CMS
		12				AD	
SP	14.0-18.5 GRAVELLY SAND: light brown; [illegible] sand; 20% gravel, dry, very dense.	14	R-5	22 27 27	1.5 / 1.5	DR	15.0-16.5 CMS
		16					
		18				AD	
CL	18.5-21.5 - SANDY CLAY: light brown; 85% clay; 15% fine sand; moderate plasticity; damp, hard.	20					

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO. B-2
		PROJECT NO. JCO-104H	SHEET NO. 1 OF 2	

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	ALLUVIUM 18.5-21.5 - Sandy Clay (Cont.)	20	R-6	7 13 23	1.5/1.5	DR	20.0-21.5 CMS 21.5 Terminate hole. Boring backfilled with cement grout
	21.5 - Total Depth	22					
		24					
		26					
		28					
		30					
		32					
		34					
		36					
		38					
		40					

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Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. JCO-10411 / SHEET NO. 2 of 2	B-2

CEG #350 7/2/87

BORING LOCATION JASCO CHEMICAL CORPORATION			GROUND EL.
DEPTH/ELEV. WATER NOT ENCOUNTERED	DRILL CONTRACTOR HEW DRILLING		TOTAL DEPTH 21.5'
DRILL RIG CME-75	BORING DIA. 6"	DATE DRILLED 6-5-87	LOGGED BY RGB

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	CODE	REMARKS
		0					DRILL WITH 6" AUGER
CL	ALLUVIUM 0.0-0.8-SANDY CLAY: Light brown, 60% clay; 40% medium sand; low to moderate plasticity; dry; very stiff 0.8-10.0-SANDY CLAY: dark brown 90% clay; 10% fine sand; moderate plasticity; moist; organic odor; rootlets present; very stiff					AD	
		2	R-1	3 8 12	1.5/1.5	DR	1.0-2.5 - 2.5" California Modified Sampler driven by 140 lb hammer falling 30"
						AD	3.0-4.5 CMS
CL	3.5-color change to mottled yellow brown/medium brown; caliche veinlets	4	R-2	7 13 19	1.5/1.5	DR	
	5.4-increase in sand content to 35-40%					AD	5.0-6.5 CMS
		6	R-3	7 7 12	1.5/1.5	DR	
		8				AD	
SC	10.0-14.0: CLAYEY SAND: Light brown; 75% medium sand, 25% clay; low to moderate plasticity; damp; dense	10	R-4	7 10 12	1.5/1.5	DR	10.0-11.5 CMS
		12				AD	
SP	14.0-18.0 GRAVELLY SAND: yellow brown; 75% sand, 20% gravel <5% clay; dry; dense	14					
		16	R-5	17 25 13	1.5/1.5	DR	15.0-16.5 CMS
SC-CL	18.0-21.5-SANDY CLAY-CLAYEY SAND: Lt. brown; 50% medium sand, 50% clay; moderate plasticity; moist; very stiff.	18				AD	
		20					

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO-104H	SHEET NO. 1 OF 2	B-3

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / ROD	REC.	MODE	REMARKS
	ALLUVIUM	20					20.0-21.5 CMS
CL	18.0-21.5 - SANDY CLAY (CONT.)		R-6	6 9 19	1.5/1.5	DR	21.5 Terminate hole.
	21.5 Total Depth	22					borings backfilled with cement grout
		24					
		26					
		28					
		30					
		32					
		34					
		36					
		38					
		40					

DATA ON THIS LOG ARE AN APPROXIMATION OF THE GEOLOGIC AND SUBSURFACE CONDITIONS BECAUSE THE INFORMATION WAS OBTAINED FROM INDIRECT, DISCONTINUOUS, AND POSSIBLY DISTURBED SAMPLING NECESSITATED BY USE OF SMALL-DIAMETER HOLES. ROTARY AND WASH BORING HOLES HAVE FURTHER COMPLICATIONS IN THIS REGARD BECAUSE OF THE NEED TO USE DRILLING FLUID AND/OR CASING IN ADVANCING HOLES.

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SOIL CLASSIFICATIONS SHOWN ON LOGS ARE FIELD CLASSIFICATIONS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. JCO-104H / SHEET NO. 2 of 2	B-3

CEG #350 7/2/87

BORING LOCATION JASCO CHEMICAL CORPORATION			GROUND EL.
DEPTH/ELEV. WATER NOT ENCOUNTERED	DRILL CONTRACTOR HEW DRILLING		TOTAL DEPTH 21.5'
DRILL RIG CME-75	BORING DIA. 6"	DATE DRILLED 6-9-87	LOGGED BY RGB

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
		0					DRILL WITH 6" AUGER
CL	ALLUVIUM 0.0-9.0 - SANDY CLAY: dark brown; 80% Clay, 20% sand; moderate plasticity; dry; Hard.					AD	
		2	R-1	7 12 21	1.5/1.5	DR	1.0-2.5 2.5" California Modified Sampler (CMS) driven by 140 lb hammer falling 30"
						AD	3.0-4.5 CMS
		4	R-2	6 9 15	1.5/1.5	DR	
	5.0- decrease in sand content to 5-10%					AD	5.0-6.5 CMS
		6	R-3	8 9 17	1.5/1.5	DR	
		8				AD	
SP	9.0-18.0- GRAVELY SAND: Light brown; 80% sand, 20% gravel, gravel clasts up to 1" long; dry; dense.	10	R-4	10 16 22	1.5/1.5	DR	10.0-11.5 CMS
		12				AD	
		14					
		16	R-5	18 15 10	1.5/1.5	DR	15.0-16.5 CMS
CL	18.0-21.5 - SANDY CLAY: medium brown; 80% clay; 20% fine sand, moderate plasticity; damp; very stiff.	18				AD	
		20					

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG PROJECT NO. JCO-104H SHEET NO. 1 OF 2	BORING NO. B-4

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	ALLUVIUM	20					20.0-21.5 CMS
CL	(8.0-21.5 - SANDY CLAY (CONT.)		R-6	9 12 19	1.5/1.5	DR	21.5 Terminate hole. Boring back filled with Cement grout
	21.5 - TOTAL DEPTH	22					
		24					
		26					
		28					
		30					
		32					
		34					
		36					
		38					
		40					

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Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. JCO-1041F / SHEET NO. 2 of 2	B-4

Chest Solomon
CEG#350 7/2/87

BORING LOCATION JASCO CHEMICAL CORPORATION			GROUND EL.
DEPTH/ELEV. WATER NOT ENCOUNTERED	DRILL CONTRACTOR HEW DRILLING		TOTAL DEPTH 21.5'
DRILL RIG CME-115	BORING DIA. 6"	DATE DRILLED 6-10-87	LOGGED BY RGB

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SP	FILL 0.0-0.5 - SAND: light brown, medium, dry, loose	0				AD	DRILL WITH 6" AUGER
CH	ALLUVIUM 0.5-4.5 - CLAY: dark brown, 95% clay, <5% sand, moderate to high plasticity, damp, stiff.	2	R-1		1.5/1.5	P	1.0-2.5 2.5" California modified sampler (CMS)
						AD	3.0-4.5 CMS
		4	R-2		1.5/1.5	P	
CL	4.5-14.0 - SANDY CLAY: blue green 70% clay, 30% fine sand, moderate plasticity, strong chemical odor, dry, firm					AD	5.0-6.5 CMS
		6	R-3		1.5/1.5	P	
		8				AD	
	10.5 - color change to mottled blue-green/brown, caliche veinlets	10	R-4		1.5/1.5	P	10.0-11.5 CMS
		12				AD	
SP1	14.0-20.5 - GRAVELY SAND: medium brown, 80% sand, 20% gravel, <5% clay; loose, dry, odor present.	14					15.0-16.5 CMS
		16	R-5		1.5/1.5	P	
		18				AD	
		20					

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. JCO-104H / SHEET NO. 1 OF 2	B-5

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SP	14.0-20.5 ALLUVIUM GRAVELLY SAND (CONT)	20					20.0-21.5 CMS
SC	20.5-21.5 - Gravely clayey Sand medium brown; 60% sand, 20% Gravel, 20% Clay;		R-6		1.5/1.5	P	21.5 Terminate hole.
	21.5 - TOTAL DEPTH	22					boring backfilled with cement grout
		24					
		26					
		28					
		30					
		32					
		34					
		36					
		38					
		40					

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Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO-11041	SHEET NO. 2 OF 2	B-5

CEG #350 7/2/87

BORING LOCATION JASCO CHEMICAL CORPORATION			GROUND EL.
DEPTH/ELEV. WATER NOT ENCOUNTERED	DRILL CONTRACTOR HEW DRILLING		TOTAL DEPTH 21.5'
DRILL RIG CME-45	BORING DIA. 6"	DATE DRILLED 6-10-87	LOGGED BY RGC

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
							DRILL WITH 5" AUGER
SP	0.0-0.8 FILL 0.8 - SAND - Light brown, medium, dry loose	0				AD	
CH	ALLUVIUM 0.8-5.8 - SANDY CLAY: dark brown 95% clay, <5% sand; moderate plasticity; damp; soft.	2	R-1		1.5/1.5	P	1.0-2.5 2.5" California Modified Sampler (CMS)
	3.0 - Color change to medium brown					AD	3.0-4.5 CMS
		4	R-2		1.5/1.5	P	
						AD	5.0-6.5 CMS
CL	5.8-15.2 - SANDY CLAY: medium brown; 60% clay; 40% sand, fine; moderate plasticity; moist; firm; slight odor	6	R-3		1.5/1.5	P	
		8				AD	
	10.5 - decrease in sand content to 25%	10	R-4		1.5/1.5	P	10.0-11.5 CMS
		12				AD	
		14					
SP	15.2-17.0 - GRAVELY SAND: medium brown; 85% sand, 15% gravel, dry, loose.	16	R-5		1.5/1.5	P	15.0-16.5 CMS
SC-CL	17.0-21.5 CLAYEY SAND - SANDY CLAY: Med. brown; 50% fine sand; 50% clay; soft, moderate to low plasticity	18				AD	
		20					

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. JCO-1041H	SHEET NO. 1 OF 2	B-6

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	ALLUVIUM 17.0-21.5 Clayey Sand (Cont.)	20	B-6		1.5/1.5	P	20.0-21.5 CMS 21.5 Terminate hole. Boring backfilled with cement grout
	21.5 TOTAL DEPTH	22					
		24					
		26					
		28					
		30					
		32					
		34					
		36					
		38					
		40					

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Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG		BORING NO. B-6
		PROJECT NO. JCO-104H	SHEET NO. 2 of 2	

CEG #350 7/2/87

BORING LOCATION JASCO CHEMICAL CORPORATION			GROUND EL.
DEPTH/ELEV. WATER NOT ENCOUNTERED	DRILL CONTRACTOR HEWI DRILLING		TOTAL DEPTH 21.5'
DRILL RIG CME-45	BORING DIA. 6"	DATE DRILLED 6-10-87	LOGGED BY RGB

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	[illegible]	0				AD	DRILL WITH 6" AUGER
CL	0.0-10.5 - SANDY CLAY: dark brown; 80% clay; 20% fine sand; low to moderate plasticity; damp; stiff.		R-1		1.5/1.5	P	1.0-2.5 2.5" California Modified Sampler (CMS)
		2				AD	3.0-4.5 CMS
CL	3.0-10.5 - Sandy Clay: Mottled olive-green/medium brown; 70% clay; 30% fine sand; low to moderate plasticity, damp, stiff	4	R-2		1.5/1.5	P	
						AD	5.0-6.5 CMS
	5.5 - Color change to medium brown, sand content decreases to 10%	6	R-3		1.5/1.5	P	
		8				AD	
		10					10.0-11.5 CMS
SC	10.5-15.5 - SANDY CLAYEY SAND: mottled medium brown/yellow brown; 55% medium sand; 20% gravel; 25% fines; damp; loose		R-4		1.5/1.5	P	
		12				AD	
		14					15.0-16.5 CMS
		16	R-5		0.7/1.5	P	
CL	15.5-21.5 - SANDY CLAY: light brown; 50-60% fines; 30-40% fine grained sand; soft to firm; moderate plasticity	18				AD	
		20					

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. JCO-10414 / SHEET NO. 1 OF 2	B-7

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	ALLUVIUM 16.8-21.5 - SANDY CLAY (CONT.)	20					20-21.5 CMS
CL			R-6		1.5 / 1.5	P	21.5 terminate hole boring backfilled with cement grout
	21.5 - TOTAL DEPTH	22					
		24					
		26					
		28					
		30					
		32					
		34					
		36					
		38					
		40					

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Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. JCO-104H / SHEET NO. 2 OF 2	B-7

CEG # 350 7/2/87

BORING LOCATION JASCO CHEMICAL CORPORATION			GROUND EL.
DEPTH/ELEV. WATER NOT ENCOUNTERED	DRILL CONTRACTOR HEW DRILLING		TOTAL DEPTH 21.5'
DRILL RIG CME-45	BORING DIA. 6"	DATE DRILLED 6-10-87	LOGGED BY RGB

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
EX	0.0-0.5: EXCAVATION	0				AD	DRILL WITH 6" AUGER
OR	0.5-1.5: ORGANIC RESIDUE: white, crystalline; Gelatinous highly odorous, soft ALLUVIUM						
CL	1.5-13.5- SANDY CLAY: dark brown; 60% clay, 40% sand; Low to Moderate plasticity; extremely odorous with organic vapors;	2	R-1		0.6/1.5	P	1.0-2.5 2.5" California Modified Sampler (CMS)
						AD	3.0-4.5 CMS
		4	R-2		1.5/1.5	P	
						AD	5.0-6.5 CMS
		6	R-3		1.5/1.5	P	
		8				AD	
	10.0- Moderate plasticity; extremely odorous; caliche veinlets.	10	R-4		1.5/1.5	P	10.0-11.5 CMS
		12				AD	
SP	13.5-16.5- GRAVELY SAND: greenish black to blue green; 70% medium sand; 30% gravel; moist; loose, highly odorous.	14					
		16	R-5		1.5/1.5	P	15.0-16.5 CMS
CL-SC	16.5-21.5- SANDY CLAY-CLAYEY SAND: greenish black 50% Clay; 50% fine sand; Low to Moderate plasticity; odorous	18				AD	
		20					

Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG PROJECT NO. 10-104H SHEET NO. 1 OF 2	BORING NO. B-8

BORING LOCATION			GROUND EL.
DEPTH/ELEV. WATER	DRILL CONTRACTOR		TOTAL DEPTH
DRILL RIG	BORING DIA.	DATE DRILLED	LOGGED BY

SOIL CLASS.	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL/SC	16.5-21.5 ALLUVIUM Sandy Clay/Clayey Sand (cont.)	20	R-6		1.5/1.5	P	20.0-21.5 CMS 21.5 Terminate hole. boring backfilled with cement grout
	21.5 - TOTAL DEPTH	22					
		24					
		26					
		28					
		30					
		32					
		34					
		36					
		38					
		40					

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Wahler Associates	JASCO CHEMICAL CORPORATION	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. JCO-1044 / SHEET NO. 2 OF 2	B-8

BORING LOCATION: SEE SITE PLAN		GROUND EL.	TOTAL DEPTH: 21.5'
DEPTH/ELEV. WATER: not encountered	DRILL CONTRACTOR: HEW Drilling		LOGGED BY: RGB
DRILL RIG: CME 45 / BORING DIA: 8.0"	DATE DRILLED: 4-5-88		APPROVED BY: F-H

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE #	PR/REQ	RQD	MODE	REMARKS
CL	ALLUVIUM 0.0'-4.5' SANDY CLAY: dark brown, damp; hard; moderate to high plasticity, occasional gravel fragments; chemical odor present	0				HA	1.0'-2.5': 2.5" dia California modified sampler driven using 140 lb hammer falling 30" (CALMOD)
		2	R-1	9/17/20	0.8/1.5	DR	2.0'-2.5' Gas Tech = 56 ppm
						HA	2.0'-2.5': Sample taken
		4	R-2	10/14/20	0.9/1.5	DR	3.0'-4.5': CALMOD 3.0'-3.5' Gas Tech = 125 ppm
	4.0' - 4.5' Caliche mottling.					HA	4.0'-4.5': Sample taken
CL	4.5'-13.0' SANDY CLAY: greenish brown; very stiff; low to moderate plasticity, chemical odor.	6	R-3	6/9/10	1.3/1.5	DR	5.0'-6.5': CALMOD 5.0'-5.5' Gas Tech = 265 ppm 6.0'-6.5': Sample taken
		8				HA	
		10	R-4	6/11/17	1.2/1.5	DR	10.0'-11.5': CALMOD 10.5'-11.0' Gas Tech = 250 ppm 11.0'-11.5': Sample taken
	11.0' Color change to grayish olive green.	12				HA	
SP	13.0' - 18.0' GRAVELLY SAND: damp, medium dense, low plasticity.	14					
		16	R-5	7/7/9	1.1/1.5	DR	15.0'-16.5': CALMOD 15.5'-16.0' Gas Tech = 255 ppm 16.0'-16.5': Sample taken
SC-CL	18.0' - 21.5' CLAYEY SAND - SANDY CLAY: grayish olive green	18				HA	
		20					

WAHLER ASSOCIATES	Jasco Chemical Corporation	EXPLORATION BORING LOG		BORING NO.
		Project No JCO-105H	Sheet No 1 of 2	B-9

BORING LOCATION: SEE SITE PLAN			GROUND EL:	TOTAL DEPTH 21.5'
DEPTH/ELEV. WATER: not encountered		DRILL CONTRACTOR: HEW Drilling		LOGGED BY: RGB
DRILL RIG: CME 45	BORING DIA: 8.0"	DATE DRILLED: 4-5-88		APPROVED BY: E.H.

SOIL CLASS	DESCRIPTION	DEPTH (ft.)	SAMPLE #	PR/RED	RQD	MODE	REMARKS
SC-CI	18.0' - 21.5' CLAYEY SAND (cont.)	20	R-6	6 14 20	1.3/1.5	DR	20.0'-21.5' CALMOD 20.5-21.5' Gas Tech = 170 ppm 21.0'-21.5' Sample taken
		22					Terminate boring at 21.5'. Filled with neat cement to surface.

DATA ON THIS LOG ARE AN APPROXIMATION OF THE GEOLOGIC AND SUBSURFACE CONDITIONS BECAUSE THE INFORMATION WAS OBTAINED FROM INDIRECT, DISCONTINUOUS, AND POSSIBLY DISTURBED SAMPLING NECESSITATED BY USE OF SMALL-DIAMETER HOLES. ROTARY AND WASH BORING HOLES HAVE FURTHER COMPLICATIONS IN THIS REGARD BECAUSE OF THE NEED TO USE DRILLING FLUID AND/OR CASING IN ADVANCING HOLES.

THIS LOG INDICATES CONDITIONS IN THIS HOLE ONLY ON THE DATE INDICATED AND MAY NOT REPRESENT CONDITIONS AT OTHER LOCATIONS AND ON OTHER DATES. ANY WATER LEVELS SHOWN ARE SUBJECT TO VARIATION.

THIS HOLE WAS LOGGED IN SUCH A WAY AS TO PROVIDE DATA PRIMARILY FOR DESIGN PURPOSES AND NOT NECESSARILY FOR THE PURPOSES OF SPECIFIC CONTRACTORS.

THE STRATIFICATION LINES OR DEPTH INTERVALS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES, AND THE TRANSITIONS MAY BE GRADUAL.

SOIL CLASSIFICATIONS SHOWN ON LOGS ARE FIELD CLASSIFICATIONS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

WAHLER ASSOCIATES	Jasco Chemical Corporation	EXPLORATION BORING LOG		BORING NO.
		Project No	Sheet No 2	
		JCO-104H	of 2	B-9

BORING LOCATION: SEE SITE PLAN			GROUND EL:	TOTAL DEPTH: 21.5'
DEPTH/ELEV. WATER: not encountered		DRILL CONTRACTOR: HEW Drilling		LOGGED BY: PL
DRILL RIG: CME 45	BORING DIA: 8.0"	DATE DRILLED: 4-5-88		APPROVED BY: E.H.

SOIL CLASS	DESCRIPTION	DEPTH (ft.)	SAMPLE #	PR/REQ	RQD	MODE	REMARKS
CL	ALLUVIUM 0.0'-11.3' SANDY CLAY. Dark brown; damp; hard; moderate to high plasticity, occasional gravel fragment	0				HA	1.0'-2.5': 2.5" Cal modified sampler driven using 140 lb hammer falling 30" (CALMOD)
		2	R-7	10 20 25	0.5/1.5	DR	2.0'-2.5'. Gas Tech = 100 ppm 2.0'-2.5': Sample taken
						HA	
		4	R-8	10 17 20	0.5/1.5	DR	3.0'-3.5': CALMOD 3.0'-3.5': Sample taken
						HA	5.0'-6.5': CALMOD
	6.0' - 6.5' Caliche mottling; moderate plasticity.	6	R-9	3 11 19	0.4/1.5	DR	6.0'-6.5': Gas Tech = 115 ppm 6.0'-6.5': Sample taken
		8				HA	
		10	R-10	17 20 25	0.7/1.5	DR	10.0'-11.5': CALMOD 10.5'-11.0' Gas Tech = 145 ppm 11.0'-11.5': Sample taken
	11.3' Color change to greyish olive green	12					
	14.25' - 18.0' GRAVELLY SAND	14					
SP			R-11	35 50	1.0/1.0	DR	15.0'-16.5': CALMOD 15.0'-15.5': Gas Tech = 155 ppm 15.5'-16.0': Sample taken
		16					
SC-CL	18.0' - 21.5' CLAYEY SAND - SANDY CLAY. Dusky green.	18				HA	
		20					

WAHLER ASSOCIATES	Jasco Chemical Corporation	EXPLORATION BORING LOG		BORING NO.
		Project No: JCD-104H	Sheet No 1 of 2	B-10

BORING LOCATION: SEE SITE PLAN			GROUND EL:			TOTAL DEPTH: 21.5'
DEPTH/ELEV WATER: not encountered		DRILL CONTRACTOR: HEW Drilling				LOGGED BY: PL
DRILL RIG: CME 45	BORING DIA: 8.0"	DATE DRILLED: 4-5-88				APPROVED BY: F-H

SOIL CLASS	DESCRIPTION	DEPTH (ft.)	SAMPLE #	PR / REC	RQD	MODE	REMARKS
SC-CL	18.0' - 21.5' CLAYEY SAND (cont)	20	R-12	7 14 16	1.0 / 1.5	DR	20.0'-21.5': CALMOD 20.0'-21.0': Gas Tech = 125 ppm 21.0'-21.5': Sample taken
		22					Terminate boring at 21.5'. Filled with neat cement to surface.

DATA ON THIS LOG ARE AN APPROXIMATION OF THE GEOLOGIC AND SUBSURFACE CONDITIONS BECAUSE THE INFORMATION WAS OBTAINED FROM INDIRECT, DISCONTINUOUS, AND POSSIBLY DISTURBED SAMPLING NECESSITATED BY USE OF SMALL-DIAMETER HOLES. ROTARY AND WASH BORING HOLES HAVE FURTHER COMPLICATIONS IN THIS REGARD BECAUSE OF THE NEED TO USE DRILLING FLUID AND/OR CASING IN ADVANCING HOLES.

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WAHLER ASSOCIATES	Jasco Chemical Corporation	EXPLORATION BORING LOG		BORING NO.
		Project No. JCO-104H	Sheet No 2 of 2	B-10

BORING LOCATION: SEE SITE PLAN			GROUND EL.	TOTAL DEPTH: 21.5'
DEPTH/ELEV. WATER: not encountered		DRILL CONTRACTOR: HEW Drilling		LOGGED BY: PL
DRILL RIG: CME 45	BORING DIA: 8.0"	DATE DRILLED: 4-5-88		APPROVED BY: F.H

SOIL CLASS	DESCRIPTION	DEPTH (ft.)	SAMPLE #	PR / REC	RQD	MODE	REMARKS
CL	ALLUVIUM 0.0' - 16.2' SANDY CLAY: dark brown; damp; hard; moderate to high plasticity, occasional gravel fragment. 6.0' - 6.5' Caliche mottling; moderate plasticity.	0				HA	1.0'-2.5': 2.5" dia. California modified sampler driven using 140 lb hammer falling 30" (CALMOD) 1.0'-2.0': Gas Tech = 85 ppm 2.0'-2.5': Sample taken
		2	R-13	40 / 35 / 15	0.7 / 1.5	DR	
						HA	3.0'-4.5' CALMOD 3.0'-4.0': Gas Tech = 100 ppm 4.0'-4.5': Sample taken
		4	R-14	7 / 17 / 21	0.8 / 1.5	DR	
						HA	5.0'-6.5' CALMOD 5.5'-6.0': Gas Tech = 125 ppm 6.0'-6.5': Sample taken
		6	R-15	9 / 14 / 16	0.8 / 1.5	DR	
		8				HA	
		10	R-16	10 / 20 / 25	1.0 / 1.5	DR	10.0'-11.5' CALMOD 10.5'-11.0': Gas Tech = 115 ppm 11.0'-11.5': Sample taken
		12				HA	
		14					
		16	R-17	16 / 20 / 35	1.2 / 1.5	DR	15.0'-16.5': CALMOD 15.5'-16.0': Gas Tech = 0.0 ppm 16.0'-16.5': Sample taken
SC	16.2'- 18.0' CLAYEY GRAVEL grayish olive/ moderate yellow brown mottling; moist; dense.						
		18				HA	
SC	18.0' - 20.5' CLAYEY SAND light olive gray, moist, medium dense.	20					

WAHLER ASSOCIATES	Jasco Chemical Corporation	EXPLORATION BORING LOG		BORING NO.
		Project No: JCC-104H	Sheet No 1 of 2	B-11

BORING LOCATION: SEE SITE PLAN			GROUND EL:			TOTAL DEPTH: 21.5'
DEPTH/ELEV. WATER: not encountered		DRILL CONTRACTOR: HEW Drilling				LOGGED BY: PL
DRILL RIG: CME 45	BORING DIA: 8.0"	DATE DRILLED: 4-5-88				APPROVED BY: E.H

SOIL CLASS	DESCRIPTION	DEPTH (ft.)	SAMPLE #	PR / REQ	RQD	MODE	REMARKS
SC	19.0' - 20.5' CLAYEY SAND (cont)	20					20.0'-21.5': CALMOD
SP	20.5' - 21.5' GRAVELLY SAND: moderate yellow brown; moist; dense.		R-18	16 40 42	1.5 / 1.5	DR	20.5'-21.0': Gas Tech = 120 ppm 21.0'-21.5': Sample taken
		22					Terminate boring at 21.5'. Filled with neat cement to surface.

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WAHLER ASSOCIATES	Jasco Chemical Corporation	EXPLORATION BORING LOG		BORING NO.
		Project No. JCO-104H	Sheet No. 2 of 2	B-11

BORING LOCATION: SEE SITE PLAN			GROUND EL:	TOTAL DEPTH: 6.5
DEPTH/ELEV. WATER: Not encountered		DRILL CONTRACTOR: HEW Drilling		LOGGED BY: PL
DRILL RIG: CME 45	BORING DIA: 8.0"	DATE DRILLED: 4-5-88		APPROVED BY: F.H

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE #	PR/REQ	RQD	MODE	REMARKS
CL	0.0' - 6.5' SANDY CLAY dark brown, damp, hard, moderate to high plasticity; occasional gravel fragments.	0				HA	1.0'-2.5': Cal. modified sampler driven using 140 lb hammer falling 30" (CALMOD)
	increasing moisture	2	R-19	5 7 9	0.7/1.5	DR	1.5'-2.5': Gas Tech = 0.0 ppm
						HA	2.0'-2.5': Sample taken 3.0'-4.5': CALMOD
		4	R-20	7 23 29	0.7/1.5	DR	3.5'-4.0': Gas Tech = 125 ppm
	caliche mottling present					HA	4.0'-4.5': Sample taken 5.0'-6.5': CALMOD
		6	R-21	5 9 20	1.0/1.5	DR	5.5'-6.0': Gas Tech = 0.0 ppm 6.0'-6.5': Sample taken

Boring terminated @ 6.5'
Filled with neat cement to surface.

DATA ON THIS LOG ARE AN APPROXIMATION OF THE GEOLOGIC AND SUBSURFACE CONDITIONS BECAUSE THE INFORMATION WAS OBTAINED FROM INDIRECT, DISCONTINUOUS, AND POSSIBLY DISTURBED SAMPLING NECESSITATED BY USE OF SMALL-DIAMETER HOLES. ROTARY AND WASH BORING HOLES HAVE FURTHER COMPLICATIONS IN THIS REGARD BECAUSE OF THE NEED TO USE DRILLING FLUID AND/OR CASING IN ADVANCING HOLES.

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SOIL CLASSIFICATIONS SHOWN ON LOGS ARE FIELD CLASSIFICATIONS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

WAHLER ASSOCIATES	Jasco Chemical Corporation	EXPLORATION BORING LOG		BORING NO.
		Project No. JCO-104H	Sheet No. 1 of 1	B-12

PART 1

JOB NO.	7403
BORE HOLE NO.	C-1
PROJECT	Jasco Chemical Corp.
LOCATION	Mountain View, CA
DRILLING CONTRACTOR	ASE Drilling
DRILLING EQUIPMENT	8" Hollow Stem Auger
HYDROGEOLOGIST	Scott Rice
DRILLER	Chris
DATE START/TIME	7/13/90 0900
DATE FINISH/TIME	7/13/90 1045
SURFACE ELEVATION	
TOTAL DEPTH	31.5 feet
WELL CASING	
SCREEN TYPE	
LENGTH	
SLOT	

BORE HOLE LOG

DEPTH	SAMPLE NUMBER	BLOW COUNT PER 6'	RECOVERY	LITHOLOGIC DESCRIPTION	REMARKS	GRAPHIC LOG
	B-1-3	7/9/14	16"	CL - sandy clay, black (7.5YR 2/0), 30-40% medium sand, subrounded particles to 2 mm diameter, low plasticity	hydrocarbon odor PID (sample) - 60	
				cuttings grade lighter in color		
5	B-1-5	4/5/8	13"	SM - silty fine to medium sand, very dark gray (7.5YR 3/0), 30% silt, trace clay, moist, poorly sorted, particles to 0.5 mm diameter, friable	hydrocarbon odor PID (sample) - 120 PID (borehole) - 1.0	
				cuttings grade finer	hydrocarbon odor in cuttings	
10	B-1-10	6/7/8	16"	ML - sandy silt, greenish gray, 20-25% moderately well sorted sand to 0.5 mm diameter, trace clay, moist, friable, not plastic	hydrocarbon odor PID (sample) - 72	
				cuttings grade finer		
15	B-1-15	7/4/5	18"	CL - clay, olive gray (5Y 4/3), trace sand, trace silt, moist, moderate plasticity, firm -- SW - gravelly sand, greenish gray, 25% gravel to 1 cm diameter, very moist, very poorly sorted CL - clay, olive gray (5Y 4/3), 15-20% poorly sorted, medium sand, trace silt, moist, moderate plasticity, firm	hydrocarbon odor PID (borehole) - 1.0	
20	B-1-20	4/7/11	17"	CL/SC - sandy and silty clay, greenish gray, 30% silt, 20% sand, moist, low plasticity, firm, interbedded with clayey and silty sand, olive (5Y 4/4), moist, poorly sorted, particles to 2 mm diameter	moderate hydrocarbon odor PID (sample) - 34	
25	B-1-25	NA	18"	SC - sandy silt and clay, bluish gray, 30% silt, 30% poorly sorted sand, moist abundant plant rootlets SM - fine sand, olive gray (5Y 4/2), 20% silt, no clay, wet, moderately well sorted, soft	moderate hydrocarbon odor PID (sample) - 110	
30	B-1-30	NA	18"	SC - clayey sand, bluish gray, 30% clay, moist but wet at 31.5 feet, poorly sorted, particles to 3 mm diameter, abundant plant rootlets, friable	moderate hydrocarbon odor PID (sample) - 52	
				Total depth - 31.5 feet		
35						

PART 1

JOB NO.	7403
BORE HOLE NO.	C-2
PROJECT	Jasco Chemical Corp.
LOCATION	Mountain View, CA
DRILLING CONTRACTOR	ASE Drilling
DRILLING EQUIPMENT	8" Hollow Stem Auger
HYDROGEOLOGIST	Scott Rice
DRILLER	Chris
DATE START/TIME	7/13/90 1115
DATE FINISH/TIME	7/13/90 1230
SURFACE ELEVATION	
TOTAL DEPTH	31.5 feet
WELL CASING	
SCREEN TYPE	
LENGTH	
SLOT	

BORE HOLE LOG

DEPTH	SAMPLE NUMBER	BLOW COUNT PER 6'	RECOVERY	LITHOLOGIC DESCRIPTION	REMARKS	GRAPHIC LOG
	B-2-3	7/9/14	10"	CL - sandy clay, 30-40% poorly sorted sand to 1 mm diameter, low plasticity, subangular, firm	no odor PID (sample) - 0.2	
				cuttings grade coarser		
5	B-2-5	6/7/8	18"	SC - clayey sand, olive gray (5Y 4/2), 40% clay, trace silt, moist, poorly sorted, subangular particles to 1 mm diameter, friable, abundant plant rootlets	no odor PID (sample) - 0.0	
10	B-2-10	7/8/10	18"	SC - clayey sand, olive (5Y 4/3), 30% clay, moist, poorly sorted, subrounded particles to 0.5 mm diameter, friable, zoned with blue-gray clay	no odor PID (sample) - 0.4	
				ML - sandy silt, dark yellowish brown (10Y 4/6), 30% poorly sorted sand to 0.5 mm diameter, moist, moderately plastic		
15	B-2-15	10/10/7	18"	-- SW - gravelly sand, salt and pepper, <10% silt and clay, moist, subangular, very poorly sorted ML - sandy silt, dark yellowish brown (10Y 4/6), 30% poorly sorted sand to 0.5 mm diameter, moist, moderately plastic	no odor PID (sample) - 0.6	
20	B-2-20	4/7/10	17"	SM - silty sand, olive (5Y 4/3), 25% silt, trace clay, moist, poorly sorted, subangular particles to 1 mm diameter, friable, not plastic	no odor PID (sample) - 1.4	
25	B-2-25	8/16/13	18"	SM - sandy silt and silty sand, olive (5Y 4/4), 40-60% silt, 40-60% sand, very moist, low plasticity, soft, grades coarser to blue gray silty sand at 27.75 feet, 30% silt, trace clay, moist, very poorly sorted, particles to 2 mm diameter, friable	slight hydrocarbon odor PID (sample) - 0.8	
30	B-2-30	6/5/7	18"	SW - coarse sand and gravel, bluish gray, 20% silt clay, wet, very poorly sorted, subangular particles to 1 cm diameter, friable to loose	no odor PID (sample) - 0.0	
				Total depth - 31.5 feet		
35						

PART 1

JOB NO.	7403
BORE HOLE NO.	C-3
PROJECT	Jasco Chemical Corp.
LOCATION	Mountain View, CA
DRILLING CONTRACTOR	ASE Drilling
DRILLING EQUIPMENT	8" Hollow Stem Auger
HYDROGEOLOGIST	Scott Rice
DRILLER	Chris
DATE START/TIME	7/13/90 1320
DATE FINISH/TIME	7/13/90 1500
SURFACE ELEVATION	
TOTAL DEPTH	31.5 feet
WELL CASING	
SCREEN TYPE	
LENGTH	
SLOT	

BORE HOLE LOG

DEPTH	SAMPLE NUMBER	BLOW COUNT PER 6'	RECOVERY	LITHOLOGIC DESCRIPTION	REMARKS	GRAPHIC LOG
	B-3-3	4/9/16	12"	SC - clayey sand and sandy clay, dark grayish brown (2.5Y 4/2), 40-60% sand, 40-60% silt, moist, very poorly sorted, particles to 2 mm diameter, not plastic, firm but friable	no odor PID (sample) - 0.0	
5	B-3-5	5/11/14	18"	SC - sandy and silty clay, dark grayish brown (2.5Y 4/2), 20-30% sand in lenses to 2 cm thick, 20% silt, poorly sorted, subrounded, low plasticity	no odor PID (sample) - 2.0	
10	B-3-10	7/9/14	18"	SC - clayey sand and sandy clay, dark grayish brown (2.5Y 4/2), 40-60% sand, 40-60% silt, moist, poorly sorted, not plastic, firm	no odor PID (sample) - 0.0	
15	B-3-15	9/9/4	18"	ML - silt and fine sand, dark grayish brown (2.5Y 4/2), grading coarser to 15.5 feet -- SW - coarse sand and gravel, <10% silt and clay, loose, very poorly sorted, subangular CL - sandy clay, 20% silt, moist, moderately plastic	no odor PID (sample) - 0.0	
20	B-3-20	9/15/21	18"	SM - silty sand, olive brown (2.5Y 4/4), 20% silt, moist, very poorly sorted, subrounded particles to 1 cm diameter, loose to friable	no odor PID (sample) - 0.0	
25	B-3-25	6/8/12	18"	SM - silty and clayey sand, dark grayish brown (2.5Y 4/2), 30% silt and clay, very moist, very poorly sorted, subrounded particles to 2 mm diameter, friable, not plastic, abundant iron oxidized plant rootlets diameter, friable	no odor PID (sample) - 0.0	
30	B-3-30	5/9/28	18"	SW - coarse sand and gravel, 15% silt and clay, saturated, very poorly sorted, subangular particles to 1 cm diameter, loose	insufficient sample for PID analysis	
				Total depth - 31.5 feet		
35						

PART 1

JOB NO.	7403
BORE HOLE NO.	C-4
PROJECT	Jasco Chemical Corp.
LOCATION	Mountain View, CA
DRILLING CONTRACTOR	ASE Drilling
DRILLING EQUIPMENT	8" Hollow Stem Auger
HYDROGEOLOGIST	Scott Rice
DRILLER	Chris
DATE START/TIME	7/14/90 0800
DATE FINISH/TIME	7/14/90 0930
SURFACE ELEVATION	
TOTAL DEPTH	31.5 feet
WELL CASING	
SCREEN TYPE	
LENGTH	
SLOT	

BORE HOLE LOG

DEPTH	SAMPLE NUMBER	BLOW COUNT PER 6'	RECOVERY	LITHOLOGIC DESCRIPTION	REMARKS	GRAPHIC LOG
	B-4-3	3/6/14	2"	CL - sandy clay, black (5Y 2.5/1), 30% poorly sorted sand to 1 mm diameter, moist, moderately plastic, firm, abundant plant rootlets	no odor PID (sample) - 0.0	
5	B-4-5	5/7/8	12"	CL - sandy clay, very dark gray (5Y 3/1), 30% poorly sorted sand to 2 mm diameter, moist, subangular, not plastic, friable	no odor PID (sample) - 0.0	
10	B-4-10	5/9/16	18"	CL - sandy clay, very dark gray (5Y 3/1), 30% poorly sorted sand to 2 mm diameter, moist, subangular, not plastic, friable, mottled with coarse sand	no odor PID (sample) - 0.0	
				ML - silty fine sand, grayish brown (2.5Y 5/2), 20% silt, 30% medium to coarse sand, poorly sorted, particles to 4 mm diameter		
15	B-4-15	4/5/6	18"	SW - coarse sand and gravel, olive brown (2.5Y 4/4), 10 10-15% gravel, 10-15% silt, moist, very poorly sorted, subrounded particles to 1 cm diameter	no odor PID (sample) - 0.0	
				ML - fine sandy silt and silty fine sand, olive brown (2.5Y 4/4), 15-20% medium to coarse sand, moist, low plasticity, firm, poorly sorted, particles to 3 mm diameter		
20	B-4-20	6/7/13	18"	SC - clayey sand, olive (5Y 5/3), 40% clay, moist, very poorly sorted, subrounded particles to 1 cm diameter, moderately firm, low plasticity, abundant plant rootlets, pockets of coarse sand	no odor PID (sample) - 0.2	
25	B-4-25	4/8/11	18"	SW - sand and gravel, 20% clay and silt, very poorly sorted, loose, particles to 1 cm diameter CL - sandy clay, dark gray (5Y 4/1), 25% sand, moist, firm, not plastic, particles to 2 mm diameter SM/SC - sandy silt and clay, bluish gray, 30% medium sand to 0.5 mm diameter, moist, low plasticity firm, abundant iron oxidized plant rootlets	no odor PID (sample) - 0.2	
30	B-4-30	7/8/7	18"	ML - sandy silt, dark olive gray (5Y 3/2), 30-40% medium sand, moist, low plasticity, subangular SW - coarse sand and gravel, bluish gray, 15% silt and clay, wet to saturated, very poorly sorted, subangular particles to 1 cm diameter, loose	no odor PID (sample) - 0.0	
				Total depth 31.5 feet		
35						

PART 1

JOB NO.	7403
BORE HOLE NO.	C-5
PROJECT	Jasco Chemical Corp.
LOCATION	Mountain View, CA
DRILLING CONTRACTOR	ASE Drilling
DRILLING EQUIPMENT	8" Hollow Stem Auger
HYDROGEOLOGIST	Scott Rice
DRILLER	Chris
DATE START/TIME	7/14/90 1115
DATE FINISH/TIME	7/14/90 1300
SURFACE ELEVATION	
TOTAL DEPTH	31.5 feet
WELL CASING	
SCREEN TYPE	
LENGTH	
SLOT	

BORE HOLE LOG

DEPTH	SAMPLE NUMBER	BLOW COUNT PER 6'	RECOVERY	LITHOLOGIC DESCRIPTION	REMARKS	GRAPHIC LOG
	B-5-3	NA	11"	SC - clayey sand, dark grayish brown (2.5Y 4/2), 40% clay, moist, poorly sorted, subrounded particles to 1 mm diameter, firm, not plastic	no odor PID (sample) - 0.6	
5	B-5-5	4/6/9	15"	SC - sandy and silty clay, dark grayish brown (2.5Y 4/2), 30% fine to medium sand and silt, moderately plastic	no odor PID (sample) - 0.6	
10	B-5-10	6/8/7	15"	SC - clayey sand, olive gray (5Y 4/2), 20-25% clay, slightly moist, poorly sorted, subangular particles to 2 mm diameter, not plastic, friable	no odor PID (sample) - 0.0	
				grades coarser to gravels up to 5 cm diameter		
15	B-5-15	9/9/9	18"	SW - coarse sand and gravel, dark brown (10YR 3/3), trace silt, moist, very poorly sorted, subrounded particles to 4 cm diameter, loose	no odor PID (sample) - 0.0	
				cuttings grade finer		
20	B-5-20	5/27/50	14"	SM - silty sand and gravel, dark grayish brown (2.5Y 4/2), 20% silt, 30% gravel to 1 cm diameter, moist, very poorly sorted, subrounded, friable, predominantly quartz gravels	no odor PID (sample) - 0.1	
25	B-5-25	3/4/6	18"	CL - sandy and silty clay, blue-gray, 20% sand, 30% silt, moist, moderate plasticity, firm, abundant decaying plant rootlets	no odor PID (sample) - 0.2	
30	B-5-30	6/20/16	18"	CL - sandy and silty clay, blue-gray, moist to wet, moderate plasticity SC - sandy clay, wet, 30% clay, 40% gravel to 2 cm diameter, poorly sorted, loose	no odor PID (sample) - 0.8 groundwater encountered at 31.5 feet	
				Total depth - 31.5 feet		
35						

