ESTES LANDFILL RI/FS
REMEDIAL INVESTIGATION REPORT

2

Volume I of V

Text, Tables, Figures & Appendix A - J

D-E-F-G-H-I-J

Prepared for

Arizona Department of Environmental Quality

By

Environmental Science & Engineering, Inc.

ESTES LANDFILL RI/FS
REMEDIAL INVESTIGATION REPORT

Volume I of V
Text, Tables, Figures & Appendix A - J

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Environmental Science & Engineering, Inc.
A MACTEC Company

Daily Field Trip Log

Client ADEQ WQARF | QST Project : Estes Landfill
Site Location: Phoenix, AZ | QST Project No.: 669 9030
QST Field Team Leader: PAD | QST Project Manager: John Miehr

Date 05-03-99 | Day of Week MONDAY | Page 1 of 1

Purpose of Trip FIRST DAY OF DRILLING

Field Team Members (Names and Initials)
PATRICIA H. DROBAT (PAD)
MATTHEW E. GARLICK (MEG)
JOHN MIEHR (JM)

Contacts N/A

Work Completed This Date BEGIN DRILLING QST B-2. (COLLECT SAMPLES FOR GEOTECHNICAL ANALYSES & VOC) @ 1425 HRS. DOWN TIME UNTIL 1425 HRS WAS FOR EQUIPMENT SET UP AND QST MOB. 45 MIN. LUNCH. DRILLED & ADVANCED CASING TO 50' BGS. SAMPLED TO 50' STOP FOR DAY @ 1708 HRS.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
N/A	QST B3-(S/15) (5-3-99)	B-3	SOIL	1539	15-16.5	PAD
N/A	QST-B3(S/26) (5-3-99)	B-3	SOIL	1547	26.5-28	PAD
N/A	QST-B3(S-45) (5-3-99)	B-3	SOIL	1636	45-45.5	PAD

Signatures:

Field Team Leader [signature] Date 5-4-99.

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.: 669 9030
QST Field Team Leader: PAD — QST Project Manager: John Mieher

Date 5-4-99 Day of Week TUESDAY Page 1 of 1

Purpose of Trip SECOND DAY SOIL BORINGS

Field Team Members (Names and Initials): PATRICIA A DROBAT (PAD); JOHN MIEHER (JM); MATTHEW E. GARLICK (MEG); JOHN KIM (JK)

Contacts N/A

Work Completed This Date CONTINUE ADVANCING B-3. BEGIN @ 0748 HRS AFTER SAFETY MEETING. ENCOUNTER ∇ ~73' BGS IN B-3. ADVANCED CASING TO 78' BGS AFTER SAMPLING @ 75' BGS. COLLECT QST-B3 (GW/78)-(5-4-99) @ 1020 HRS. DECON EQUIPMENT, BEGIN QST-B4 @ 1420 HOURS. Sampled to 65' BGS. STOP DRILLING @ 1700 HRS — NO water encountered in B4.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	QST-B3-(GW/78) (5-4-99)	B3	AQ	1020	78' BGS	PAD
	QST-B3-(S/75) (5-4-99)	QST-B3	S	0915	75' BGS (75'-75'10")	PAD
	QST-B3-(S/45) (5-4-99)	QST-B3	S	1636	45' BGS (45'-45'5")	PAD
	3@	PAD				
	QST-B4(S/25) (5-4-99)	QST-B4	S	1503	25'-26'2"	PAD
	QST-B4(S/49) (5-4-99)	QST-B4	S	1618	49-50'3"	PAD
	QST-B4(S/35) (5-4-99	QST-B4	S	1531	35-35'8"	PAD
	QST-B4(S/55) (5-4-99)	QST-B4	S	1627	55-55'8"	PAD

S= SOIL AQ= AQUEOUS

Signatures:

Field Team Leader John A. Drobat Date 5-5-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project: Estes Landfill
QST Project No.: 6699030
QST Project Manager: John Mieher

Date 5-5-99 Day of Week Wednesday Page 1 of 1

Purpose of Trip SOIL BORINGS

Field Team Members (Names and Initials)
PATRICIA A. DROBAT (PAD)
JOHN MIEHER (JM)
MATTHEW E. GARUCK (MEG)

Contacts N/A

Work Completed This Date WATER IN B4 @ ~67'. ATTEMPT SAMPLING WITH BAILER @ 0845 HRS - WATER TOO SILTY. COMPLETED COLLECTING SAMPLES @ 78' BGS. - DECON & MOB TO QST-B6. ADVANCED B6 TO ~ 26' BGS. ENCOUNTERED REFUSE @ ~3' BGS. DIFFICULT TO OBTAIN SAMPLES. 25' SAMPLE ENCOUNTERED NO REFUSE. OFF SITE @ 1711 HRS

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	QST-B4-(GW/78) (5-5-99)	QST-B4	AQ	1126	~78'-73'	JM PAD

Signatures:

Field Team Leader [signature] Date 5-5-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: TRICIA DROBAT

QST Project : Estes Landfill
QST Project No.: 669 9030
QST Project Manager: John Mieher

Date 5-6-99 Day of Week THURSDAY Page 1 of 1

Purpose of Trip SOIL BORINGS

Field Team Members (Names and Initials)
PATRICIA A DROBAT (PAD)
JEFF MARTIN (JM)