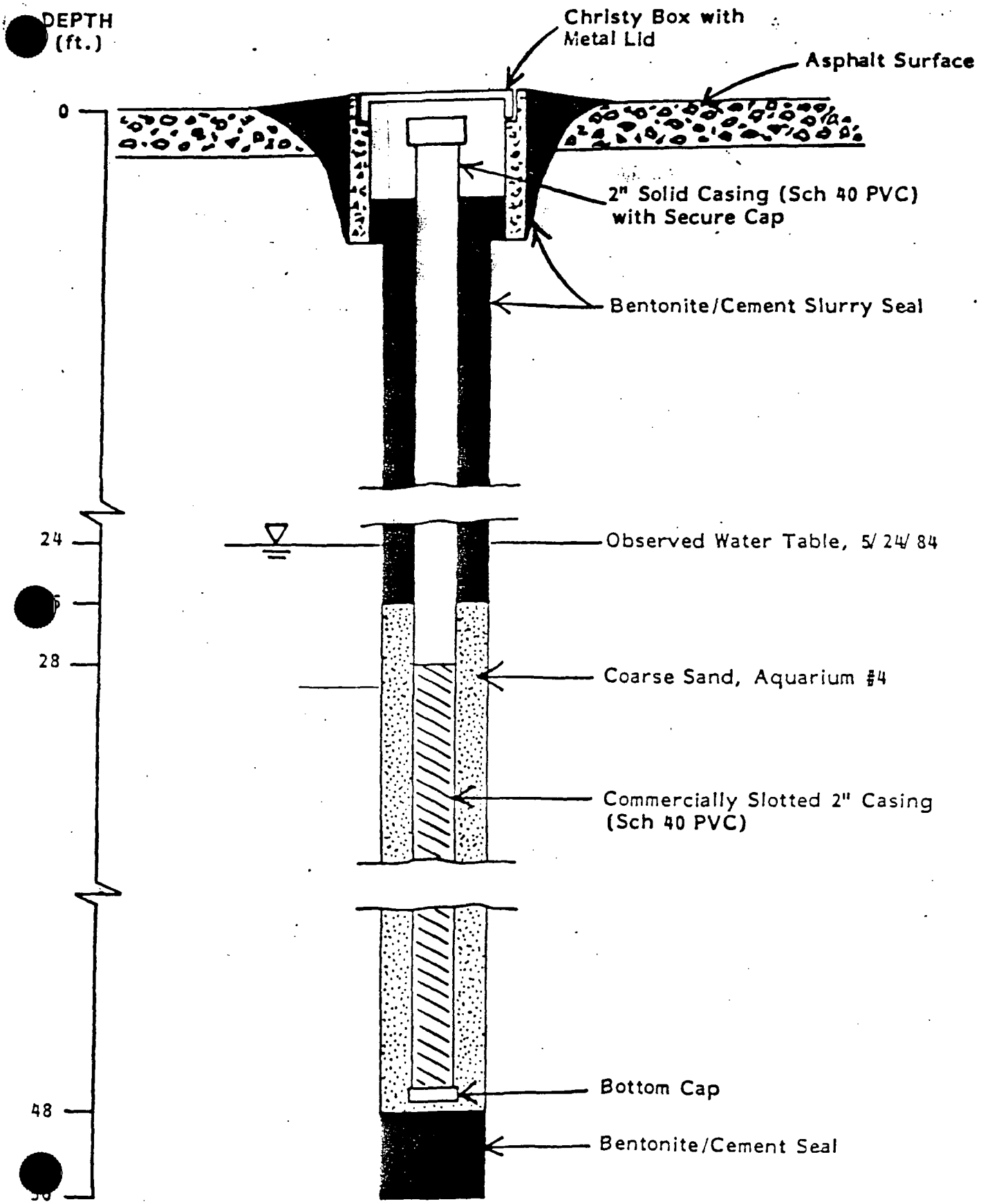
APPENDIX C

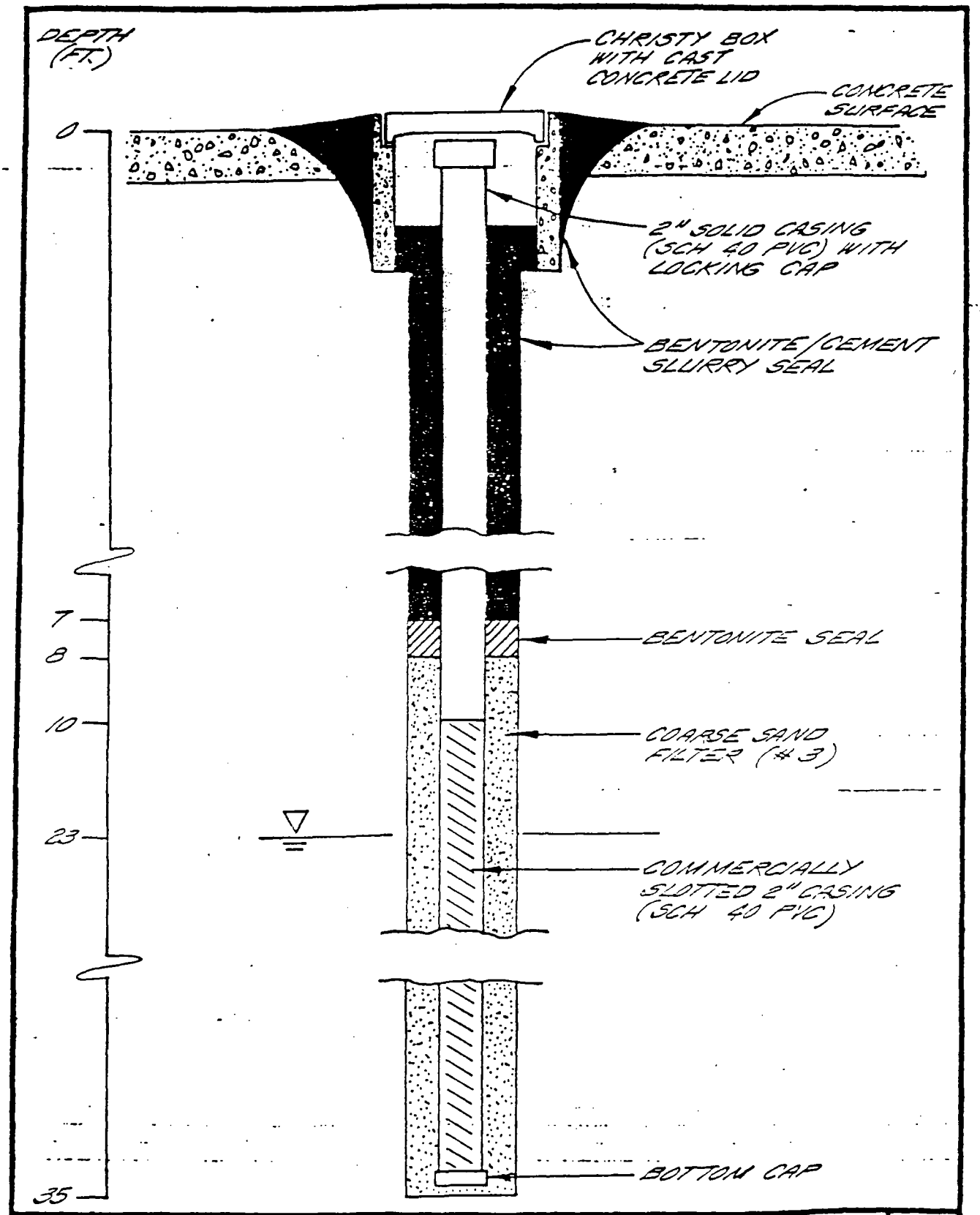
MONITOR WELL CONSTRUCTION DIAGRAMS

Questa Engineering Corp.

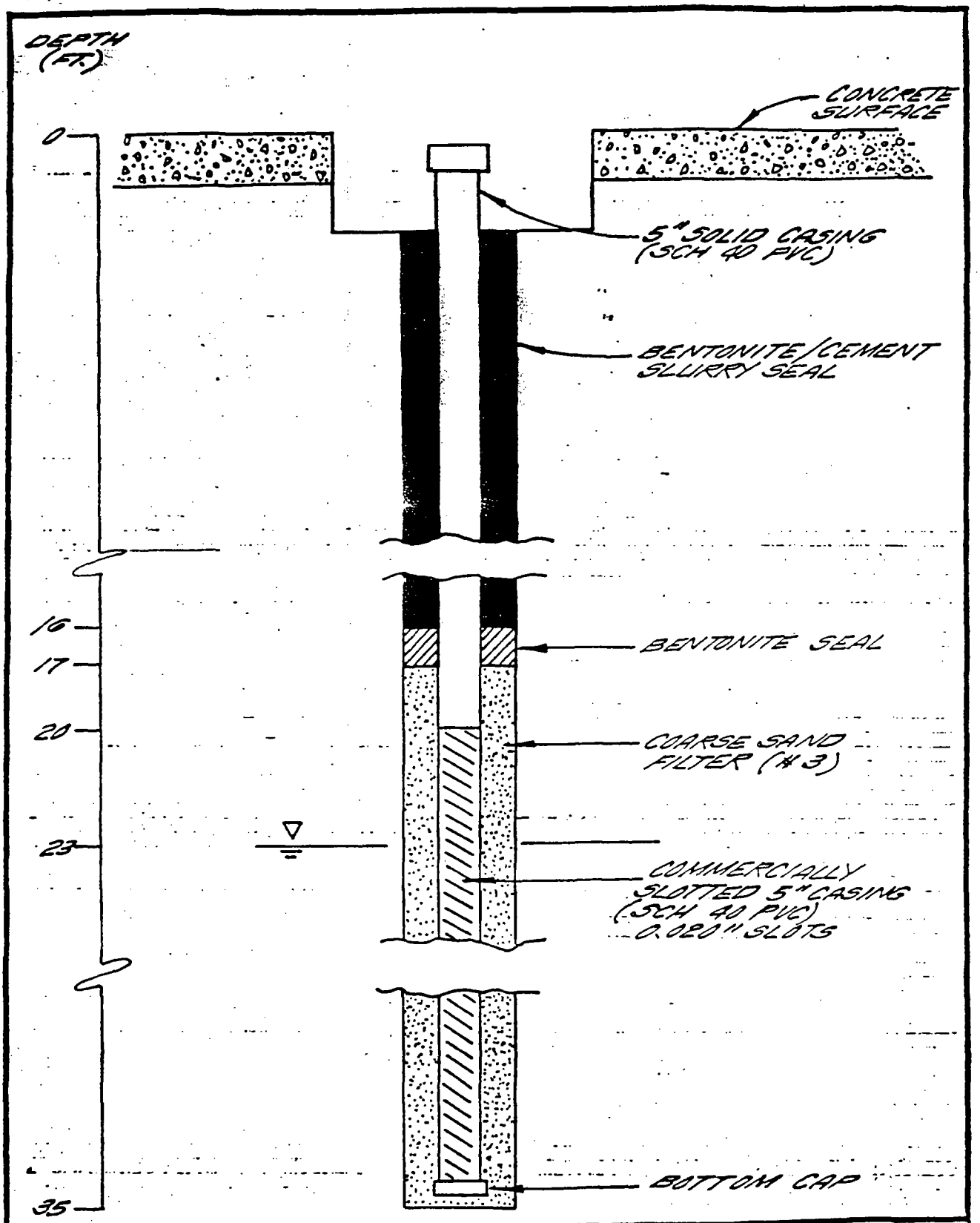
PLATE 3

V-1 WELL CONSTRUCTION DETAILS

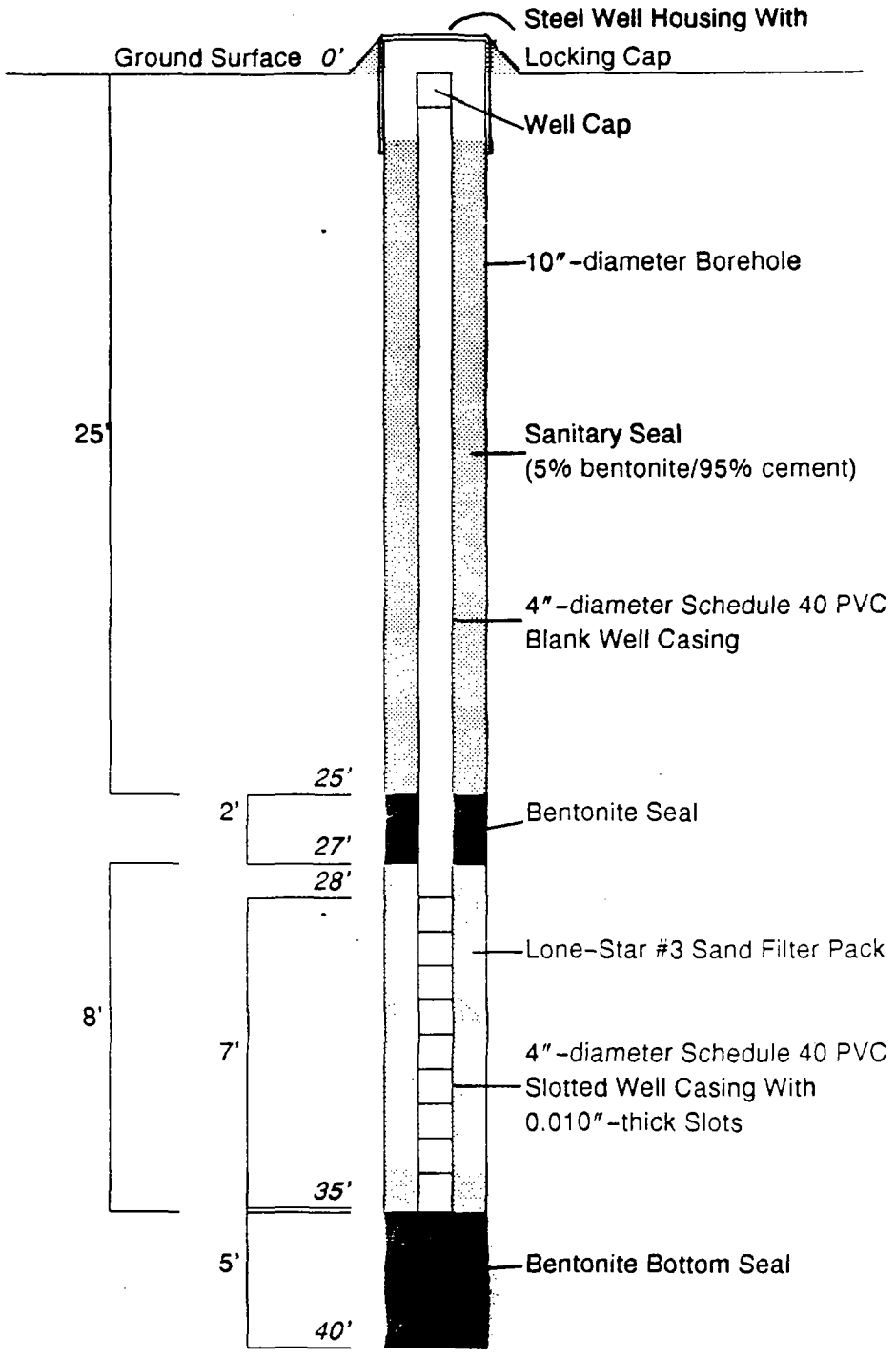




Questa Engineering Corp. Point Richmond, Calif.	V #2 WELL CONSTRUCTION DETAILS	Fig. 2



Questa Engineering Corp. Point Richmond, Calif.	V #3 WELL CONSTRUCTION DETAILS	Fig. 2



Note: Well construction as shown is based upon data presented in original consultant's technical report.

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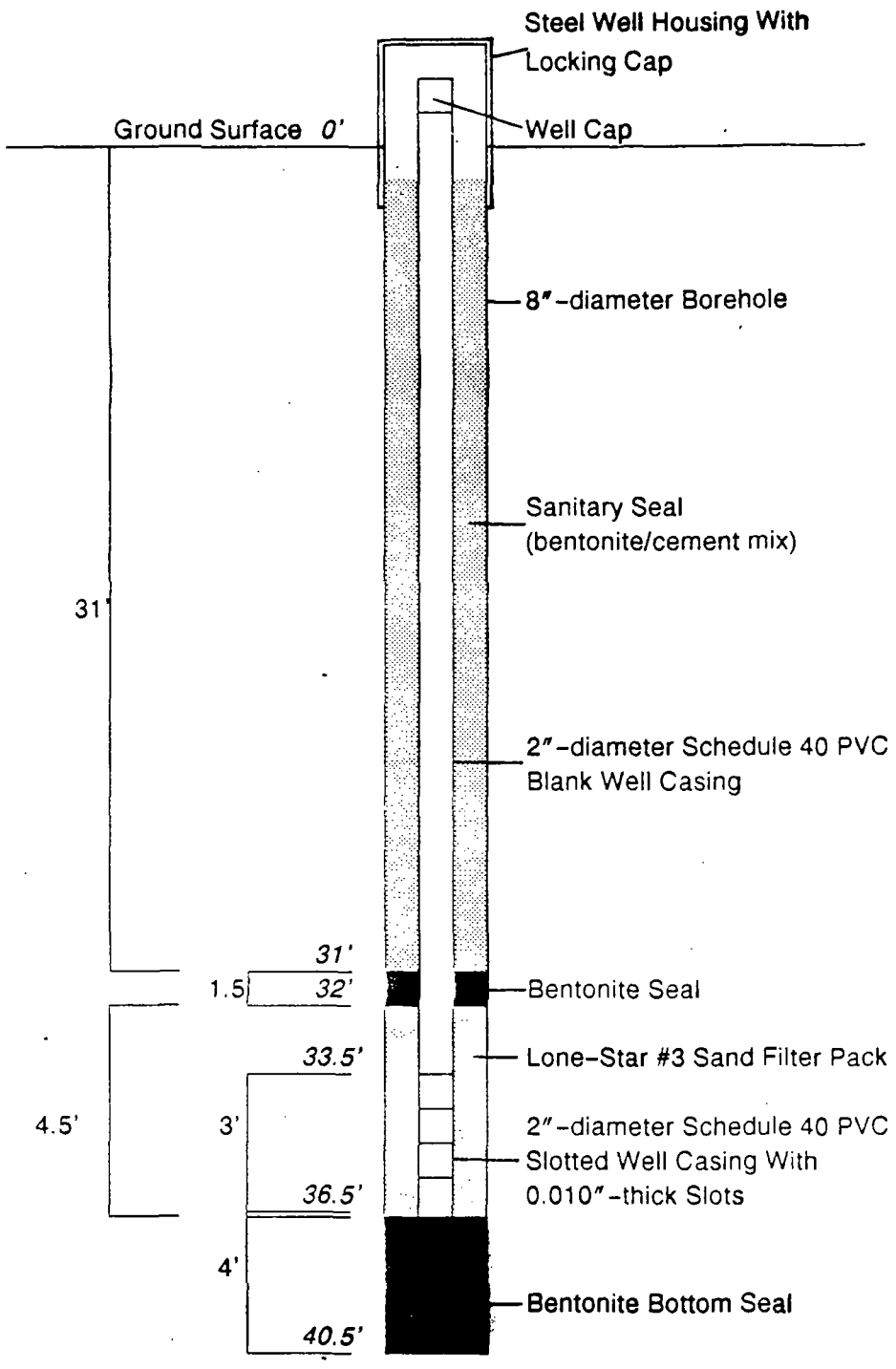

Note: Well construction as shown is based upon data presented in original consultant's technical report.

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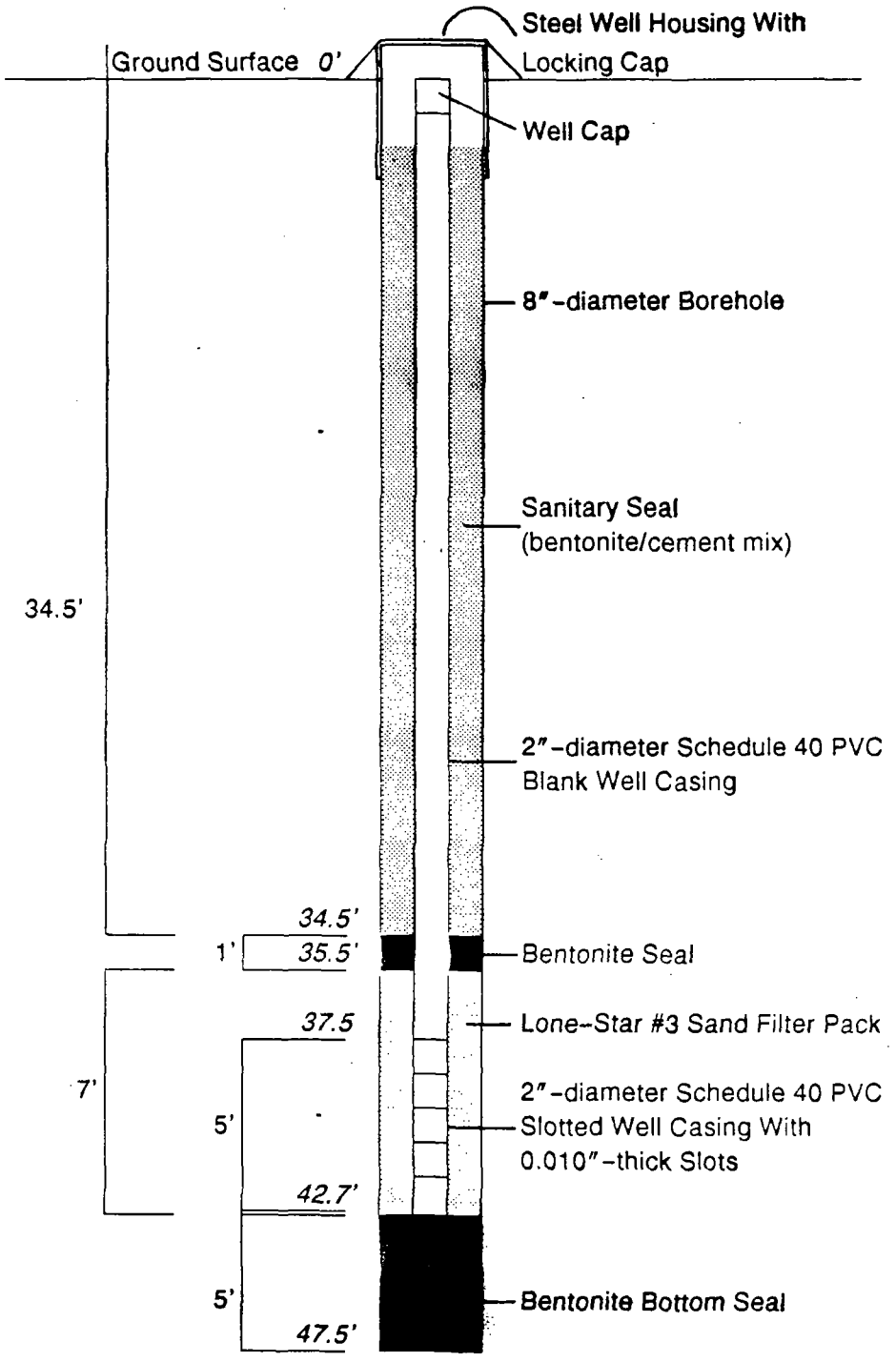
WELL COMPLETION DIAGRAM
MONITOR WELL V-5
JASCO CHEMICAL CORPORATION
MOUNTAIN VIEW, CA



Note: Well construction as shown is based upon data presented in original consultant's technical report.

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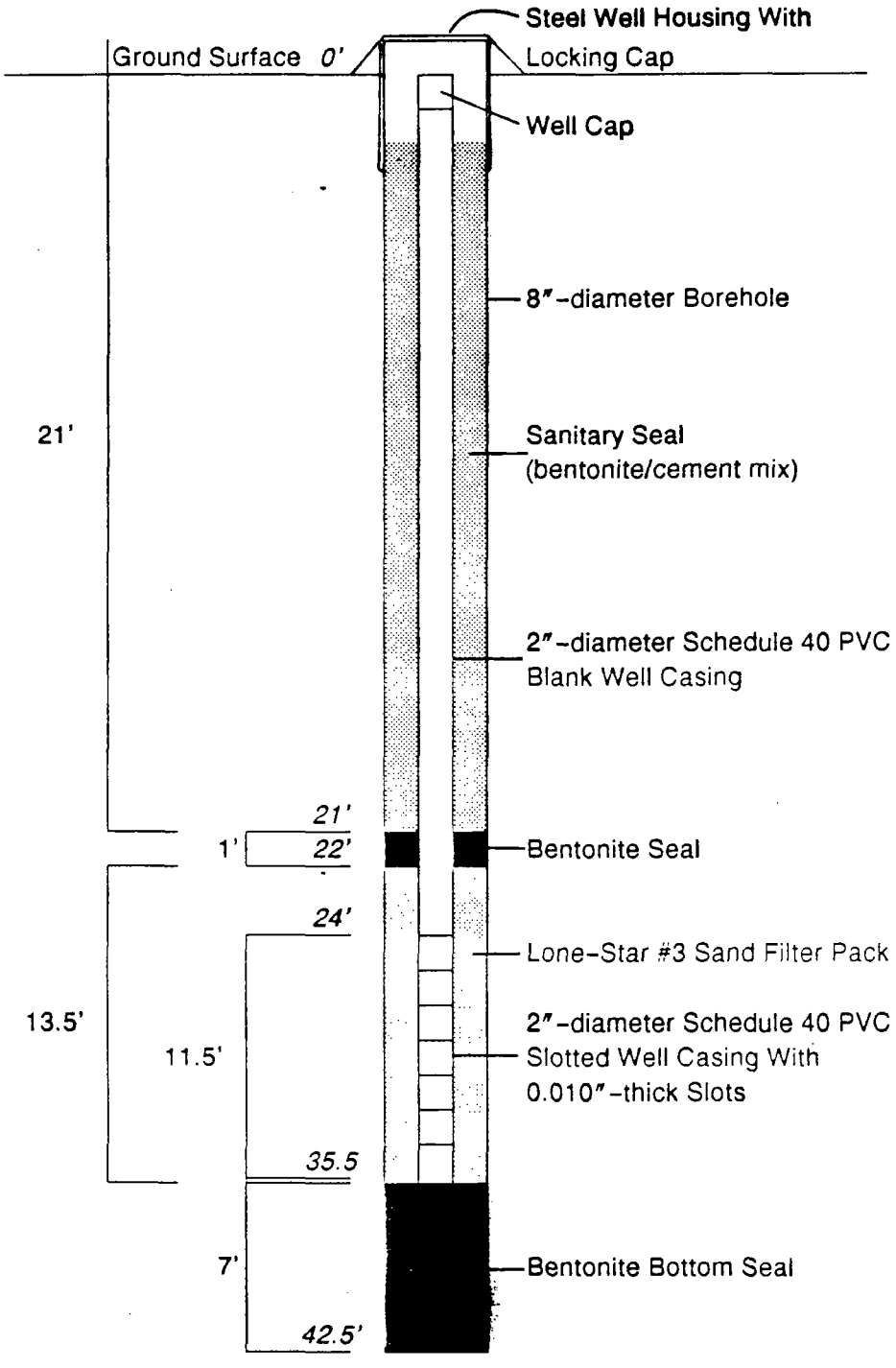
WELL COMPLETION DIAGRAM
MONITOR WELL V-6
JASCO CHEMICAL CORPORATION
MOUNTAIN VIEW, CA



Note: Well construction as shown is based upon data presented in original consultant's technical report.

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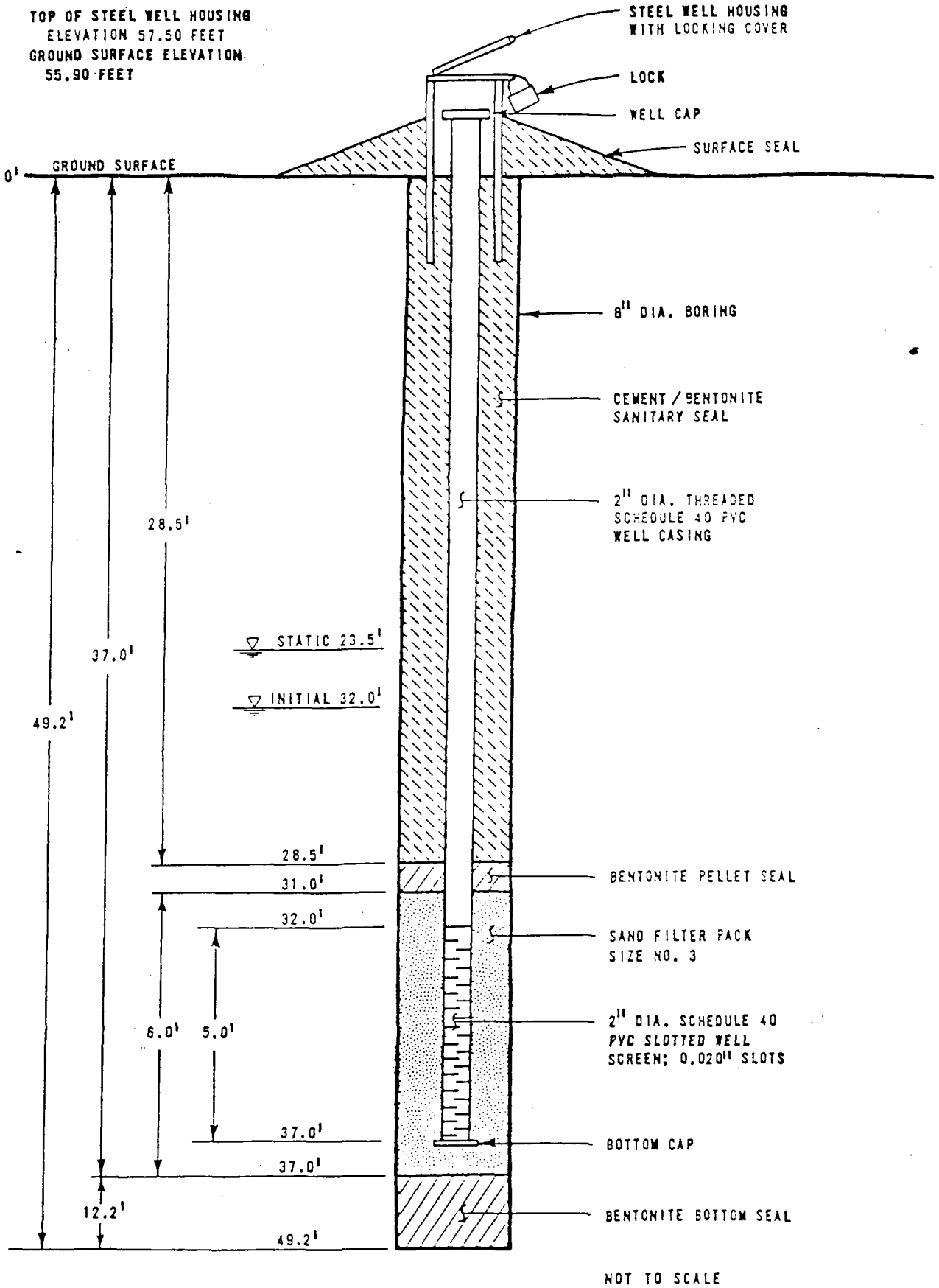
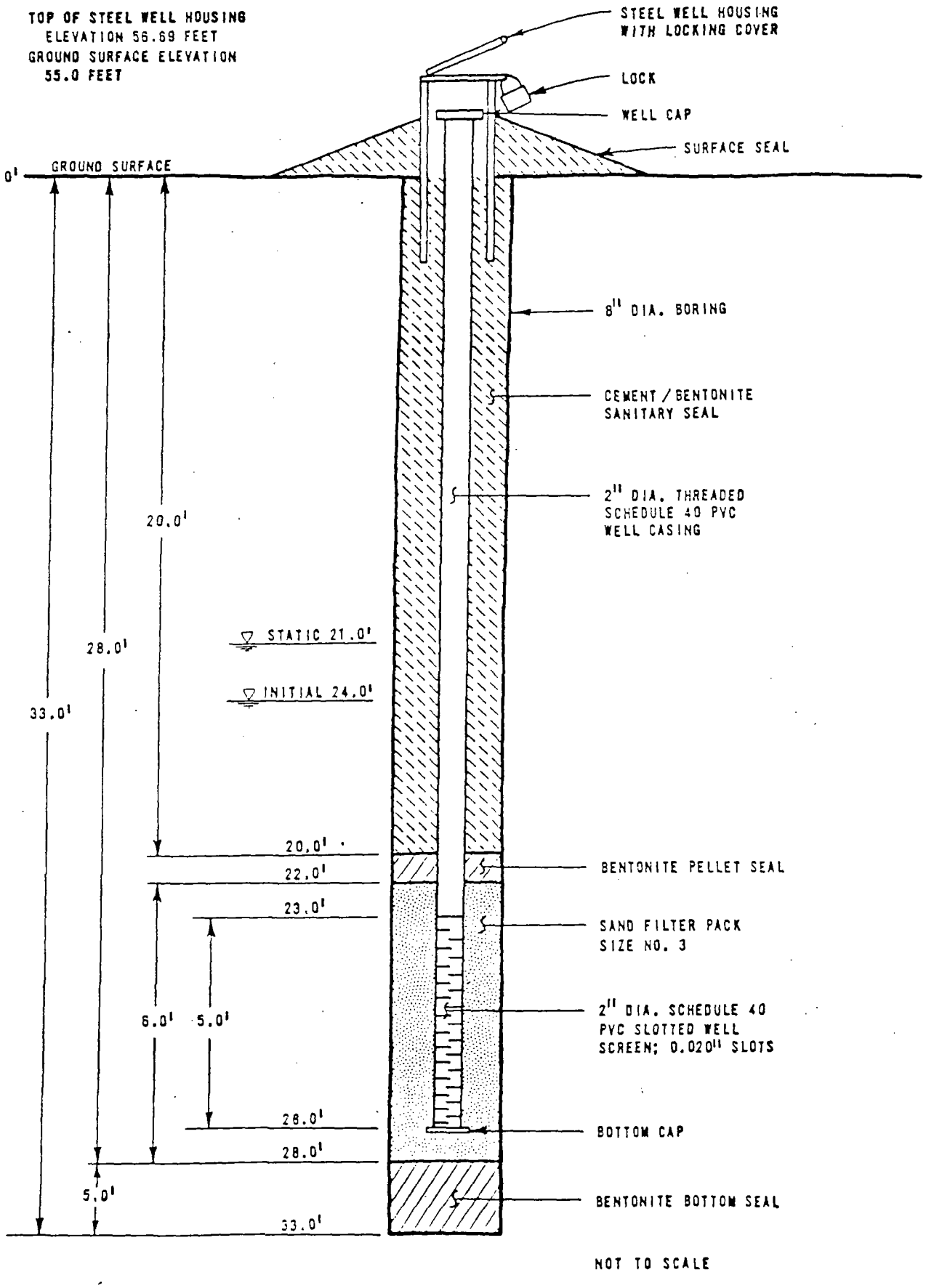


Wahler Associates	JASCO CHEMICAL CORPORATION PHASE IIA HYDROGEOLOGIC INVESTIGATION	WELL COMPLETION DIAGRAM OF Y-8		
		PROJECT NO.	DATE	FIGURE NO.
	PALO ALTO • CALIFORNIA	JCO-104H	MARCH 1988	3



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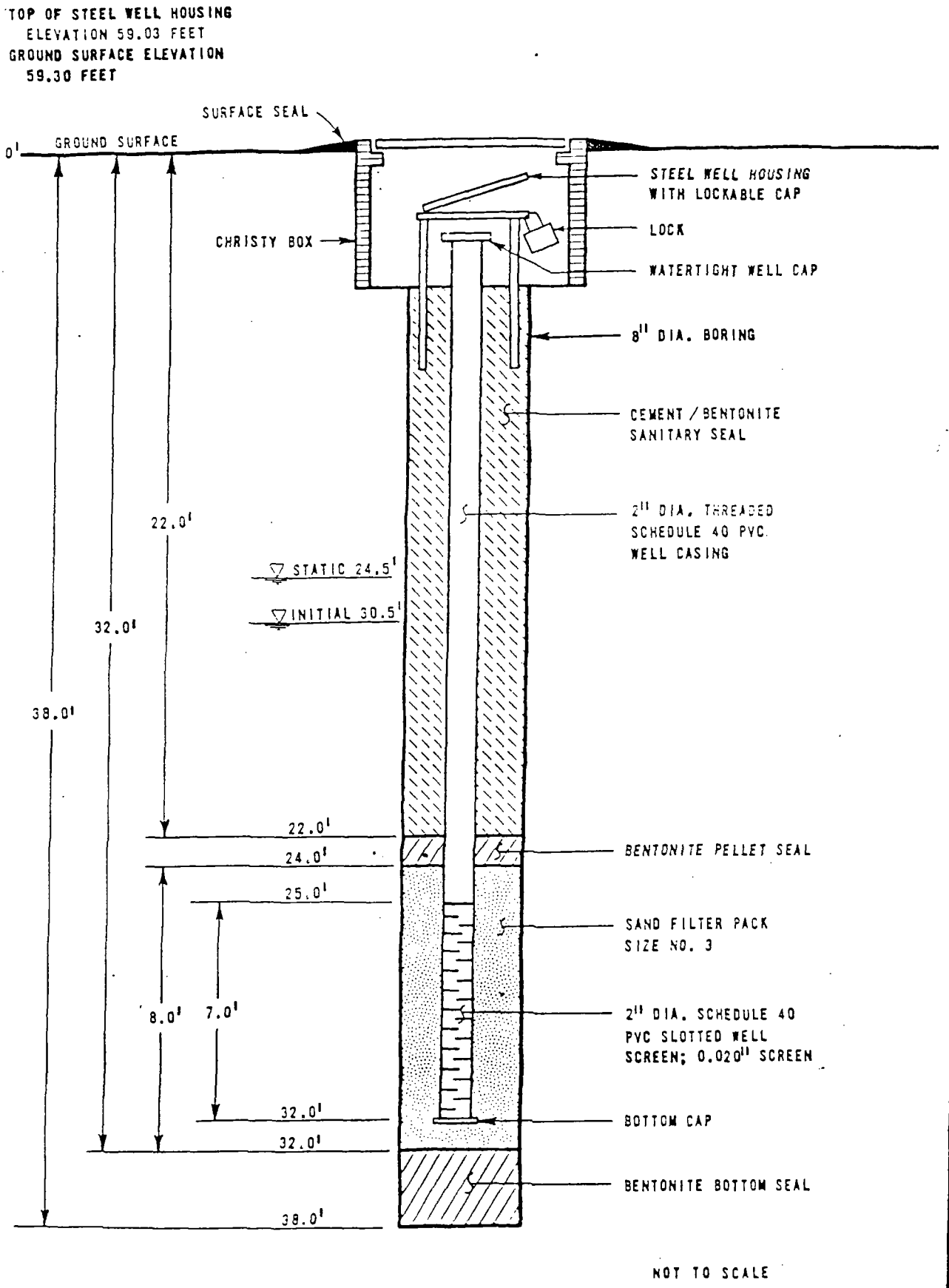
		PROJECT NO.	DATE	FIGURE NO.
	PALO ALTO • CALIFORNIA	JCO-104H	MARCH 1988	4



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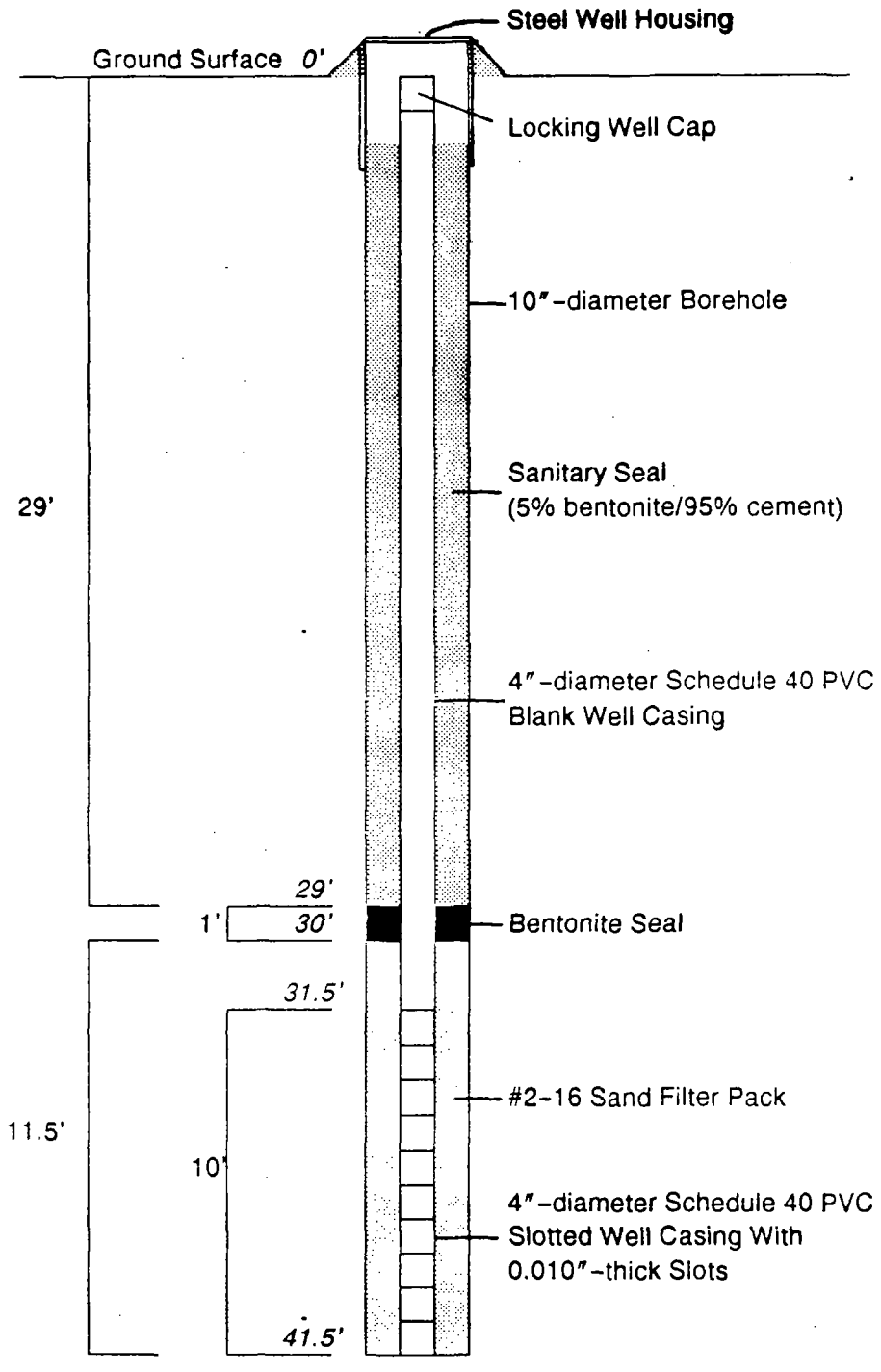
		PROJECT NO.	DATE	FIGURE NO.
	PALO ALTO • CALIFORNIA	JCO-104M	MARCH 1988	5