Contacts

Work Completed This Date ENCOUNTERED WATER IN QST-B6 @ ~67' BGS. COLLECT SAMPLE QST-B6-(GW/TO)-(5-6-99) WITH WELL SCREEN 65-70' BGS. DECON. EQUIP. MOB TO BORING QST-B15 (TOP OF LANDFILL). NOTAM FLAG SET ON TOP OF DERRICK. ENCOUNTERED REFUSE @ ~5.5' BGS @ QST-B15. OUT OF REFUSE @ 66' BGS. ENCOUNTERED H2O @ 80' BGS. 1820 collect gw samples from temp. well set 80-85' BGS. OFF SITE 1915 HOURS.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
N/A	QST-B6(GW/TO) (5-6-99)	QST-B6	AQ	0915	65-70'	PAD
N/A	QST-B6(S/36) (5-6-99)	QST-B6	S	0742	~~50'-50'6"~~ 36'-36'6"	PAD
N/A	QST-B6(S/55) (5-6-99)	QST-B6	S	0828	55'-65'	PAD
N/A	QST-B15(S/39) (5-6-99)	QST-B15	S	1431	39'-39'5"	PAD
N/A	QST-B15(S/66) (5-6-99)	QST-B15	S	1545	66'-66'8"	PAD
N/A	QST-B15(GW/BS) (5-6-99	QST-B15	AQ	1820	80-85'	JM/PAD

AQ = AQUEOUS S = SOIL

Signatures:

Field Team Leader Patricia A Drobat Date 5-6-99

Reviewer Date

Reviewer Title

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.: 669 9030
QST Field Team Leader: PAD — QST Project Manager: John Mieher

Date 05-7-99 Day of Week FRIDAY Page 1 of 1

Purpose of Trip SOIL BORINGS

Field Team Members (Names and Initials)
PATRICIA A. DROBAT (PAD)
JEFF MARTIN (JM)

Contacts N/A

Work Completed This Date COMPLETED QST-B15. DECON'D RIG & EQUIPMENT – MOB TO QST-B16. QST-B15 GROUTED WITH CEMENT. ½ HOUR DOWN TIME (1430 TO 1500) FOR RIG MAINTENANCE. ENCOUNTERED GROUNDWATER ~75' BGS AT QST-B16. COLLECT GW SAMPLE @ 1620 HOURS – FULL SUITE OF SAMPLES. OFF SITE FOR DAY AT 1710 HOURS.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
N/A	QSTB16(S/26) (5-7-99)	QST-B16	S	1023	26'-27.5'	PAD
N/A	(QST-B16 (S/30) (5-7-99)	QST-B16	S	1044	26'-27.5'	PAD
N/A	(QST-B16(GW/80) (5-7-99)	QST-B16	AQ	1620	75'-80'	PAD

S=SOIL AQ = AQUEOUS

Signatures:

Field Team Leader _____ Date 5-7-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project : Estes Landfill
QST Project No.: 669 9030
QST Project Manager: John Mieher

Date 05-10-99 Day of Week MONDAY Page 1 of 1

Purpose of Trip

Field Team Members (Names and Initials)
(PAD) Patricia A Drobat
(JM) Jeff Martin

Contacts N/A

Work Completed This Date FULL PIPE & GROUT QST-B16. RIG MAINTENANCE FROM 8:15-930 hrs. MOB TO QST-B18 AFTER DECON. COMPLETED B18 (T.D. = 90' BGS) COLLECTED GW SAMPLE @ 1437 HOURS. ALL PIPE OUT OF HOLE, 1530 HOURS. DECON EQUIPMENT - CREW CHANGED OUT WINCH CABLE.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
N/A	QST-B18(GW/BS) (5-10-99)	QST-B18	AQ	1437	~80-85'	PAD
N/A	QST-B18(S/40) (5.10.99)	QST-B18	SOIL	1120	40'-40'8"	PAD
N/A	QST-B18(S/74) * (5-10-99)	QST-B18	SOIL	1152	64'-64'9" *	PAD

AQ = AQUEOUS. * NOTE THAT THIS SAMPLE WAS INCORRECTLY LABELED AS (S/74). IT SHOULD BE LABLED (S/64) AS THE SAMPLED INTERVAL WAS 64'-64'9". PAD

Signatures:

Field Team Leader _____ Date 5-11-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.: 6699030
QST Field Team Leader: PAD — QST Project Manager: John Mieher

Date 5-11-99 — Day of Week TUESDAY — Page 1 of 1

Purpose of Trip SOIL BORINGS

Field Team Members (Names and Initials): PATRICIA A. DROSAT (PAD); JEFF MARDN (JM)

Contacts N/A.

Work Completed This Date 0700-0745 rig maintenance. 0745-825 standby for geotech sample collection. ENCOUNTER GROUNDWATER AT ~78' BGS COLLECT GW SAMPLES. PULL CASING AND DECON. QST-B18 GROUTED. COLLECT RINSEATE SAMPLE (SPLIT SPOON). MOB TO QST-B8. COLLECT SAMPLES - ADVANCE CASING TO 50' BGS AND STOP FOR DAY @ ~~1500~~ @ 1700 HRS.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
NA	QST-B20(GW/80) (5-11-99)	QST-B20	AQ	1107	80'-85'	PAD
NA	QST-B31(GW/80) (5-11-99)	QST-B20	AQ	1213	80-85'	PAD
N/A	QST-B30(GW/80) (5-11-99)	QST-B20	AQ	1407	N/A	PAD
N/A	QST-B20(S/76) (5-11-99)	QST-B20	SOIL	1009	76-77.5'	PAD
N/A	QST-B20(S/64) (5-11-99	QST-B20	SOIL	0941	64'-64' 11"	PAD
N/A	QST-B20(S/25) (5-11-99)	QST-B20	SOIL	0858	25'-26.5'	PAD

Signatures:

Field Team Leader [signature] Date 5-11-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF | QST Project : Estes Landfill
Site Location: Phoenix, AZ | QST Project No.: 669030
QST Field Team Leader: PAD | QST Project Manager: John Mieher

Date 05-12-99 Day of Week WEDNESDAY Page 1 of 2

Purpose of Trip SOIL BORINGS

Field Team Members (Names and Initials)
PATRICIA A. DROBAT (PAD)
JEFF MARTIN (JM)
JOHN MIEHER (JOM)

Contacts N/A

Work Completed This Date Complete Boring QST-B8. QST-B20 GROUTED. COLLECT GW SAMPLE FROM B-8 @ ~65'BGS. DECON AND MOB TO QST-B7. ADVANCE QST-B7 TO '72' (WATER ENCOUNTERED AT 58' BGS). POOR RECOVERY DUE TO PRESENCE OF REFUSE AND COBBLES. COLLECT WATER SAMPLE AND RINSEATE (SPLIT SPOON) PULL CASING & DECON. DRILLERS OFF SITE AT 1630 HOURS.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
NA	QST-B8(S/45) (5-11-99)	QST-B8	SOIL	1637	45'-45'7"	PAD
NA	QST-B8(S/35) (5-11-99)	QST-B8	SOIL	1614	35'-35'8"	PAD
NA	QST-B8(S/57) (5-12-99)	QST-B8	SOIL	0803	57'-57'11"	PAD
NA	QST-B8(GW/65) (5-12-99)	QST-B8	AQ	0847	60-65'	
N/A	QST-B7(S/55) (5-12-99)	QST-B7	SOIL	1422	55'-56'2"	PAD
N/A	QST-B7(S/37) (5-12-99)	QST-B7	SOIL	1215	37'-37'4"	PAD
NA	QST-B7(S/5) (5-12-99)	QST-B7	SOIL	1117	5'6.5'	PAD
NA	QST-B7(GW/63) (5-12-99)	QST-B7	AQ	1508	58-63'	PAD

Signatures:
Field Team Leader Patricia A. Drobat Date 5-12-99
Reviewer _____ Date _____
Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader:

QST Project : Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Date 5-12-99 Day of Week WEDNESDAY Page 2 of 2

Purpose of Trip SOIL BORINGS

Field Team Members (Names and Initials)
PATRICIA A DROBAT (PAD)
JEFF MARTIN (JM)

Contacts N/A

Work Completed This Date SEE PREVIOUS PAGE

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
NA	QST-B33(GW/GS) (5-12-99)	QST-B4	AQ	1555	—	PAD/JM

Signatures:

Field Team Leader Patricia A Drobat Date 5-12-99

Reviewer Date

Reviewer Title

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project : Estes Landfill
QST Project No.: 6699030
QST Project Manager: John Mieher

Date 05-19-99 Day of Week WEDNESDAY Page 1 of 1

Purpose of Trip RI SOIL BORINGS

Field Team Members (Names and Initials)
PATRICIA A. DROBAT (PAD)
JEFF MARTIN (JM)
PETER J. HOFFMAN (PJH)
JOHN C. MIEHER (JCM)

Contacts N/A

Work Completed This Date 0730 - SET UP ON QST-B11 ~25' NORTH OF FENCELINE ALONG NORTHERN ACCESS RD. GEOTECH ON SITE @ 0900. COMPLETE BORING 1412 HRS. DECON. EQUIPMENT - MOB TO QST-B12, EAST ALONG ACCESS RD. 1530 HOURS SET UP ON B12, WAIT FOR GEOTECH (RAM). COLLECT SPLIT SPOON INSERTS; ADVANCE B-12 TO 10' BEFORE SHUTTING DOWN FOR DAY.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
NA	QST-B11(GW/15) (5-19-99)	QST-B-11	AQ	1236	15-70	PAD JM
NA	QST-B11(5/5) (5-19-99)	QST-B11	SOIL	0927	5'-5'5"	PAD
NA	QST-B11(5/66) (5-19-99)	QST-B11	SOIL	1140	66'-66'8"	PAD
NA	QST-B11(5/68) (5-19-99)	QST-B11	SOIL	1202	68-69'5"	PAD
N/A	QST-B12(GW/60) (5-19-99)	QST-B12	AQ	1500	N/A	PJH, JM

Signatures:

Field Team Leader Patricia A. Drobat Date 5-19-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project : Estes Landfill
QST Project No.: 6699030
QST Project Manager: John Mieher

Date 05-20-99 Day of Week THURSDAY Page 1 of 2

Purpose of Trip RI SOIL BORINGS

Field Team Members (Names and Initials): PATRICIA A. DROBAT (PAD), JOHN HICKEY, JEFF MARTIN (JM), JOHN KIM, PETER J. HOFFMAN (PJH)

Contacts N/A

Work Completed This Date COMPLETED BORINGS B-12 AND 13. COLLECT GROUND WATER SAMPLES FROM BOTH LOCATIONS, GEOTECH. SAMPLES COLLECTED @ EACH LOCATION. FINISH FOR DAY, MOB RIG TO DECON PAD @ 1630 HOURS

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
NA	QST-B12(GW/55) (5-20-99)	QST-B12	AQ	0950	50-55	PAD, JM
NA	QST-B39(S/55) (5-20-99)	QST-B12	SOIL	1416	45'-45'8"	PAD
NA	QST-B12(S/45) (5-20-99)	QST-B12	SOIL	0840	45'-45'8"	PAD
NA	QST-B12(S/34) (5-20-99)	QST-B12	SOIL	0816	34'-34'5"	PAD
NA	QST-B12(S/50) (5-20-99)	QST-B12	SOIL	0851	50'-50'9"	PAD
NA	QST-B13(S/40) (5-20-99)	QST-B13	SOIL	1415	40'-40'10"	PAD
NA	QST-B13(S/50) (5-20-99)	QST-B13	SOIL	1434	50'-50'5"	PAD
NA	QST-B38(S/40) (5-20-99)	QST-B13	SOIL	1218	40'-40'10"	PAD