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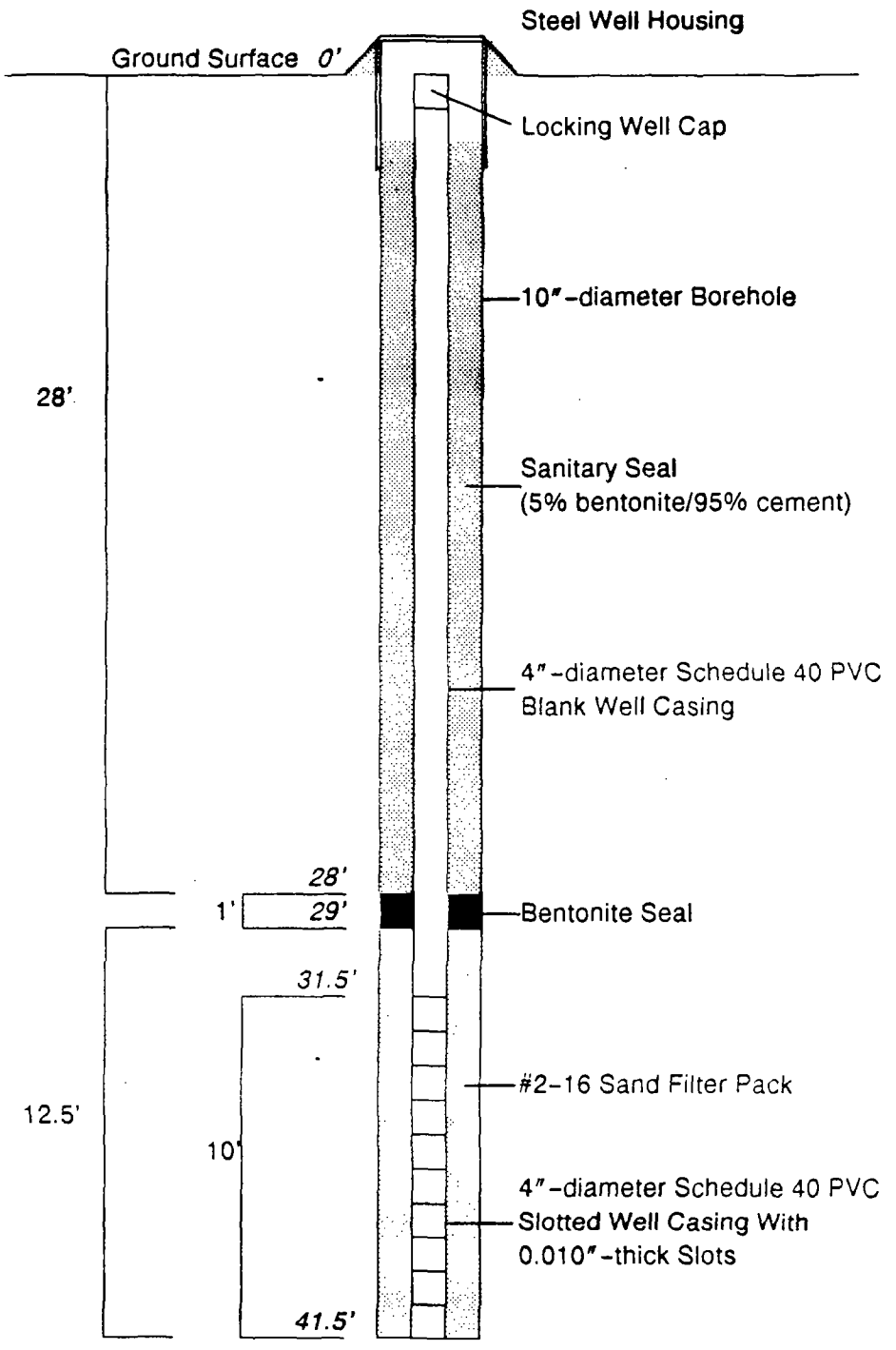
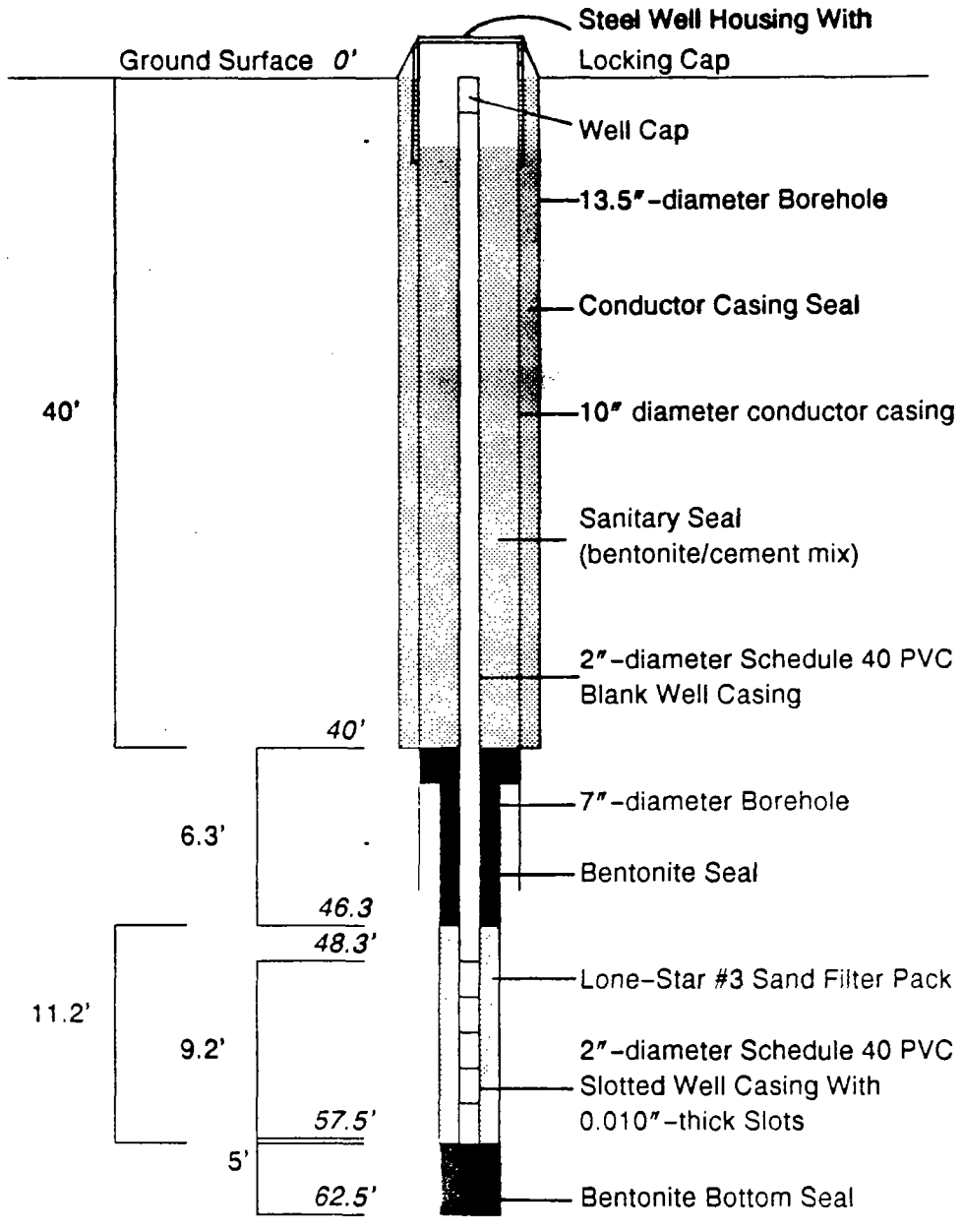


OHM CORP.

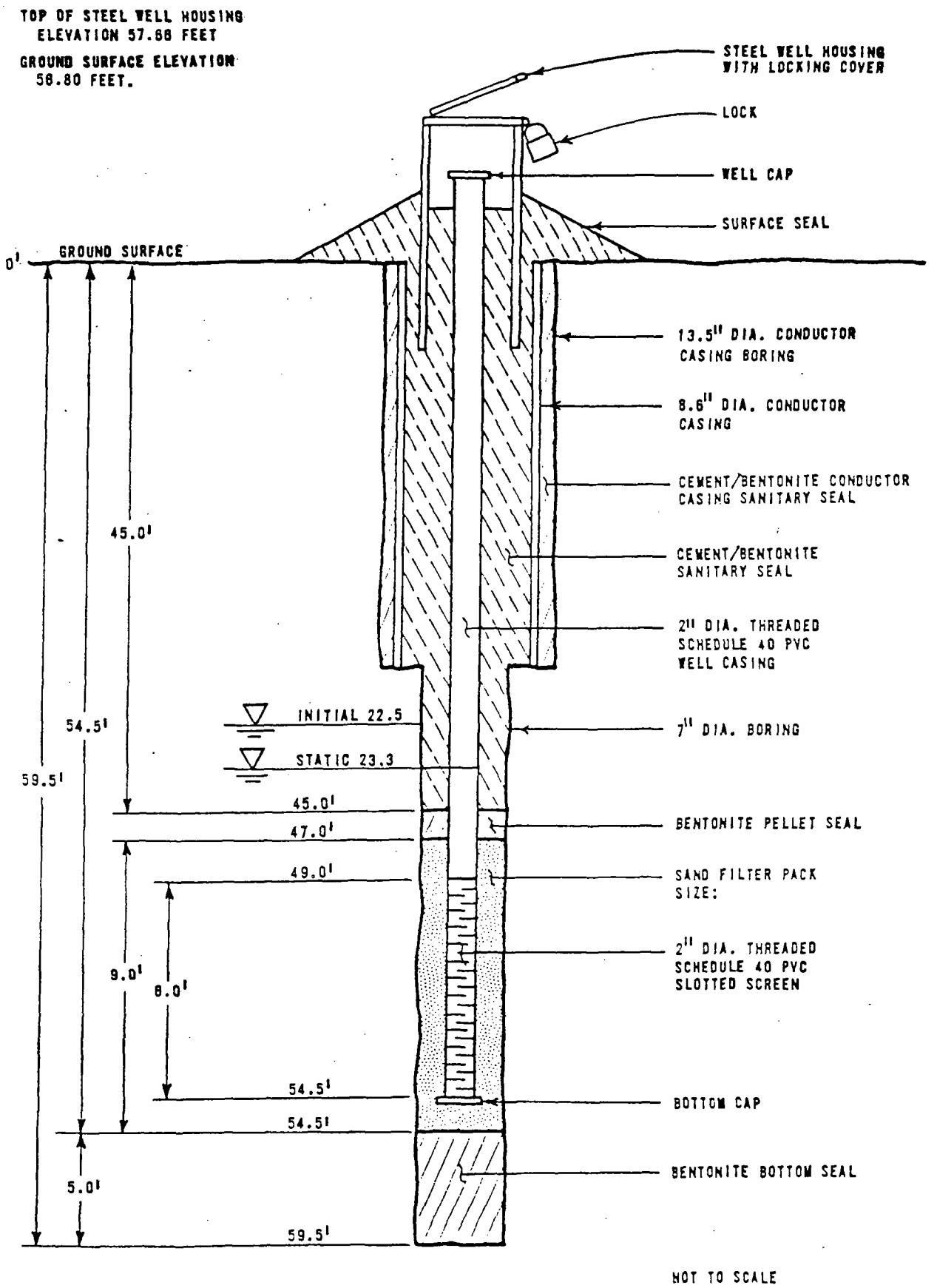
WELL COMPLETION DIAGRAM
MONITOR WELL V-12
JASCO CHEMICAL CORPORATION
MOUNTAIN VIEW, CA



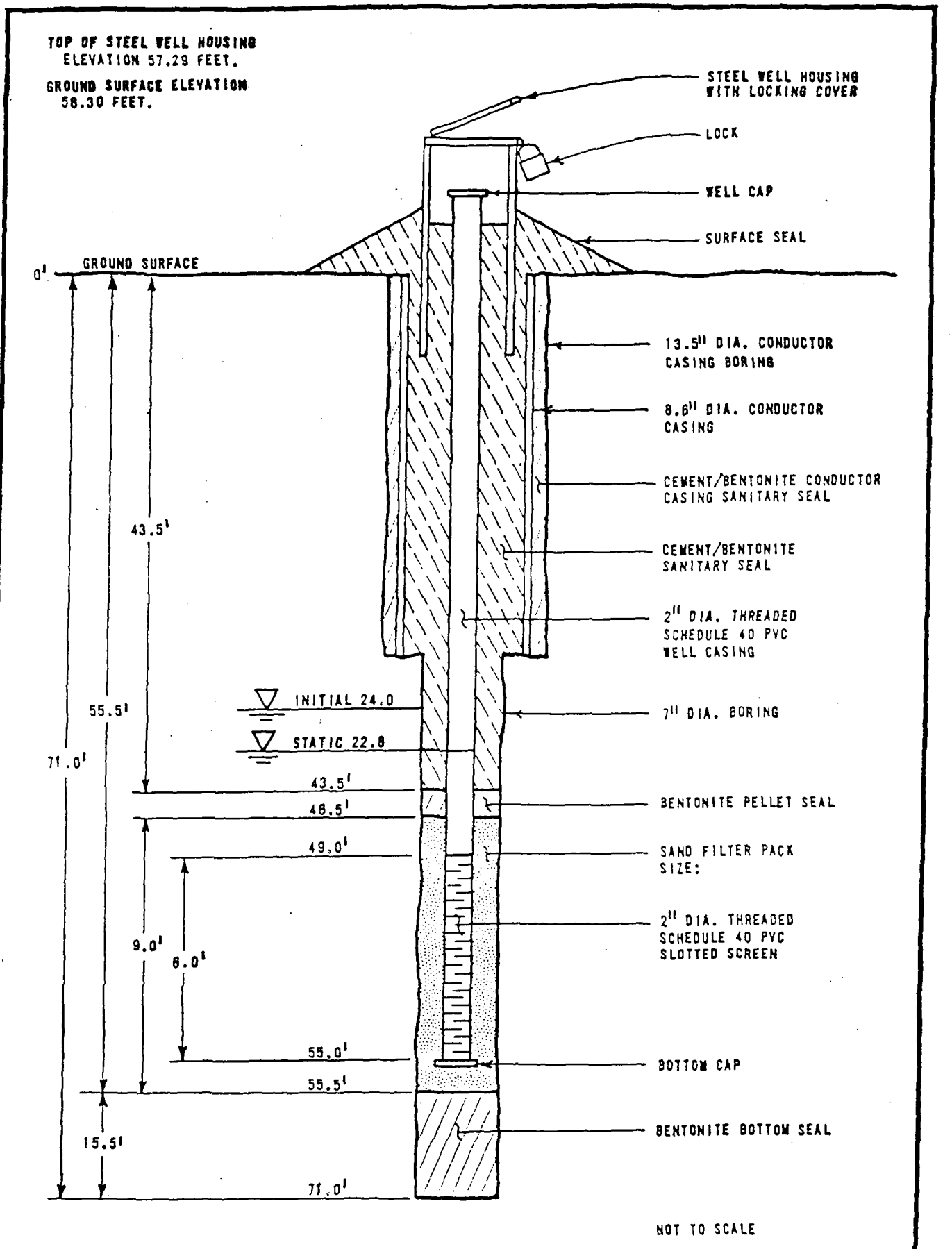
Note: Well construction as shown is based upon data presented in original consultant's technical report.

OHM CORP.

WELL COMPLETION DIAGRAM
MONITOR WELL I-1
JASCO CHEMICAL CORPORATION
MOUNTAIN VIEW, CA



Wahler Associates	JASCO CHEMICAL CORPORATION PHASE II HYDROGEOLOGIC INVESTIGATION PALO ALTO • CALIFORNIA	WELL COMPLETION DIAGRAM OF I-2		
		PROJECT NO.	DATE	FIGURE NO.
		JCO-104H	OCTOBER 1987	4



Wahler Associates	JASCO CHEMICAL CORPORATION PHASE II HYDROGEOLOGIC INVESTIGATION	WELL COMPLETION DIAGRAM OF I-3		
		PROJECT NO.	DATE	FIGURE NO.
	PALO ALTO • CALIFORNIA	JCO-104H	OCTOBER 1987	3

APPENDIX D

LABORATORY INVESTIGATION OF ENGINEERING PROPERTIES OF SOIL

APPENDIX B

LABORATORY INVESTIGATION

A. INTRODUCTION

This appendix includes a discussion of the procedures followed during the laboratory testing performed on soil samples from wells I-2 and I-3. The investigation program was carried out employing, in most cases, currently accepted test procedures of the American Society of Testing and Materials (ASTM).

Undisturbed thin wall tube samples used in the laboratory investigation were obtained during the course of the field investigation as described in the Well Construction Section of this report. Identification of each sample is by hole number, sample number, and depth.

B. INDEX PROPERTIES TESTING

In the field of soil mechanics, it is advantageous to have a standard method of identifying soils and classifying them into categories or groups that have similar or distinct engineering properties. The most commonly used method of identifying and classifying soils according to their engineering properties is the Unified Soil Classification System (USCS), as described by ASTM D2487-83. The USCS is based on a recognition of the various types and significant distribution of soil characteristics, and plasticity of materials.

The index properties tests discussed in this report include the determination of natural and as-tested water content and dry density, vertical permeability, grain-size distribution, and Atterberg limits.

1. Natural Water Content and Dry Density

Natural water content and dry density were determined, usually in conjunction with other tests, on selected undisturbed tube samples. The samples

were extruded and visually classified, trimmed to obtain a smooth flat face, and accurately measured to obtain volume and wet weight. The samples were then dried, in accordance with ASTM 2216-80, for a period of 24 hours in an oven maintained at a temperature of 110°C. After drying, the weight of each sample was determined and the moisture content and dry density calculated. All the water content and dry density results are summarized in Table B-1 and are also shown with the various other index and engineering properties test results.

2. Grain-Size Distribution

The gradation characteristics of selected samples were determined in accordance with ASTM D422-63 and USBR E-6, except as modified below. The gravelly samples were initially sieved through the 3/4-inch and 1-1/2-inch sieves. Representative samples were obtained and soaked in water until individual soil particles were separated and then washed on the No. 200 mesh sieve. That portion of the material retained on the No. 200 mesh sieve was oven-dried and then mechanically sieved. A hydrometer analysis was performed on a representative portion of the minus No. 200 mesh material of selected samples. The hydrometer test was run in a constant-temperature hydrometer bath using sodium hexametaphosphate as a dispersing agent. The grain-size distribution tests are presented on Figures B-1 and B-2.

3. Atterberg Limits

Liquid and plastic limits were determined on selected samples in accordance with ASTM Designation D4318-83. Results of the Atterberg limits tests are summarized on Figure B-3.

C. ENGINEERING PROPERTIES TESTING

Vertical permeability tests were performed on selected soil samples from wells I-2 and I-3.

Permeability Tests

The tests were performed in general accordance with the Corps of Engineers Test Method EM-1110-2-1906. Below is a description of the test procedure.

The samples were extruded from the tubes and placed in a special cradle that supported the specimen horizontally while the ends were trimmed to a flat face. After the initial weight and volume measurements were determined, each specimen was placed in a triaxial cell, encased in a latex membrane and sealed to the bottom pedestal and top cap with rubber "O" rings. After securing the triaxial chamber, the cell was filled with water and transported to the saturation bay. The samples were saturated using a combination vacuum-back pressure technique. A small vacuum was applied to de-air the lines and increase the initial saturation without a change in void ratio. A back pressure of 50 psi was then incrementally applied to obtain a sufficient degree of saturation prior to consolidation. In order to determine whether the back pressure applied was causing complete saturation, Skempton's "B" parameter in excess of 0.9 was measured for all samples. After achieving saturation, the samples were consolidated to pressures equivalent to overburden load.

The permeability was determined by applying a constant head hydraulic gradient and monitoring the flow of water from bottom to top of the sample through calibrated constant diameter sight tubes as a function of time. The consolidation pressure and head pressure used for each test appears on the data sheet. The permeability test results, together with the gradation characteristics of the samples tested are presented in Table B-1.

TABLE B-1

PERMEABILITY TEST RESULTS

Hole No.	Sample No.	Depth, ft.	USCS Classification	Natural Water Content (%)	Natural Dry Density (pcf)	As-Tested Water Content (%)	As-Tested Dry Density (pcf)	Consolidated Pressure (psi)	Head, (psi)	Coefficient of Permeability cm/sec
I-2	T-6	13.7-14.2	CH	26.2	92.5	29.5	95.2	11	0.5	2.4×10^{-4}*
I-2	T-13	31.7-32.4	SW-SM	15.1	119.1	15.2	121.1	27	0.5	2.3×10^{-4}
I-2	T-15	37.4-37.9	CL	27.5	97.7	25.8	101.5	26	2.0	3.1×10^{-7}
I-2	R-10	47.5-48.0	SW-SM	17.4	110.9	17.9	113.5	32	0.5	2.3×10^{-4}
I-2	R-15	56.5-57.0	CL	23.0	104.8	20.8	110.5	36	5.0	2.3×10^{-8}
I-3	T-6	12.9-13.4	CL	20.0	102.6	23.7	105.1	11	0.5	2.5×10^{-4}*
I-3	T-10	22.7-23.2	SP-SM	14.8	122.7	14.3	124.8	23	1.0	5.2×10^{-5}
I-3	T-12	26.2-26.7	CL	25.7	98.5	24.3	101.7	22	2.0	2.8×10^{-6}
I-3	R-5	49.0-49.5	SW	13.4	124.7	12.3	128.2	37	0.5	1.2×10^{-4}
I-3	R-6	57.0-57.5	SC	21.6	108.4	19.7	112.5	38	2.0	2.9×10^{-7}

*Permeability was influenced by roots and root holes in samples.

Samples were tested in triaxial cells after back pressure saturation and consolidation equal to overburden load. The permeability was determined by applying a constant head hydraulic gradient and monitoring the flow of water from bottom to top of the sample through calibrated constant diameter sight tubes as a function of time.

*DISPERSING AGENT WAS INEFFECTIVE AFTER 7 HOUR READING

Wahler Associates

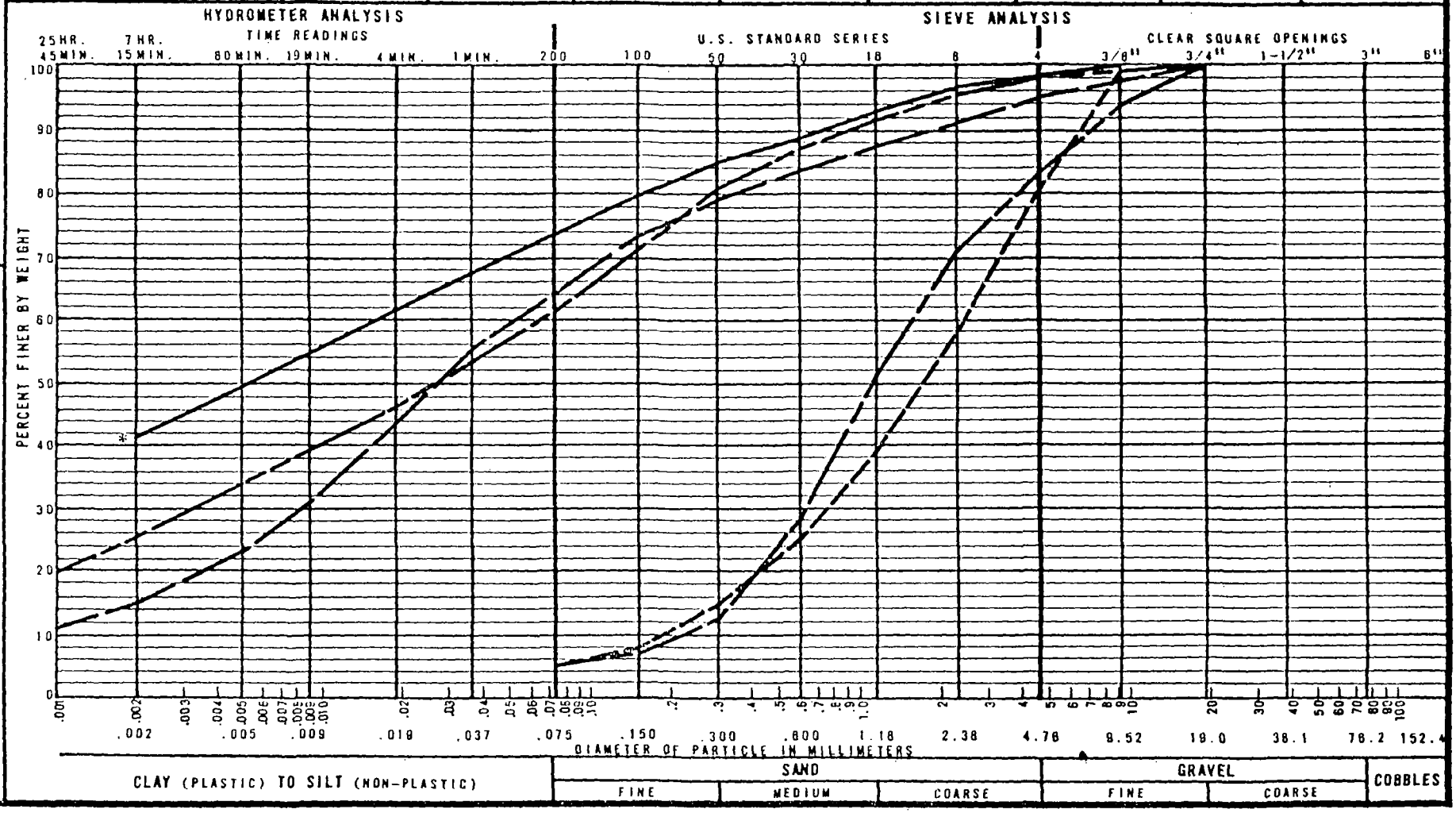
JASCO CHEMICAL CORPORATION
PHASE II HYDROGEOLOGIC INVESTIGATION
PALO ALTO • CALIFORNIA

GRADATION TEST RESULTS
ASTM D422-63 & USBR E-6

PROJECT NO. JCO-1034 | DATE OCTOBER 1987 | FIGURE NO. 7

KEY:

LL	52	NP	38	NP	42
PL	20	NP	21	NP	20
PI	32	0	17	0	22
NAT. W/C%	27.1	15.1	27.5	17.4	21.4
SPEC. GRAVITY	----	----	----	----	----
CLASSIF. SYMB.	CH	SW-SM	CL	SW-SM	CL
SAMPLE NO.	T-6	T-13	T-15	R-10	R-15
DEPTH, FT.	13.7-14.2	31.7-32.9	37.4-37.9	47.5-48.0	56.5-57.0
HOLE NO.	I-2	I-2	I-2	I-2	I-2



*DISPERSING AGENT WAS INEFFECTIVE AFTER 7 HOUR READING.

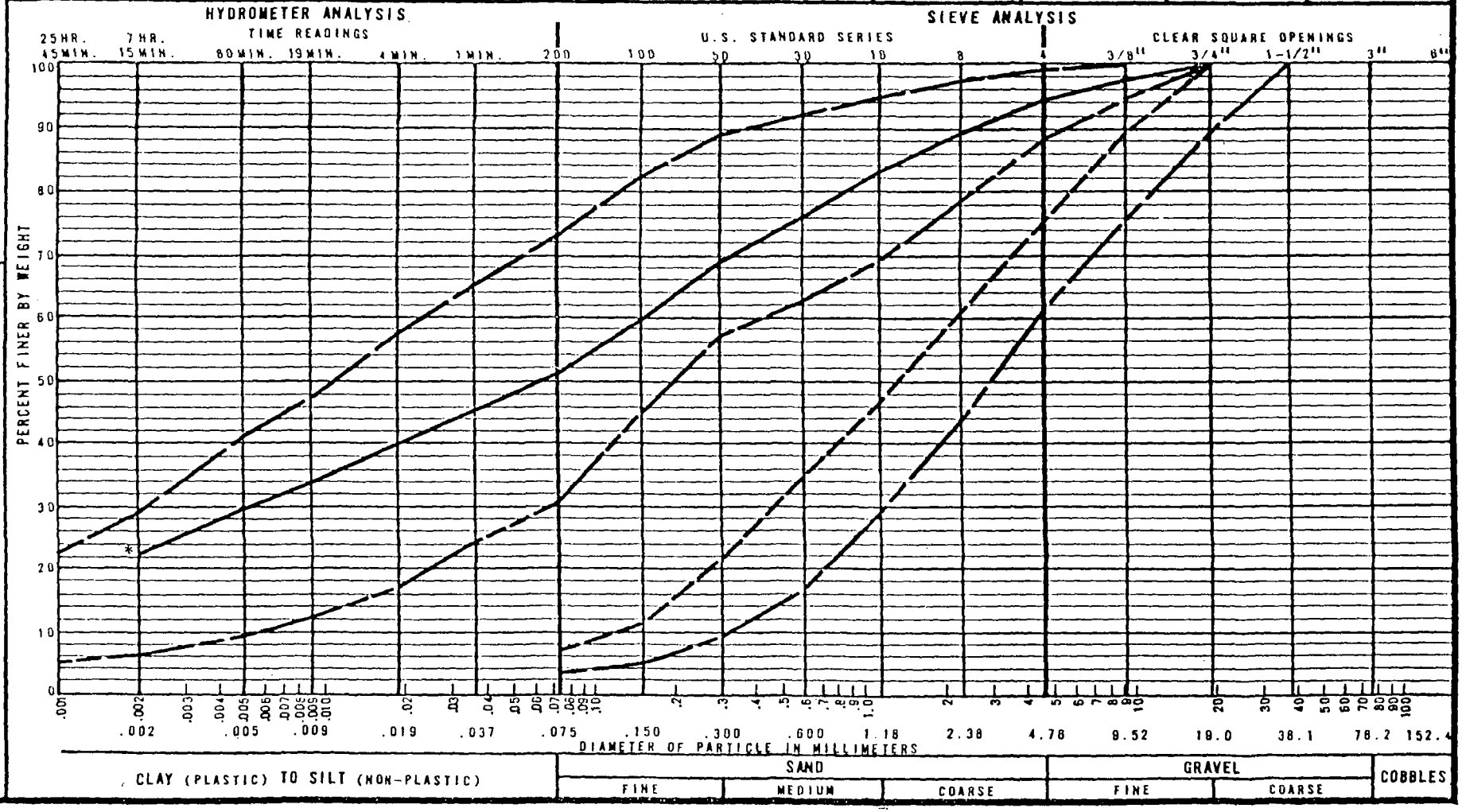
Wahler Associates

JASCO CHEMICAL CORPORATION
PHASE II HYDROGEOLOGIC INVESTIGATION
PALO ALTO • CALIFORNIA

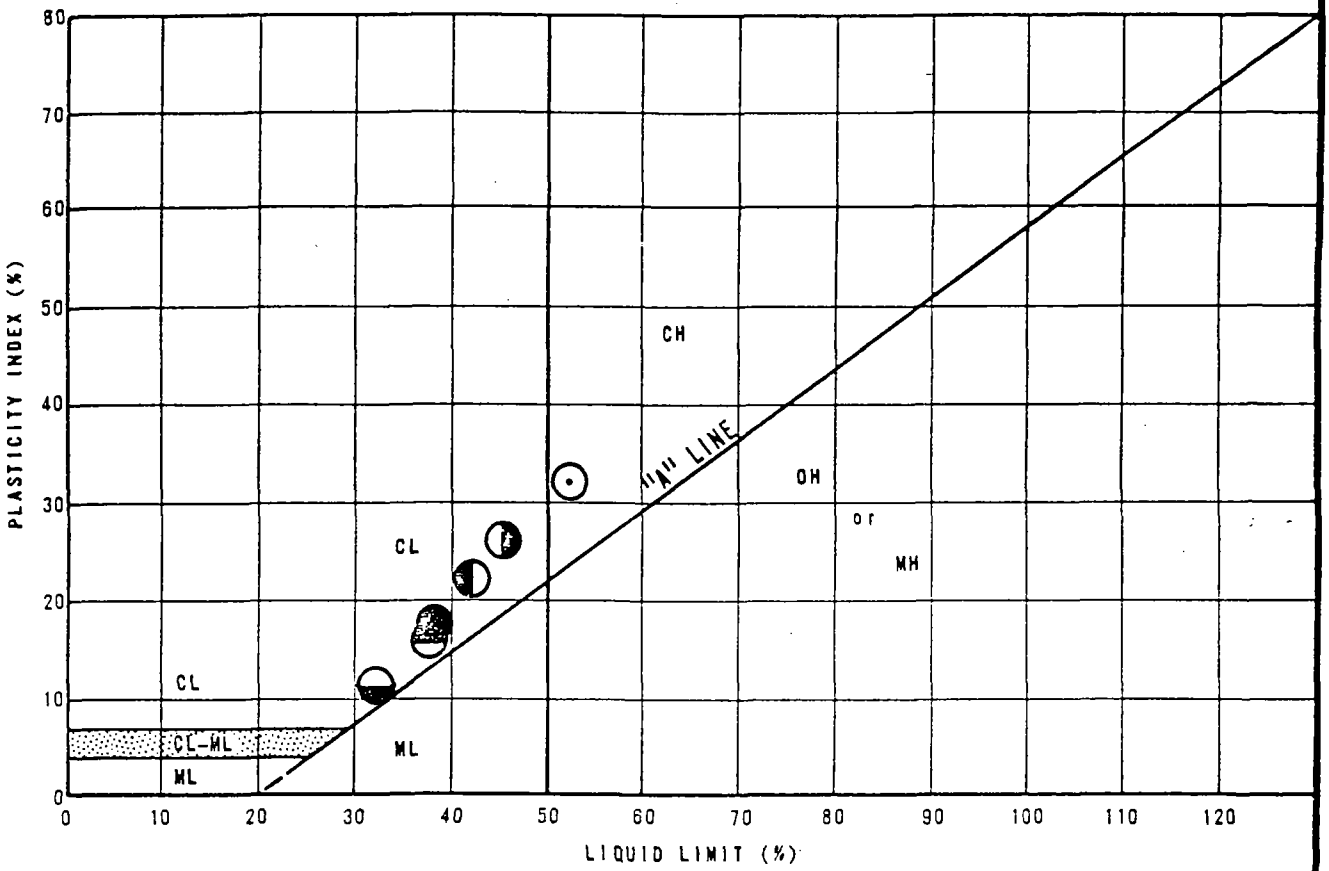
GRADATION TEST RESULTS
ASTM D422-63 & USBR E-6

PROJECT NO. JCO-1C4H
DATE OCTOBER 1987
FIGURE NO. B-2

KEY:									
LL	45	NP	37	NP	32				
PL	19	NP	21	NP	21				
PI	26	0	16	0	11				
NAT. W/C	18.6	14.8	24.8	13.4	20.2				
SPEC. GRAVITY	----	----	----	----	----				
CLASSIF.SYMB.	CL	SP-SM	CL	SW	SC				
SAMPLE NO.	T-6	T-10	T-12	R-5	R-6				
DEPTH, FT.	12.9-13.4	22.7-23.2	26.2-26.7	49.0-49.5	57.0-57.5				
HOLE NO.	I-3	I-3	I-3	I-3	I-3				



PLASTICITY CHART



PLASTICITY DATA

KEY SYMBOL	HOLE NUMBER	DEPTH (ft)	NATURAL WATER CONTENT W (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX $\left(\frac{W - PL}{LL - PL}\right)$	UNIFIED SOIL CLASSIFICATION SYMBOL
⊙	I-2, T-6	13.7-14.2	27.1	20	52	32	----	CH
●	I-2, T-15	37.4-37.9	27.5	21	38	17	----	CL
◐	I-2, R-15	56.5-57.0	21.4	20	42	22	----	CL
◑	I-3, T-6	12.9-13.4	18.6	19	45	26	----	CL
◕	I-3, T-12	26.2-26.7	24.8	21	37	16	----	CL
◒	I-3, R-6	57.0-57.5	20.2	21	32	11	----	SC

Wahler Associates

JASCO CHEMICAL CORPORATION
PHASE II HYDROGEOLOGIC INVESTIGATION
PALO ALTO • CALIFORNIA

ATTERBERG LIMITS - PLASTICITY DATA
ASTM D4318-84

PROJECT NO.	DATE	FIGURE NO.
JCO-104H	OCTOBER 1987	B-3

APPENDIX E

AQUIFER TESTING REPORT

AQUIFER TESTING REPORT

JASCO CHEMICAL CORPORATION

MOUNTAIN VIEW, CALIFORNIA

A. INTRODUCTION

1. Purpose

This aquifer testing report has been prepared in response to Provision C.2.c.2 of Cleanup and Abatement Order No. 87-094 issued to Jasco Chemical Corporation (Jasco) by the California Regional Water Quality Control Board (CRWQCB) on August 3, 1987. The objectives of the investigation are as follows:

a. To determine values of transmissivity, hydraulic conductivity and storativity for the A-aquifer, as well as lateral variability in these properties.

b. To evaluate whether the A-aquifer at the Jasco facility is a confined aquifer.

c. To evaluate whether hydraulic connection exists between the A and B_1-aquifers at and in the vicinity of the Jasco site.

d. To evaluate the effects of external influences (e.g., barometric pressure) on ground water levels.

e. To evaluate the effectiveness of well V-4 as an extraction well.

This report presents the methods used during the field investigation, summary of the site hydrogeology, the solution techniques used to analyze the data acquired in the field, analysis of the aquifer testing results, and conclusions based on the data. Appendices containing the field data, analytical solution documentation, and aquifer testing protocols are also included.

This report is organized into six sections: (A) an introductory section, (B) a discussion of the site hydrogeology, (c) the pumping test methodology and results, (D) the slug test methodology and results, (E), a conclusions section, and (F) a statement of limitations.

2. Site Description

Jasco Chemical Corporation is located at 1710 Villa Street, Mountain View, California (Figure 1). The 2.05-acre Jasco site is bordered on the north by the Southern Pacific Railroad and the Central Expressway and by residential units on the remaining sides. The Jasco site has historically been zoned and used for industrial purposes, but is now zoned residential. Within a one-mile radius of the site, the current land use is a combination of light industrial, commercial and residential. The actual plant location is on the northern portion of the property, leaving approximately 66 percent of the site as vacant land.

The Jasco site is located on a gently sloping alluvial plain which terminates at San Francisco Bay, approximately 2.5 miles north of the site. Permanente Creek, a northward-flowing, concrete-lined and channelized stream is located approximately 600 feet to the west-northwest of the site.

Preliminary investigations of the Jasco site have led to the discovery of a number of volatile organic compounds in the subsurface, primarily chemicals that have been stored at the site by Jasco. While a variety of organic compounds have been detected in the subsurface, the compounds with the highest observed concentrations are: 1,1,1-trichloroethane, 1,1-dichloroethane, and methylene chloride.

3. Scope of Work Performed

As part of the work program, slug tests were performed on existing A-aquifer wells V-1 through V-7 and existing B_1-aquifer wells I-1, 2, and 3. The A-aquifer wells yielded reliable estimates of transmissivity, hydraulic

conductivity, and storativity. The recovery at the B_1-aquifer wells was too rapid to yield reliable estimates of these parameters. The slug tests were performed on September 27, 1987. On September 28, 1981, a step discharge test was performed at A-aquifer well V-4. The purpose of the step discharge test was to determine the appropriate pumping rate for the 48-hour constant discharge test as well as to determine the well loss coefficient for well V-4. Finally, a 48-hour constant discharge test was performed on September 29, 30, and October 1, 1987. Well V-4 was used as the pumping well. Water level variation was measured in the well V-4, as well as in observation well V-2 using an electronic data logger. Water level variations in the additional monitoring wells were monitored using an electric water level meter.

STRATIGRAPHY AND HYDROGEOLOGY

As discussed above, seven A-aquifer monitoring wells have been installed thus far, V-1 through V-7 (Figure 2). Three B_1-aquifer wells have been installed, I-1, I-2, and I-3 (Figure 2). As part of the Phaes II hydrogeologic investigation conducted earlier, laboratory classification and laboratory vertical permeability testing were performed on soil samples from I-2 and I-3 (Wahler Associates, November, 1987). The results of the classification and laboratory permeability testing will be incorporated into the discussion. The soil types have been classified according to the Unified Soil Classification System which is summarized on Figure 3.

The stratigraphy encountered in the completed borings can be divided into four relatively permeable zones: the Vadose Higher Permeability Zone, the A-aquifer, the B_1-aquifer, and the B_2-aquifer, separated by zones of lower permeability including the Vadose Lower Permeability Zone, the A-B_1 aquitard, and the B_1-B_2 aquitard. Two representative cross-sections taken from Wahler's report, "Phase II Hydrogeologic Investigation, Jasco Chemical Corporation, November, 1987", showing the above described units are enclosed as Figures 4 and 5.

a. Vadose Lower Permeability Unit - The upper 9 to 18 feet of section encountered in wells V-1 through V-7 and I-1, 2, and 3 consist of clay, and silty, sandy, or gravelly clay. In I-2, a soil sample from approximately 14 feet (I-2,T-6) was classified as a CH with a vertical coefficient of permeability of 4.7×10^{-4} ft/min. A sample from approximately 13 feet in I-3 was classified as a CL, with a vertical coefficient of permeability of 4.9×10^{-4} ft/min. The vertical permeabilities of the clay samples are much higher than one could expect considering their composition. Laboratory analysis revealed that both of the samples contained rootlets and rootlet holes, features which can increase the permeability of a soil sample.

A lower permeability unit consisting of clay to sandy clay is located between the VHPZ (discussed below) and the A-aquifer. In V-7 and I-2, this unit is located within the vadose zone. In I-3, this lower permeability unit is located within the zone of saturation.

b. Vadose Higher Permeability Zone (VHPZ) - The VHPZ ranges in thickness from a few inches in the case of V-7 and I-2 to 14.9 feet as was observed in V-5. In I-3, the VHPZ consists of 7.8 feet of dark, yellow-brown, silty to gravelly sand. The VHPZ appears to thin towards the northeast, as evidenced by the unit being represented by 7.8 feet of gravelly and silty sand in I-3, a 0.9-foot layer of gravelly clay in I-2, and by an increase in gravel content within a clay layer in V-7. This type of deposition pattern is common in an alluvial setting where rapid changes in stratigraphy are observed over short distances, both vertically and laterally.