AG = METALS

Signatures:

Field Team Leader [signature] Date 5-21-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD
QST Project : Estes Landfill
QST Project No.: 6699030
QST Project Manager: John Mieher

Date 5-20-99 Day of Week THURSDAY Page 2 of 2

Purpose of Trip RI SOIL BORINGS

Field Team Members (Names and Initials)
SEE
PAGE
ONE

Contacts N/A

Work Completed This Date SEE PAGE 1

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
NA	QST-B37(9/25) (5-20-99)	QST-B13	SOIL	1507	50'-50'5"	PAD
NA	QST-B13(GW/60) (5-20-99)	QST-B13	AQ	1525	55'-60'	JH, PAD

AQ = AQUEOUS.

Signatures:

Field Team Leader [signature] Date 5-21-99

Reviewer ______ Date ______

Reviewer Title ______

Daily Field Trip Log

Client ADEO WOARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.:
QST Field Team Leader: — QST Project Manager: John Mieher

Date 5-12-99 Day of Week WEDNESDAY Page 1 of

Purpose of Trip METHANE MONITORING + SAMPLING

Field Team Members (Names and Initials): DAN KUDLICKI; FRANANDO Rodriguez

Contacts

Work Completed This Date ~~PP-5~~, PP-4, PP-17, PP-16.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	PP-5	PP-5	AIR	11:45AM		DK FR
	PP-4	PP-4	AIR	12:30		
	PP-~~16~~ 17	PP-~~16~~ 17	AIR	1517 ~~1540~~ F.R.		
	PP-16	PP-16	AIR	1558		

Signatures:

Field Team Leader — Date

Reviewer — Date

Reviewer Title

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.: 6699030
QST Field Team Leader: PAD — QST Project Manager: John Mieher

Date 05-14-99 — Day of Week FRIDAY — Page 1 of 1

Purpose of Trip LANDFILL GAS PROBE MONITORING

Field Team Members (Names and Initials)
PATRICIA A DROBAT (PAD)
PETER J. HOFFMAN (PJH)
JOHN MEHER (JM)

Contacts N/A

Work Completed This Date SAMPLED PROBES PP-12, PP-13, PP-11, PP-2, PP-3 AND PP-6, BOTH SHALLOW AND DEEP PROBES IN EACH CLUSTER. SUBMITTED SAMPLES TO AIR TOXICS FOR METHANE ANALYSES VIA ASTM D-1945.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
N/A	PP-12(V/19) (5-14-99)	PP-12	GAS	1152	N/A	PAD, PJH
N/A	PP-13(V/17) (5-14-99)	PP-13	GAS	1239	N/A	PAD, PJH
N/A	PP-11(V/19) (5-14-99)	PP-11	GAS	1342	N/A	PAD, PJH
N/A	PP-3(V/5) (5-14-99)	PP-3	GAS	1430	N/A	PAD, PJH
N/A	PP-6(V/19) (5-14-99)	PP-6	GAS	1536	N/A	PAD, PJH
N/A	PP-7(V/19) (5-14-99)	PP-7	GAS	1608	N/A	PAD, PJH

Signatures:

Field Team Leader Patricia A. Drobat — Date 5-14-99

Reviewer _____ — Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF | QST Project : Estes Landfill
Site Location: Phoenix, AZ | QST Project No.: 669030
QST Field Team Leader: PAD | QST Project Manager: John Mieher

Date 05-17-99 Day of Week MONDAY Page 1 of 2

Purpose of Trip METHANE PROBE MONITORING

Field Team Members (Names and Initials)
PATRICIA A. DROBAT (PAD)
PETER J. HOFFMAN (PJH)

Contacts N/A

Work Completed This Date SAMPLED METHANE PROBES PP-2, PP-1, PP-10, PP-9, PP-8, PP-14, PP-15, PP-17, COLLECTED 2 DUPLICATE SAMPLES AND ONE AMBIENT AIR BLANK. METHANE PROBE SAMPLING COMPLETE

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
N/A	PP-18(V/19) (5-17-99)	PP-10	GAS	0945 54 PAD	N/A	PAD, PJH
N/A	PP-10(V/10) (5-17-99)	PP-10	GAS	0945	N/A	PAD, PJH
N/A	PP-19(V/6) (5-17-99)	PP-15	GAS	1141	N/A	PAD, PJH
N/A	PP-9(V/5) (5-17-99)	PP-9	GAS	1308	N/A	PAD, PJH
N/A	PP20(V/19) (5-17-99)	PP-9	GAS	1315	N/A	PAD, PJH
N/A	PP-8(V/19) (5-17-99)	PP-8	GAS	1351	NA	PAD, PJH
N/A	PP-15(V/17) (5-17-99)	PP-15	GAS	1424	N/A	PAD, PJH
N/A	PP-14(V/5)	PP-14	GAS	1416	N/A	PAD, PJH

Signatures:
Field Team Leader Robert A. Drobat Date 5-17-99
Reviewer _____ Date _____
Reviewer Title _____

Daily Field Trip Log

Client ADEQ WOARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project : Estes Landfill
QST Project No.: 6699030
QST Project Manager: John Mieher

Date 5-17-99 Day of Week MONDAY Page 2 of 2

Purpose of Trip METHANE PROBE MONITORING

Field Team Members (Names and Initials): PATRICIA A. DROBAT (PAD); PETER J. HOFFMAN (PJH)

Contacts N/A

Work Completed This Date SEE PAGE 1

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
N/A	PP-1 (V/19) (5-17-99)	PP-1	GAS	1516	N/A	PAD, PJH
N/A	PP-2 (V/5) (5-17-99)	PP-2	GAS	1537	N/A	PAD, PJH

Signatures:

Field Team Leader Patricia A. Drobat Date 5-17-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WOARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.:
QST Field Team Leader: — QST Project Manager: John Mieher

Date 06/08/99 — Day of Week TUESDAY — Page 1 of 2

Purpose of Trip G.W. Sampling

Field Team Members (Names and Initials): Peter J. Hoffman (PJH), Dan Kudlicki, John Mieher, Fernando Rodriguez

Contacts

Work Completed This Date: Prep materials and equipment for sampling G.W. 0800/1000 Mobe to Estes Site 1030. Assemble decon set-up for Water Level Indicator + decon. Begin depth to G.W measurements from most contaminated well to least in sequence. EW-NE start. Inspect sounder 1200. Measure EW-NE 1213 Mobe thru sequence. De-coming 11 steps between measurements. EW-1 1250. OVER →

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew

Signatures:

Field Team Leader _____ Date _____

Reviewer _____ Date _____

Reviewer Title _____

1250 De-con tape/probe for EW-1 depth to G.W. measurement
1310 ~~Mobe to EW-25~~ PJM
1320 (F) for Refreshments.

1330 Receive parts for electrical pumping back-up 5
1345 Pump de-con fr site into Baker tank
Assemble T's for G.W. sampling
1400 De-con tape/probe for EW-25
1410 Mobe Key for EW-25
1420 > Locate key, gain access, obtain G.W. Level
1430 Mark Northerly orientation on newly installed well
Mobe to EW-24. De-con tape probe
1440 Obtain EW-24 depth to G.W.
De-con tape/probe
1450 Mobe to EW-11
1505 Hike to well. Obtain depth to G.W.
1510 De-con and mobe to EW-9
1530 Obtain EW-9 depth to G.W. De-con probe/tape
"T" rested on blocks (@.41)
1540 > De-con and mobe to EW-18
1550
1610 Finally locate EW-18 on Waste Mgmt property back lot
+ obtain depth to G.W. measurement

1620 > Attempt to locate EW-4. Find under
1640 man-hole cover in street
1645 De-con water-level indicator
Obtain depth to G.W. measurement
1700 Locate EW-8. Decon probe/tape
Obtain depth to G.W.
1710 > Decon probe/tape
1715 Obtain EW-5 depth to G.W
1725 > Decon probe/tape. Mobe to EW-19
Unable to Obtain depth to G.W. measurements. Gasket off-center
will cut in AM
1740 Unload equip and supplies

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.:
QST Field Team Leader: — QST Project Manager: John Mieher

Date 06/09/99 — Day of Week WEDNESDAY — Page 1 of 2

Purpose of Trip Groundwater Sampling

Field Team Members (Names and Initials)

Contacts

Work Completed This Date Load truck, fill water bottles, get sample bottles 0930. Mobe to Estes. Pick up ice, DI water enroute 0815. Arrive Estes 0835. Obtain EW-19 depth to G.W. 0849. Arrive at EW-26. Decon probe/tape. Obtain depth to G.W. 0859. De-con probe/tape. Mobe to EW-15. 0925. Obtain depth to G.W. EW-15. 0930. Decon probe/tape. Mobe to EW-E Obtain depth to G.W. 0935. Mobe to EW-P21. Decon tape/probe. Obtain depth measurement after locating well. (G) OVER →

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	EWNE-GW(6-9-99)	EW-NE	Aqueous	1511		PJH DT EM

Signatures:

Field Team Leader _____ Date _____

Reviewer _____ Date _____

Reviewer Title _____

Decon new "T" set-ups for new wells. Change out Decon tubs.
Dispose of rinsate in Baker Tank pole

1025 Load tank for sampling event. Fork-lift battery dead. Load manually.
1055 Set up YSI for sampling. Fill out COC's + Labels. Change
1205 out plug to pump. Verify sampling analyses.
1300 Calibrate turbidity meter. Purge volumes and take parameters. 3 volumes.
Take samples.
1350 Generator breakdown.
Fill out COC's + Labels.
1500 New generator delivered. Set-up.
Finish taking bottle samples
1520 Take final field parameters
1532 Take final depth to groundwater 51.42
Empty rinsate after jumping fork-lift.
Organize for Thursday's sampling
1610 Hand off samples to Del Mar Lab courier. Fill out bottle order and COC's for week
1635 Depart Estes

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader:

QST Project : Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Date 06/10/99 Day of Week THURSDAY Page 1 of 3

Purpose of Trip Sampling Event, G.W. wells, Sky Harbor

Field Team Members (Names and Initials)
Peter J. Hoffman
Fernando Rodriguez
John Mieher

Contacts

Work Completed This Date Obtain field parameters and samples for Groundwater monitoring wells EW-22 + EW-23 @ Sky Harbor Airport. 0700 QST office, load YSI, run-off Field Log Copies. Make to Estes. Pick up trailer, load tanks, DI water, rinse water, De-con stations, hoses etc. 0730. Make to Sky Harbor gate to meet Layne/Christensen at 0800 → over

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	EW-23-GW-(6-10-99)	EW-23	AQUEOUS	1100		PDH FR.