Properties testing was performed on one VHPZ section sample from I-3 (I-3, T-10). The grain size analysis and vertical permeability testing revealed the soil to be an SP-SM, with a vertical permeability of 1.0×10^{-4} ft/min, which is rather low for sandy material. Even though the VHPZ is composed of predominantly sandy material, the VLPU has a higher coefficient of permeability, induced by rootlets and rootlet holes present in the clay.

c. A-Aquifer - In wells V-1 through V-7 and I-1, the A-aquifer ranges in thickness from 0.5 to 13.5 feet. In V-7, located adjacent to I-2 on the median of the Central Expressway, the A-aquifer is represented by 13.5 feet of alternating layers of sand, gravel, and clay. In I-2, located 8 feet east of V-7, the A-aquifer is represented by 14.7 feet of gravelly sand and silty sand. Soil sample I-2, T-13, identified in the field as an SM, was determined in the laboratory to be an SW-SM with a vertical permeability of 4.5×10^{-4} ft/min. From a comparison of the boring logs of I-2, I-3, and V-7, it is apparent that the thickness of the A-aquifer decreases towards the west on the median of the Central Expressway. At I-3, the equivalent of the A-aquifer is recognized as a change in the color of the soil from dark, greenish-gray to yellow-brown, as well as an increase in the sand content of the clayey material. A sample of the A-aquifer equivalent material in I-3 was not analyzed in the materials testing laboratory, as it was not recognized as aquifer material in the field.

d. $A\text{-}B_1$ Aquitard - The full thickness of the $A\text{-}B_1$ aquitard has been penetrated by B_1-aquifer wells I-1, 2, and 3. The thickness of the $A\text{-}B_1$ aquitard ranges from 6.5 feet at I-1, to 17 feet at I-2, and finally 14 feet at I-3. The $A\text{-}B_1$ aquitard is composed of clay to sandy clay. Properties testing was performed on two samples of $A\text{-}B_1$ aquitard material. Sample I-2, T-15 was classified as a CL with a vertical permeability of 6.1×10^{-7} ft/min. Sample T-12 from I-3, was also classified as a CL, but had a slightly higher vertical permeability, 5.5×10^{-6} ft/min. Rootlets or rootlet holes were not observed in either of the $A\text{-}B_1$ aquitard samples. The vertical permeability data indicate that the $A\text{-}B_1$ aquitard is of sufficiently low permeability to substantially retard the vertical migration of ground water to deeper aquifers.

e. B_1-Aquifer - Before the installation of B_1-aquifer monitoring wells I-2 and I-3, the full thickness of the B_1-aquifer had been penetrated only at I-1 where it was composed of gravelly sand (SP-GP) and had an observed thickness of 11.2 feet. At I-2, the B_1-aquifer is composed of 7.5 feet of silty, gravelly, sand, identified in the laboratory as an SW-SM, with a

vertical permeability of 4.5×10^{-4} ft/min. The B_1-aquifer at I-3 is composed of 9.0 feet of gravelly sand, identified in the laboratory as an SW. The vertical permeability observed at I-3, 2.4×10^{-4} ft/min, is similar to that observed for the B_1-aquifer at I-2. The vertical permeability values obtained for soil samples from the B_1-aquifer are similar to the value calculated for the A-aquifer material taken from I-2 (4.5×10^{-4} ft/min).

f. B_1-B_2 Aquitard - At I-2, five feet of B_1-B_2 aquitard material were penetrated before drilling was terminated at 59.5 feet. Laboratory testing revealed the aquitard material to be a CL (field identified as a sandy clay) with a vertical permeability of 4.5×10^{-8} ft/min. At I-3, a one-foot thick bed of bluish-gray, sandy clay, of the same type as observed in I-2, was found from 56.5 to 57.5 feet. A sample taken from the same sandy clay unit M-I-3 (I-3, R-6) was identified in the laboratory as an SC (clayey sand). Although the sample was identified as an SC, the vertical permeability, 5.7×10^{-7} ft/min, is typical for aquitard material. Although only one foot of aquitard material exists between the B_1 and B_2-aquifers at I-3, the stratigraphic and permeability data strongly show that first, the same aquitard exists at both locations, and second, the B_1-B_2 aquitard is of low permeability (5.7×10^{-7} ft/min at I-3 and 5.5×10^{-8} ft/min at I-2). The permeability data indicate that the B_1-B_2 aquitard is of sufficiently low permeability to substantially retard the vertical migration of ground water to deeper aquifers.

g. B_2-Aquifer - The B_2-aquifer was penetrated only at I-3. There are no monitoring wells screened within the B_1-aquifer. During the drilling of I-3, it was observed that the B_1 and B_2 aquifers are very similar in composition, both being composed of dark, yellow-brown gravelly sand. The top of the B_2-aquifer was penetrated at 57.5 feet. I-3 was terminated at 71.0 feet without reaching the bottom of the B_2-aquifer. A total of 13.5 feet of B_2-aquifer material were penetrated.

h. Ground Water Elevations - Maps of both the A and B_1-aquifer potentiometric surface have been constructed using water level data collected on October 7, 1987 (Figures 6 and 7).

Examination of Figure 6 reveals that at the time the ground water level data were taken, the general direction of ground water flow in the A-aquifer was 30 degrees east of north (N30°E) and the gradient 0.004 ft/ft. This A-aquifer gradient was used in the calculation of ground water velocities for the A-aquifer. The water level data from wells I-1, I-2, and I-3, indicate that the general flow direction of B_1-aquifer ground water is N15°E. The B_1-aquifer ground water gradient is 0.003 ft/ft (Figure 7).

PUMPING TESTS

The pumping tests were conducted using A-aquifer monitoring well V-4, a four-inch diameter well installed by WA as part of a ground water investigation being conducted at and in the vicinity of Jasco Chemical Corporation. Two types of pumping tests were performed at well V-4: a step-drawdown test, and a 48-hour constant discharge test (including 12 hours of recovery). Slug tests were performed in all the A-aquifer wells. Attempts were made to carry out slug tests in B_1-aquifer wells, but the test data collected was unusable due to the rapid recovery of water levels after insertion and withdrawal of the slug. The slug test results will be discussed later in this report.

Well V-4 was chosen as the pumping test location based on existing hydrogeological and ground water quality information. Extraction pumping has been conducted in V-4 since April 1987. Therefore, it was the logical choice for the constant discharge test location. Results from the pumping test in V-4 will indicate the approximate radius of influence due to pumping and hence will aid in determining the effect of extraction pumping on reducing the concentrations of chemicals in the ground water. The step-drawdown test was performed to assess the well loss coefficient and to determine a suitable pumping rate for the constant-discharge test.

The pumping test procedure is described below. Detailed pumping test protocols and a further description of the pumping test procedure may be found in Appendix A.

- All pumping test equipment was decontaminated and calibrated before being placed down each well.

- The variation in water level in well V-4 induced during the step-drawdown test were recorded with a pressure transducer/data logger system.

- A constant-discharge test was conducted after water levels had re-equilibrated following the step-drawdown test. From the step-drawdown test, 2 gpm was found to be a suitable pumping rate for V-4 in order to maintain a suitable water level above the pump. Water level variations in V-4, as well as observation well V-2, were recorded automatically with an electronic data logger system. Water levels in all other wells (A and B_1-aquifer wells) were measured manually at set time intervals during the test using an electric water level meter.

- All extracted ground water from well V-4 was discharged to local sanitary sewers in accordance with the permit issued to Jasco by the City of Mountain View.

- At the end of the constant-discharge test, water levels were monitored until they had recovered to within approximately 90 percent of their original levels.

STEP-DRAWDOWN TEST

A two-hour step-drawdown test was carried out in well V-4 on September 28, 1987. An increase in the water level drawdown was observed as the pumping rate was increased, indicating the stability of the well during the test. The test data were analyzed using the Bierschenk method (Driscoll, 1986), which involves plotting the drawdown to discharge ratio versus discharge. The well loss coefficient was determined from the resulting linear curve. From this coefficient, the head loss due to pumping well geometry and construction could be estimated for a specific pumping rate. The test data,

plotted curve and detailed calculations may be found in Appendix B. A pumping rate of approximately 2 gpm was found to be suitable to sustain a desirable water level above the pump.

CONSTANT DISCHARGE TEST

A 48-hour constant-discharge test was performed in pumping well V-4, for a duration from September 29, 1987 to October 1, 1987. The pumping portion of the test lasted 36 hours. The recovery period was scheduled to be 12 hours in length, but 90 percent recovery was reached after approximately 4.5 hours.

Water level variations in V-4, the pumping well, as well as in observation well V-2 were recorded by an electric data logger/pressure transducer system. V-2 was chosen as the observation well because it was the closest to V-4 (8 feet away) and should show the largest drawdown due to pumping. Water levels in all other wells were measured periodically throughout the test, using an electric water level meter. Two analysis techniques, the Hantush-Jacob (1955) method for leaky, confined aquifer and the Jacob straight line method (Freeze and Cherry, 1979) were used in calculating the aquifer parameters from the time versus drawdown data collected at well V-2.

A computer program called Graphical Well Analysis Package (GWAP) which incorporated the Hantush-Jacob method was used to obtain estimates of transmissivity, hydraulic conductivity and storativity. The results were compared with those calculated manually using the Jacob straight line method.

After the constant-discharge test, water level recoveries in well V-4 and other wells were monitored for 12 hours until the levels reached approximately 90 percent of their original values. The recovery data was analyzed by hand, using the modified Theis equation (Driscoll, 1986). Data records of V-4 and V-2, plotted data curves, type curves, method assumptions and calculations may be found in Appendix C. The pumping test results are

tabulated in Table 1. The temporal variation in water elevations measured in wells V-1, V-5, V-6, and V-7 are shown on Figure 8. The water elevation variation in V-3 is shown on Figure 9. Figure 10 shows the variation in B_1-aquifer wells I-1, 2, and 3.

The variation in barometric pressure recorded at San Jose Airport during the pumping test is shown on Figure 11. The data were used to determine if the variation in water levels was positively correlated with the barometric pressure variation. The data indicated very small pressure fluctuation over the test period. The difference between the highest and the lowest pressure was only 0.17 inches of mercury.

Comparison of the water level variation measured in the monitoring wells (Figures 8, 9, and 10) with the barometric pressure data (Figure 11) reveals little positive correlation between the two variables. The minimum barometric pressure reading was observed at hour thirty-one. Theoretically, if barometric pressure were driving the water level variation, the water elevations should have reached a maximum at this time. In fact, water levels in all of the A and B_1-aquifer wells reached their lowest elevations at hour thirty-six, just before pumping was terminated. In addition, only well V-3 shows significant water level variation during the first 25 hours of pumping, during which time the barometric pressure increases and decreases harmonically. After pumping was stopped, all wells rapidly recovered to their pre-pumping levels. Therefore, it is concluded that the decrease in water levels observed in monitoring wells V-1, V-3 through V-7 and I-1, 2, and 3 were induced by extraction from well V-4. The influence of barometric pressure on water levels, if any, was not significant. All of the A-aquifer monitoring wells monitored during the test lie within the area of influence of well V-4. The steepest drawdown of 2.2 feet at the end of pumping was observed in well V-2, located only 8 feet from V-4 (see Appendix C for drawdown records). The water elevation in well V-3, located directly up-gradient of V-4, was lowered 0.30 feet due to pumping at well V-4 (Figure 9). After pumping was terminated, the water level increased 0.19 feet during the first 3 hours of recovery. Wells V-1, V-5, V-6, and V-7 showed

decreases in water elevation ranging from 0.08 to 0.13 feet (Figure 8). As was observed in well V-3, the other A-aquifer wells quickly recovered to their pre-pumping levels after pumping was terminated.

Drawdown was also observed in B_1-aquifer wells I-1, 2, and 3. Maximum drawdown was again observed at the 36-hour measurement. The drawdown ranged form 0.10 to 0.14 feet. The observed drawdown in the B_1-aquifer wells implies that under the stressed conditions created by pumping, there is a degree of interconnection between the A and B_1-aquifer at and in the vicinity of the Jasco facility.

SLUG TESTS

Slug tests were conducted in all A and B_1-aquifer wells on September 15, 1987 to evaluate the hydraulic conductivity of the aquifer material immediately adjacent to the wells. The data supplied by slug tests were used to compare with the more reliable data produced by the pumping tests. The slug test data were also used to observe the amount of variability in hydraulic conductivity there is in the A-aquifer. The slug tests consisted of lowering a solid slug of known volume into the standing water of each well which induces an instantaneous rise in water level. The decrease in water level with time inside each well was monitored using a pressure transducer/electric data logger system. After the water level had equilibrated with the slug inside well, the slug was withdrawn and the rise in water level was recorded.

The technique for determining the aquifer characteristics from slug test data was adopted from a method derived by Cooper, Bredehoeft, and Papadopules (1967). In this method, changes in water levels are plotted against time to form a curve. The curve is then matched with a type curve for slug tests, and the resulting values are used in calculating the parameters. Instead of analyzing the data manually, the computer program GWAP which incorporated the above method was used. Data records, plotted data curves and slug test type curves may be found in Appendix E. A summary of the test results is presented in Table 2.

The slug tests conducted at the A-aquifer wells yielded reliable results, the B_1-aquifer wells recovered too quickly to yield reliable data. Estimates of hydraulic conductivity, transmissivity, and storativity were therefore not calculated for the B_1-quifer wells.

CONCLUSIONS

The average horizontal hydraulic conductivity of A-aquifer was estimated to be 7.90×10^{-3} ft/min from in-situ pumping tests. The corresponding average velocity is 41.5/yr based on a hydraulic gradient of 0.004 (from Figure 6) and an effective porosity of 0.4 (see Appendix C for calculations). The three methods of analysis were:

1. Hantush-Jacob method for leaky confined aquifers;

2, Jacob Straight-Line method for bounded confined aquifers with short distance between the pumping and observation wells;

3. Jacob Solution for Recovery Data.

The hydraulic conductivity measured by the in-situ pumping test is an average value of a larger aquifer volume surrounding well V-4. This conductivity corresponds to the range for material such as silty sand or clean sand (Freeze and Cherry, 1979), which is the type of material most commonly found within the A-aquifer. The storativity estimate is within the range for confined aquifers (Freeze and Cherry, 1979), indicating that the A-aquifer is confined by the vadose zone.

The hydraulic conductivity and storativity of the A-aquifer in the immediate vicinity of each well were determined using slug tests. There is a large variation in hydraulic conductivity and storativity across the site. The highest conductivity value, 1.03×10^{-1} ft/min, was found at well V-6, with a corresponding seepage velocity of 541.4 ft/yr (see Appendix E for calculations). The lowest hydraulic conductivity was found at well V-5,

with a value of 6.6×10^{-4} ft/min, and a corresponding flow velocity of 3.5 ft/yr. The hydraulic conductivities at the rest of the well locations, V-1, V-2, V-3, V-4, and V-7 are of similar order of magnitude and are comparable with those calculated using the pumping test data from well V-4.

The storativities at all well locations except well V-2, fall into the range for confined aquifers, while that of well V-2 is in the range for unconfined aquifers. The A-aquifer at well V-2 may not be as confined as other locations across the site. Alternatively, the fact that well V-2 is screened through a portion of the vadose zone may account for anomalous low storativity value.

The water levels at all wells during the pumping test were monitored to assess the extent of radius of influence due to pumping at well V-4. All A and B_1-aquifer wells showed positive drawdown response towards the latter portion of pumping. This indicates that the on and off-site aquifer wells lie within the zone of influence of well V-4. Drawdowns in B_1-aquifer wells indicate probable hydraulic connection between A and B_1-aquifers.

F. LIMITATIONS

The data, information, interpretations, and conclusions contained within this report are presented specifically and solely for Bronson, Bronson, and McKinnon. The conclusions and professional opinions presented herein were developed by Wahler Associates, in accordance with currently accepted geologic and hydrogeologic principles and practices. Wahler Associates cannot be responsible for any conclusions and recommendations that may be made by others, unless we have been given an opportunity to review such conclusions and concur in writing.

TABLE 1

CONSTANT DISCHARGE TEST RESULTS OF WELL V-4

Method of Analysis	T (ft^2/min)	K (ft/min)	S (--)	v (ft/yr)
Hantush-Jacob by GWAP	6.29×10^{-2}	8.98×10^{-3}	1.59×10^{-3}	47.2
Jacob Straight-Line Method	6.04×10^{-2}	8.63×10^{-3}	1.44×10^{-3}	45.4
Theis Solution for Recovery Data	4.26×10^{-2}	6.09×10^{-3}	*	32.0
		Average: 7.90×10^{-3}		Average: 41.5

Note:

T - Transmissivity

K - Hydraulic Conductivity

S - Storativity (dimensionless)

v - seepage velocity

* - residual-drawdown plot cannot be used for determining storativity (Driscoll, 1986).

TABLE 2

A-AQUIFER WELLS SLUG TEST RESULTS

Well No.	Aquifer Thickness (ft)	T (ft^2/min)	K (ft/min)	S (--)	v (ft/yr)
V-1	22.0	6.11×10^{-2} 5	2.78×10^{-3} 5	5.88×10^{-10} 6	14.6 5
V-2	12.0	6.95×10^{-2} 4	5.79×10^{-3} 4	3.67×10^{-2} 1	30.4 4
V-3	12.0	2.98×10^{-2} 6	2.48×10^{-3} 6	4.77×10^{-5} 3	13.0 6
V-4	7.0	1.05×10^{-1} 3	1.50×10^{-2} 2	1.64×10^{-3} 2	78.8 2
V-5	3.0	1.98×10^{-3} 7	6.60×10^{-4} 7	5.88×10^{-6} 4	3.5 7
V-6	7.0	7.18×10^{-1} 1	1.03×10^{-1} 1	5.88×10^{-9} 5	541.4 1
V-7	13.5	1.80×10^{-1} 2	1.33×10^{-2} 3	5.88×10^{-6} 4	70.0 3

Note:

T - Transmissivity

K - Hydraulic conductivity

S - Storativity (dimensionless)

v - seepage velocity

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Freeze A., and Cherry, J.A.; (1979), Ground Water, Prentice Hall.

Hantush, M.S., and Jacob, C.E.; (1955), Nonsteady Radial Flow in an Infinite Leaky Aquifer, Trans. Amer. Geophys. Union, 36, pp. 95-100.

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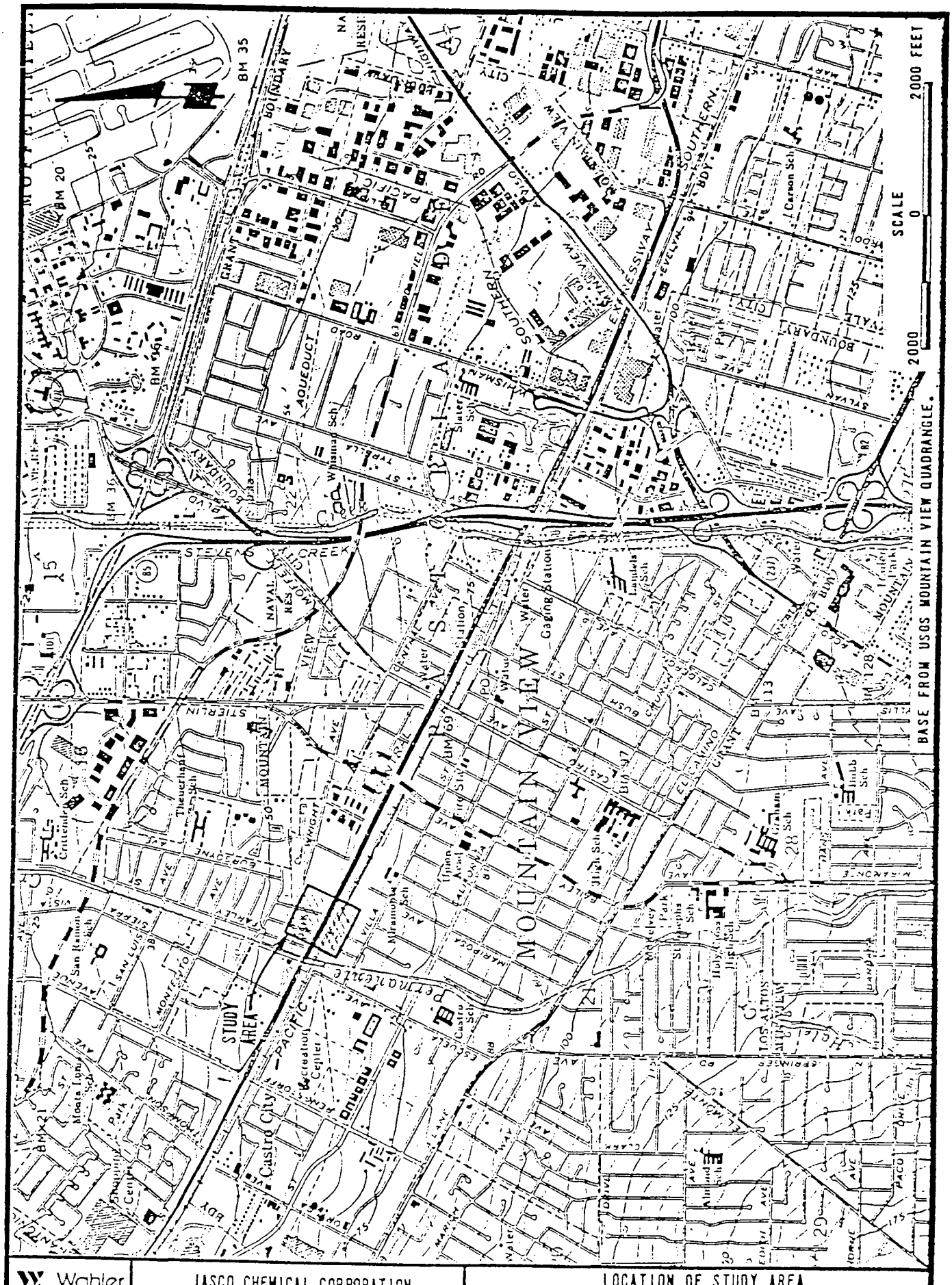

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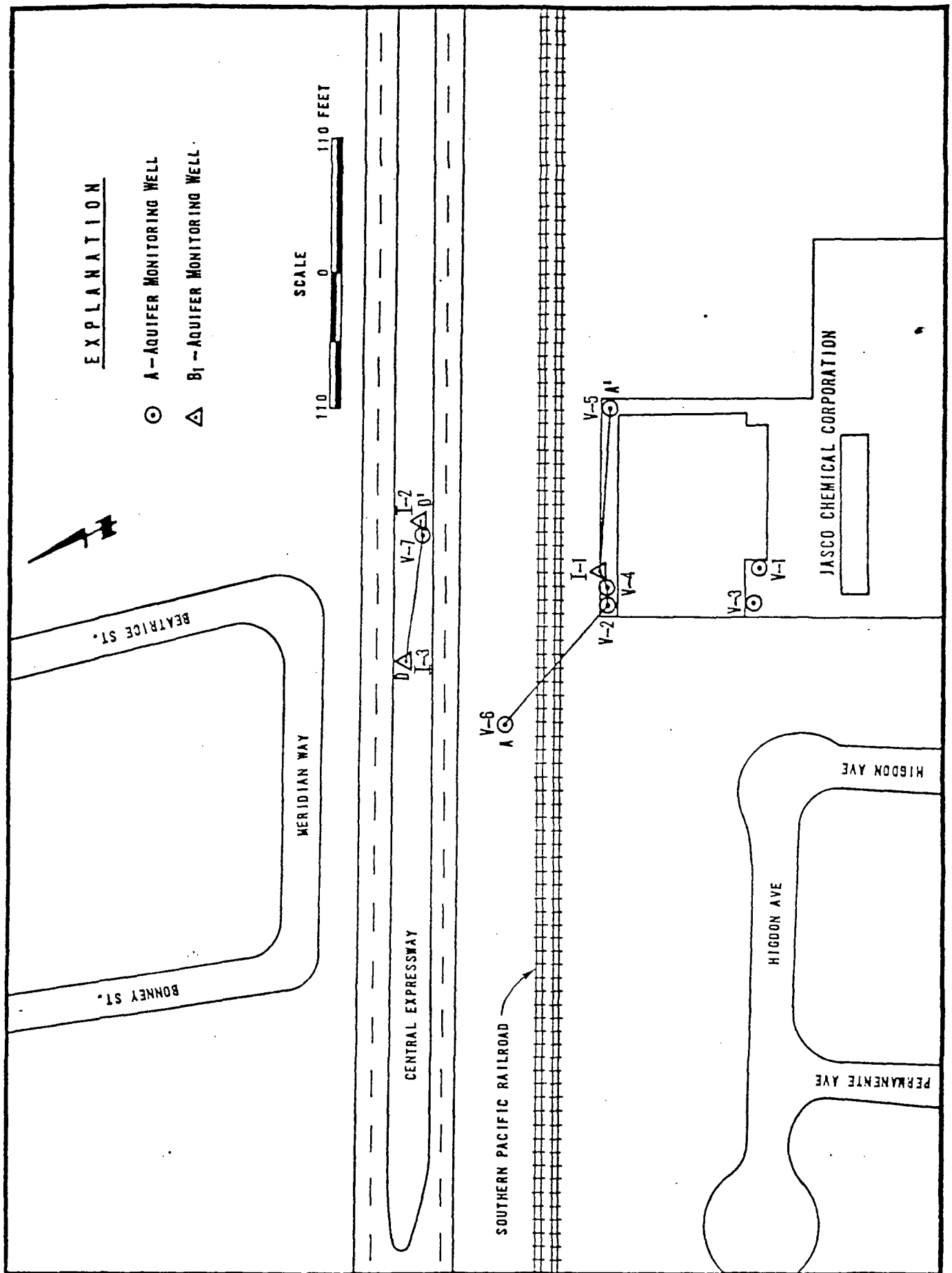
JASCO CHEMICAL CORPORATION
AQUIFER-TESTING REPORT

PALO ALTO • CALIFORNIA

LOCATION OF STUDY AREA
(AREA SHOWN IN FIGURE 2)

PROJECT NO.	DATE	FIGURE NO.
JCO-104H	DECEMBER 1987	



Wahler Associates	JASCO CHEMICAL CORPORATION AQUIFER-TESTING REPORT	A AND B_1 AQUIFER MONITORING WELLS AND GEOLOGIC CROSS SECTIONS		
		PROJECT NO.	DATE	FIGURE NO.
	PALO ALTO • CALIFORNIA	JCO-104H	DECEMBER 1987	2

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)

PRIMARY DIVISIONS			GROUP SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOILS MORE THAN HALF OF MATERIALS IS LARGER THAN #200 SIEVE SIZE	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN #4 SIEVE	CLEAN GRAVELS (LESS THAN 5% FINES)	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.
			GP	POORLY GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.
		GRAVEL WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURE. NON PLASTIC FINES.
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES. PLASTIC FINES.
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN #4 SIEVE	CLEAN SANDS (LESS THAN 5% FINES)	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.
			SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.
		SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES. NON-PLASTIC FINES.
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES. PLASTIC FINES.
FINE GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE	SILTS & CLAYS LIQUID LIMIT IS LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY.
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY.
	SILTS & CLAYS LIQUID LIMIT IS GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS.
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS.
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS.

DEFINITION OF TERMS

GRAIN SIZES

U.S. STANDARD SERIES SIEVE

200 50 16 4 3/4" 3" 6"

SILTS & CLAYS DISTINGUISHED ON BASIS OF PLASTICITY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

MOISTURE CONDITION (INCREASING MOISTURE ⟶)

DRY — SLIGHTLY DAMP — DAMP — MOIST — VERY MOIST — WET (SATURATED)

(PL) (LL)

KEY

SAMPLE NUMBER

SAMPLE CONTAINER:

- BAG..... B
- JAR..... J
- SHELBY TUBE... S
- DRIVE SAMPLER RINGS..... R

MODE

METHOD OF ADVANCING HOLE:

DRILL

- FLIGHT AUGER..... AO
- BUCKET AUGER..... BA
- SPIN AUGER..... SO
- HOLLOW STEM AUGER... HA
- ROTARY DRILL..... RO
- CABLE TOOL..... CT

SAMPLER

- DRIVE..... DR
- PITCHER BARREL..... PB
- CORE..... C
- PUSH..... P

RECOVERY

RECOVERY RATIO INDICATED BY A FRACTION:

$$\frac{1.2}{1.5} = \frac{\text{FOOTAGE RECOVERED}}{\text{FOOTAGE SAMPLED}}$$

REMARKS

INCLUDES DRILLING INFORMATION, E.G. WATER LEVEL, DATES.

REFUSAL: STOPPED BY MATERIAL TOO HARD FOR EQUIPMENT.

TERMINATED: SUFFICIENT INFORMATION OBTAINED.

ABANDONED: STOPPED BECAUSE OF DIFFICULTIES EXPLAINED ON LOG.

PENETRATION RESISTANCE (PR)

(RECORDED AS BLOWS/0.5 FOOT)

SANDS & GRAVELS

RELATIVE DENSITY	BLOWS/FOOT*
VERY LOOSE	0–4
LOOSE	4–10
MEDIUM DENSE	10–30
DENSE	30–50
VERY DENSE	OVER 50

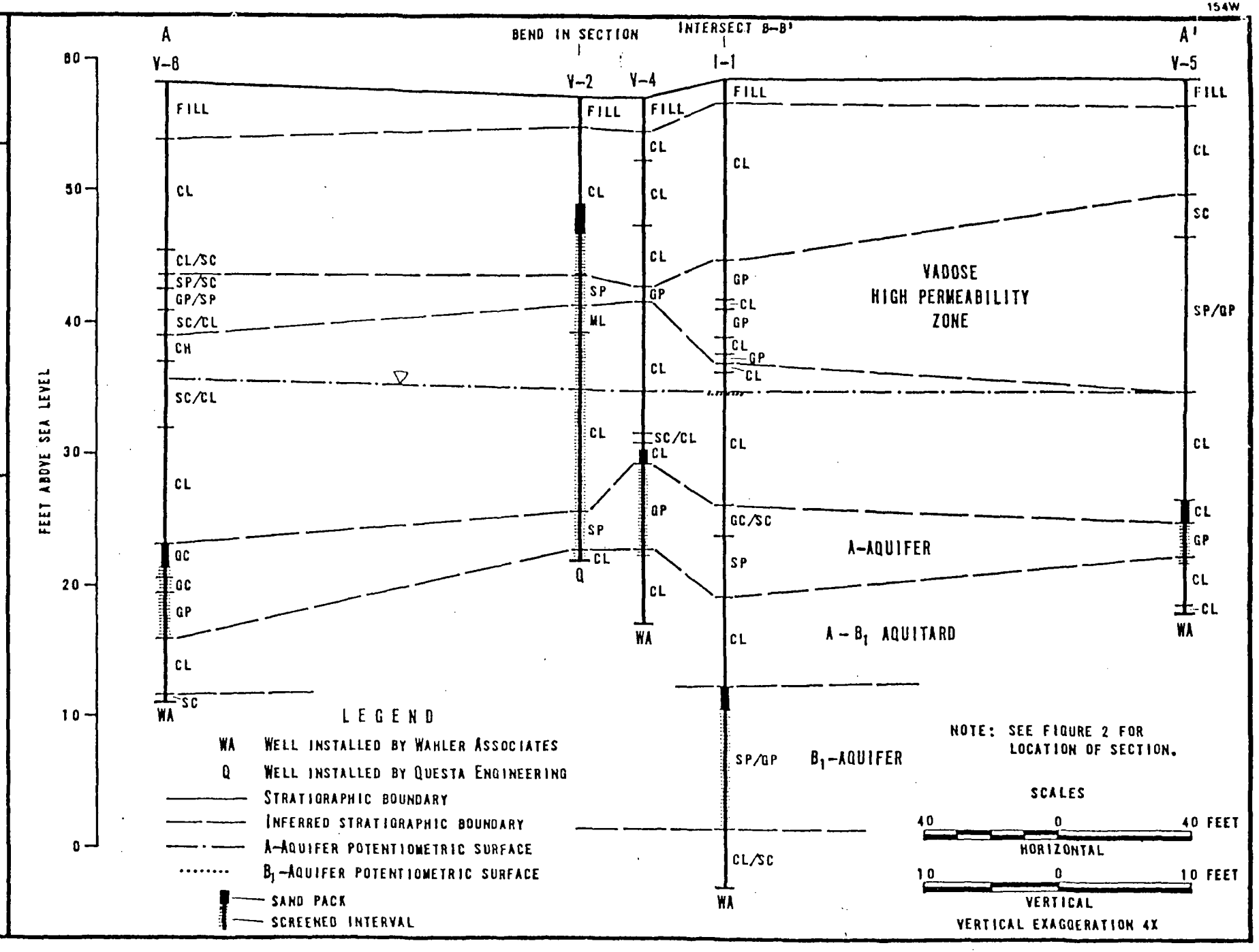
CLAYS & SILTS

CONSISTENCY	BLOWS/FOOT*	STRENGTH ‡
VERY SOFT	0–2	0–¼
SOFT	2–4	¼–½
FIRM	4–8	½–1
STIFF	8–15	1–2
VERY STIFF	15–30	2–4
HARD	OVER 30	OVER 4

* Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1-3/8 inch I.D.) Split-Barrel sampler (ASTM-1586 standard penetration test).

‡ Unconfined compressive strength in tons/sq ft. Read from a pocket penetrometer.

Wahler Associates	JASCO CHEMICAL CORPORATION AQUIFER-TESTING REPORT	KEY FOR SOIL EXPLORATION LOGS	
		PROJECT NO.	FIGURE NO.
		JC0-104M	3



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AQUIFER-TESTING REPORT

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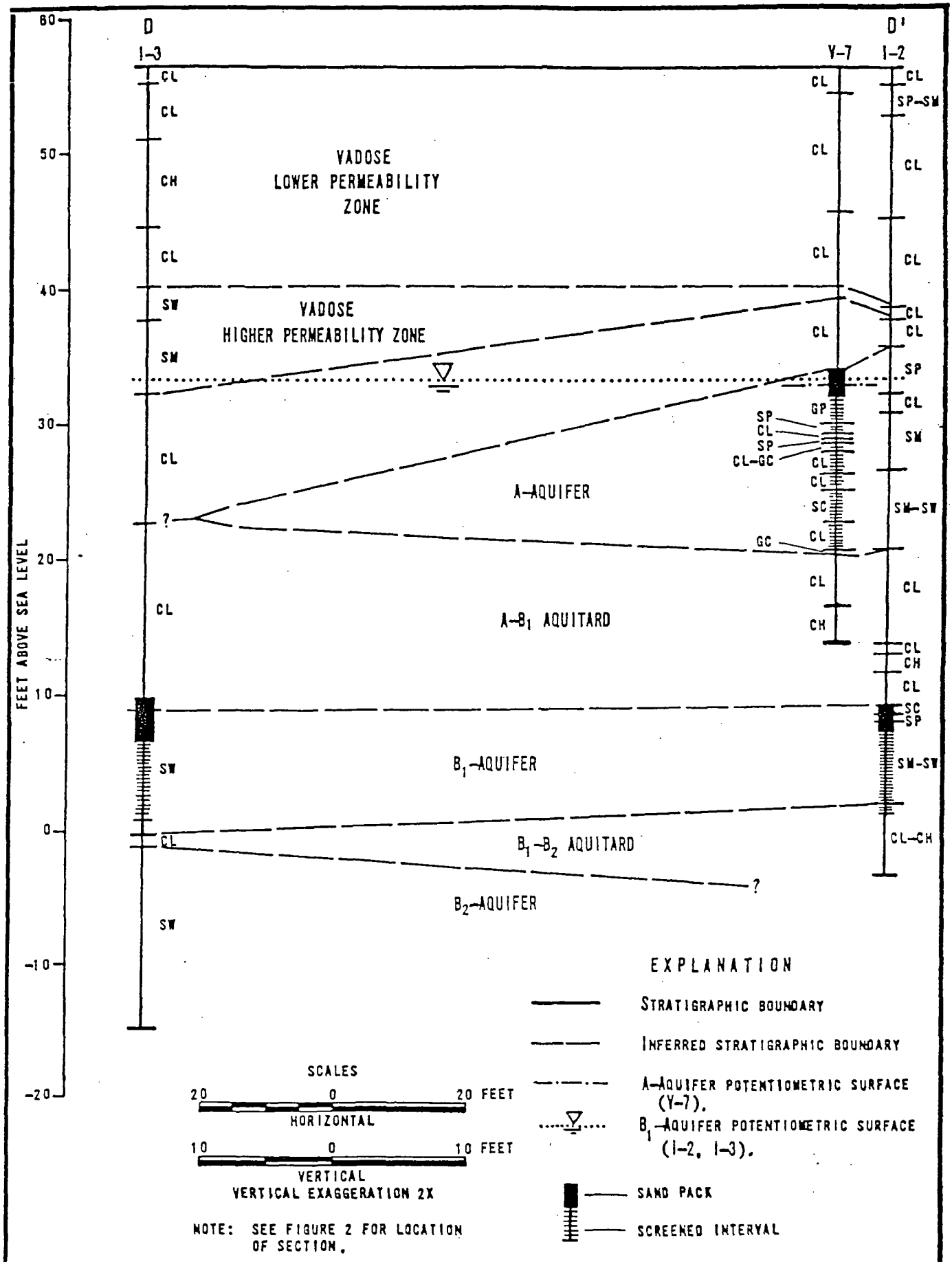
GEOLOGIC CROSS SECTION A-A'

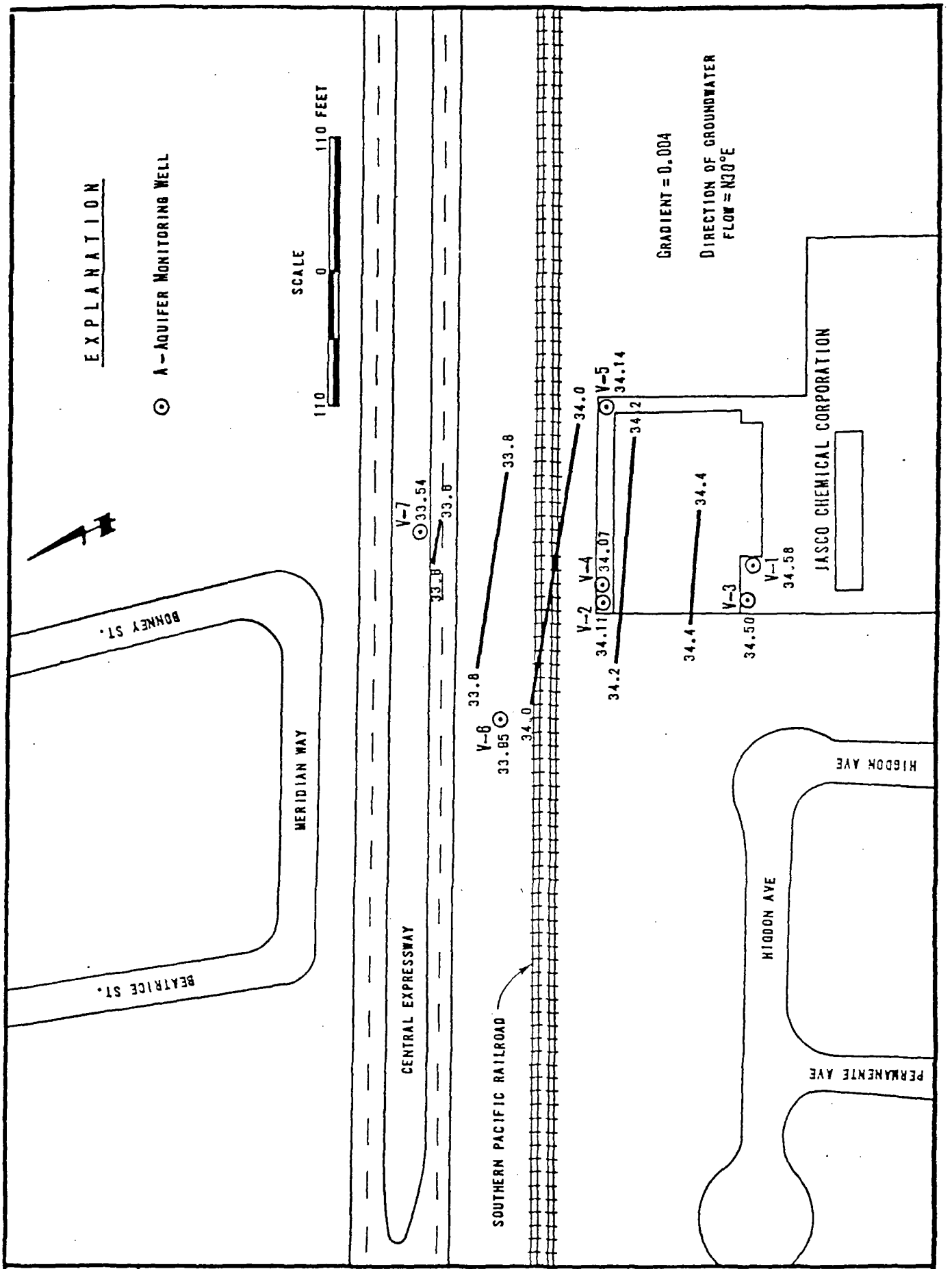
PROJECT NO.	DATE	FIGURE NO.
JCO-04H	DECEMBER 1987	4

154W

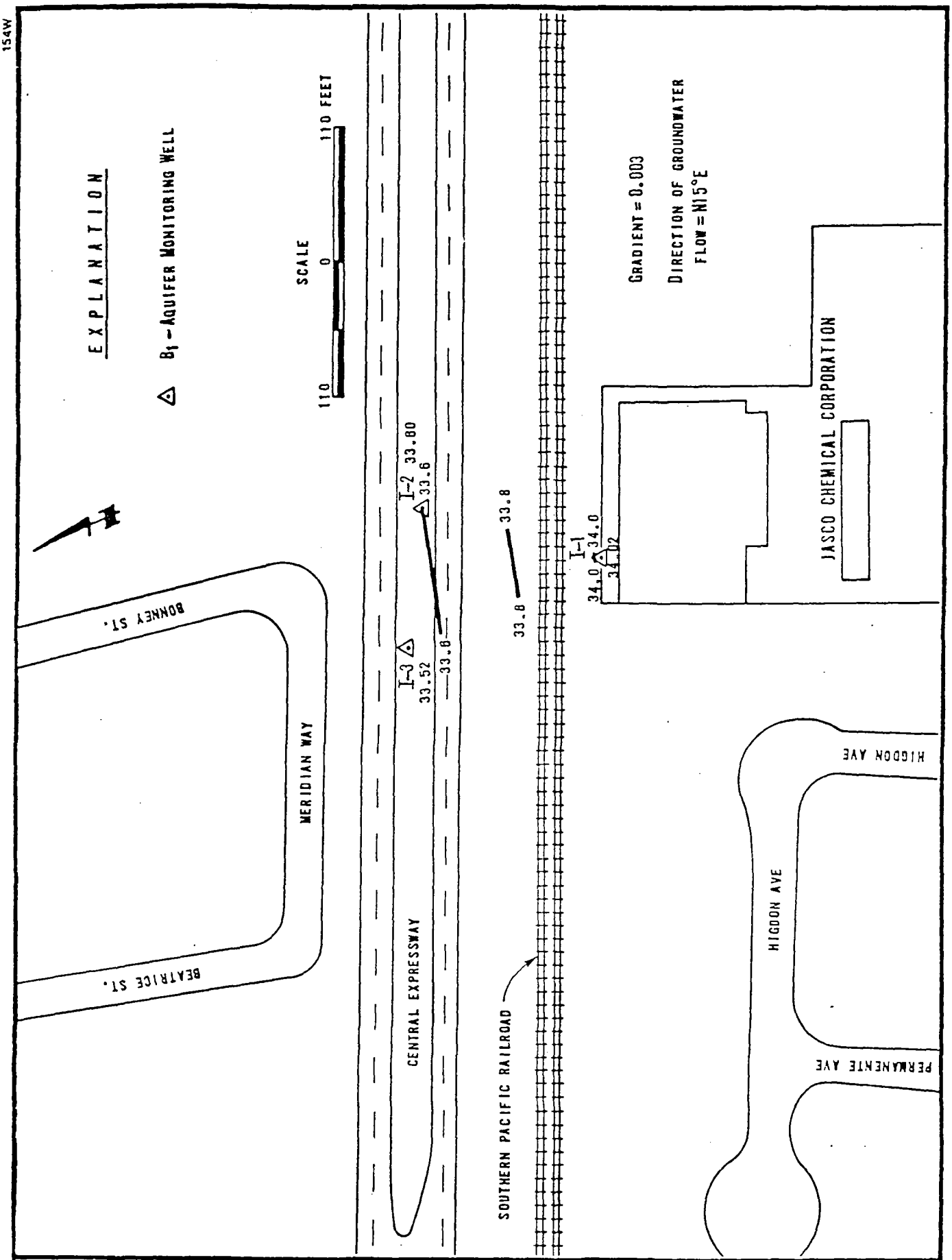
OZALID



Wahler Associates	JASCO CHEMICAL CORPORATION AQUIFER-TESTING REPORT	GEOLOGIC CROSS SECTION D-D'		
		PROJECT NO.	DATE	FIGURE NO.
	PALO ALTO • CALIFORNIA	JCO-104H	DECEMBER 1987	5