Signatures:

Field Team Leader _____ Date _____

Reviewer _____ Date _____

Reviewer Title _____

0800 Layne calls, says told by his office to be at 220 GATE at 0900
Organize trailer, load generator from van.

0900 Rico/Layne arrives to escort to site
0920 Arrive at EW-23, Set-up for sampling
0930 Calibrate: Turbidity Meter
0940 Set-up Decon/ Decon Water Level Indicator
0950 Obtain Depth to G.W.
1000
1018 Take initial field parameters
1029 Pump first purge volume / obtain field parameters
1044 Obtain second purge volume and field parameters
Take samples → YSI Gasket on Flow-Cell slips
1122 Finish sampling
Fixing FlowCell
1130 Attempting to obtain final set of field parameters
1140 Obtaining final depth to Groundwater measurement 70.43
Decon sounder
Put away instruments
1150 Head off-site for lunch / Ice down samples
1200 Exit Gate
1230 Return site
1240 Mobe to EW-22
1250 Set up at EW-22
1300 open well vault to reveal 30 amp 125/250 v / Four prong plug
Cannot get pump to run. Trips generator. Call John Mather
1315 John Calls us off-site (3/4 hp. pump)* for remedy
Need new box
Load sampling complement
Dump de-con water
Demobe to Gate 220
1330 Meet w/ Jim Kuellinski (City of Phx) Inform of predicament
1345 Exit Gate 220 / Sky Harbor
1400 Arrive Estes
Must empty Airpot purged H_2O to get trailer up-hill to EW- using pump. Too slow, plan B. Transfer and tank generator to
1430 Set-up decon. Decon tape/probe

1430 Head to EW-1. Set up for sampling. Check pump.
Will not run. Same symptoms as EW-23. (trips breaker)
Call John Mickler with news and authorization to
jump to EW-24 + EW-25 (newly dedicated pumps)
1500 Return to Estes from phone
Attempt to head to EW-25. Truck running out of gas. Go fuel up.
Return to Estes.
1530 Head to EW-25.
1545 Set up for sampling
1600 Meet courier to hand off samples
1610 Return to EW-25 to start process
Fill out C.O.C's, Labels
1630 Finish setup to sample
1640 Start sampling procedure
Set screw (Allen-head) forced off gasket. Cannot find
Unload sampling equipment
1500 Head to hardware store
1515

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader:

QST Project : Estes Landfill
QST Project No.: 669030
QST Project Manager: John Mieher

Date 06/11/99 Day of Week FRIDAY Page 1 of

Purpose of Trip Groundwater Sampling

Field Team Members (Names and Initials)
Peter J. Hoffman PJH
Matthew Garlick MG

Contacts

Work Completed This Date 0600 Meet w/ HLA at Estes to receive their pump control box. 0625 HLA arrives w/ box. 0640 Go for ice, gas. 0700 Load tank, sampling complement. 0730 Calibrate YSI #1 0820. Set up for sampling. Plug from HLA does not fit generator. Head to electrical supply to purchase proper plug. 0915 Return to EW-1. Obtain VOA samples, generator breakdown 1000 Go to rental for new generator. Return to

over →

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	EW-1-GW-(6-11-99)		AQUEOUS	1000-1250		PJH MG

Signatures:

Field Team Leader _____ Date _____

Reviewer _____ Date _____

Reviewer Title _____

EW-1 Take final samples and field parameters. Final depth to GW 250.
Drain holding tank
1330 John Mischer takes samples to Del Mar.
1345 Load tank and sampling gear. Head to EW-25
1355 Arrive EW-25. Take field parameters, initial and each purge volume. Take samples. Take final depth to G.W.
1440 Load sampling gear

Daily Field Trip Log

Client ADEQ WQARF
QST Project : Estes Landfilll
Site Location: Phoenix, AZ
QST Project No.:
QST Field Team Leader:
QST Project Manager: John Mieher

Date 06/14/99 . Day of Week MONDAY Page ____ of ____

Purpose of Trip Groundwater Sampling

Field Team Members (Names and Initials) Peter J. Hoffman PJH
Matthew Garlick MG

Contacts

Work Completed This Date 0500 Pick up by back, truck keys at QST. 0515 (K) Ice for sample transit + H2O 0515 Arrive Estes load, pack instruments. 0530 Calibrate parameter meter + turbidity meter 0630] 0640 Arrive EW 24, set up. 0655 START pump Take parameters each volume, sample + final parameters 0735] Load up, find depth to G.W. Move to yard. 0740] Drain on site fill c44 CC's + bottles 0812] Arrive Airport 220. 0830 Escort to EW-28

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	~~EW-22-GW(6-14-99)~~	Airport	~~AQUEOUS~~			PJH M.G.
	EW-24-GW-(6.14.99)		AQ			
	EW-11-GW (6.14.99)		AQ			
	EW-9-GW (6.14.99)		AQ			

Signatures:

Field Team Leader ____________ Date ____________

Reviewer ____________ Date ____________

Reviewer Title ____________

0845 Arrive EW-23 w/ survey crew. Shoot casing elevation, Mobe to EW-22 0910 Set up for sampling. Pump not working. Depart EW-22 0930 Escort to 220. Arrive 0945, Head to Estes, Arrive 1000 COC's, Labels mobe to EW-11 1015 ~~Remote site must carry gear to well~~ Found 4 wheel route arrive EW-11 at 1030 Set up to sample. Take 3 sets of parameters + final Take samples. Take final depth to GW. Pack-up. 1140 Mobe to Estes Unload samples 1155 Empty purge collection tank Get ice for samples Mobe to EW-?? 1245 Set up for sampling 1305. Parameters, paperwork, sampling. 1400 Mobe to Estes to drain purge collection tank. Drain. Pack sample 1430, Mobe to W... Property EW-18 1440 Set up to sample. Fill out Labels. Take samples 1512 Load up demobe 1525 Pump out purge water. Handle samples. Unload from sampling event. 1600 Depart Estes.