Wahler Associates	JASCO CHEMICAL CORPORATION AQUIFER-TESTING REPORT	POTENTIOMETRIC SURFACE A-AQUIFER OCTOBER 7, 1987		
		PROJECT NO.	DATE	FIGURE NO.
	PALO ALTO • CALIFORNIA	JCO-104H	DECEMBER 1987	8



Wahler Associates	JASCO CHEMICAL CORPORATION AQUIFER-TESTING REPORT	POTENTIOMETRIC SURFACE - B_1 AQUIFER OCTOBER 7, 1987		
		PROJECT NO.	DATE	FIGURE NO.
	PALO ALTO • CALIFORNIA	JCO-104H	DECEMBER 1987	7

154W

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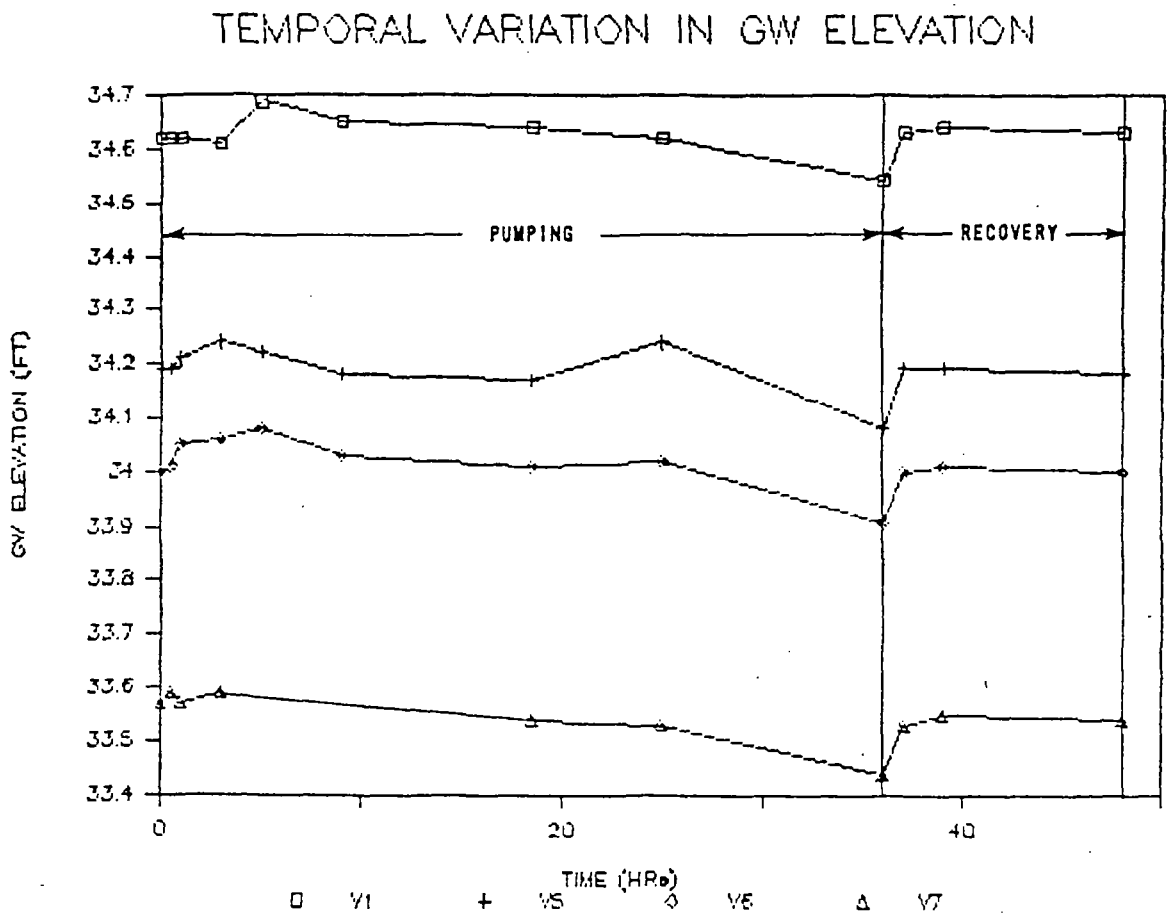
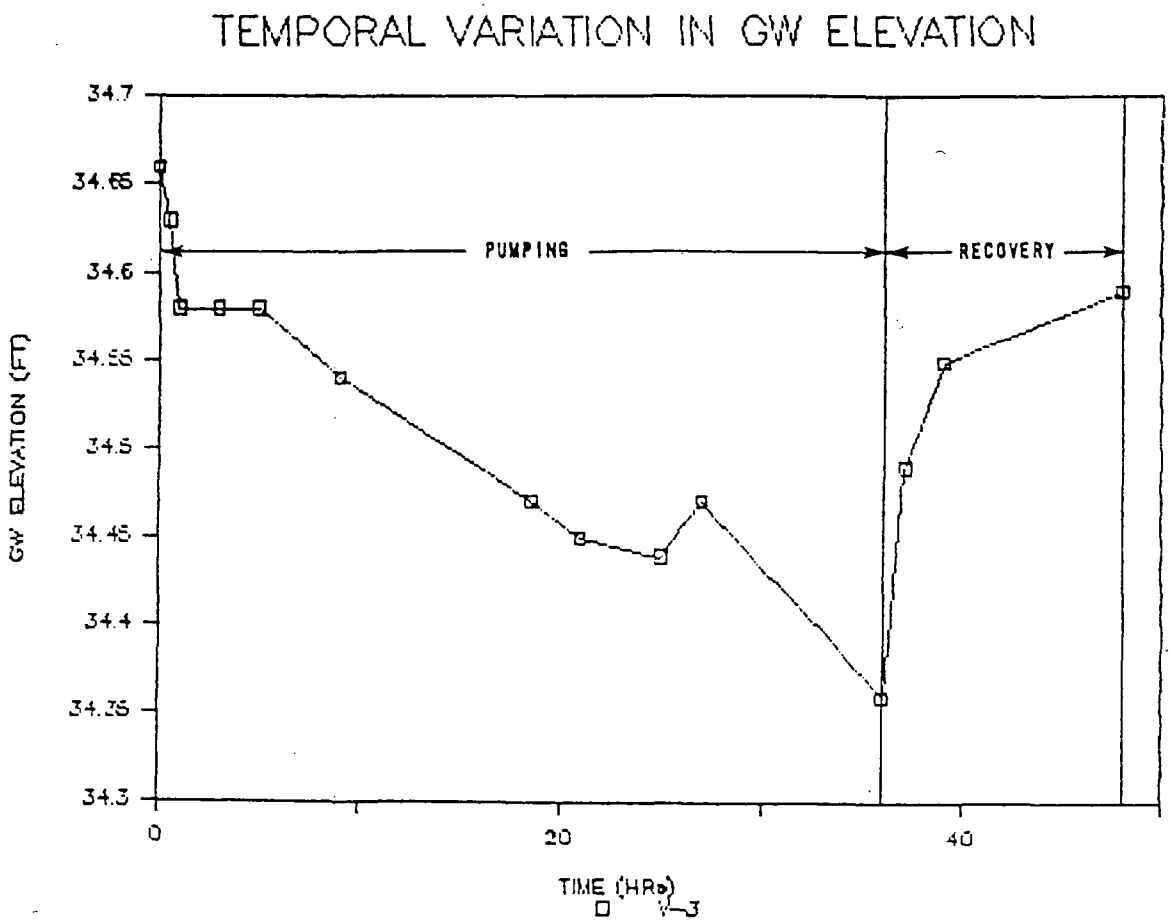
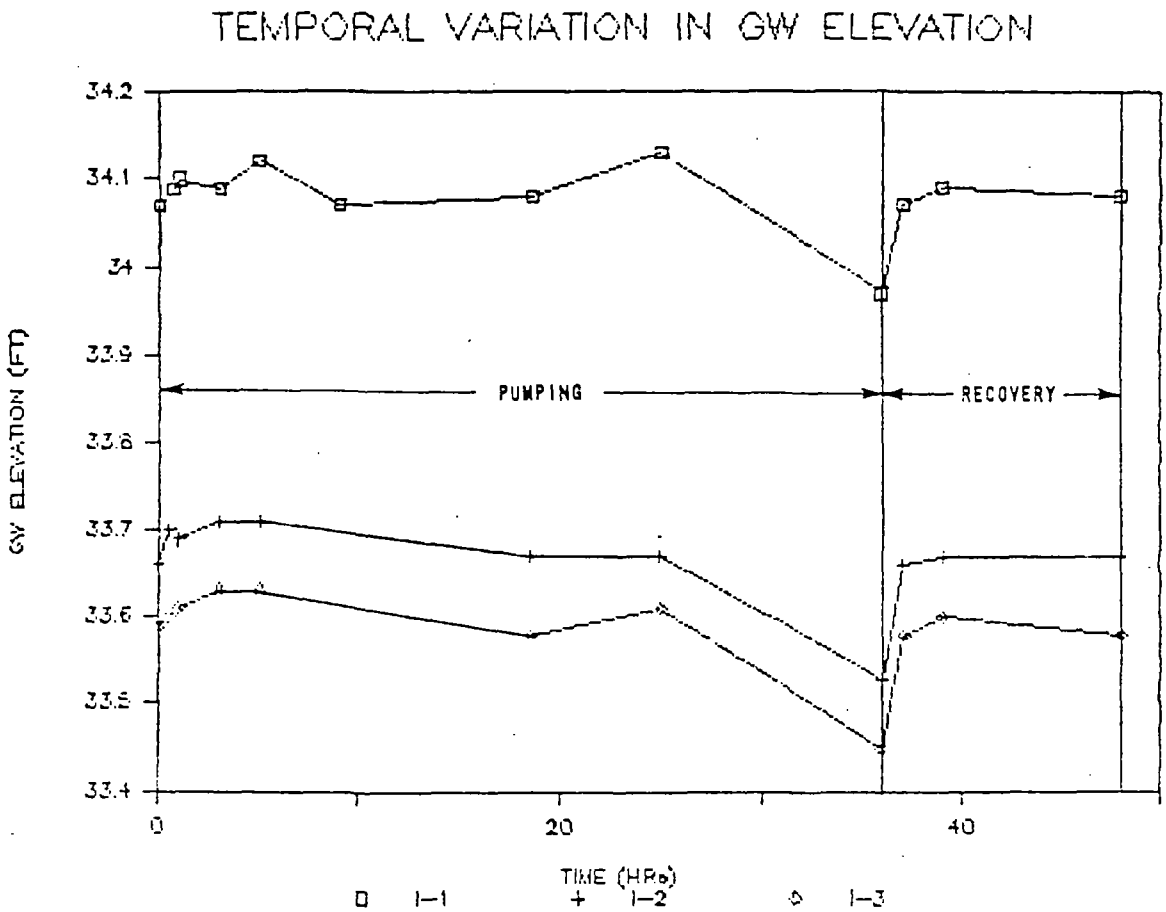


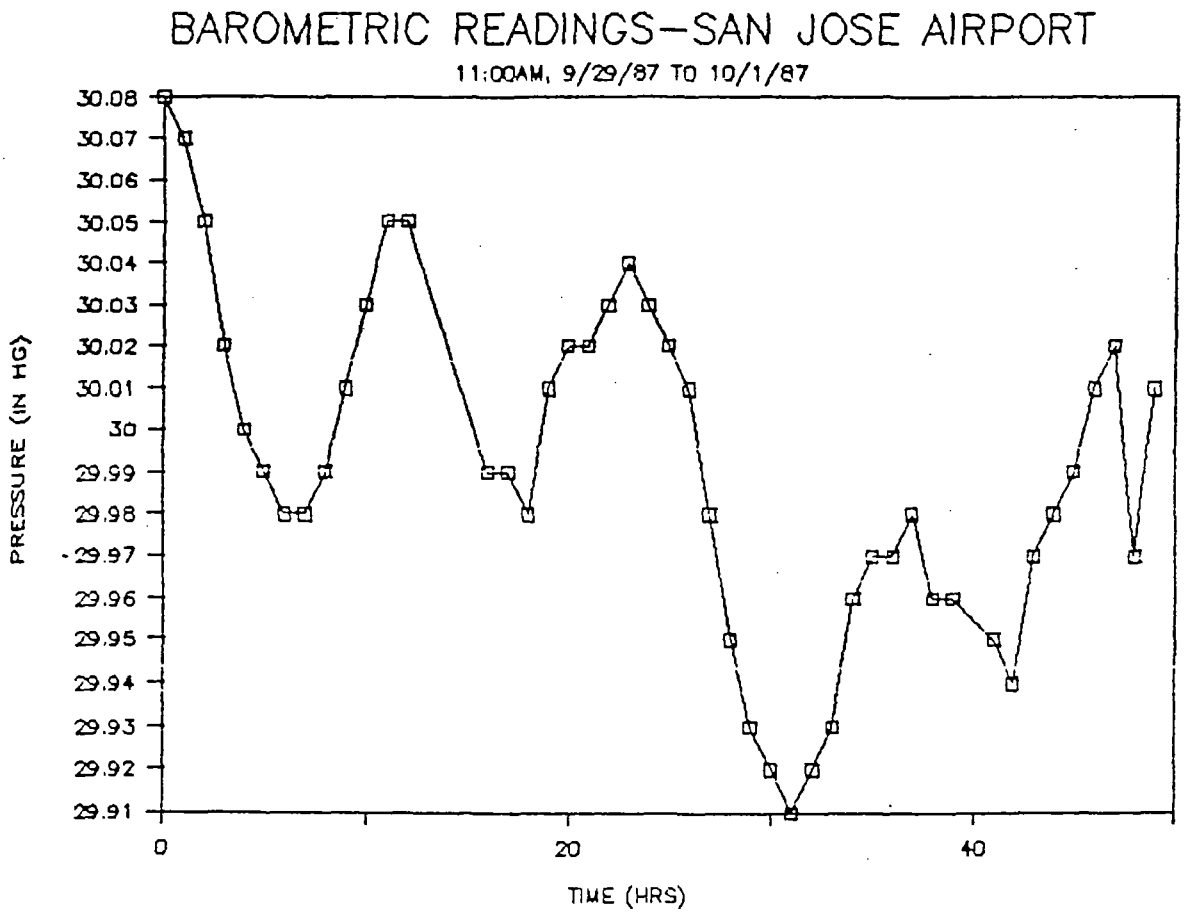
Wahler Associates	JASCO CHEMICAL CORPORATION AQUIFER-TESTING REPORT	TEMPORAL VARIATIONS IN WATER LEVELS WELLS Y-1, Y-5, Y-6, Y-7		
		PROJECT NO.	DATE	FIGURE NO.
	PALO ALTO • CALIFORNIA	JCO-104H	DECEMBER 1987	8



Wahler Associates	JASCO CHEMICAL CORPORATION AQUIFER-TESTING REPORT	TEMPORAL VARIATION IN WATER LEVEL WELL Y-3		
		PROJECT NO.	DATE	FIGURE NO.
	PALO ALTO • CALIFORNIA	JCO-104H	DECEMBER 1987	9



Wahler Associates	JASCO CHEMICAL CORPORATION AQUIFER-TESTING REPORT PALO ALTO • CALIFORNIA	TEMPORAL VARIATIONS IN WATER LEVELS WELLS I-1, I-2, I-3		
		PROJECT NO.	DATE	FIGURE NO.
		JCO-104H	DECEMBER 1987	10



Wahler Associates	JASCO CHEMICAL CORPORATION AQUIFER-TESTING REPORT	BAROMETRIC PRESSURE READINGS AT SAN JOSE INTERNATIONAL AIRPORT		
		PROJECT NO.	DATE	FIGURE NO.
	PALO ALTO • CALIFORNIA	JCO-184H	DECEMBER 1987	11

APPENDIX A

APPENDIX A

PUMPING AND SLUG TEST PROTOCOL

A. FIELD PROCEDURE

1. Slug Tests

Slug tests were performed in wells V-1 through V-7 and wells I-1, 2, and 3. This method was used because it provides a simple method of determining values of hydraulic conductivity and transmissivity for the aquifer material in the immediate vicinity of the well screen. The hydraulic conductivity data were also used to determine the degree of spatial variability in hydraulic conductivity possessed by the A-aquifer.

On September 28, 1987, a representative of Wahler Associates visited the Jasco site and conducted slug tests on ground water monitoring wells V-1 through V-7 and I-1, 2, and 3. The slug test consisted of lowering a solid "slug" of known volume into the standing water of each monitoring well which induced a rise in the water level. An electronic data logging device manufactured by Envirolabs of Glendale, California, was simultaneously used to record the decrease in water levels with time. In addition, a reverse slug test was conducted, when possible, by withdrawing the solid "slug" and recording the increase in water level with time. The rate at which the water level rises or falls is controlled by the permeability of the materials in which the monitoring well is screened.

Calculation methods used to determine values of permeabilities from slug tests are found in Appendix E. The QA protocol for the slug tests is outlined below.

2. Pumping

Procedures and equipment used for performing the step discharge and constant discharge pumping tests are described below. Eight episodes of water levels

were measured six days before the step discharge test to determine the amount of temporal variation in water levels that occurs over an eight-hour period. In addition, water levels were measured immediately prior to pumping, both before and after the pumping equipment was placed into the well. At the start of pumping, water levels measurement were made at exponentially expanded intervals, beginning with five second intervals. Water levels were measured in V-4, the pumping well, as well as in well V-2, during the constant discharge test using an Envirolabs electric data logger and a calibrated pressure transducer. Well V-2 was chosen as the most closely monitored observation well due to its proximity to well V-4. Well V-2 is located just eight feet west of well V-4. Proximity was the key issue because a steep cone of depression was anticipated.

Water level measurements were taken periodically from wells V-1, V-4 through V-7 and I-1, 2, and 3 using an electric water level meter. Water level measurements were not taken as frequently from wells V-7, I-2, and I-3 compared to other wells, due to problems with gaining access to the Central Expressway at night as well as for safety reasons.

All pumping tests were conducted using a Grunfus-stainless steel submersible pump. Discharged volume was measured using an in-line flow meter. The flow meter was field checked periodically during the test by calculating the time it took to fill a bucket of known volume. No problems with the pump or flow meter were observed during the test. Extracted ground water was transferred away from the well site using a two-inch flexible hose to the sanitary sewer correction at the Jasco facility. The long-term constant discharge consisted of a 36-hour pumping period followed by a recovery period. Twelve hours of recovery were planned prior to carrying out the test. In the field, it was determined that at least 90 percent recovery had occurred after only approximately 4.5 hours. Monitoring of wells V-2 and V-4 using the data logger was discontinued at that time. A final set of water level measurements were taken 48 hours after pumping began to document the final set of recovery data.

3. Quality Assurance Protocol

The following set of quality assurance guidelines were followed during the slug and pumping tests:

- Horizontal and vertical control for the pumping well and observation wells was established by a licensed surveyor to provide a reliable basis for water level measurements and pumping test calculations.

- The performance of the pump, generator and flow meter was monitored periodically throughout the pumping test to verify the quality of measurements as well as the continuity of the test.

- All equipment was thoroughly steam-cleaned and then rinsed with clean tap water prior to being lowered down the hole.

- A representative of Wahler Associates was on-site at all times during the test to verify the reliability of the data, as well as to make sure the equipment did not malfunction.

APPENDIX B

Step Discharge Test: V-4

9-28-87

Q=1.2gpm, 2.81gpm, 2.69gpm, 2.16gpm, 2.07gpm, 6.08gpm, 4.56gpm

Time	ch	H(ft)
14:52	HRS 7	7.35
14:51	HRS 7	7.37
14:50	HRS 7	7.40
14:49	HRS 7	7.42
14:48	HRS 7	7.45
14:47	HRS 7	7.45
14:46	HRS 7	7.47
14:45	HRS 7	7.50
14:44	HRS 7	7.52
14:43	HRS 7	7.55
14:42	HRS 7	7.57
14:41	HRS 7	7.60
14:40	HRS 7	7.62
14:39	HRS 7	7.65
14:38	HRS 7	7.67
14:37	HRS 7	7.70
14:36	HRS 7	7.72
14:35	HRS 7	7.75
14:34	HRS 7	7.80
14:33	HRS 7	7.82
14:32	HRS 7	7.85
14:31	HRS 7	7.90
14:30	HRS 7	7.95
14:29	HRS 7	8.00
14:28	HRS 7	8.07
14:27	HRS 7	8.15
14:26	HRS 7	8.22
14:25	HRS 7	8.30
14:24	HRS 7	8.52
14:23	HRS 7	8.92
14:22	HRS 7	9.55
14:21	HRS 7	9.52
14:20	HRS 7	9.52
14:19	HRS 7	9.52
14:18	HRS 7	9.55
14:17	HRS 7	9.55
14:16	HRS 7	9.57
14:15	HRS 7	9.57
14:14	HRS 7	9.60
14:13	HRS 7	9.57
14:12	HRS 7	9.57
14:11	HRS 7	9.57
14:10	HRS 7	9.57
14:09	HRS 7	9.57
14:08	HRS 7	9.60
14:07	HRS 7	9.55
14:06	HRS 7	9.37
14:05	HRS 7	7.42
14:04	HRS 7	10.85
14:03	HRS 7	10.85
14:02	HRS 7	10.85
14:01	HRS 7	10.85
14:00	HRS 7	10.15
13:59	HRS 87/09/15	=19

Begin test

Time	ch	H(ft)
15:53	HRS 7	9.37
15:52	HRS 7	9.22
15:51	HRS 7	9.02
15:50	HRS 7	8.70
15:49	HRS 7	7.80
15:48	HRS 7	7.07
15:47	HRS 7	6.95
15:46	HRS 7	6.80
15:45	HRS 7	6.57
15:44	HRS 7	6.17
15:43	HRS 7	5.17
15:42	HRS 7	3.20
15:41	HRS 7	2.25
15:40	HRS 7	2.42
15:39	HRS 7	2.55
15:38	HRS 7	2.62
15:37	HRS 7	2.50
15:36	HRS 7	1.82
15:35	HRS 7	2.90
15:34	HRS 7	7.85
15:33	HRS 7	7.85
15:32	HRS 7	7.82
15:31	HRS 7	7.82
15:30	HRS 7	7.82
15:29	HRS 7	7.82
15:28	HRS 7	7.82
15:27	HRS 7	7.82
15:26	HRS 7	7.80
15:25	HRS 7	7.80
15:24	HRS 7	7.80
15:23	HRS 7	7.77
15:22	HRS 7	7.77
15:21	HRS 7	7.77
15:20	HRS 7	7.75
15:19	HRS 7	7.72
15:18	HRS 7	7.70
15:17	HRS 7	7.65
15:16	HRS 7	7.57
15:15	HRS 7	7.15
15:14	HRS 7	7.17
15:13	HRS 7	7.12
15:12	HRS 7	7.12
15:11	HRS 7	7.12
15:10	HRS 7	7.15
15:09	HRS 7	7.15
15:08	HRS 7	7.15
15:07	HRS 7	7.17
15:06	HRS 7	7.17
15:05	HRS 7	7.20
15:04	HRS 7	7.20
15:03	HRS 7	7.22
15:02	HRS 7	7.22
15:01	HRS 7	7.25
15:00	HRS 7	7.25
14:59	HRS 7	7.27
14:58	HRS 7	7.27
14:57	HRS 7	7.30
14:56	HRS 7	7.30
14:55	HRS 7	7.32
14:54	HRS 7	7.32
14:53	HRS 7	7.35

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STEP DRAWDOWN TEST

WELL PUMPING/TESTING DATA SHEET

JOB NO. : JCO-1041H WELL NO. : V-4 DATE: 9-28-87 PUMPED/TESTED BY: RGA/C

WELL DIA.: 4" Pumping Method: Grönfos Submersible Weather: Sunny + warm

REFERENCE POINT: Pressure Transducer REFERENCE ELEVATION: —

INITIAL DEPTH TO WATER: _____ INITIAL DEPTH OF OPEN WELL: _____

INITIAL HEIGHT OF WATER COLUMN IN WELL: _____

VOLUME OF 1 CASING FULL OF WATER: _____ CU. FEET

(PI x R^2 x H), IN FT^3 _____ x 7.479 = _____ GAL.

CLOCK TIME	STEP number	Volume Pumped per Q-estimate (gallons)	Depth of water above probe (FT)	Q (gpm)	Meter reading (FT^3)
1347.23	1	0	10.82	—	12087.45
1406.42	1	5	9.57	—	12088.27
1410.35	1	10	(9.57)	1.2	12089.57
—	SAME Q	—	—	—	—
1416.45	1A	0	9.57	—	12089.97
1420.31	1A	5	9.52	1.19	12090.57
1422.45	Δ Q	—	(9.52)	—	12090.93
1424.00	2	0	8.47	—	12091.44
1425.46	2	5	8.22	2.81	12092.10
1426.12	2	—	8.07	—	—
1456.20	2	—	7.30	—	—
1456.30	Δ Q	—	-	—	—
1457.00	3	0	7.27	—	12103.24
1500.00	3	8	7.22	2.69	12104.32
1504.30	3	—	7.20	—	12106.94
1509.30	3A	0	7.15	—	12107.72
1512.30	3A	8	7.12	2.71	12108.79
—	Δ Q	—	—	—	—
1516.30	4	0	7.65	—	12110.06
1519.30	4	6.5	7.77	2.16	12110.93

NO. OF CASINGS FULL PUMPED: _____

Depth Sampled: _____

SAMPLES TAKEN: _____

PRESERVATIVE: _____

( ) - water level is stable

Wahler Associates

STEP DRAWDOWN TEST

WELL PUMPING/TESTING DATA SHEET

JOB NO. : JCO-104H WELL NO. : V-4 DATE: 8-28-87 PUMPED/TESTED BY: RGB/D

WELL DIA.: 4" Pumping Method: Grinfos Submersible Weather: Sunny + warm

REFERENCE POINT: Pressure Transducer REFERENCE ELEVATION: —

INITIAL DEPTH TO WATER: _____ INITIAL DEPTH OF OPEN WELL: _____

INITIAL HEIGHT OF WATER COLUMN IN WELL: _____

VOLUME OF 1 CASING FULL OF WATER: _____ CU. FEET

(PI x R^2 x H), IN FT^3 _____ x 7.479 = _____ GAL.

CLOCK TIME	STEP NUMBER	VOLUME PUMPED PER Q-ESTIMATE (gallons)	DEPTH OF WATER ABOVE PROBE (FT)	Q (GPM)	METER READING (FT^3)
1527.00	5	0	7.82	—	12112.56
1530.00	5	6.2	7.82	2.07	12113.79
15330.30	5	—	7.82	—	12114.75
—	ΔQ	—	—	—	—
1537.30	6	0	7.72	—	12118.23
1540.30	6	18.25	2.51	6.08	12120.67
—	ΔQ	—	—	—	—
1543.15	7	0	6.82	—	12121.04
1546.15	7	13.7	6.90	4.56	12122.87
		Conclusion:			
		PUMP AT 2.0-2.2gpm			
		During Constant Discharge			
		Test			

NO. OF CASINGS FULL PUMPED: _____

Depth Sampled: _____

SAMPLES TAKEN: _____

PRESERVATIVE: _____

Wahler Associates

CALCULATION SHEET

SHEET 1 OF 2 SHEETS

PROJECT Jasco Chemical Corporation PROJECT NO. JCO-104 H

SUBJECT Step - Drawdown Test

FILE

CALCULATED BY D.S. CHECKED BY A.C. DATE 9/28/87

Step - Drawdown Test

Jacob Solution (1946):

$$s = \underbrace{BQ}_{\text{Av. head loss}} + \underbrace{CQ^2}_{\text{Well head loss}}$$

s — drawdown in well, ft

Q — discharge rate, ft^3/min

B — constant

C — well loss coefficient

By Bierschenk's method of analysis (Driscoll, 1986):

$$\frac{s}{Q} = B + CQ$$

plot s/Q vs. Q } Two data points chosen:

$Q_1 = 1.2$ gpm $= 0.16$ ft^3/min

$Q_2 = 2.7$ gpm $= 0.36$ ft^3/min

Q (ft^3/min)	s (ft)	s/Q (min/ft^2)
$Q_1 = 0.16$	$s_1 = 1.33$	$s_1/Q_1 = 8.31$
$Q_2 = 0.36$	$s_2 = 3.73$	$s_2/Q_2 = 10.36$

From graph:

$$\boxed{\begin{aligned} B &= 6.6 \ min/ft^2 \\ C &= 10.25 \ min^2/ft^5 \end{aligned}}$$

Wahler Associates

CALCULATION SHEET

PROJECT

PROJECT NO. JCO-104H

SUBJECT Step-Drawdown Test

FILE

CALCULATED BY D.S. CHECKED BY A.C. DATE 9/28/87

$$\therefore \boxed{s = 6.6\,Q + 10.25\,Q^2}$$

Check

$Q_1 = 0.16\ ft^3/min$

$s = (6.6\ min/ft^2)(.16\ ft^3/min) + (10.25\ min^2/ft^5)(0.0256\ ft^6/min^2)$

$s_1 = 1.06' + 0.26' = 1.32'$ // , similar to what measured.

$Q_2 = 0.36\ ft^3/min$

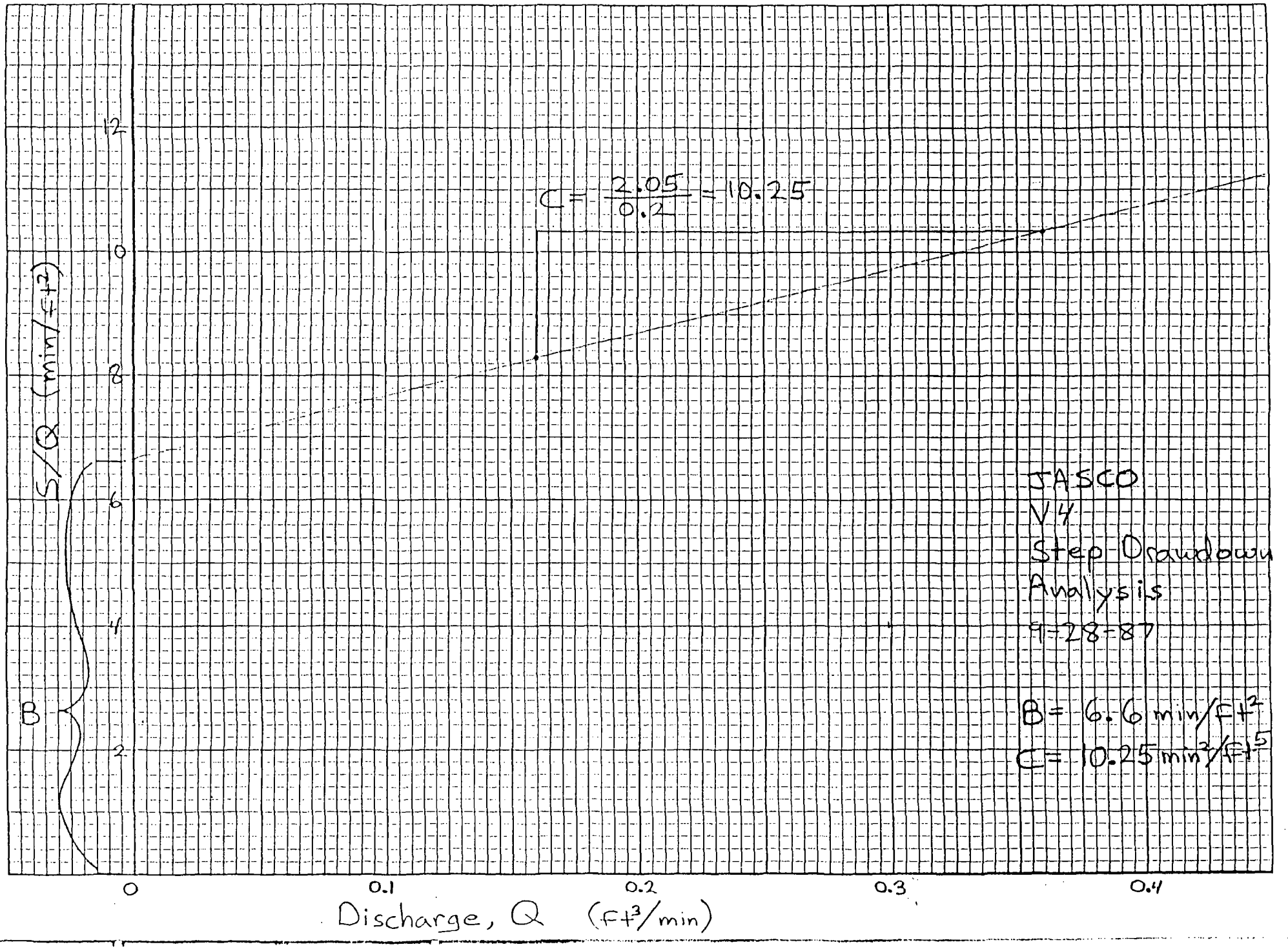
$s_2 = (6.6\ min/ft^2)(.36\ ft^3/min) + (10.25\ min^2/ft^5)(0.1296\ ft^6/min^2)$

$s_2 = 2.38' + 1.33' = 3.71'$ //

When $Q = 2\ gpm\ (0.27\ ft^3/min)$

$s = 6.6 \times 0.27 + 10.25 \times (0.27)^2$

$s = 2.53'$ desirable drawdown


$C = \frac{2.05}{0.2} = 10.25$
S/Q (min/ft²)
12
10
8
6
4
2
B
0
0.1
0.2
0.3
0.4
Discharge, Q (ft³/min)
JASCO
V4
Step Drawdown
Analysis
9-28-87
B = 6.6 min/ft²
C = 10.25 min²/ft⁵

APPENDIX C

CONSTANT-DISCHARGE TEST DATA AND CALCULATIONS

Methods of Analysis

1. Hantush-Jacob Method (1955):

General equation for leaky confined aquifer:

$$T = \frac{Q}{4\pi s} W(u, r/B)$$

s - drawdown
Q - discharge rate
T - transmissivity
W(u,r/B) - well function

dimensionless parameter $r/B = r\sqrt{\frac{K'}{K_1 b_1 b'}}$

K' - hydraulic conductivity of the leaky aquitard

K_1 - hydraulic conductivity of the aquifer being tested

b' - thickness of the leaky aquitard

b_1 - thickness of the aquifer being tested

assumptions

- The aquifer is confined on top and bottom by aquitards. One of the aquitards may be leaky.
- The aquifer is level and infinte in horizontal extent.
- The aquifer is homogeneous and isotropic
- The pumping well fully penetrates the aquifer.
- Discharge from the well is at a constant rate.
- There is no storage within the well itself.
- The storativity of the leaky aquitard is zero.

2. Jacob Straight Line Method (Freeze and Cherry, 1979):

$$T = \frac{2.3\,Q}{4\pi\,\Delta(h_o - h)} \quad ; \quad S = \frac{2.25\,T\,t_o}{r^2}$$

T - transmissivity (ft^2/min)

S - storativity

Q - discharge rate (ft^3/min)

r - radial distance from pumping to observation well (ft)

$\Delta(h_o - h)$ - drawdown for one log cycle of time

t_o - time intercept on semi-log plot

assumptions and limitations:

- Assumptions are similar to those of Hantush and Jacob method
- this method is well suited to the analysis of bounded confined aquifers and small r, i.e., observation well close to pumping well.

3. Theis non-equilibrium equation modified by Cooper and Jacob (1946) for Recovery Data (Driscoll, 1986):

$$T = \frac{Q}{4\pi(s_1 - s_2)} \ln\left(\frac{(t_1/t_1')}{(t_2/t_2')}\right)$$

T - transmissivity (ft^2/min)

Q - discharge rate (ft^3/min)

$s_{1,2}$ - residual drawdown (ft)

$t_{1,2}$ - time since pumping began (min)

$t'_{1,2}$ - time since pumping stopped (min)

4. Determining Hydraulic Conductivity:

$$K = T/b$$

K - hydraulic conductivity (ft/min)

T - transmissivity (ft^2/min)

b - aquifer thickness (ft)

5. Determining Seepage Velocity:
By Darcy's Law,

$$v = K \cdot \frac{dh}{dl} \cdot \frac{1}{n}$$

v - seepage velocity (ft/min)

K - hydraulic conductivity

$\frac{dh}{dl}$ - hydraulic gradient

n - effective porosity

Constant Discharge Pumping Test: V-4
9/29-30, 10/1/87
Q=2.07gpm, 2.40gpm

Time	V-4 Ch	V-4 H(ft)	V-2 ch	V-2 H(ft)
12:06:20	7	9.00	8	4.52
12:06:10	7	9.00	8	4.55
12:06:00	7	9.02	8	4.55
12:05:50	7	9.02	8	4.55
12:05:40	7	9.02	8	4.57
12:05:30	7	9.05	8	4.57
12:05:20	7	9.05	8	4.60
12:05:10	7	9.07	8	4.60
12:05:00	7	9.10	8	4.62
12:04:50	7	9.10	8	4.62
12:04:40	7	9.10	8	4.62
12:04:30	7	9.12	8	4.65
12:04:20	7	9.15	8	4.67
12:04:10	7	9.15	8	4.67
12:04:00	7	9.17	8	4.70
12:03:50	7	9.17	8	4.70
12:03:40	7	9.20	8	4.72
12:03:30	7	9.22	8	4.75
12:03:20	7	9.22	8	4.77
12:03:10	7	9.25	8	4.77
12:03:00	7	9.27	8	4.80
12:02:50	7	9.30	8	4.82
12:02:40	7	9.32	8	4.85
12:02:30	7	9.35	8	4.87
12:02:20	7	9.37	8	4.90
12:02:10	7	9.40	8	4.92
12:02:00	7	9.42	8	4.95
12:01:55	7	9.45	8	4.97
12:01:50	7	9.47	8	4.97
12:01:45	7	9.47	8	5.00
12:01:40	7	9.50	8	5.00
12:01:35	7	9.52	8	5.02
12:01:30	7	9.55	8	5.05
12:01:25	7	9.57	8	5.05
12:01:20	7	9.60	8	5.07
12:01:15	7	9.62	8	5.10
12:01:10	7	9.65	8	5.10
12:01:05	7	9.67	8	5.12
12:01:00	7	9.70	8	5.15
12:00:55	7	9.75	8	5.17
12:00:50	7	9.80	8	5.17
12:00:45	7	9.82	8	5.20
12:00:40	7	9.87	8	5.22
12:00:35	7	9.95	8	5.25
12:00:30	7	10.00	8	5.27
12:00:25	7	10.07	8	5.27
12:00:20	7	10.17	8	5.30
12:00:15	7	10.27	8	5.32
12:00:10	7	10.40	8	5.35
12:00:05	7	10.57	8	5.35
12:00:00	7	10.80	8	5.35
12:54 [illegible] 87/09 11 #19				
Begin test				

Time	V-4 ch	V-4 H(ft)	V-2 ch	V-2 H(ft)
12:56:00	7	8.35	8	4.02
12:55:00	7	8.37	8	4.02
12:54:00	7	8.37	8	4.02
12:53:00	7	8.37	8	4.02
12:52:00	7	8.37	8	4.02
12:51:00	7	8.37	8	4.02
12:50:00	7	8.37	8	4.02
12:49:00	7	8.40	8	4.02
12:48:00	7	8.40	8	4.02
12:47:00	7	8.40	8	4.05
12:46:00	7	8.40	8	4.02
12:45:00	7	8.40	8	4.02
12:44:00	7	8.42	8	4.05
12:43:00	7	8.42	8	4.05
12:42:00	7	8.42	8	4.05
12:41:00	7	8.42	8	4.05
12:40:00	7	8.45	8	4.05
12:39:00	7	8.45	8	4.05
12:38:00	7	8.47	8	4.07
12:37:00	7	8.47	8	4.07
12:36:00	7	8.47	8	4.07
12:35:00	7	8.47	8	4.07
12:34:00	7	8.50	8	4.07
12:33:00	7	8.50	8	4.07
12:32:00	7	8.50	8	4.10
12:31:00	7	8.52	8	4.10
12:30:00	7	8.52	8	4.10
12:29:00	7	8.52	8	4.10
12:28:00	7	8.55	8	4.12
12:27:00	7	8.55	8	4.12
12:26:00	7	8.55	8	4.15
12:25:00	7	8.57	8	4.15
12:24:00	7	8.57	8	4.15
12:23:00	7	8.60	8	4.17
12:22:00	7	8.60	8	4.17
12:21:00	7	8.62	8	4.20
12:20:00	7	8.65	8	4.20
12:19:00	7	8.65	8	4.22
12:18:00	7	8.67	8	4.22
12:17:00	7	8.67	8	4.25
12:16:00	7	8.70	8	4.25
12:15:00	7	8.72	8	4.27
12:14:00	7	8.72	8	4.27
12:13:00	7	8.75	8	4.30
12:12:00	7	8.77	8	4.32
12:11:00	7	8.80	8	4.35
12:10:00	7	8.82	8	4.37
12:09:00	7	8.87	8	4.42
12:08:00	7	8.90	8	4.45
12:07:00	7	8.95	8	4.50
12:06:50	7	8.97	8	4.50
12:06:40	7	8.97	8	4.50
12:06:30	7	8.97	8	4.52

Constant Discharge pumping test: V-4 (continued)
9/29-30, 10/1/87
Q=2.07gpm, 2.40gpm

Time	V-4 ch	V-4 H(ft)	V-2 ch	V-2 H(ft)
16:07:00	7	7.82	8	3.85
16:03:00	7	7.80	8	3.85
15:59:00	7	7.82	8	3.85
15:55:00	7	7.82	8	3.85
15:51:00	7	7.82	8	3.85
15:47:00	7	7.82	8	3.85
15:43:00	7	7.82	8	3.85
15:39:00	7	7.85	8	3.85
15:35:00	7	7.85	8	3.85
15:31:00	7	7.87	8	3.85
15:27:00	7	7.87	8	3.85
15:23:00	7	7.90	8	3.87
15:19:00	7	7.90	8	3.87
15:15:00	7	7.90	8	3.87
15:11:00	7	7.92	8	3.87
15:07:00	7	7.92	8	3.87
15:03:00	7	7.95	8	3.87
14:59:00	7	7.95	8	3.87
14:55:00	7	7.97	8	3.87
14:51:00	7	8.00	8	3.90
14:47:00	7	8.05	8	3.92
14:43:00	7	7.97	8	3.90
14:39:00	7	8.00	8	3.90
14:35:00	7	8.00	8	3.90
14:31:00	7	8.00	8	3.90
14:27:00	7	8.02	8	3.90
14:23:00	7	8.02	8	3.90
14:19:00	7	8.05	8	3.90
14:15:00	7	8.05	8	3.90
14:11:00	7	8.07	8	3.92
14:07:00	7	8.07	8	3.92
14:03:00	7	8.10	8	3.92
13:59:00	7	8.10	8	3.92
13:55:00	7	8.10	8	3.92
13:51:00	7	8.12	8	3.92
13:47:00	7	8.15	8	3.95
13:43:00	7	8.15	8	3.95
13:39:00	7	8.15	8	3.95
13:35:00	7	8.17	8	3.95
13:31:00	7	8.20	8	3.97
13:27:00	7	8.20	8	3.97
13:23:00	7	8.22	8	3.97
13:19:00	7	8.25	8	3.97
13:15:00	7	8.27	8	4.00
13:11:00	7	8.27	8	4.00
13:07:00	7	8.30	8	4.00
13:06:00	7	8.30	8	4.00
13:05:00	7	8.30	8	4.00
13:04:00	7	8.32	8	4.00
13:03:00	7	8.32	8	4.00
13:02:00	7	8.32	8	4.00
13:01:00	7	8.32	8	4.00
13:00:00	7	8.32	8	4.00
12:59:00	7	8.32	8	4.00
12:58:00	7	8.35	8	4.02
12:57:00	7	8.35	8	4.02

STATION ID = 04

Time	V-4 ch	V-4 H(ft)	V-2 ch	V-2 H(ft)
19:43:00	7	7.47	8	3.75
19:39:00	7	7.50	8	3.77
19:35:00	7	7.50	8	3.77
19:31:00	7	7.50	8	3.77
19:27:00	7	7.50	8	3.75
19:23:00	7	7.50	8	3.77
19:19:00	7	7.52	8	3.77
19:15:00	7	7.52	8	3.77
19:11:00	7	7.52	8	3.75
19:07:00	7	7.47	8	3.77
19:03:00	7	7.55	8	3.77
18:59:00	7	7.55	8	3.77
18:55:00	7	7.55	8	3.77
18:51:00	7	7.55	8	3.77
18:47:00	7	7.57	8	3.80
18:43:00	7	7.57	8	3.77
18:39:00	7	7.57	8	3.77
18:35:00	7	7.57	8	3.77
18:31:00	7	7.57	8	3.77
18:27:00	7	7.60	8	3.80
18:23:00	7	7.60	8	3.80
18:19:00	7	7.60	8	3.80
18:15:00	7	7.60	8	3.80
18:11:00	7	7.62	8	3.80
18:07:00	7	7.62	8	3.80
18:03:00	7	7.62	8	3.80
17:59:00	7	7.62	8	3.80
17:55:00	7	7.65	8	3.80
17:51:00	7	7.65	8	3.80
17:47:00	7	7.65	8	3.80
17:43:00	7	7.65	8	3.80
17:39:00	7	7.65	8	3.80
17:35:00	7	7.67	8	3.82
17:31:00	7	7.67	8	3.82
17:27:00	7	7.67	8	3.82
17:23:00	7	7.67	8	3.82
17:19:00	7	7.70	8	3.82
17:15:00	7	7.70	8	3.82
17:11:00	7	7.70	8	3.82
17:07:00	7	7.70	8	3.82
17:03:00	7	7.72	8	3.82
16:59:00	7	7.72	8	3.82
16:55:00	7	7.75	8	3.82
16:51:00	7	7.72	8	3.82
16:47:00	7	7.72	8	3.82
16:43:00	7	7.72	8	3.82
16:39:00	7	7.72	8	3.82
16:35:00	7	7.75	8	3.85
16:31:00	7	7.77	8	3.85
16:27:00	7	7.77	8	3.85
16:23:00	7	7.77	8	3.85
16:19:00	7	7.77	8	3.85
16:15:00	7	7.80	8	3.85
16:11:00	7	7.80	8	3.85

Constant Discharge test recovery data: V-4

V-4 V-2 10-1-87 V-4 V-2

Time	ch	H(ft)	ch	H(ft)	Time	ch	H(ft)	ch	H(ft)
00:16:21	7	9.90	8	4.57	01:42:21	7	10.65	8	5.32
00:15:21	7	9.87	8	4.52	01:38:21	7	10.65	8	5.32
00:14:21	7	9.82	8	4.50	01:34:21	7	10.62	8	5.32
00:13:21	7	9.77	8	4.45	01:30:21	7	10.62	8	5.30
00:12:21	7	9.72	8	4.37	01:26:21	7	10.60	8	5.27
00:11:21	7	9.65	8	4.32	01:22:21	7	10.60	8	5.27
00:10:21	7	9.55	8	4.25	01:18:21	7	10.57	8	5.25
00:10:11	7	9.52	8	4.22	01:14:21	7	10.55	8	5.22
00:10:01	7	9.50	8	4.22	01:10:21	7	10.55	8	5.22
00:09:51	7	9.47	8	4.20	01:09:21	7	10.52	8	5.22
00:09:41	7	9.45	8	4.17	01:08:21	7	10.52	8	5.20
00:09:31	7	9.42	8	4.17	01:07:21	7	10.52	8	5.20
00:09:21	7	9.42	8	4.15	01:06:21	7	10.52	8	5.20
00:09:11	7	9.40	8	4.15	01:05:21	7	10.52	8	5.20
00:09:01	7	9.37	8	4.12	01:04:21	7	10.50	8	5.20
00:08:51	7	9.35	8	4.10	01:03:21	7	10.50	8	5.17
00:08:41	7	9.35	8	4.10	01:02:21	7	10.50	8	5.17
00:08:31	7	9.32	8	4.07	01:01:21	7	10.50	8	5.17
00:08:21	7	9.30	8	4.05	01:00:21	7	10.47	8	5.17
00:08:11	7	9.27	8	4.05	00:59:21	7	10.47	8	5.15
00:08:01	7	9.27	8	4.02	00:58:21	7	10.47	8	5.15
00:07:51	7	9.22	8	4.00	00:57:21	7	10.47	8	5.15
00:07:41	7	9.22	8	3.97	00:56:21	7	10.45	8	5.15
00:07:31	7	9.17	8	3.95	00:55:21	7	10.45	8	5.12
00:07:21	7	9.17	8	3.92	00:54:21	7	10.45	8	5.12
00:07:11	7	9.12	8	3.90	00:53:21	7	10.45	8	5.12
00:07:01	7	9.10	8	3.87	00:52:21	7	10.42	8	5.12
00:06:51	7	9.07	8	3.85	00:51:21	7	10.42	8	5.10
00:06:41	7	9.02	8	3.82	00:50:21	7	10.42	8	5.10
00:06:31	7	9.00	8	3.80	00:49:21	7	10.42	8	5.10
00:06:21	7	8.95	8	3.77	00:48:21	7	10.40	8	5.07
00:04:11	7	8.92	8	3.75	00:47:21	7	10.40	8	5.07
00:06:01	7	8.87	8	3.70	00:46:21	7	10.40	8	5.07
00:05:51	7	8.82	8	3.67	00:45:21	7	10.37	8	5.05
00:05:41	7	8.77	8	3.65	00:44:21	7	10.37	8	5.05
00:05:31	7	8.70	8	3.62	00:43:21	7	9.97	8	5.05
00:05:21	7	8.65	8	3.57	00:42:21	7	10.35	8	5.02
00:05:16	7	8.60	8	3.57	00:41:21	7	10.35	8	5.02
00:05:11	7	8.57	8	3.55	00:40:21	7	10.35	8	5.02
00:05:06	7	8.52	8	3.52	00:39:21	7	10.32	8	5.00
00:05:01	7	8.47	8	3.52	00:38:21	7	10.32	8	5.00
00:04:56	7	8.42	8	3.50	00:37:21	7	10.30	8	4.97
00:04:51	7	8.35	8	3.47	00:36:21	7	10.30	8	4.97
00:04:46	7	8.27	8	3.47	00:35:21	7	10.27	8	4.95
00:04:41	7	8.22	8	3.45	00:34:21	7	10.27	8	4.95
00:04:36	7	8.12	8	3.42	00:33:21	7	10.25	8	4.92
00:04:31	7	8.05	8	3.42	00:32:21	7	10.25	8	4.92
00:04:26	7	7.95	8	3.40	00:31:21	7	10.22	8	4.90
00:04:21	7	7.85	8	3.40	00:30:21	7	10.22	8	4.90
00:04:16	7	7.72	8	3.37	00:29:21	7	10.20	8	4.87
00:04:11	7	7.60	8	3.35	00:28:21	7	10.17	8	4.85
00:04:06	7	7.47	8	3.35	00:27:21	7	10.17	8	4.85
00:04:01	7	7.30	8	3.32	00:26:21	7	10.15	8	4.82
00:03:56	7	7.15	8	3.32	00:25:21	7	10.12	8	4.80
00:03:51	7	6.95	8	3.30	00:24:21	7	10.12	8	4.80
00:03:46	7	6.75	8	3.30	00:23:21	7	10.10	8	4.77
00:03:41	7	6.52	8	3.30	00:22:21	7	10.07	8	4.75
00:03:36	7	6.27	8	3.30	00:21:21	7	10.05	8	4.72
00:03:31	7	6.00	8	3.30	00:20:21	7	10.02	8	4.70
00:03:26	7	5.92	8	3.30	00:19:21	7	10.00	8	4.67
00:03:21	7	5.92	8	3.30	00:18:21	7	9.97	8	4.65
00:00 HRS 87/10/01 #19					00:17:21	7	9.92	8	4.60

Begin recovery

Constant Discharge test Recovery Data: V-4 (continued)

10-1-87

Time	V-4 ch	V-4 H(ft)	V-2 ch	V-2 H(ft)
04:38:21	7	10.85	8	5.55
04:34:21	7	10.85	8	5.55
04:30:21	7	10.85	8	5.55
04:26:21	7	10.85	8	5.55
04:22:21	7	10.85	8	5.55
04:18:21	7	10.85	8	5.52
04:14:21	7	10.85	8	5.55
04:10:21	7	10.82	8	5.52
04:06:21	7	10.85	8	5.52
04:34:21	7	10.85	8	5.52
03:58:21	7	10.82	8	5.52
03:54:21	7	10.82	8	5.52
03:50:21	7	10.82	8	5.52
03:46:21	7	10.82	8	5.52
03:42:21	7	10.82	8	5.52
03:38:21	7	10.82	8	5.52
03:34:21	7	10.82	8	5.50
03:30:21	7	10.82	8	5.50
03:26:21	7	10.80	8	5.50
03:22:21	7	10.80	8	5.50
03:18:21	7	10.80	8	5.50
03:14:21	7	10.80	8	5.50
03:10:21	7	10.80	8	5.47
03:06:21	7	10.80	8	5.47
03:02:21	7	10.80	8	5.47
02:58:21	7	10.80	8	5.47
02:54:21	7	10.77	8	5.47
02:50:21	7	10.77	8	5.45
02:46:21	7	10.77	8	5.45
02:42:21	7	10.77	8	5.45
02:38:21	7	10.77	8	5.45
02:34:21	7	10.75	8	5.42
02:30:21	7	10.75	8	5.42
02:26:21	7	10.75	8	5.42
02:22:21	7	10.75	8	5.42
02:18:21	7	10.72	8	5.40
02:14:21	7	10.72	8	5.40
02:10:21	7	10.72	8	5.40
02:06:21	7	10.72	8	5.40
02:02:21	7	10.70	8	5.37
01:58:21	7	10.70	8	5.37
01:54:21	7	10.67	8	5.35
01:50:21	7	10.67	8	5.35
01:46:21	7	10.67	8	5.35

Wahler Associates

WELL PUMPING/TESTING DATA SHEET

JOB NO. : JCO-1041t WELL NO. : V-4 DATE: 9/29, 30, 10/1/87 PUMPED/TESTED BY: RGB/DS

WELL DIA.: 4" Pumping Method: Grünfus Submersible Weather: Sunny + warm.

REFERENCE POINT: TOP of Protective Casing (Pressure Transducer) REFERENCE ELEVATION: 58.54'

INITIAL DEPTH TO WATER: 24.40 INITIAL DEPTH OF OPEN WELL: 35'

INITIAL HEIGHT OF WATER COLUMN IN WELL: 10.6'

VOLUME OF 1 CASING FULL OF WATER: 0.23 CU. FEET

(PI x R^2 x H), IN FT^3 0.23 x 7.479 = 1.73 GAL.

CLOCK TIME	TIME ELAPSED	TOTAL VOLUME PUMPED (gallons)	DEPTH TO WATER (feet)	Δh $(h_o - h)$	COMMENTS & OBSERVATIONS
1109.54	0	0	24.40	h_o	measured w/ M-Scope 9/29
1131.00	0	0	10.97	$-h_o$	depth of H2O above Transducer
1200.00	0	0	10.82		Begin test. at 12:00
					WATER LEVELS
					RECORDED USING
					DATA LOGGER
0100	37	4566.38	10.55		depth of H2O above Transducer
0300	39	4566.38	10.80		depth of H2O above Transducer
1148.40	48	4566.38	24.52		measured w/ M-Scope

NO. OF CASINGS FULL PUMPED: _____

Depth Sampled: _____

SAMPLES TAKEN: _____

PRESERVATIVE: _____

NOTE: 24.40' = 10.97' = STATIC recorded on Channel 7

Wahler Associates

WELL PUMPING/TESTING DATA SHEET

JOB NO. : JCO-1041H WELL NO. : V-4 DATE: 9/29,30, 10/1/07 PUMPED/TESTED BY: RGB/DS

WELL DIA.: 4" Pumping Method: Grundfos Submersible Weather: Sunny + warm.

REFERENCE POINT: Pressure Transducer REFERENCE ELEVATION: —

INITIAL DEPTH TO WATER: 24.40 INITIAL DEPTH OF OPEN WELL: 35'

INITIAL HEIGHT OF WATER COLUMN IN WELL: 10.6'

VOLUME OF 1 CASING FULL OF WATER: 0.23 CU. FEET

(PI x R^2 x H), IN FT^3 0.23 x 7.479 = 1.73 GAL.

INITIAL METER READIN = 12126.17

CLOCK TIME	TIME ELAPSED	METER READING (FT^3)	DEPTH OF WATER ABOVE PROBE (FEET)	Q (cfs)	COMMENTS & OBSERVATIONS
1605.30	4 hours	12189.13	7.80	2.04	9/29
1750.45	5	12205.71	7.72	2.02	
1800.30	6	12224.69	7.62	2.07	
1900.30	7	12241.05	7.52	2.02	
2000.45	8	12257.50	7.45	2.04	
2100.45	9	12273.86	7.37	2.02	
2158.30	10	12289.61	7.32	2.02	
2259.30	11	12306.20	7.25	2.07	
2357.30	12	12322.94	7.25	2.09	9/30
NO DATA	13	NO DATA	NO DATA	NO DATA	
0203.30	14	12356.08	7.17	1.99	
NO DATA	15	NO DATA	NO DATA	NO DATA	
0402.30	16	12388.16	7.10	2.02	
NO DATA	17	NO DATA	NO DATA	NO DATA	
0601.30	18	12420.23	7.02	2.02	
0704.00	19	12437.05	6.97	2.02	
0758.00	20	12451.57	6.92	1.99	
0900.00	21	12468.23	6.87	2.02	
0958.00	22	12483.815	6.85	2.01	
1105.00	23	12501.60	6.80	1.98	

NO. OF CASINGS FULL PUMPED: 2648.78 = 4582.40 gal NOTE: 10.97 = Static

Depth Sampled: —

SAMPLES TAKEN: —

PRESERVATIVE: —

Total Drawdown = 10.97 - 5.92 = 5.05'

Recorded on Channel 7

Wahler Associates

WELL PUMPING/TESTING DATA SHEET

JOB NO. : JCO-1041H WELL NO. : U-4 DATE: 9/29-30, 10/1/87 PUMPED/TESTED BY: RGB

WELL DIA.: 4" Pumping Method: Grinfos Submersible Weather: Sunny + warm

REFERENCE POINT: Pressure Transducer REFERENCE ELEVATION: —

INITIAL DEPTH TO WATER: 24.40 INITIAL DEPTH OF OPEN WELL: 35'

INITIAL HEIGHT OF WATER COLUMN IN WELL: 10.6'

VOLUME OF 1 CASING FULL OF WATER: 0.23 CU. FEET

(PI x R^2 x H), IN FT^3 0.23 x 7.479 = 1.73 GAL.

CLOCK TIME	TIME ELAPSED	METER READING (cfs)	Depth of water above probe (ft)	Q (cfs)	COMMENTS & OBSERVATIONS
1200.00	24	12516.38	6.77	2.01	
1300.00	25	12532.51	6.82	2.01	
1359.00	26	12551.91	6.25*	2.41*	Q increased at 1315
1500.00	27	12569.79	6.17	2.23	
1604.00	28	12589.94	6.17	2.35	
1700.00	29	12607.54	6.12	2.35	
1800.00	30	12626.39	6.10	2.35	
1900.00	31	12645.20	6.07	2.34	
2000.00	32	12663.95	6.02	2.34	
2100.00	33	12682.66	6.00	2.33	
2200.00	34	12701.37	6.00	2.33	
2300.00	35	12720.07	5.97	2.33	
2400.00	36	12738.79	5.92	2.33	END OF PUMPING 10/1

NO. OF CASINGS FULL PUMPED: —

Depth Sampled: —

SAMPLES TAKEN: —

PRESERVATIVE: —

Note: 10.97 = STATIC

Total Drawdown = 10.97 - 5.92 = 5.05'

Recorded on Channel 7

Wahler Associates

WELL PUMPING/TESTING DATA SHEET

JOB NO. : JCO-1041t WELL NO. : V-2 DATE: 9/29-30, 10/1/87 PUMPED/TESTED BY RGB/DS

WELL DIA.: 2" Pumping Method: OBSERVATION WELL Weather: sunny and warm

REFERENCE POINT: Pressure Transducer/ TOP of Christy REFERENCE ELEVATION: ?/ 57.38'

INITIAL DEPTH TO WATER: 23.23' INITIAL DEPTH OF OPEN WELL: 35'

INITIAL HEIGHT OF WATER COLUMN IN WELL: 11.77'

VOLUME OF 1 CASING FULL OF WATER: 0.26' CU. FEET

(PI x R^2 x H), IN FT^3 0.26 x 7.479 = 1.92 GAL.

CLOCK TIME	TIME ELAPSED	TOTAL VOLUME PUMPED (gallons)	DEPTH TO WATER (feet)	Δh (h_o - h)	COMMENTS & OBSERVATIONS
29 1107.52	0	0	23.23	= depth to H_2O	9-29 (M-SCOPE)
1127.40	0	0	5.50	depth of = water above probe	TEST BEGINS AT 1200
					WATER LEVELS
					RECORDED USING
					DATA LOGGER
0055.15	37	4566.38	5.25	-0.25	10-1 (Recovery)
0256.21	39	4566.38	5.47	-0.03	
1150.20	48	4566.38	23.32	-0.09	96% recovered (measured w/ m-scope)

NO. OF CASINGS FULL PUMPED: _____

Depth Sampled: _____

SAMPLES TAKEN: _____

PRESERVATIVE: _____

Note: 23.23 = 5.50 = StDC recorded on channel 8

Wahler Associates

WELL PUMPING/TESTING DATA SHEET

JOB NO. : JCO-1041 WELL NO. : V-2 DATE: 9/29,30, 10/1/07 PUMPED/TESTED BY: RGB/DS

WELL DIA.: " Pumping Method: OBSERVATION WELL Weather: Sunny + Warm.

REFERENCE POINT: Pressure Transducer REFERENCE ELEVATION: —

INITIAL DEPTH TO WATER: 23.23 INITIAL DEPTH OF OPEN WELL: 35'

INITIAL HEIGHT OF WATER COLUMN IN WELL: 11.77

VOLUME OF 1 CASING FULL OF WATER: 0.26 CU. FEET

(PI x R^2 x H), IN FT^3 0.26 x 7.479 = 1.92 GAL. STATIC LEVEL = 5.50'

CLOCK TIME	TIME ELAPSED	V-4 METER READING (FT^3)	DEPTH OF WATER ABOVE PROBE (FEET)	Q (CFS)	COMMENTS & OBSERVATIONS
1605.30	4 hrs	12189.13	3.85	2.04	9/29
1750.45	5	12205.71	3.82	2.02	
1800.30	6	12224.69	3.80	2.07	
1900.30	7	12241.05	3.77	2.02	
2000.45	8	12257.50	3.75	2.04	
2100.45	9	12273.86	3.72	2.02	
2158.30	10	12289.61	3.70	2.02	
2259.30	11	12306.20	3.70	2.07	
2357.30	12	12322.94	3.72	2.09	9/30
NO DATA	13	NO DATA	NO DATA	NO DATA	
0203.30	14	12356.08	3.75	1.99	
NO DATA	15	NO DATA	NO DATA	NO DATA	
0402.30	16	12388.16	3.72	2.02	
NO DATA	17	NO DATA	NO DATA	NO DATA	
0601.30	18	12420.23	3.72	2.02	
0704.00	19	12437.05	3.70	2.02	
0758.00	20	12451.57	3.70	1.99	
0900.00	21	12468.23	3.67	2.02	
0958.00	22	12483.815	3.65	2.01	
1105.00	23	12501.60	3.65	1.98	

NO. OF CASINGS FULL PUMPED: —

Depth Sampled: —

SAMPLES TAKEN: —

PRESERVATIVE: —

Note: recorded on channel 8

Total Drawdown = 5.50' - 3.30 = 2.20'

Wahler Associates

WELL PUMPING/TESTING DATA SHEET

JOB NO. : JCO-1041 WELL NO. : U-2 DATE: 9/29-30, 10/1/87 PUMPED/TESTED BY: RGB

WELL DIA.: 2" Pumping Method: OBSERVATION-WELL Weather: Sunny + warm

REFERENCE POINT: Pressure Transducer REFERENCE ELEVATION: —

INITIAL DEPTH TO WATER: 23.23' INITIAL DEPTH OF OPEN WELL: 35'

INITIAL HEIGHT OF WATER COLUMN IN WELL: 11.77'

VOLUME OF 1 CASING FULL OF WATER: 0.26 CU. FEET

(PI x R^2 x H), IN FT^3 0.26 x 7.479 = 1.92 GAL.

CLOCK TIME	TIME ELAPSED	U-4 METER READING (CFS)	Depth of water above probe (ft)	Q (cfs)	COMMENTS & OBSERVATIONS
1200.00	24	12516.38	3.65	2.01	
1300.00	25	12532.51	3.67	2.01	
1359.00	26	12551.91	3.42*	2.41*	Q increased at 1315
1500.00	27	12569.79	3.40	2.23	
1604.00	28	12589.94	3.40	2.35	
1700.00	29	12607.54	3.37	2.35	
1800.00	30	12626.39	3.37	2.35	
1900.00	31	12645.20	3.37	2.34	
2000.00	32	12663.95	3.35	2.34	
2100.00	33	12682.66	3.35	2.33	
2200.00	34	12701.37	3.32	2.33	
2300.00	35	12720.07	3.32	2.33	
2400.00	36	12738.79	3.30	2.33	END OF PUMPING 10/1

NO. OF CASINGS FULL PUMPED: _____

Depth Sampled: _____

SAMPLES TAKEN: _____

PRESERVATIVE: _____

Note: recorded on Channel 8

Total Drawdown = 5.50 - 3.30 = 2.20'

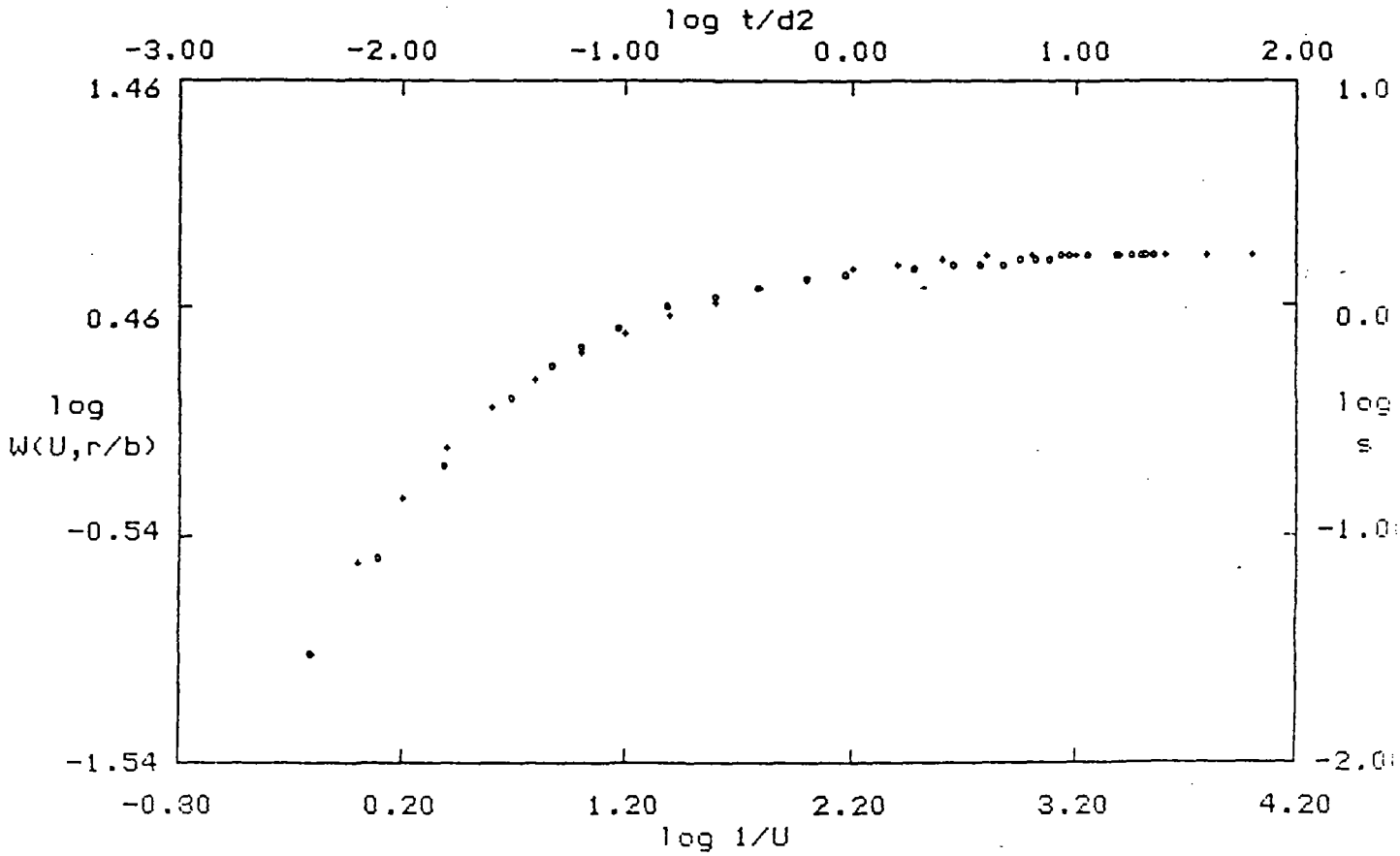
Hantush - Jacob Method (by GWAP)

Data for Pump Test

Well Name: V4a Date of Test: 9/29/87
Well Number: 1
Pumped Well Discharge(Q) = 2.05 gpm
Pumped Well Radius(r) = 0.17 feet
Distance(d) of Observation Well from Pumped Well = 8.00 feet (V2)

Entry No.	Time(t) (min.)	Drawdown(s) (ft.)	t / d^2 (min./sq.ft.)
1	0.000	0.000	0.00E+00
2	0.250	0.030	3.91E-03
3	0.500	0.060	7.81E-03
4	1.000	0.200	1.56E-02
5	2.000	0.400	3.13E-02
6	3.000	0.550	4.69E-02
7	4.000	0.650	6.25E-02
8	6.000	0.800	9.38E-02
9	10.000	0.980	1.56E-01
10	16.000	1.100	2.50E-01
11	25.000	1.200	3.91E-01
12	40.000	1.300	6.25E-01
13	60.000	1.350	9.38E-01
14	119.000	1.430	1.86E+00
15	179.000	1.480	2.80E+00
16	240.000	1.500	3.75E+00
17	300.000	1.530	4.69E+00
18	360.000	1.550	5.63E+00
19	420.000	1.580	6.56E+00
20	480.000	1.600	7.50E+00
21	540.000	1.630	8.44E+00
22	600.000	1.650	9.38E+00
23	720.000	1.630	1.13E+01
24	960.000	1.630	1.50E+01
25	1140.000	1.650	1.78E+01
26	1260.000	1.680	1.97E+01
27	1320.000	1.680	2.06E+01
28	1440.000	1.680	2.25E+01

PUMP TEST DATA (V4)



o - Data

+ - Type Curve
Confined Leaky: r/B = 0.10

SOLUTION

Transmissivity = 6.289E-02 ft.2/min.
Storativity = 1.587E-03

Wahler Associates

CALCULATION SHEET

SHEET 1 OF 5 SHEETS

PROJECT Jacco Chemical Corporation PROJECT NO. JCO-104H

SUBJECT Constant-Discharge Test Calculations

FILE

CALCULATED BY D.S. CHECKED BY A.C. DATE 10/1/87

Hantush - Jacob Method (by computer program GWAP)

$T = 6.29 \times 10^{-2}$ ft²/min

$K = \frac{6.29 \times 10^{-2}}{7}$ $b = 7'$

$K = 8.98 \times 10^{-3}$ ft/min

$= 4.56 \times 10^{-3}$ cm/sec

Seepage velocity, V

$V = K \frac{dh}{dl} \frac{1}{n}$

From A-aquifer potentiometric maps, $\frac{dh}{dl} \simeq 0.004$

$V = 8.98 \times 10^{-3} \times 0.004 \times \frac{1}{0.4}$

$v = 8.98 \times 10^{-5}$ ft/min

$V = 47.2$ ft/yr

n for A-aquifer material is assumed to be 0.4 (Freeze and Cherry, 1979)

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CALCULATION SHEET

SHEET 2 OF 5 SHEETS

PROJECT Jasco Chemical Corporation PROJECT NO. JCO-104H

SUBJECT Constant – Discharge Test Calculations

FILE

CALCULATED BY D.S. CHECKED BY A.C. DATE

Jacob Straight Line Analysis:

$$T = \frac{2.3\,Q}{4\pi\,\Delta(h_o - h)}$$

$Q = 2.05$ gpm $= 0.274$ ft³/min

b (aquifer thickness) = 7'

$$T = \frac{2.3\,(0.274\ ft^3/min)}{4\pi\,(0.83\ ft)}$$

$\Delta(h_o - h) = 0.83'$ from graph

$$\boxed{T = 6.04 \times 10^{-2}\ ft^2/min}$$

$$K = T/b$$

$$K = \frac{6.04 \times 10^{-2}\ ft^2/min}{7\ ft}$$

$$\boxed{K = 8.63 \times 10^{-3}\ ft/min = 4.23 \times 10^{-3}\ cm/sec}$$

$$S = \frac{2.25\,T\,t_o}{r^2}$$

$r = 8$ ft

$t_o = 0.68$ min (from graph)

$$S = \frac{2.25\,(6.04 \times 10^{-2}\ ft^2/min)\,(0.68\ min)}{64\ ft^2}$$

$$\boxed{S = 1.44 \times 10^{-3}}$$

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CALCULATION SHEET

PROJECT Jasco Chemical Corporation PROJECT NO. JCO-104H

SUBJECT Constant Discharge Test Calculations

FILE

CALCULATED BY D.S. CHECKED BY A.C. DATE 10/1/87

Seepage Velocity V,

$$V = K \cdot \frac{dh}{dl} \cdot \frac{1}{n}$$

Based on potentiometric maps,

$$\frac{dh}{dl} \simeq 0.004$$

Porosity of A-aquifer material is assumed to be 0.4 (Freeze & Cherry, 1979).

$$V = 8.63 \times 10^{-3} \times 0.004 \times \frac{1}{0.4}$$

$$V = 8.63 \times 10^{-5} \text{ ft/min}$$

$$\boxed{V = 45.4 \text{ ft/yr}}$$

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CALCULATION SHEET

PROJECT

PROJECT NO. JCO-104-H

SUBJECT Constant Discharge Test Calculations

FILE

CALCULATED BY D.S. CHECKED BY A.C. DATE 10/1/87

Modified Theis non-equilibrium equation for Recovery Data:

$$T = \frac{Q}{4\pi (s_1 - s_2)} \ln\left(\frac{(t_1/t_1')}{(t_2/t_2')}\right)$$

Recovery data from V-4:

t/t'		t' time since pumping stopped (min)	s residual drawdown (ft)
21605/.5	= 4,321.0	0.5	4.02
2161/1.0	= 2161.0	1.00	3.12
2162/2.0	= 1081.0	2.00	2.32
2164/4.0	= 541.0	4.00	1.80
2168/8.0	= 271.0	8.00	1.32
2176/16.0	= 136.0	16.00	0.97
2185/25.0	= 87.4	25.00	0.80
2198/38.0	= 57.8	38.00	0.62
2220/60.0	= 37.0	60.00	0.47
2259/99.0	= 22.8	99.00	0.32
2299/139.0	= 16.5	139.00	0.22
2335/175.0	= 13.3	175.00	0.17

t_0 = 36 hrs = 2160 mins

$t = 2160 + t'$

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CALCULATION SHEET

PROJECT

PROJECT NO. JCO-104H

SUBJECT Constant Discharge Test Calculations

FILE

CALCULATED BY D.S. CHECKED BY A.C. DATE 10/1/87

$$T = \frac{0.31\ ft^3/min}{4\pi(2.95)\ ft} \ln\left(\frac{2161}{13.3}\right)$$

$$\boxed{T = 4.26 \times 10^{-2}\ ft^2/min}$$

$Q = 2.33$ gpm
$= 0.31\ ft^3/min$

Select 2 data points from graph:

$(t_1/t_1') = 2161.0$

$(t_2/t_2') = 13.3$

$s_1 - s_2 = 3.12 - 0.17$
$= 2.95$

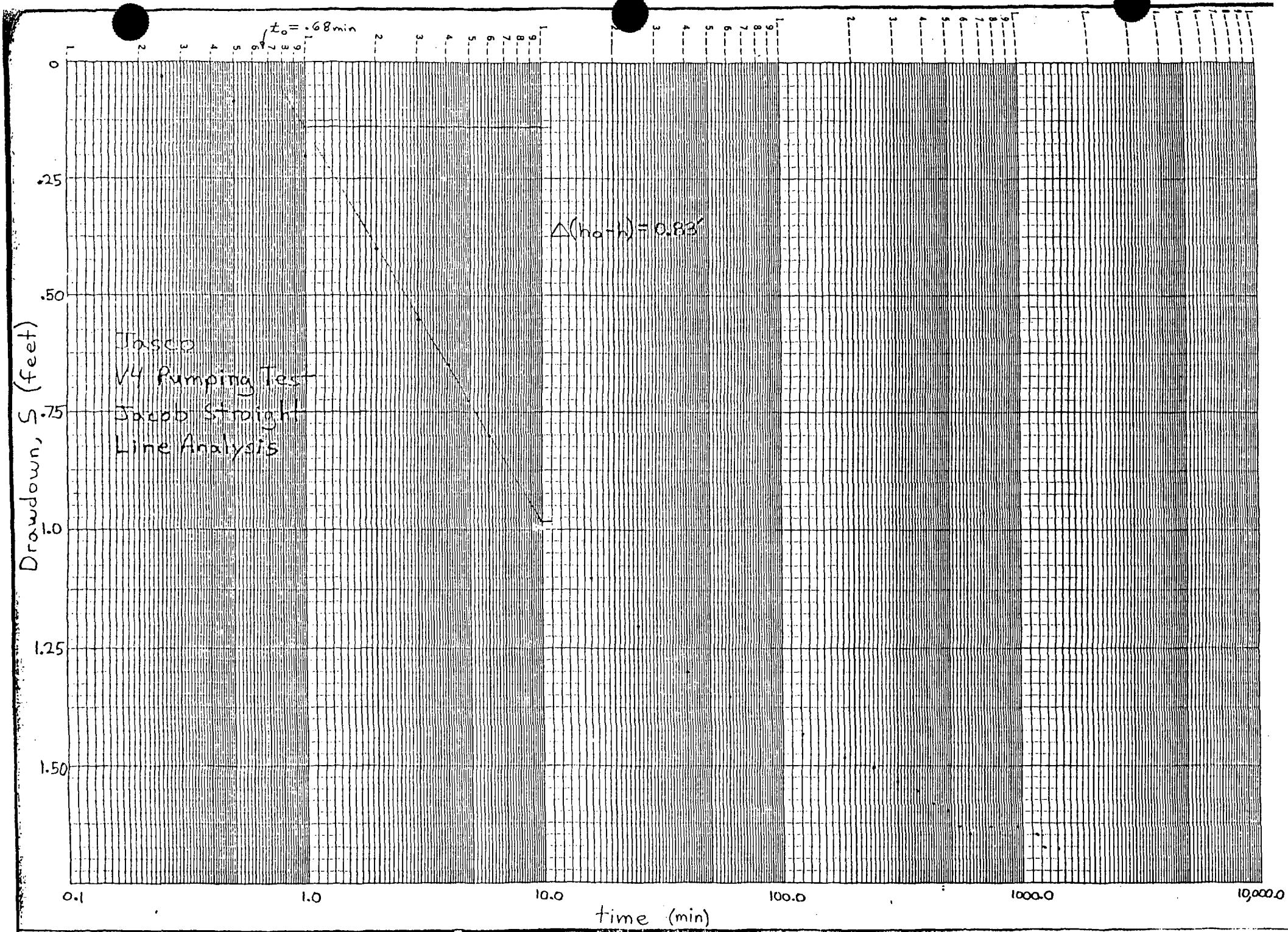
$b = 7'$

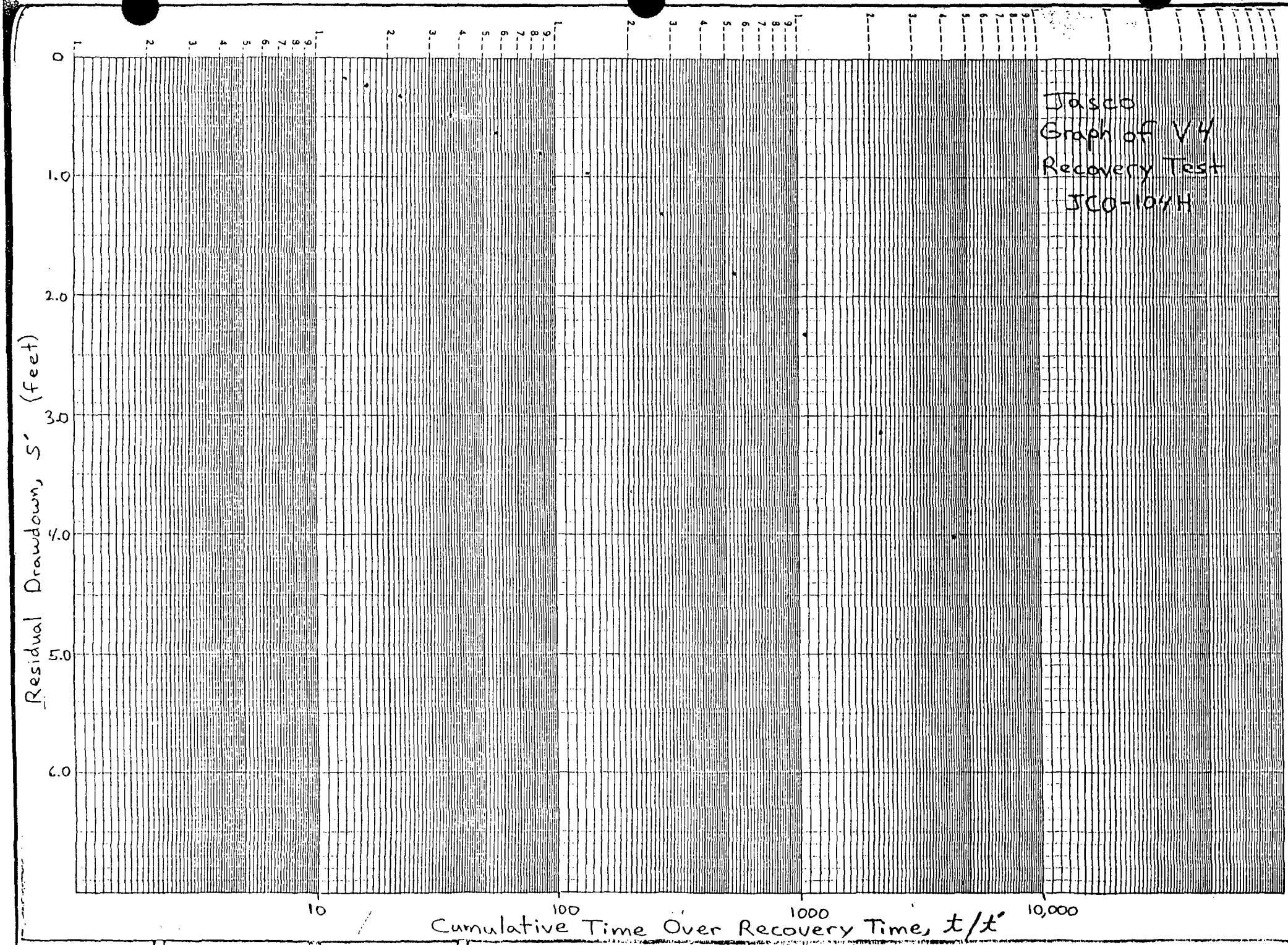
$$K = \frac{T}{b} = \frac{4.26 \times 10^{-2}}{7} \boxed{\begin{aligned} &= 6.09 \times 10^{-3}\ ft/min \\ &= 3.10 \times 10^{-3}\ cm/sec \end{aligned}}$$

Seepage velocity, $V = K \frac{dh}{dl} \times \frac{1}{n}$; $\frac{dh}{dl} = 0.004$

$n = 0.4$

$$\boxed{V = 32\ ft/yr.}$$


t_o = .68 min
Δ(h₀-h) = 0.83'
Jasco
V4 Pumping Test
Second Straight
Line Analysis
Drawdown, S (feet)
0
.25
.50
.75
1.0
1.25
1.50
0.1
1.0
10.0
100.0
1000.0
10,000.0
time (min)


Jasco
Graph of V4
Recovery Test
JCO-104H
Residual Drawdown, s' (feet)
0
1.0
2.0
3.0
4.0
5.0
6.0
10
100
1000
10,000
Cumulative Time Over Recovery Time, t/t'

APPENDIX D

Wahler Associates

WELL PUMPING/TESTING DATA SHEET

JOB NO. : JCO-1041H WELL NO. : V-1 DATE: 9/29-30, 10/1/87 PUMPED/TESTED BY: RGB/DS

WELL DIA.: 2" Pumping Method: OBSERVATION WELL Weather: Sunny and warm

REFERENCE POINT: TOP of Christy REFERENCE ELEVATION: 58.29'

INITIAL DEPTH TO WATER: 23.67 INITIAL DEPTH OF OPEN WELL: 48.00'

INITIAL HEIGHT OF WATER COLUMN IN WELL: 24.33'

VOLUME OF 1 CASING FULL OF WATER: 0.53 CU. FEET

(PI x R^2 x H), IN FT^3 0.53 x 7.479 = 3.97 GAL.

	CLOCK TIME	TIME ELAPSED	TOTAL VOLUME PUMPED (gallons)	DEPTH TO WATER (feet)	Δh $(h_o - h)$	COMMENTS & OBSERVATIONS
29	1100.04	0	0	23.67	h_o	9-29 Test begins at 12:00 p.m.
	1237.47	30 min	76.32	23.67	0.00	—
	1306.11	60 min	134.35	23.67	0.00	—
	1503.27	3 hours	370.60	23.68	-0.01	—
	1706.40	5	619.47	25.60	+0.07	—
	2046.15	9	1063.03	23.64	+0.03	—
0	0641.30	18.5	2265.43	23.65	+0.02	9-30
	1249.17	25	3008.35	23.67	0.00	Δ pumping rate at 13:15
	2353.35	36	4551.39	23.75	-0.08	possible drawdown
-1	0057.41	37	4566.38	23.66	+0.01	10/1 RECOVERY DATA
	0301.00	39	4566.38	23.65	+0.02	
	1203.45	48	4566.38	23.66	+0.01	

NO. OF CASINGS FULL PUMPED: _____

Depth Sampled: _____

SAMPLES TAKEN: _____

PRESERVATIVE: _____

Wahler Associates

WELL PUMPING/TESTING DATA SHEET

JOB NO. : JCO-1041H WELL NO. : V-3 DATE: 9/29, 30, 10/1/87 PUMPED/TESTED BY: RGB/DS

WELL DIA.: 5" Pumping Method: OBSERVATION WELL Weather: Sunny + warm

REFERENCE POINT: TOC REFERENCE ELEVATION: 57.60

INITIAL DEPTH TO WATER: 22.94' INITIAL DEPTH OF OPEN WELL: 35'

INITIAL HEIGHT OF WATER COLUMN IN WELL: 12.06

VOLUME OF 1 CASING FULL OF WATER: 0.26 CU. FEET

(PI x R^2 x H), IN FT^3 0.26 x 7.479 = 1.97 GAL.

CLOCK TIME	TIME ELAPSED	TOTAL VOLUME PUMPED (gallons)	DEPTH TO WATER (feet)	Δh $(h_o - h)$	COMMENTS & OBSERVATIONS
1104.15	0	0	22.94	h_o	9-29 Begin Test at 12:00
1236.00	30min	72.70	22.97	-0.03	
1309.33	60min	140.05	23.02	-0.08	
1501.00	3hr	365.62	23.02	-0.08	
1704.10	5	614.42	23.02	-0.08	
2050.20	9	1071.27	23.06	-0.12	drawdown observed.
0644.30	18.5	2271.49	23.13	-0.19	9-30
0850.00	21	2525.00	23.15	-0.21	
1251.31	25	3012.83	23.16	-0.22	Δ pumping rate at 13:15
1445.30	27	3271.62	23.13	-0.19	
2345.30	36	4532.52	23.24	-0.30	
0050.15	37	4566.38	23.11	-0.17	10-1 recovery data
0305.08	39	4566.38	23.05	-0.11	↓
1201.50	48	4566.38	23.01	-0.07	↓

NO. OF CASINGS FULL PUMPED: _____

Depth Sampled: _____

SAMPLES TAKEN: _____

PRESERVATIVE: _____

Wahler Associates

WELL PUMPING/TESTING DATA SHEET

JOB NO. : JCO-1041H WELL NO. : V-5 DATE: 9/29-30, 10/1/87 PUMPED/TESTED BY: RGB/DS

WELL DIA.: 2" Pumping Method: OBSERVATION WELL Weather: Sunny + Warm

REFERENCE POINT: Top of Steel casing REFERENCE ELEVATION: 60.14'

INITIAL DEPTH TO WATER: 25.95' INITIAL DEPTH OF OPEN WELL: 36.5'

INITIAL HEIGHT OF WATER COLUMN IN WELL: 10.55'

VOLUME OF 1 CASING FULL OF WATER: 0.23 CU. FEET

(PI x R^2 x H), IN FT^3 0.23 x 7.479 = 1.72 GAL.

CLOCK TIME	TIME ELAPSED	TOTAL VOLUME PUMPED (gallons)	DEPTH TO WATER (feet)	Δh $(h_o - h)$	COMMENTS & OBSERVATIONS
1125.30	0	0	25.95	h_o	9-29 TEST begins at 12:00
1223.50	30min	48.14	25.95	0.00	
1301.57	60min	125.14	25.93	0.02	
1452.00	3hr	327.24	25.90	0.05	
1700.00	5	606.00	25.92	0.03	
2050.40	9	1071.95	25.96	-0.01	
0637.27	18.5	2257.25	25.97	-0.02	9-30
1244.00	25	2997.68	25.90	0.05	Δq at 1315
2356.15	36	4557.62	26.06	-0.11	10-1 - recovery begins
0102.20	37	4566.38	25.95	0.00	
0309.20	39	4566.38	25.95	0.00	
1159.50	48	4566.38	25.96	-0.01	

NO. OF CASINGS FULL PUMPED: _____

Depth Sampled: _____

SAMPLES TAKEN: _____

PRESERVATIVE: _____

Wahler Associates

WELL PUMPING/TESTING DATA SHEET

JOB NO. : JCO-104H WELL NO. : U-6 DATE: 9/29-30, 10/1/87 PUMPED/TESTED BY: RGB/DS

WELL DIA.: 2" Pumping Method: OBSERVATION WELL Weather: sunny + warm

REFERENCE POINT: Top of metal Casing REFERENCE ELEVATION: 58.59'

INITIAL DEPTH TO WATER: 24.59 INITIAL DEPTH OF OPEN WELL: 42.7'

INITIAL HEIGHT OF WATER COLUMN IN WELL: 18.11

VOLUME OF 1 CASING FULL OF WATER: 0.40 CU. FEET

($PI \times R^2 \times H$), IN FT^3 0.40 x 7.479 = 2.96 GAL.

CLOCK TIME	TIME ELAPSED	TOTAL VOLUME PUMPED (gallons)	DEPTH TO WATER (feet)	Δh ($h_o - h$)	COMMENTS & OBSERVATIONS
1113.33	0	0	24.59	h_o	9.29 TEST begins at 12:00
1226.40	30min	53.87	24.58	0.01	
1257.50	60min	116.82	24.54	0.05	
1453.30	3hrs	350.47	24.53	0.06	
1656.30	5	598.93	24.51	0.09	
2106.15	9	1103.43	24.56	0.03	
0638.00	18.5	2258.36	24.58	0.01	9.30
1237.51	25	2985.26	24.57	0.02	DQ at 1315
1805.00	30	3737.45	24.57	0.02	possible drawdown
2358.00	36	4561.71	24.68	-0.11	10.1 recovery begins at 000
0106.00	37	4566.38	24.59	0.00	
0312.40	39	4566.38	24.58	0.01	
1151.50	48	4566.38	24.59	0.00	

NO. OF CASINGS FULL PUMPED: _____

Depth Sampled: _____

SAMPLES TAKEN: _____

PRESERVATIVE: _____

Wahler Associates

WELL PUMPING/TESTING DATA SHEET

JOB NO. : JC0404H WELL NO. : V-7 DATE: 9/29,30, 10/1/87 PUMPED/TESTED BY: RGB/DS

WELL DIA.: 2" Pumping Method: OBSERVATION WELL Weather: Sunny + warm

REFERENCE POINT: Top of Steel Casing REFERENCE ELEVATION: 56.76'

INITIAL DEPTH TO WATER: 23.19' INITIAL DEPTH OF OPEN WELL: 35.5'

INITIAL HEIGHT OF WATER COLUMN IN WELL: 12.31'

VOLUME OF 1 CASING FULL OF WATER: 0.27 CU. FEET

($PI \times R^2 \times H$), IN FT^3 0.27 x 7.479 = 2.01 GAL.

CLOCK TIME	TIME ELAPSED	TOTAL VOLUME PUMPED (gallons)	DEPTH TO WATER (feet)	Δh $(h_o - h)$	COMMENTS & OBSERVATIONS
1043.04	0	0	23.19	h_o	9-29 Test begins at 12:00
1240.05	30min	80.97	23.17	0.02	
1314.36	60min	150.69	23.19	0.00	
1512.20	3hr	388.51	23.17	0.02	
1716.30	5	639.33	23.06	0.13	
0649.40	18.5	2281.93	23.22	-0.03	9-30
1227.30	25	2964.35	23.23	-0.04	Δ pumping rate at 13:15
2340.10	36	4520.07	23.32	-0.10	possible drawdown
0038.50	37	4566.38	23.23	-0.04	10-1 Recovery data
0242.00	39	4566.38	23.21	-0.02	
1213.40	48	4566.38	23.22	-0.03	

NO. OF CASINGS FULL PUMPED: _____

Depth Sampled: _____

SAMPLES TAKEN: _____

PRESERVATIVE: _____

Wahler Associates

WELL PUMPING/TESTING DATA SHEET

JOB NO.: JCO-104H WELL NO.: I-1 DATE: 9/29,30,10/1/87 PUMPED/TESTED BY: RGB/DS

WELL DIA.: 2" Pumping Method: OBSERVATION WELL Weather: Sunny + Warm

REFERENCE POINT: Top of Steel Casing REFERENCE ELEVATION: 59.22'

INITIAL DEPTH TO WATER: 25.13' INITIAL DEPTH OF OPEN WELL: 57.5'

INITIAL HEIGHT OF WATER COLUMN IN WELL: 32.37'

VOLUME OF 1 CASING FULL OF WATER: 0.71 CU. FEET

(PI x R^2 x H), IN FT^3 0.71 x 7.479 = 5.28 GAL.

CLOCK TIME	TIME ELAPSED	TOTAL VOLUME PUMPED (gallons)	DEPTH TO WATER (feet)	Δh ($h_o - h$)	COMMENTS & OBSERVATIONS
1111.45	0	0	25.15	h_o	9-29 test begins at 1200
1201.00	1min	2.02	25.13	0.02	
1202.00	2	4.04	25.13	0.02	
1203.00	3	6.06	25.14	0.01	
1204.00	4	8.08	25.13	0.02	
1205.00	5	10.10	25.13	0.02	
1210.00	10	22.00	25.14	0.01	
1215.00	15	33.00	25.13	0.02	
1220.05	20	40.57	25.15	0.00	
1246.20	40	93.59	25.13	0.02	
155.25	60	111.95	25.12	0.03	
1450.25	3hr	344.24	25.13	0.02	
1648.09	5	582.06	25.10	0.05	
2051.50	9	1074.34	25.15	0.00	
0627.00	18.5	2236.14	25.14	0.01	9-30
1241.00	25	2991.62	25.09	0.06	
2354.40	36	4553.93	25.25	-0.10	possible drawdown recovery begins at 0000
0100.00	37	4566.38	25.15	0.00	10/1
0307.00	39	4566.38	25.13	0.02	
1149.05	48	4566.38	25.14	0.01	

NO. OF CASINGS FULL PUMPED: _____

Depth Sampled: _____

SAMPLES TAKEN: _____

PRESERVATIVE: _____

Wahler Associates

WELL PUMPING/TESTING DATA SHEET

JOB NO.: JCO-104H WELL NO.: I-2 DATE: 9/29,30,10/1/87 PUMPED/TESTED BY: RGB/DS

WELL DIA.: 2" Pumping Method: OBSERVATION WELL Weather: Sunny + warm

REFERENCE POINT: Top of Steel Casing REFERENCE ELEVATION: 57.66

INITIAL DEPTH TO WATER: 24.00 INITIAL DEPTH OF OPEN WELL: 54.50

INITIAL HEIGHT OF WATER COLUMN IN WELL: 30.50

VOLUME OF 1 CASING FULL OF WATER: 0.67 CU. FEET

(PI x R^2 x H), IN FT^3 0.67 x 7.479 = 4.98 GAL.

CLOCK TIME	TIME ELAPSED	TOTAL VOLUME PUMPED (gallons)	DEPTH TO WATER (feet)	Δh $(h_o - h)$	COMMENTS & OBSERVATIONS
1040.22	0	0	24.00	h_o	9-29 test begins at 1200
1241.25	30min	83.66	23.96	0.04	
1307.00	60	135.34	23.97	0.03	
1510.40	3hr	385.15	23.95	0.05	
1714.30	5	635.29	23.95	0.05	
0651.40	18.5	2285.97	23.99	0.01	9-30
1231.17	25	2971.99	23.99	0.01	
2338.00	36	4515.01	24.13	-0.13	possible drawdown
0043.00	37	4566.38	24.00	0.00	10-1 Recovery data
0246.00	39	4566.38	23.99	0.01	
1211.30	48	4566.38	23.99	0.01	

NO. OF CASINGS FULL PUMPED: _____

Depth Sampled: _____

SAMPLES TAKEN: _____

PRESERVATIVE: _____

Wahler Associates

WELL PUMPING/TESTING DATA SHEET

JOB NO. : JCO-1041H WELL NO. : II-3 DATE: 9/29, 30, 10/1/87 PUMPED/TESTED BY: RGB/DS

WELL DIA.: 2" Pumping Method: OBSERVATION WELL Weather: Sunny + Warm

REFERENCE POINT: Top of Steel Casing REFERENCE ELEVATION: 57.29

INITIAL DEPTH TO WATER: 23.70 INITIAL DEPTH OF OPEN WELL: 55.0

INITIAL HEIGHT OF WATER COLUMN IN WELL: 30.3

VOLUME OF 1 CASING FULL OF WATER: 0.66 CU. FEET

(PI x R^2 x H), IN FT^3 0.66 x 7.479 = 4.94 GAL.

CLOCK TIME	TIME ELAPSED	TOTAL VOLUME PUMPED (gallons)	DEPTH TO WATER (feet)	Δh $(h_s - h)$	COMMENTS & OBSERVATIONS
1047.10	0	0	23.70	h_0	9-29 Test begins at 1200
1238.30	30 min	77.77	23.69	0.01	
1316.30	60 min	154.53	23.68	0.02	
1508.35	3	380.94	23.66	0.04	
1718.15	5	642.87	23.66	0.04	
0658.05	18.5	2298.93	23.71	-0.01	9-30
1223.31	25	2956.27	23.68	0.02	
2336.00	36	4510.34	23.84	-0.14	Possible drawdown
0047.00	37	4566.38	23.71	-0.01	10-1 recovery data
0252.00	39	4566.38	23.69	0.01	
1216.50	48	4566.38	23.71	-0.01	

NO. OF CASINGS FULL PUMPED: _____

Depth Sampled: _____

SAMPLES TAKEN: _____

PRESERVATIVE: _____

APPENDIX E

SLUG Test: Well V-1
9-28-87

Time	ch	H(ft)
10:22:42	7	7.10
10:22:37	7	7.10
10:22:32	7	7.12
10:22:27	7	7.12
10:22:22	7	7.15
10:22:17	7	7.15
10:22:12	7	7.17
10:22:07	7	7.20
10:22:02	7	7.22
10:21:57	7	7.27
10:21:52	7	7.30
10:21:50	7	7.32
10:21:48	7	7.35
10:21:46	7	7.35
10:21:44	7	7.37
10:21:42	7	7.40
10:21:40	7	7.42
10:21:38	7	7.45
10:21:36	7	7.47
10:21:34	7	7.50
10:21:32	7	7.52
10:21:30	7	7.57
10:21:28	7	7.60
10:21:26	7	7.62
10:21:24	7	7.67
10:21:22	7	7.72
10:21:20	7	7.75
10:21:18	7	7.80
10:21:16	7	7.85
10:21:14	7	7.90
10:21:12	7	7.95
10:21:11	7	7.97
10:21:10	7	8.02
10:21:09	7	8.05
10:21:08	7	8.07
10:21:07	7	8.10
10:21:06	7	8.15
10:21:05	7	8.17
10:21:04	7	8.20
10:21:03	7	8.25
10:21:02	7	8.27
10:21:01	7	8.32
10:21:00	7	8.37
10:20:59	7	8.42
10:20:58	7	8.47
10:20:57	7	8.52
10:20:56	7	8.57
10:20:55	7	8.65
10:20:54	7	8.72
10:20:53	7	9.22
10:20:52	7	9.32
10:06 HRS 87/09/15 #10		

Begin slug test

Time	ch	H(ft)
10:27:08	7	6.05
10:27:07	7	6.00
10:27:06	7	5.97
10:27:05	7	5.95
10:27:04	7	5.90
10:27:03	7	5.87
10:27:02	7	5.85
10:27:01	7	5.82
10:27:00	7	5.77
10:26:59	7	5.75
10:26:58	7	5.70
10:26:57	7	5.65
10:26:56	7	5.60
10:26:55	7	5.55
10:26:54	7	5.50
10:26:53	7	5.42
10:26:52	7	5.32
10:26:51	7	5.25
10:26:50	7	5.12
10:26:49	7	5.00
10:25 HRS 87/09/15 #10		

Begin reverse slug test

STATION ID = 01

Time	ch	H(ft)
10:25:52	7	7.02
10:25:42	7	7.02
10:25:32	7	7.02
10:25:22	7	7.02
10:25:12	7	7.02
10:25:02	7	7.02
10:24:52	7	7.02
10:24:42	7	7.02
10:24:32	7	7.02
10:24:22	7	7.02
10:24:17	7	7.05
10:24:12	7	7.05
10:24:07	7	7.05
10:24:02	7	7.05
10:23:57	7	7.05
10:23:52	7	7.05
10:23:47	7	7.05
10:23:42	7	7.05
10:23:37	7	7.05
10:23:32	7	7.05
10:23:27	7	7.05
10:23:22	7	7.05
10:23:17	7	7.05
10:23:12	7	7.05
10:23:07	7	7.07
10:23:02	7	7.07
10:22:57	7	7.07
10:22:52	7	7.07
10:22:47	7	7.10

Time	ch	H(ft)
STATION ID = 01		
10:30:04	7	7.00
10:29:59	7	7.00
10:29:54	7	7.00
10:29:49	7	7.00
10:29:44	7	7.00
10:29:39	7	7.00
10:29:34	7	6.97
10:29:29	7	6.97
10:29:24	7	7.00
10:29:19	7	6.97
10:29:14	7	6.97
10:29:09	7	6.97
10:29:04	7	6.97
10:28:59	7	6.97
10:28:54	7	6.97
10:28:49	7	6.95
10:28:44	7	6.95
10:28:39	7	6.95
10:28:34	7	6.92
10:28:29	7	6.92
10:28:24	7	6.90
10:28:19	7	6.90
10:28:14	7	6.87
10:28:09	7	6.85
10:28:04	7	6.82
10:27:59	7	6.80
10:27:54	7	6.77
10:27:49	7	6.72
10:27:47	7	6.72
10:27:45	7	6.70
10:27:43	7	6.67
10:27:41	7	6.65
10:27:39	7	6.62
10:27:37	7	6.60
10:27:35	7	6.57
10:27:33	7	6.55
10:27:31	7	6.52
10:27:29	7	6.50
10:27:27	7	6.47
10:27:25	7	6.42
10:27:23	7	6.40
10:27:21	7	6.35
10:27:19	7	6.32
10:27:17	7	6.27
10:27:15	7	6.22
10:27:13	7	6.17
10:27:11	7	6.12
10:27:09	7	6.07

10:57:48	7	6.97
10:57:43	7	6.97
10:57:38	7	6.97
10:57:33	7	6.97
10:57:28	7	6.97
10:57:23	7	6.97
10:57:18	7	7.00
10:57:13	7	7.00
10:57:08	7	7.00
10:57:06	7	7.00
10:57:04	7	7.00
10:57:02	7	7.00
10:57:00	7	7.02
10:56:58	7	7.02
10:56:56	7	7.02
10:56:54	7	7.02
10:56:52	7	7.02
10:56:50	7	7.02
10:56:48	7	7.02
10:56:46	7	7.02
10:56:44	7	7.05
10:56:42	7	7.05
10:56:40	7	7.05
10:56:38	7	7.05
10:56:36	7	7.05
10:56:34	7	7.07
10:56:32	7	7.07
10:56:30	7	7.07
10:56:28	7	7.10
10:56:27	7	7.10
10:56:26	7	7.10
10:56:25	7	7.10
10:56:24	7	7.10
10:56:23	7	7.12
10:56:22	7	7.12
10:56:21	7	7.12
10:56:20	7	7.12
10:56:19	7	7.15
10:56:18	7	7.15
10:56:17	7	7.15
10:56:16	7	7.17
10:56:15	7	7.17
10:56:14	7	7.17
10:56:13	7	7.20
10:56:12	7	7.20
10:56:11	7	7.25
10:56:10	7	7.12
10:56:09	7	7.15
10:56:08	7	9.35

10:46 HRS 87/09/15 #10

Begin slug

11:01:05	7	6.77
11:01:03	7	6.77
11:01:02	7	6.75
11:01:01	7	6.75
11:01:00	7	6.75
11:00:59	7	6.75
11:00:58	7	6.72
11:00:57	7	6.72
11:00:56	7	6.70
11:00:55	7	6.70
11:00:54	7	6.67
11:00:53	7	6.65
11:00:52	7	6.62
11:00:51	7	6.60
11:00:50	7	6.57
11:00:49	7	6.52
11:00:48	7	6.45
11:00:47	7	6.32
11:00:46	7	6.17
11:00:45	7	6.02
11:00:44	7	5.87
11:00:43	7	5.82

11:00 HRS 87/09/15 #10

Begin reverse

STATION ID = 02

11:00:18	7	6.95
11:00:08	7	6.95
10:59:58	7	6.95
10:59:48	7	6.95
10:59:38	7	6.95
10:59:33	7	6.95
10:59:28	7	6.95
10:59:23	7	6.95
10:59:18	7	6.95
10:59:13	7	6.95
10:59:08	7	6.95
10:59:03	7	6.95
10:58:58	7	6.95
10:58:53	7	6.95
10:58:48	7	6.95
10:58:43	7	6.95
10:58:38	7	6.95
10:58:33	7	6.95
10:58:28	7	6.95
10:58:23	7	6.95
10:58:18	7	6.97
10:58:13	7	6.97
10:58:08	7	6.97
10:58:03	7	6.97
10:57:58	7	6.97
10:57:53	7	6.97

STATION ID = 02

11:03:03	7	6.90
11:02:58	7	6.90
11:02:53	7	6.90
11:02:48	7	6.90
11:02:43	7	6.90
11:02:38	7	6.90
11:02:33	7	6.90
11:02:28	7	6.90
11:02:23	7	6.90
11:02:18	7	6.90
11:02:13	7	[illegible]
11:02:08	7	6.87
11:02:03	7	6.87
11:01:58	7	6.87
11:01:53	7	6.87
11:01:48	7	6.87
11:01:43	7	6.87
11:01:41	7	6.87
11:01:39	7	6.87
11:01:37	7	6.85
11:01:35	7	6.85
11:01:33	7	6.85
11:01:31	7	6.85
11:01:29	7	6.85
11:01:27	7	6.85
11:01:25	7	6.85
11:01:23	7	6.85
11:01:21	7	6.82
11:01:19	7	6.82
11:01:17	7	6.82
11:01:15	7	6.82
11:01:13	7	6.82
11:01:11	7	6.80
11:01:09	7	6.80
11:01:07	7	6.80

09:54:04	7	6.20
09:53:59	7	6.20
09:53:54	7	6.20
09:53:49	7	6.20
09:53:44	7	6.20
09:53:39	7	6.20
09:53:34	7	6.22
09:53:29	7	6.22
09:53:24	7	6.22
09:53:19	7	6.22
09:53:14	7	6.22
09:53:09	7	6.25
09:53:07	7	6.25
09:53:05	7	6.25
09:53:03	7	6.25
09:53:01	7	6.25
09:52:59	7	6.25
09:52:57	7	6.25
09:52:55	7	6.25
09:52:53	7	6.25
09:52:51	7	6.25
09:52:49	7	6.25
09:52:47	7	6.27
09:52:45	7	6.27
09:52:43	7	6.27
09:52:41	7	6.27
09:52:39	7	6.27
09:52:37	7	6.27
09:52:35	7	6.27
09:52:33	7	6.27
09:52:31	7	6.27
09:52:29	7	6.27
09:52:28	7	6.30
09:52:27	7	6.30
09:52:26	7	6.30
09:52:25	7	6.30
09:52:24	7	6.30
09:52:23	7	6.30
09:52:22	7	6.30
09:52:21	7	6.30
09:52:20	7	6.30
09:52:19	7	6.30
09:52:18	7	6.30
09:52:17	7	6.30
09:52:16	7	6.31
09:52:15	7	6.31
09:52:14	7	6.31
09:52:13	7	6.27
09:52:12	7	6.27
09:52:11	7	5.92
09:52:10	7	[illegible]
09:52:09	7	[illegible]

Begin slug test

10:02:09	7	6.00
10:01:39	7	6.00
10:01:09	7	6.00
10:00:39	7	6.02
10:00:29	7	6.02
10:00:19	7	6.02
10:00:09	7	6.02
09:59:59	7	6.02
09:59:49	7	6.02
09:59:39	7	6.02
09:59:29	7	6.05
09:59:19	7	6.05
09:59:09	7	6.05
09:58:59	7	6.05
09:58:49	7	6.05
09:58:39	7	6.05
09:58:29	7	6.05
09:58:19	7	6.05
09:58:09	7	6.07
09:57:59	7	6.07
09:57:49	7	6.07
09:57:39	7	6.07
09:57:29	7	6.07
09:57:19	7	6.07
09:57:09	7	6.10
09:56:59	7	6.10
09:56:49	7	6.10
09:56:39	7	6.10
09:56:29	7	6.10
09:56:19	7	6.12
09:56:09	7	6.12
09:55:59	7	6.12
09:55:49	7	6.12
09:55:39	7	6.12
09:55:34	7	6.12
09:55:29	7	6.15
09:55:24	7	6.15
09:55:19	7	6.15
09:55:14	7	6.15
09:55:09	7	6.15
09:55:04	7	6.15
09:54:59	7	6.15
09:54:54	7	6.15
09:54:49	7	6.15
09:54:44	7	6.17
09:54:39	7	6.17
09:54:34	7	6.17
09:54:29	7	6.17
09:54:24	7	6.17
09:54:19	7	6.17
09:54:14	7	6.17
09:54:09	7	6.17

STATION ID = 03

10:06:39	7	5.95
10:06:09	7	5.95
10:05:39	7	5.95
10:05:09	7	5.95
10:04:39	7	5.95
10:04:09	7	5.97
10:03:39	7	5.97
10:03:09	7	5.97
10:02:39	7	5.97

11:11:41	7	9.17
11:11:36	7	9.20
11:11:31	7	9.20
11:11:26	7	9.20
11:11:21	7	9.22
11:11:16	7	9.22
11:11:11	7	9.25
11:11:06	7	9.25
11:11:01	7	9.27
11:10:59	7	9.27
11:10:57	7	9.27
11:10:55	7	9.30
11:10:53	7	9.30
11:10:51	7	9.30
11:10:49	7	9.32
11:10:47	7	9.32
11:10:45	7	9.35
11:10:43	7	9.35
11:10:41	7	9.37
11:10:39	7	9.37
11:10:37	7	9.40
11:10:35	7	9.42
11:10:33	7	9.42
11:10:31	7	9.45
11:10:29	7	9.47
11:10:27	7	9.50
11:10:25	7	9.52
11:10:23	7	9.55
11:10:21	7	9.60
11:10:20	7	9.60
11:10:19	7	9.62
11:10:18	7	9.65
11:10:17	7	9.67
11:10:16	7	9.70
11:10:15	7	9.70
11:10:14	7	9.72
11:10:13	7	9.77
11:10:12	7	9.80
11:10:11	7	9.82
11:10:10	7	9.85
11:10:09	7	9.90
11:10:08	7	9.92
11:10:07	7	9.97
11:10:06	7	10.00
11:10:05	7	10.05
11:10:04	7	10.12
11:10:03	7	10.27
11:10:02	7	11.22
11:10:01	7	12.45

11:03 HRS 87/09/15 #10

Begin slug

11:15:17	7	8.45
11:15:16	7	8.42
11:15:15	7	8.40
11:15:14	7	8.37
11:15:13	7	8.32
11:15:12	7	8.30
11:15:11	7	8.27
11:15:10	7	8.25
11:15:09	7	8.20
11:15:08	7	8.15
11:15:07	7	8.12
11:15:06	7	8.07
11:15:05	7	8.02
11:15:04	7	7.97
11:15:03	7	7.90
11:15:02	7	7.82
11:15:01	7	8.00
11:15:00	7	8.92

11:14 HRS 87/09/15 #10

Begin reverse slug

STATION ID = 04

11:14:41	7	9.10
11:14:31	7	9.10
11:14:21	7	9.10
11:14:11	7	9.10
11:14:01	7	9.10
11:13:51	7	9.10
11:13:41	7	9.10
11:13:31	7	9.12
11:13:26	7	9.12
11:13:21	7	9.12
11:13:16	7	9.12
11:13:11	7	9.12
11:13:06	7	9.12
11:13:01	7	9.12
11:12:56	7	9.12
11:12:51	7	9.12
11:12:46	7	9.12
11:12:41	7	9.12
11:12:36	7	9.12
11:12:31	7	9.15
11:12:26	7	9.15
11:12:21	7	9.15
11:12:16	7	9.15
11:12:11	7	9.15
11:12:06	7	9.15
11:12:01	7	9.15
11:11:56	7	9.17
11:11:51	7	9.17
11:11:46	7	9.17

11:18:20	7	9.00
11:18:15	7	9.00
11:18:10	7	9.00
11:18:05	7	9.00
11:18:00	7	9.00
11:17:55	7	9.00
11:17:50	7	9.00
11:17:45	7	9.00
11:17:40	7	9.00
11:17:35	7	9.00
11:17:30	7	9.00
11:17:25	7	8.97
11:17:20	7	8.97
11:17:15	7	8.97
11:17:10	7	8.97
11:17:05	7	8.97
11:17:00	7	8.97
11:16:55	7	8.97
11:16:50	7	8.95
11:16:45	7	8.95
11:16:40	7	8.95
11:16:35	7	8.95
11:16:30	7	8.92
11:16:25	7	8.92
11:16:20	7	8.90
11:16:15	7	8.90
11:16:10	7	8.90
11:16:05	7	8.87
11:16:00	7	8.85
11:15:58	7	8.85
11:15:56	7	8.85
11:15:54	7	8.82
11:15:52	7	8.82
11:15:50	7	8.80
11:15:48	7	8.80
11:15:46	7	8.80
11:15:44	7	8.77
11:15:42	7	8.77
11:15:40	7	8.75
11:15:38	7	8.72
11:15:36	7	8.72
11:15:34	7	8.70
11:15:32	7	8.67
11:15:30	7	8.65
11:15:28	7	8.62
11:15:26	7	8.60
11:15:24	7	8.57
11:15:22	7	8.52
11:15:20	7	8.50
11:15:19	7	8.47
11:15:18	7	8.45

STATION ID = 04

11:20:00	7	9.01
11:19:50	7	9.01
11:19:40	7	9.01
11:19:30	7	9.01
11:19:20	7	9.01
11:19:10	7	9.01
11:19:00	7	9.01
11:18:50	7	9.01
11:18:40	7	9.01
11:18:30	7	9.01
11:18:25	7	9.00

11:44:32	7	8.55
11:44:27	7	8.57
11:44:22	7	8.57
11:44:17	7	8.60
11:44:12	7	8.62
11:44:07	7	8.65
11:44:02	7	8.67
11:43:57	7	8.70
11:43:52	7	8.72
11:43:47	7	8.75
11:43:42	7	8.77
11:43:37	7	8.80
11:43:32	7	8.85
11:43:30	7	8.85
11:43:28	7	8.85
11:43:26	7	8.87
11:43:24	7	8.87
11:43:22	7	8.90
11:43:20	7	8.90
11:43:18	7	8.92
11:43:16	7	8.92
11:43:14	7	8.95
11:43:12	7	8.97
11:43:10	7	8.97
11:43:08	7	9.00
11:43:06	7	9.02
11:43:04	7	9.02
11:43:02	7	9.05
11:43:00	7	9.05
11:42:58	7	9.07
11:42:56	7	9.10
11:42:54	7	9.12
11:42:52	7	9.12
11:42:51	7	9.15
11:42:50	7	9.15
11:42:49	7	9.17
11:42:48	7	9.17
11:42:47	7	9.20
11:42:46	7	9.20
11:42:45	7	9.22
11:42:44	7	9.22
11:42:43	7	9.25
11:42:42	7	9.25
11:42:41	7	9.27
11:42:40	7	9.27
11:42:39	7	9.30
11:42:38	7	9.32
11:42:37	7	9.35
11:42:36	7	9.37
11:42:35	7	9.35
11:42:34	7	9.22
11:42:33	7	10.47
11:42:32	7	9.65

11:30 HRS 87/09/15 #10

Begin slug

11:54:02	7	7.65
11:53:32	7	7.67
11:53:02	7	7.67
11:52:32	7	7.70
11:52:02	7	7.72
11:51:32	7	7.75
11:51:02	7	7.80
11:50:52	7	7.80
11:50:42	7	7.80
11:50:32	7	7.82
11:50:22	7	7.82
11:50:12	7	7.85
11:50:02	7	7.85
11:49:52	7	7.85
11:49:42	7	7.87
11:49:32	7	7.87
11:49:22	7	7.90
11:49:12	7	7.92
11:49:02	7	7.92
11:48:52	7	7.95
11:48:42	7	7.95
11:48:32	7	7.97
11:48:22	7	7.97
11:48:12	7	8.00
11:48:02	7	8.02
11:47:52	7	8.02
11:47:42	7	8.05
11:47:32	7	8.07
11:47:22	7	8.10
11:47:12	7	8.10
11:47:02	7	8.12
11:46:52	7	8.15
11:46:42	7	8.17
11:46:32	7	8.20
11:46:22	7	8.22
11:46:12	7	8.25
11:46:02	7	8.27
11:45:57	7	8.27
11:45:52	7	8.27
11:45:47	7	8.30
11:45:42	7	8.32
11:45:37	7	8.32
11:45:32	7	8.35
11:45:27	7	8.35
11:45:22	7	8.37
11:45:17	7	8.40
11:45:12	7	8.40
11:45:07	7	8.42
11:45:02	7	8.42
11:44:57	7	8.45
11:44:52	7	8.47
11:44:47	7	8.50
11:44:42	7	8.50
11:44:37	7	8.52

STATION ID = 05

12:02:32	7	7.45
12:02:02	7	7.45
12:01:32	7	7.45
12:01:02	7	7.47
12:00:32	7	7.47
12:00:02	7	7.47
11:59:32	7	7.50
11:59:02	7	7.50
11:58:32	7	7.52
11:58:02	7	7.52
11:57:32	7	7.52
11:57:02	7	7.55
11:56:32	7	7.55
11:56:02	7	7.57
11:55:32	7	7.60
11:55:02	7	7.60
11:54:32	7	7.62

STATION ID = 06

11:30:34	7	8.60
11:30:32	7	8.60
11:30:30	7	8.60
11:30:28	7	8.60
11:30:26	7	8.60
11:30:24	7	8.60
11:30:22	7	8.60
11:30:20	7	8.60
11:30:19	7	8.60
11:30:18	7	8.60
11:30:17	7	8.60
11:30:16	7	8.57
11:30:15	7	8.57
11:30:14	7	8.60
11:30:13	7	8.57
11:30:12	7	8.57
11:30:11	7	8.57
11:30:10	7	8.57
11:30:09	7	8.55
11:30:08	7	8.55
11:30:07	7	8.55
11:30:06	7	8.52
11:30:05	7	8.50
11:30:04	7	8.47
11:30:03	7	8.42
11:30:02	7	8.35
11:30:01	7	8.25
11:30:00	7	7.57

11:29 HRS 87/09/15 #10

Begin reverse slug

STATION ID = 06

11:29:04	7	8.62
11:28:59	7	8.62
11:28:57	7	8.62
11:28:55	7	8.62
11:28:53	7	8.62
11:28:51	7	8.62
11:28:49	7	8.62
11:28:47	7	8.62
11:28:45	7	8.62
11:28:43	7	8.62
11:28:41	7	8.62
11:28:39	7	8.62
11:28:37	7	8.62
11:28:35	7	8.62
11:28:33	7	8.62
11:28:31	7	8.62
11:28:29	7	8.62
11:28:27	7	8.62
11:28:25	7	8.62
11:28:23	7	8.62
11:28:21	7	8.62
11:28:19	7	8.65
11:28:18	7	8.62
11:28:17	7	8.62
11:28:16	7	8.62
11:28:15	7	8.65
11:28:14	7	8.65
11:28:13	7	8.65
11:28:12	7	8.65
11:28:11	7	8.65
11:28:10	7	8.65
11:28:09	7	8.65
11:28:08	7	8.67
11:28:07	7	8.67
11:28:06	7	8.70
11:28:05	7	8.70
11:28:04	7	8.75
11:28:03	7	8.77
11:28:02	7	8.87
11:28:01	7	9.07
11:28:00	7	9.27
11:27:59	7	10.62

11:29 HRS 87/09/15 #10

Begin slug test

STATION ID = 07

12:27:03	7	8.52
12:26:58	7	8.52
12:26:53	7	8.55
12:26:48	7	8.55
12:26:43	7	8.55
12:26:38	7	8.55
12:26:33	7	8.55
12:26:28	7	8.55
12:26:23	7	8.55
12:26:18	7	8.55
12:26:16	7	8.55
12:26:14	7	8.55
12:26:12	7	8.55
12:26:10	7	8.55
12:26:08	7	8.55
12:26:06	7	8.55
12:26:04	7	8.55
12:26:02	7	8.57
12:26:00	7	8.57
12:25:58	7	8.57
12:25:56	7	8.57
12:25:54	7	8.57
12:25:52	7	8.57
12:25:50	7	8.57
12:25:48	7	8.57
12:25:46	7	8.60
12:25:44	7	8.60
12:25:42	7	8.60
12:25:40	7	8.62
12:25:38	7	8.62
12:25:37	7	8.65
12:25:36	7	8.65
12:25:35	7	8.65
12:25:34	7	8.67
12:25:33	7	8.67
12:25:32	7	8.70
12:25:31	7	8.70
12:25:30	7	8.72
12:25:29	7	8.75
12:25:28	7	8.77
12:25:27	7	8.82
12:25:26	7	8.85
12:25:25	7	8.90
12:25:24	7	8.97
12:25:23	7	9.05
12:25:22	7	9.17
12:25:21	7	9.30
12:25:20	7	9.45
12:25:19	7	9.67
12:25:18	7	10.25

12:20 HRS 87/09/15 #10

Begin slug test

STATION ID = 07

12:30:15	7	8.50
12:30:10	7	8.52
12:30:05	7	8.50
12:30:00	7	8.50
12:29:55	7	8.50
12:29:50	7	8.50
12:29:45	7	8.50
12:29:40	7	8.50
12:29:35	7	8.50
12:29:30	7	8.50
12:29:25	7	8.50
12:29:20	7	8.50
12:29:15	7	8.50
12:29:10	7	8.50
12:29:05	7	8.50
12:29:00	7	8.50
12:28:58	7	8.50
12:28:56	7	8.50
12:28:54	7	8.50
12:28:52	7	8.47
12:28:50	7	8.47
12:28:48	7	8.47
12:28:46	7	8.47
12:28:44	7	8.47
12:28:42	7	8.47
12:28:40	7	8.47
12:28:38	7	8.47
12:28:36	7	8.47
12:28:34	7	8.47
12:28:32	7	8.45
12:28:30	7	8.45
12:28:28	7	8.45
12:28:26	7	8.45
12:28:24	7	8.42
12:28:22	7	8.42
12:28:20	7	8.42
12:28:19	7	8.40
12:28:18	7	8.40
12:28:17	7	8.40
12:28:16	7	8.37
12:28:15	7	8.37
12:28:14	7	8.35
12:28:13	7	8.35
12:28:12	7	8.32
12:28:11	7	8.30
12:28:10	7	8.27
12:28:09	7	8.22
12:28:08	7	8.17
12:28:07	7	8.12
12:28:06	7	8.05
12:28:05	7	7.97
12:28:04	7	7.85
12:28:03	7	7.72
12:28:02	7	7.55
12:28:01	7	7.40
12:28:00	7	6.67

12:27 HRS 87/09/15 #10

Begin reverse slug

10:42:58	7	6.55
10:42:53	7	6.55
10:42:48	7	6.55
10:42:43	7	6.55
10:42:38	7	6.55
10:42:33	7	6.55
10:42:28	7	6.55
10:42:23	7	6.55
10:42:18	7	6.55
10:42:13	7	6.55
10:42:08	7	6.55
10:42:03	7	6.55
10:41:58	7	6.55
10:41:53	7	6.55
10:41:48	7	6.55
10:41:43	7	6.55
10:41:38	7	6.55
10:41:36	7	6.55
10:41:34	7	6.55
10:41:32	7	6.55
10:41:30	7	6.55
10:41:28	7	6.55
10:41:26	7	6.55
10:41:24	7	6.55
10:41:22	7	6.55
10:41:20	7	6.55
10:41:18	7	6.55
10:41:16	7	6.55
10:41:14	7	6.55
10:41:12	7	6.55
10:41:10	7	6.55
10:41:08	7	6.55
10:41:06	7	6.55
10:41:04	7	6.55
10:41:02	7	6.55
10:41:00	7	6.55
10:40:58	7	6.55
10:40:57	7	6.55
10:40:56	7	6.55
10:40:55	7	6.55
10:40:54	7	6.55
10:40:53	7	6.55
10:40:52	7	6.55
10:40:51	7	6.57
10:40:50	7	6.57
10:40:49	7	6.55
10:40:48	7	6.52
10:40:47	7	6.50
10:40:46	7	6.55
10:40:45	7	6.60
10:40:44	7	6.67
10:40:43	7	6.67
10:40:42	7	6.52
10:40:41	7	6.27
10:40:40	7	6.12
10:40:39	7	6.20
10:40:38	7	8.15

10:30 HRS 87/09/15 #10

Begin slug test

10:45:45	7	6.52
10:45:40	7	6.52
10:45:35	7	6.52
10:45:30	7	6.52
10:45:25	7	6.52
10:45:20	7	6.52
10:45:18	7	6.52
10:45:16	7	6.52
10:45:14	7	6.52
10:45:12	7	6.52
10:45:10	7	6.52
10:45:08	7	6.52
10:45:06	7	6.52
10:45:04	7	6.52
10:45:02	7	6.52
10:45:00	7	6.52
10:44:58	7	6.52
10:44:56	7	6.52
10:44:54	7	6.52
10:44:52	7	6.52
10:44:50	7	6.52
10:44:48	7	6.52
10:44:46	7	6.52
10:44:44	7	6.52
10:44:42	7	6.52
10:44:40	7	6.55
10:44:39	7	6.55
10:44:38	7	6.55
10:44:37	7	6.52
10:44:36	7	6.55
10:44:35	7	6.55
10:44:34	7	6.57
10:44:33	7	6.55
10:44:32	7	6.50
10:44:31	7	6.50
10:44:30	7	6.52
10:44:29	7	6.60
10:44:28	7	6.55
10:44:27	7	6.57
10:44:26	7	6.42
10:44:25	7	6.32
10:44:24	7	6.45
10:44:23	7	6.82
10:44:22	7	7.05
10:44:21	7	6.75
10:44:20	7	5.70

10:43 HRS 87/09/15 #10

Begin reverse slug

STATION ID = 08

10:43:48	7	6.55
10:43:43	7	6.55
10:43:38	7	6.55
10:43:33	7	6.55
10:43:28	7	6.55
10:43:23	7	6.55
10:43:18	7	6.55
10:43:13	7	6.55
10:43:08	7	6.55
10:43:03	7	6.55

STATION ID = 08

10:46:35	7	6.52
10:46:30	7	6.52
10:46:25	7	6.52
10:46:20	7	6.52
10:46:15	7	6.52
10:46:10	7	6.52
10:46:05	7	6.52
10:46:00	7	6.52
10:45:55		6.52
10:45:53	7	6.52

STATION ID = 09

12:18:40	7	9.32
12:18:38	7	9.32
12:18:36	7	9.32
12:18:34	7	9.32
12:18:32	7	9.32
12:18:30	7	9.32
12:18:28	7	9.32
12:18:26	7	9.32
12:18:24	7	9.32
12:18:22	7	9.32
12:18:21	7	9.32
12:18:20	7	9.32
12:18:19	7	9.32
12:18:18	7	9.32
12:18:17	7	9.32
12:18:16	7	9.32
12:18:15	7	9.32
12:18:14	7	9.32
12:18:13	7	9.32
12:18:12	7	9.30
12:18:11	7	9.30
12:18:10	7	9.32
12:18:09	7	9.35
12:18:08	7	9.37
12:18:07	7	9.37
12:18:06	7	9.30
12:18:05	7	9.20
12:18:04	7	9.17
12:18:03	7	9.15
12:18:02	7	11.00

12:02 HRS 87/09/15 #10

Begin slug test

STATION ID = 09

12:20:09	7	9.32
12:20:07	7	9.30
12:20:05	7	9.32
12:20:03	7	9.30
12:20:02	7	9.30
12:20:01	7	9.30
12:20:00	7	9.30
12:19:59	7	9.30
12:19:58	7	9.32
12:19:57	7	9.32
12:19:56	7	9.30
12:19:55	7	9.30
12:19:54	7	9.30
12:19:53	7	9.32
12:19:52	7	9.35
12:19:51	7	9.35
12:19:50	7	9.30
12:19:49	7	9.20
12:19:48	7	9.17
12:19:47	7	9.32
12:19:46	7	9.57
12:19:45	7	9.65
12:19:44	7	9.22
12:19:43	7	8.05

12:18 HRS 87/09/15 #10

Begin reverse slug test

12:39 HRS 87/09/15 #10

STATION ID = 10

12:39:33	7	9.65
12:39:31	7	9.65
12:39:29	7	9.65
12:39:27	7	9.65
12:39:25	7	9.65
12:39:23	7	9.65
12:39:21	7	9.65
12:39:19	7	9.65
12:39:17	7	9.65
12:39:15	7	9.65
12:39:13	7	9.65
12:39:11	7	9.65
12:39:09	7	9.65
12:39:07	7	9.65
12:39:05	7	9.65
12:39:03	7	9.65
12:39:01	7	9.65
12:38:59	7	9.65
12:38:57	7	9.62
12:38:55	7	9.67
12:38:53	7	9.67
12:38:52	7	9.62
12:38:51	7	9.60
12:38:50	7	9.62
12:38:49	7	9.70
12:38:48	7	9.75
12:38:47	7	9.72
12:38:46	7	9.62
12:38:45	7	9.50
12:38:44	7	9.52
12:38:43	7	9.70
12:38:42	7	9.90
12:38:41	7	9.87
12:38:40	7	9.60
12:38:39	7	9.25
12:38:38	7	9.25
12:38:37	7	9.72
12:38:36	7	10.30
12:38:35	7	10.32
12:38:34	7	9.52
12:38:33	7	8.60

12:38 HRS 87/09/15 #10

Begin slug test

STATION ID = 10

12:38:04	7	9.65
12:38:02	7	9.65
12:38:00	7	9.65
12:37:58	7	9.65
12:37:56	7	9.65
12:37:54	7	9.65
12:37:52	7	9.65
12:37:50	7	9.65
12:37:48	7	9.65
12:37:46	7	9.67
12:37:45	7	9.67
12:37:44	7	9.65
12:37:43	7	9.62
12:37:42	7	9.62
12:37:41	7	9.65
12:37:40	7	9.70
12:37:39	7	9.72
12:37:38	7	9.70
12:37:37	7	9.62
12:37:36	7	9.55
12:37:35	7	9.55
12:37:34	7	9.67
12:37:33	7	9.85
12:37:32	7	9.90
12:37:31	7	9.75
12:37:30	7	9.47
12:37:29	7	9.12
12:37:28	7	9.30
12:37:27	7	11.12
12:37:26	7	9.65

12:30 HRS 87/09/15 #10

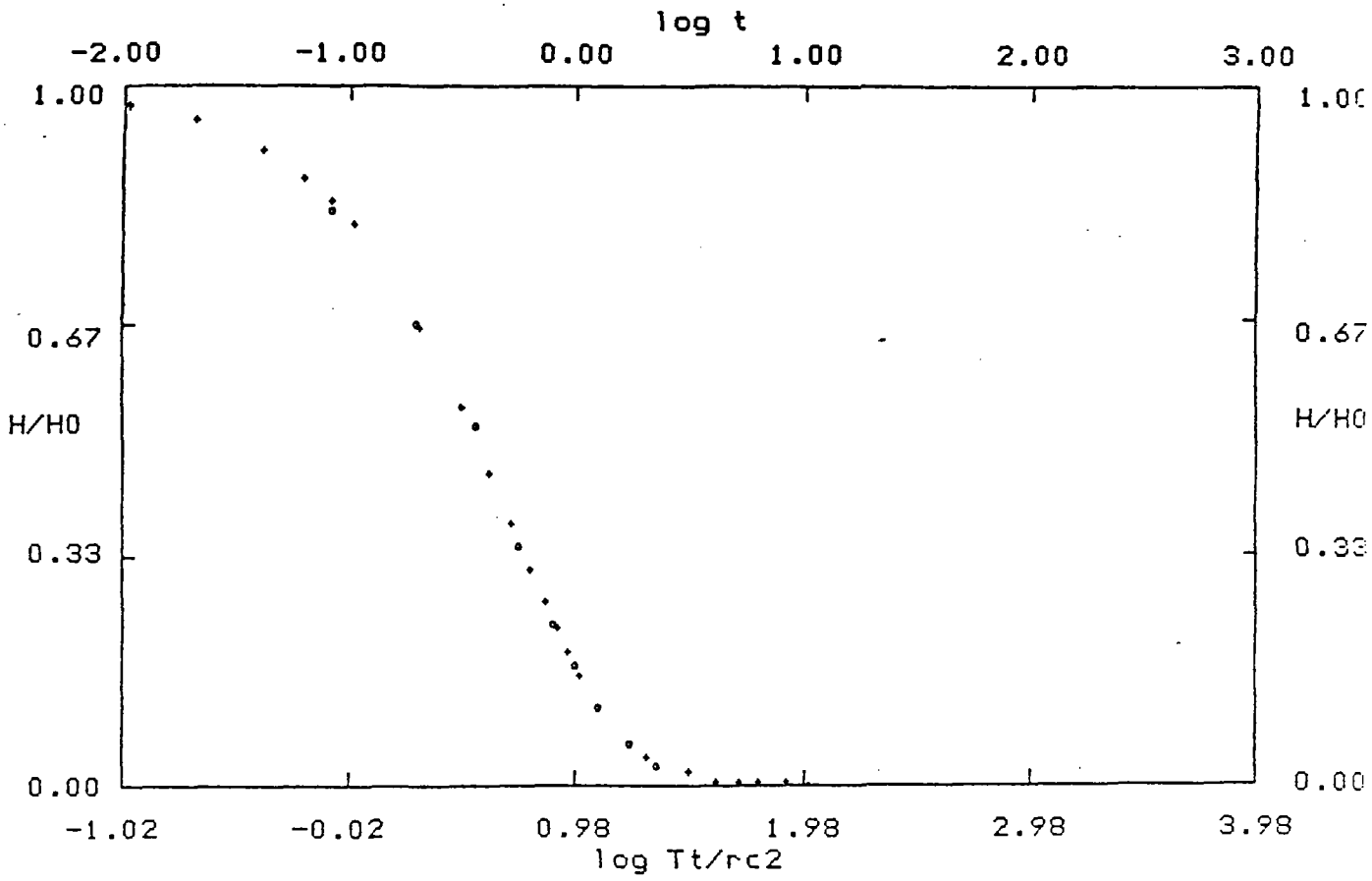
Begin reverse slug test

Data for Slug Injection/Withdrawal Test

Well Name: V1 Date of Test: 9/15/87
Well Number: 1
Change in Vol.of Water = 0.04 cu.ft.
Effective Radius of Well = 0.33 feet
Radius of Casing(rc) over Water Level Decline = 0.08 feet

Entry No.	Time(t) (min.)	Head (ft.)	H (ft.)	H/H0
1		7.000		
2	0.000	8.720	1.720	1.000
3	0.083	8.420	1.420	0.826
4	0.200	8.150	1.150	0.669
5	0.367	7.900	0.900	0.523
6	0.567	7.600	0.600	0.349
7	0.800	7.400	0.400	0.233
8	1.000	7.300	0.300	0.174
9	1.250	7.200	0.200	0.116
10	1.750	7.100	0.100	0.058
11	2.300	7.050	0.050	0.029

SLUG TEST DATA (V1)



o - Data

+ - Type Curve
Slug Test: alpha = -8.0

SOLUTION

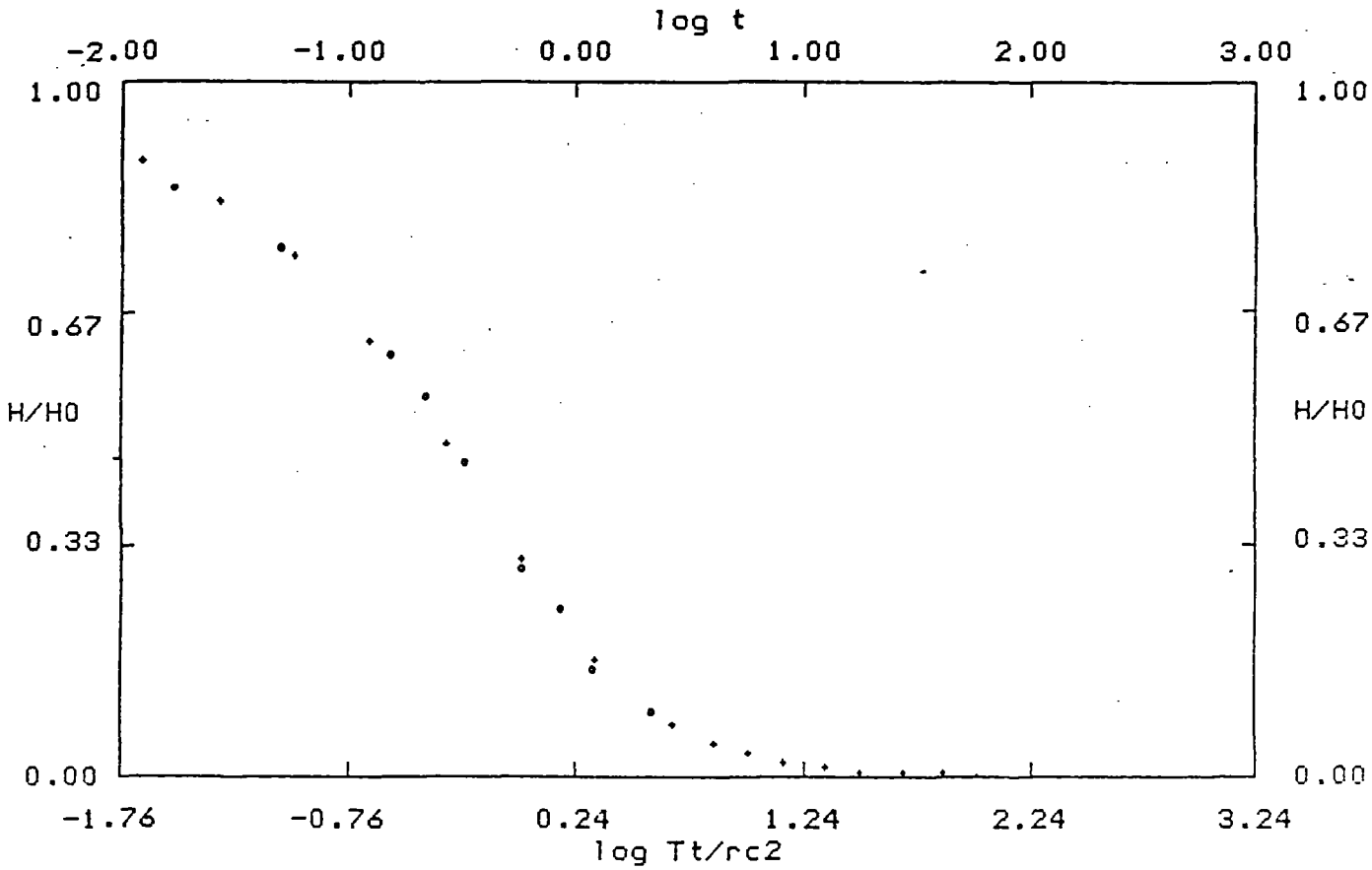
Transmissivity = 6.112E-02 ft.2/min.
Storativity = 5.877E-10

Data for Slug Injection/Withdrawal Test

Well Name: V2 Date of Test: 9/15/87
Well Number: 1
Change in Vol.of Water = 0.04 cu.ft.
Effective Radius of Well = 0.33 feet
Radius of Casing(rc) over Water Level Decline = 0.20 feet

Entry No.	Time(t) (min.)	Head (ft.)	H (ft.)	H/H0
1		6.920		
2	0.000	7.250	0.330	1.000
3	0.017	7.200	0.280	0.848
4	0.050	7.170	0.250	0.758
5	0.150	7.120	0.200	0.606
6	0.220	7.100	0.180	0.545
7	0.320	7.070	0.150	0.455
8	0.580	7.020	0.100	0.303
9	0.850	7.000	0.080	0.242
10	1.200	6.970	0.050	0.152
11	2.200	6.950	0.030	0.091

SLUG TEST DATA (V2)



o - Data

+ - Type Curve
Slug Test: alpha = -1.0

SOLUTION

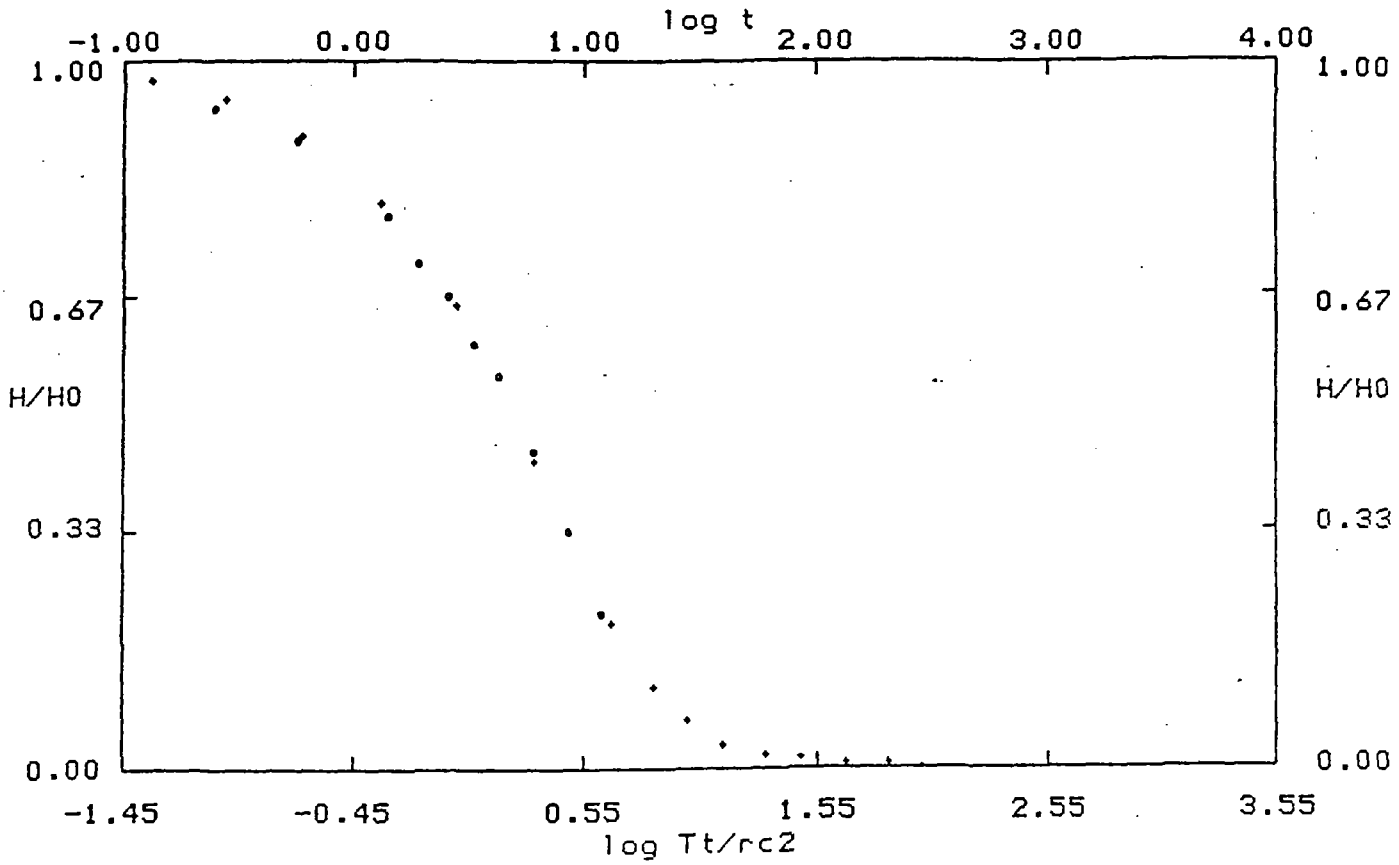
Transmissivity = 6.951E-02 ft.2/min.
Storativity = 3.673E-02

Data for Slug Injection/Withdrawal Test

Well Name: V3 Date of Test: 9/15/87
Well Number: 1
Change in Vol.of Water = 0.09 cu.ft.
Effective Radius of Well = 0.42 feet
Radius of Casing(rc) over Water Level Decline = 0.29 feet

Entry No.	Time(t) (min.)	Head (ft.)	H (ft.)	H/H0
1		5.850		
2	0.000	6.300	0.450	1.000
3	0.250	6.270	0.420	0.933
4	0.580	6.250	0.400	0.889
5	1.420	6.200	0.350	0.778
6	1.920	6.170	0.320	0.711
7	2.580	6.150	0.300	0.667
8	3.330	6.120	0.270	0.600
9	4.250	6.100	0.250	0.556
10	6.080	6.050	0.200	0.444
11	8.580	6.000	0.150	0.333
12	12.080	5.950	0.100	0.222

SLUG TEST DATA (V3)



o - Data

+ - Type Curve
Slug Test: alpha = -4.0

SOLUTION

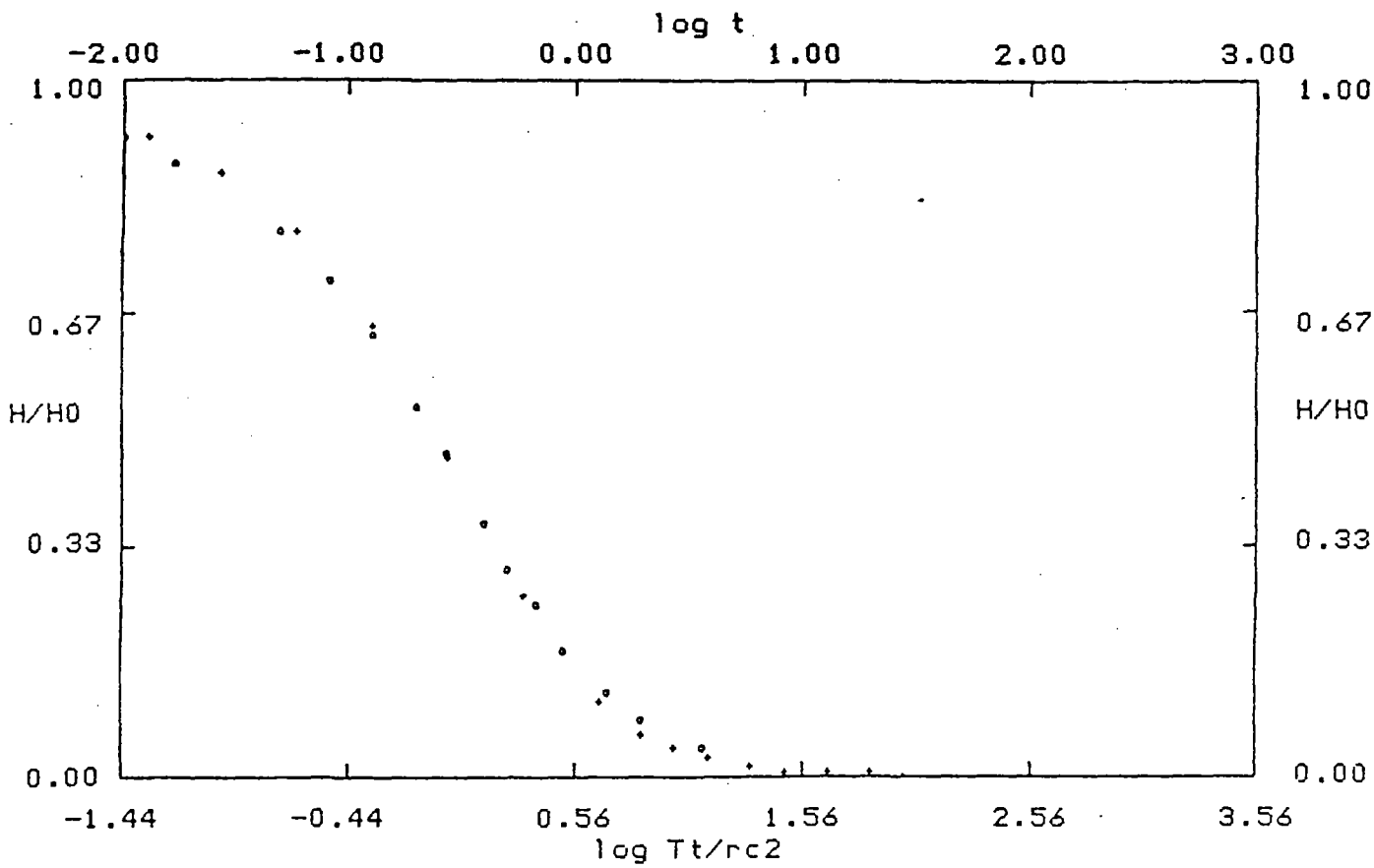
Transmissivity = 2.984E-02 ft.2/min.
Storativity = 4.768E-05

Data for Slug Injection/Withdrawal Test

Well Name: V4 Date of Test: 9/15/87
Well Number: 1
Change in Vol.of Water = 0.10 cu.ft.
Effective Radius of Well = 0.42 feet
Radius of Casing(rc) over Water Level Decline = 0.17 feet

Entry No.	Time(t) (min.)	Head (ft.)	H (ft.)	H/H0
1		9.050		
2	0.000	10.270	1.220	1.000
3	0.017	10.120	1.070	0.877
4	0.050	10.000	0.950	0.779
5	0.083	9.920	0.870	0.713
6	0.130	9.820	0.770	0.631
7	0.200	9.700	0.650	0.533
8	0.270	9.620	0.570	0.467
9	0.400	9.500	0.450	0.369
10	0.500	9.420	0.370	0.303
11	0.670	9.350	0.300	0.246
12	0.900	9.270	0.220	0.180
13	1.380	9.200	0.150	0.123
14	1.970	9.150	0.100	0.082
15	3.630	9.100	0.050	0.041

SLUG TEST DATA (V4)



o - Data

+ - Type Curve
Slug Test: alpha = -2.0

SOLUTION

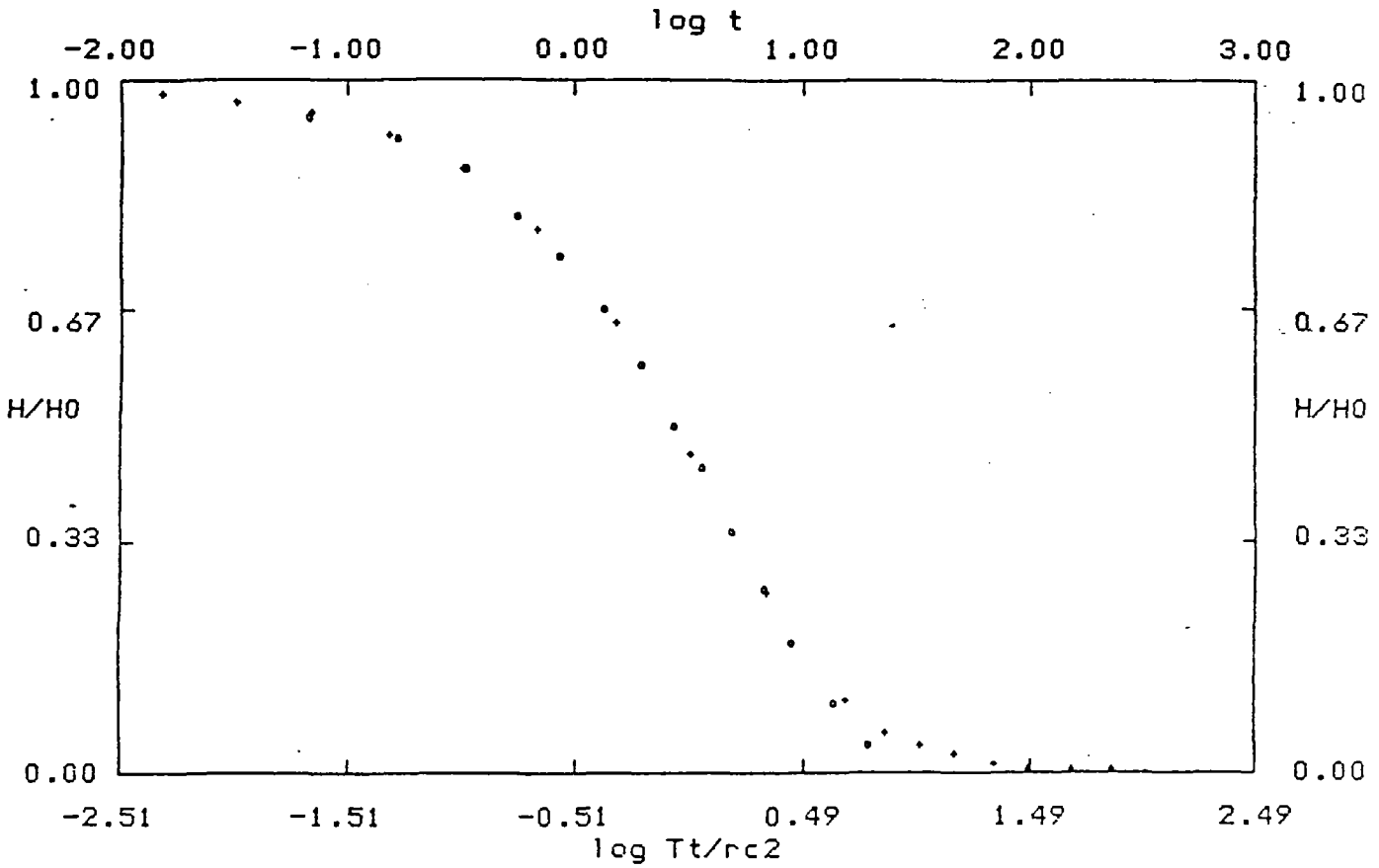
Transmissivity = 1.049E-01 ft.2/min.
Storativity = 1.638E-03

Data for Slug Injection/Withdrawal Test

Well Name: V5 Date of Test: 9/15/87
Well Number: 1
Change in Vol.of Water = 0.04 cu.ft.
Effective Radius of Well = 0.33 feet
Radius of Casing(rc) over Water Level Decline = 0.08 feet

Entry No.	Time(t) (min.)	Head (ft.)	H (ft.)	H/H0
1		7.370		
2	0.000	9.370	2.000	1.000
3	0.067	9.270	1.900	0.950
4	0.167	9.200	1.830	0.915
5	0.333	9.100	1.730	0.865
6	0.567	8.970	1.600	0.800
7	0.867	8.850	1.480	0.740
8	1.350	8.700	1.330	0.665
9	1.930	8.550	1.180	0.590
10	2.770	8.370	1.000	0.500
11	3.600	8.250	0.880	0.440
12	4.930	8.070	0.700	0.350
13	6.770	7.900	0.530	0.265
14	8.930	7.750	0.380	0.190
15	13.430	7.570	0.200	0.100
16	18.933	7.450	0.080	0.040

SLUG TEST DATA (V5)



o - Data

+ - Type Curve
Slug Test: alpha = -2.0

SOLUTION

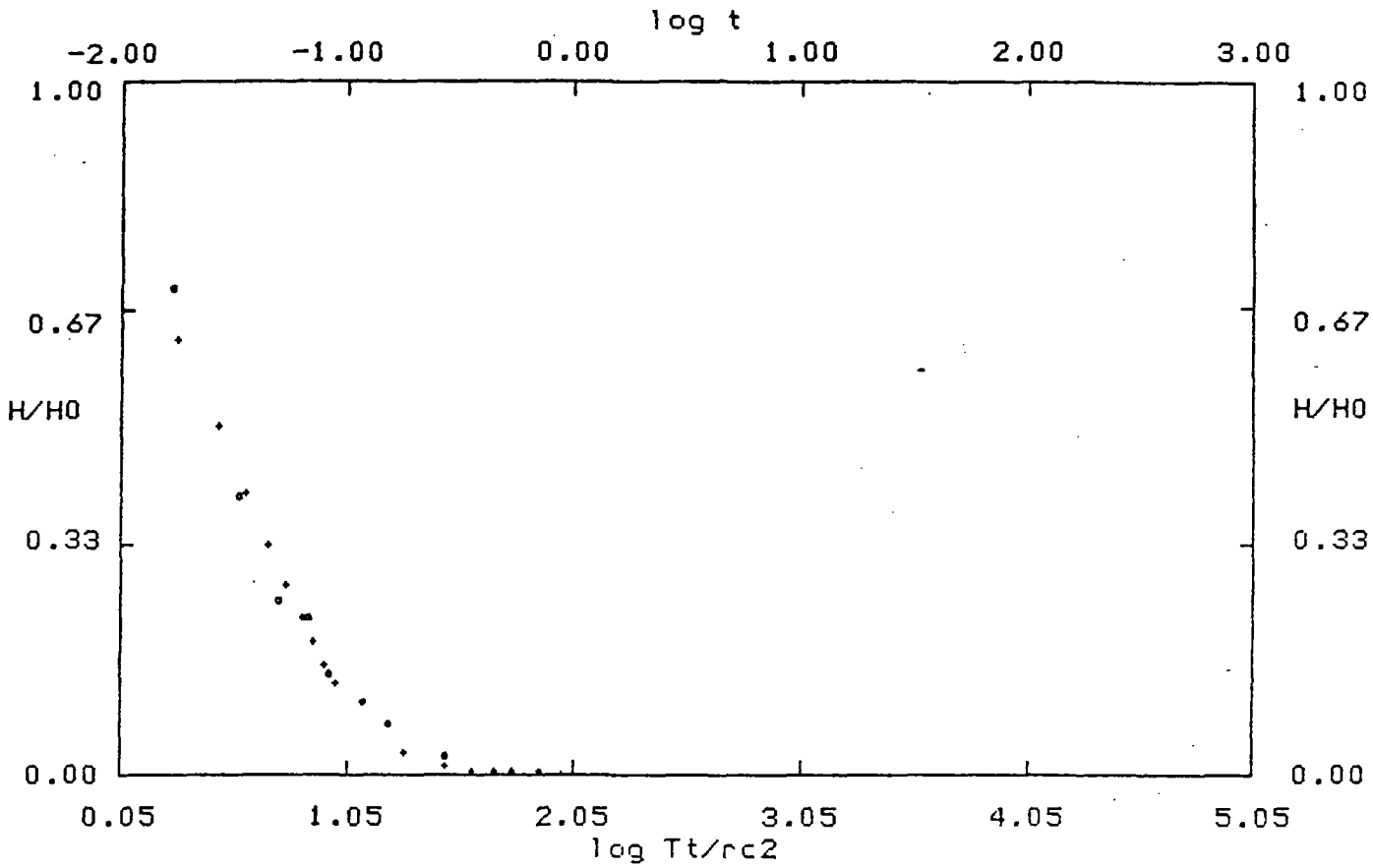
Transmissivity = 1.978E-03 ft.2/min.
Storativity = 5.877E-04

Data for Slug Injection/Withdrawal Test

Well Name: V6 Date of Test: 9/15/87
Well Number: 1
Change in Vol.of Water = 0.01 cu.ft.
Effective Radius of Well = 0.33 feet
Radius of Casing(rc) over Water Level Decline = 0.08 feet

Entry No.	Time(t) (min.)	Head (ft.)	H (ft.)	H/H0
1		8.600		
2	0.000	9.270	0.670	1.000
3	0.017	9.070	0.470	0.701
4	0.033	8.870	0.270	0.403
5	0.050	8.770	0.170	0.254
6	0.067	8.750	0.150	0.224
7	0.083	8.700	0.100	0.149
8	0.117	8.670	0.070	0.104
9	0.150	8.650	0.050	0.075
10	0.267	8.620	0.020	0.030

SLUG TEST DATA (V6)



o - Data

+ - Type Curve
Slug Test: alpha = -7.0

SOLUTION

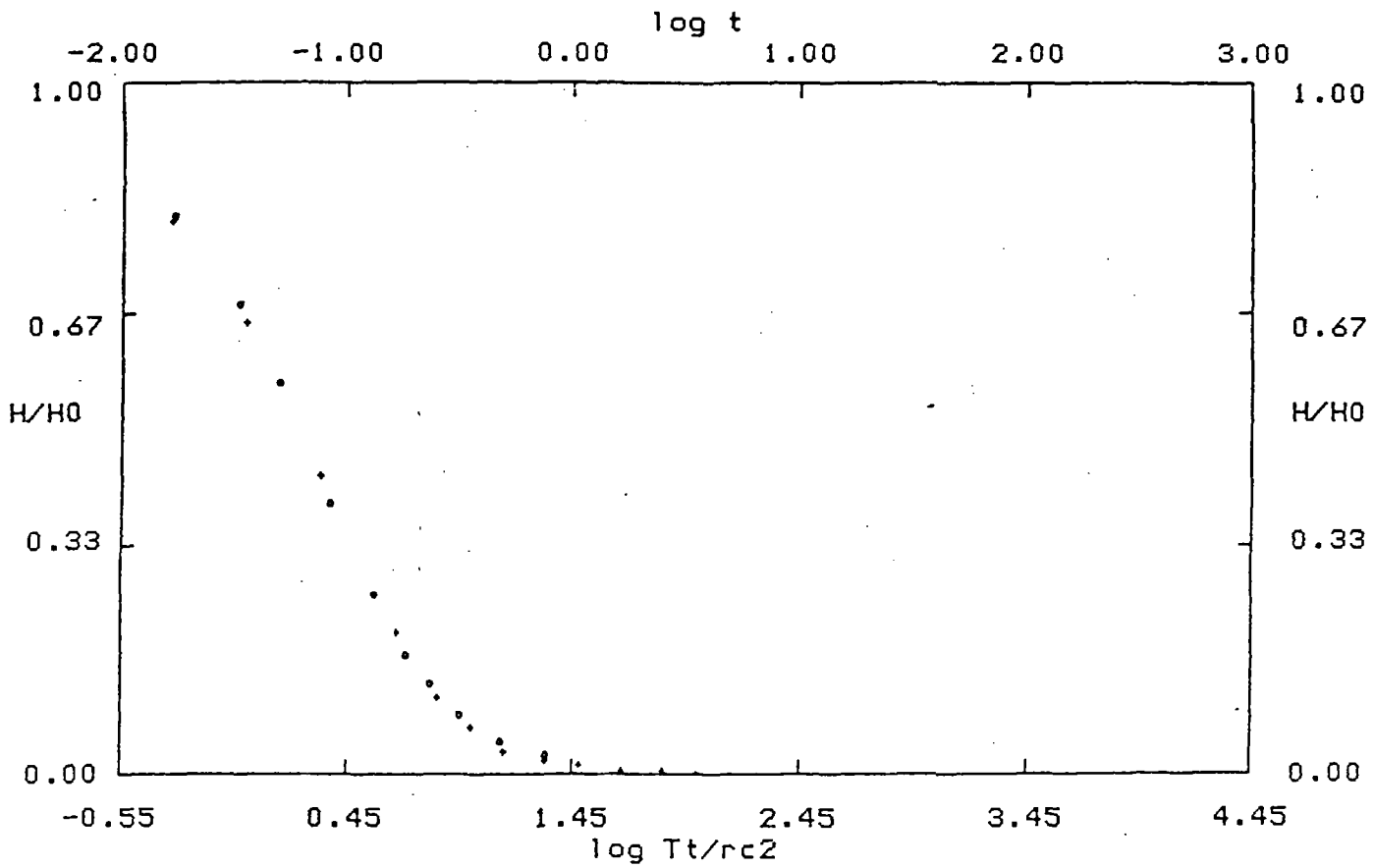
Transmissivity = 7.181E-01 ft.2/min.
Storativity = 5.877E-09

Data for Slug Injection/Withdrawal Test

Well Name: V7 Date of Test: 9/15/87
Well Number: 1
Change in Vol.of Water = 0.02 cu.ft.
Effective Radius of Well = 0.33 feet
Radius of Casing(rc) over Water Level Decline = 0.08 feet

Entry No.	Time(t) (min.)	Head (ft.)	H (ft.)	H/H0
1		8.520		
2	0.000	9.670	1.150	1.000
3	0.017	9.450	0.930	0.809
4	0.033	9.300	0.780	0.678
5	0.050	9.170	0.650	0.565
6	0.083	8.970	0.450	0.391
7	0.133	8.820	0.300	0.261
8	0.183	8.720	0.200	0.174
9	0.233	8.670	0.150	0.130
10	0.317	8.620	0.100	0.087
11	0.483	8.570	0.050	0.043
12	0.750	8.550	0.030	0.026

SLUG TEST DATA (V7)



o - Data

+ - Type Curve
Slug Test: alpha = -4.0

SOLUTION

Transmissivity = 1.804E-01 ft.2/min.
Storativity = 5.877E-06

Wahler Associates

CALCULATION SHEET

SHEET 1 OF 3 SHEETS

PROJECT Jasco Chemical Corporation PROJECT NO. JCO-104H

SUBJECT Slug Test Calculation

FILE

CALCULATED BY D.S. CHECKED BY A.C. DATE 9/15/87

Hydraulic Conductivity Calculations:

$$K = \frac{T}{b}$$

Well no:

V-1: $K = 6.11 \times 10^{-2}/22 = 2.78 \times 10^{-3}$ ft/min $= 1.42 \times 10^{-3}$ cm/sec

V-2: $K = 6.95 \times 10^{-2}/12 = 5.79 \times 10^{-3}$ ft/min $= 2.95 \times 10^{-3}$ cm/sec

V-3: $K = 2.98 \times 10^{-2}/12 = 2.48 \times 10^{-3}$ ft/min $= 1.27 \times 10^{-3}$ cm/sec

V-4: $K = 1.05 \times 10^{-1}/7 = 1.5 \times 10^{-2}$ ft/min $= 7.65 \times 10^{-3}$ cm/sec

V-5* (low): $K = 1.98 \times 10^{-3}/3 = 6.6 \times 10^{-4}$ ft/min $= 3.37 \times 10^{-4}$ cm/sec

V-6* (high): $K = 7.18 \times 10^{-1}/7 = 1.03 \times 10^{-1}$ ft/min $= 5.23 \times 10^{-2}$ cm/sec

V-7: $K = 1.8 \times 10^{-1}/13.5 = 1.33 \times 10^{-2}$ ft/min $= 6.80 \times 10^{-3}$ cm/sec

* Conductivity values used to determine velocity ranges.

Wahler Associates

CALCULATION SHEET

SHEET 2 OF 3 SHEETS

PROJECT Jasco Chemical Corporation

PROJECT NO. JCO-104-H

SUBJECT Slug Test Calculation

FILE

CALCULATED BY D.S. CHECKED BY A.C. DATE 9/15/87

Seepage Velocity:

$$V = K \frac{dh}{dl} \frac{1}{n}$$

$$\frac{dh}{dl} = 0.004$$

$$n = 0.4$$

K ranges from 6.6×10^{-4} ft/min to 1.03×10^{-1} ft/min.

Average $K = 2.04 \times 10^{-2}$ ft/min

Lowest V (V-5)

$$V = 6.6 \times 10^{-4} \times 0.004 \times \frac{1}{0.4}$$

$$V = 6.6 \times 10^{-6} \text{ ft/min}$$

Low $V = 3.5$ ft/yr

Highest V (V-6)

$$V = 1.03 \times 10^{-1} \times 0.004 \times \frac{1}{0.4}$$

$$= 1.03 \times 10^{-3} \text{ ft/min}$$

High $V = 541.4$ ft/yr

Average V

$$V = 2.04 \times 10^{-2} \times 0.004 \times \frac{1}{0.4}$$

Average $V = 107.2$ ft/yr

Wahler Associates

CALCULATION SHEET

PROJECT

PROJECT NO. JCO-104H

SUBJECT Slug Test Calculations

FILE

CALCULATED BY D.S. CHECKED BY A.C. DATE 9/15/87

Other seepage velocities:

V-1: $v = (2.78 \times 10^{-3} \times 0.004 \times 1/0.4)$ ft/min = 14.6 ft/yr

V-2: $v = (5.79 \times 10^{-3} \times 0.004 \times 1/0.4)$ ft/min = 30.4 ft/yr

V-3: $v = (2.48 \times 10^{-3} \times 0.004 \times 1/0.4)$ ft/min = 13.0 ft/yr

V-4: $v = (1.5 \times 10^{-2} \times 0.004 \times 1/0.4)$ ft/min = 78.8 ft/yr

V-7: $v = (1.33 \times 10^{-2} \times 0.004 \times 1/0.4)$ ft/min = 70.0 ft/yr