Daily Field Trip Log

Client ADEQ WQARF | QST Project : Estes Landfilll
Site Location: Phoenix, AZ | QST Project No.:
QST Field Team Leader: | QST Project Manager: John Mieher

Date 06/15/99 Day of Week TUESDAY Page 1 of 2

Purpose of Trip Groundwater Simpling

Field Team Members (Names and Initials) Peter J. Hoffman PJH | Matthew Garlick M.G.

Contacts Jim Kudlinski, City of Phx

Work Completed This Date 0500 QST to Estes w/truck 0515 Gather sampling complement, fill out COC's, load tanks. 0615 Calibrate YSI + Turbidity Meter 0715 Fill out meters, COC's and labels 0745 Mobe to Airport Gate 220. Meet w/ escort + HLA 0800 820 Arrive at EW-22. Set up to sample. Sample + pack DuplGW 915 Escort to gate 0930 Arrive Estes 0958 Pump collected purge H2O into Baker Tank. 1015 Mobe to EW-4. Sample and take parameters 1100 CVER

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	EW-22-GW-(6-15-99)	Airport	AQUEOUS	0900		PJH + M.G.
	EW-4-GW-(6-15-99)	40th St.	AQUEOUS	1040		
	EW-8-GW-(6-15-99)	Landfill	AQUEOUS			

Signatures:

Field Team Leader _____ Date _____

Reviewer _____ Date _____

Reviewer Title _____

1100 Take depth to G.W. Load up sampling compliment, Head to ~~Estes yard~~ to drain purge water. Drain water 1120 Fill out COC's, EW-30 (Duplicate EW-5)

1145/1245 LUNCH 1345 1400

Fill out COC's, Labels 1345 Mobe to EW-8. ~~Set up for sampling~~ Obtain 2nd set of parameters/ 1st purge volume 1430

** Pump running erratically. ~~Slow then fast~~ then slow purge rate. Very slow going pumping slowly - Deep well 201.00 ft?. Still ~~note~~ to Inspect. Old pump? Pumping dry: 1500 Determine well pumped dry. Take parameters @ app. 150 gallons. Sample and take final parameters. Load samples 1525

~~Reset~~ Drain purge volumes. Put away sampling gear. Meet Del-Mar to hand off samples 1600 Depart Estes 1615

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.:
QST Field Team Leader: — QST Project Manager: John Mieher

Date 06/16/99 — Day of Week WEDNESDAY — Page 1 of 2

Purpose of Trip Groundwater Sampling

Field Team Members (Names and Initials): Peter J. Hoffman; Matthew Garlick

Contacts

Work Completed This Date 0500 Depart Qst w/ company truck 0615 Arrive Estes. Fill out COC's and check Get ice and rinsate water. EW-30 Sample will rinsate sample. EW-31 will be a duplicate sample of EW-5. 0710 Calibrate YSI. Fill out COC's + check 755 Test out Grundfos pump for sampling well with no dedicated pump. 0825 Collect rinsate (water level) sample + pack 0920. Set up on EW-5 0930 Replace 3 sampling w/ OVER

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	EW-5-GW-(6-16-99)					
	EW-30-GW-(6-16-99)					
	EW-31-GW-(6-16-99)					
	EW-19-GW-(6-16-99)					
	EW-26-GW-(6-16-99)					

Signatures:

Field Team Leader _____ Date _____

Reviewer _____ Date _____

Reviewer Title _____

0940 Replace 3 prong plug w/ 4 prong plug to enable pumping. Begin sampling
1030 obtain samples start. Take duplicate sample + well sample. Pack. Load sampling gear, mobe to drain purge water 1112 Drain water. De con water level indicator. Change out decon set-up. 1145 Lunch. 1230 Fill out COCs and labels. Mobe to EW-19. Sample, take parameters. Load gear. Pack samples 1350 G.W. depth + Water level, change out batteries 1357
1405 Begin to pump out purge collection tank. Decon tube.
Fill out coc's, labels for EW-26. Call to determine casing depth.
Mobe to EW-26. Set up to sample 1500 Start pumping 1515
Initial field parameters 1520 (30 gallons pumped 1550 At 190 gallons note
*** rapid rise in alkalinity (up to 10.43) Pump rate slowing after
[ec gallons removal. 300 gallons 1900 Drain purge volume one 1930
Remobe to EW-26 to remove 100 more gallons / 2nd purge volume.
Obtain 2nd set of parameters at 2nd purge volume 1957
75 gallons of 3rd purge 1820 40 gallons remaining of 3rd purge volume 1844
1922 Finish sampling, final parameters taken. Mobe to drain
purge water + unload generators + sampling complement 2000

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfilll
Site Location: Phoenix, AZ — QST Project No.:
QST Field Team Leader: — QST Project Manager: John Mieher

Date 06/17/99 Day of Week THURSDAY Page ____ of ____

Purpose of Trip Groundwater Sampling

Field Team Members (Names and Initials) Peter J. Hoffman PJH
Matthew Garlick M.G.

Contacts

Work Completed This Date 0500 pick up truck 0515 pick up ice + water 0530 Fill out COC's, labels + load truck for sampling. Rinsate (duplicate) will be (EW-32. COC's GB 10841 + GR 10843) Well duplicate will be EW-33 (EW-15 will be well duplicated.) Calibrate YSI, Fill out COC's, labels, Calibrate Turbidity Meter 0900 Initial parameter 0930 EW-34 will be a blank for Grundfos rinsate check.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	EW-15-GW-(6.14.99)					
	EW-26-GW-(6.14.99)					
	EW-32-GW-(6.14.99)					
	EW-33-GW-(6.14.99)					
	EW-34-GW-(6.14.99)					

Signatures:

Field Team Leader _____ Date _____

Reviewer _____ Date _____

Reviewer Title _____

1030 Finish sample + duplicate sample. Load truck. Move to Baker Tanks
drain purge water. Fill out COC's + labels. Decon water level indicator.
1130 Move to EW-E + set up. Change out 3 prong plug to 4 prong plug
Pump will not run. Investigate other options... none successful.
Possibly a bad pump. Move on to EW-PZ1. PZ1 has no
dedicated pump, must sample with other means. Pump
and hose length must be decon'd. Run alconox and distilled
H_2O thru pump and hose continuously for 10 + minutes. Then
flush with water w/ no alconox til clean. Move to PZ1,
set up to obtain samples + field parameters. Fill out bottle
labels PZ-1. Attempt to diagnose EW-E electrical problem
w/ John Mizher

20 gals
Run clean H_2O 10 minutes
Then DI H_2O
10 gals
prior to sampling
Sampled afterwards, sent to lab as EW-34 *

1530 Set up on PZ-1 to begin sampling
1535 Initial parameters
1543 1st volume parameters.
1610 2nd volume parameters - Flow rate slowing.
1634 Obtain 3rd set of parameters
Sample well
1700 Obtain final set of parameters. Load sampling gear
1715 Obtain final depth to Groundwater. Move to Baker Tanks
Pump out collection tank into Baker Tank. Unload gear
1745 Depart Estes

* EW-35 will be the FE sample
on 06/18/99

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.: _____
QST Field Team Leader: _____ — QST Project Manager: John Mieher

Date 6/18/99 Day of Week Friday Page 1 of 1

Purpose of Trip Troubleshoot EW-E pump & submit PE samples

Field Team Members (Names and Initials)
JOHN MIEHER (JM)
MATTHEW GALICK (MG)
PETER HOFFMAN (PH)

Contacts _____

Work Completed This Date 0700 clean up site from drilling & sampling
0830 Bloomquist Pump (Ted) on site to diagnose problem w/ pump @ EW-E; re splice motor connections; pump runs out of water but won't in well; will need to remove & take back to shop. 11:30 leave site back to office; prepare PE Samples #s EW-35

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
PE-GW	EW-35	N/A	WATER	11:30	NA	JM

Signatures:

Field Team Leader: JOHN MIEHER Date 6/18/99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: M. Garlick

QST Project : Estes Landfilll
QST Project No.: 6699030 - TASK 0300
QST Project Manager: John Mieher

Date June 22, 1999 Day of Week Tuesday Page 1 of 2

Purpose of Trip SAmple EW-E

Field Team Members (Names and Initials)
Matthew E. Garlick (5:00am)
Frendo Martinez (8:35am)

Contacts

Work Completed This Date 0500 - Arrive at office, wait for helpee, 0530 - mob to storage pickup Equipment, 0615 - Arrive at site begin calibration of Turbidity + YSI Instruments. Equipment blanks EW-4d-6w-(6/22/99) collected @ 8:20am Sampled EW-E @ 9:20am Complete break down @ 12.45

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	EW-E-GW-(6/22/99)	EW-E	AQ	0920	—	
	EW-AC-GW-(6/22/99)	EW-E	AQ	0820	—	

Signatures:

Field Team Leader Matthew E. Garlick Date June 22, 1999

Reviewer Date

Reviewer Title

Daily Field Trip Log

Client ADEO WOARF
Site Location: Phoenix, AZ
QST Field Team Leader:
QST Project : Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Date 5-21-99 Day of Week FRIDAY Page 1 of

Purpose of Trip DRILLING WELL EW-26

Field Team Members (Names and Initials)
PETE HOFFMAN
JOHN MIEHER
JEFF MARTIN

Contacts
ARRIVE AT LATE @ 0630. PREP FOR TODAY. DRILL CREW ARRIVES @ 0645. BEGINS SET-UP + PREP TO DRILL EW-26. GEOTECH ARRIVES @ 0730. NO GEOTECH SAMPLES REQ'D HERE PER

Work Completed This Date TABLE 1 OF FIELD SAMPLING PLAN. GEOTECH LEAVES SITE @ 0745. BEGIN DRILLING EW-26 @ 10:15. RELINQUISH SAMPLE EW-26-(S/10)-5-21-99 TO DEL MAR COURIER @ 15:35. TIGHT, SLOW DRILLING. STOP DRILLING @ 25'@ 16:15. DRILL CREW SECURES RIG + LEAVES SITE @ 16:30. QST LEAVES SITE @ 16:45.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	EW-26-(S/10)-5-21-99		SOIL	1040	10-11'	
	EW-26-(S/20)-5-21-99		SOIL	1330	20-21'	

Signatures:
Field Team Leader [signature] Date 5-21-99
Reviewer Date
Reviewer Title

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.:
QST Field Team Leader: — QST Project Manager: John Mieher

Date 5-24-99 Day of Week MONDAY Page ____ of ____

Purpose of Trip DRILLING EW-26

Field Team Members (Names and Initials): JEFF MARTIN; PETE HOFFMAN; JOHN MIEHER; TRICIA DROBAT

Contacts ____

Work Completed This Date ARRIVE @ GATE @ 06:45. MET DRILL CREW @ GATE. PREP TO DRILL. BEGIN DRILLING @ 25' BGS AT 07:30. ROLL-OFF BIN ARRIVES @ 09:50. DSM (DRILLER) ORDERS A COMPRESSOR TO AUGMENT EXISTING SETUP. SHOULD HELP CLEAN HOLE + SPEED PROGRESS. COMPRESSOR ARRIVES @ ~1300. RIG DOWN @ 14:00 W/ COMPRESSOR OIL LEAK. DRILLING AGAIN @ 14:45. DRILLER AND 2, SOMETIMES 3 HELPERS ON-SITE TODAY. SWITCHED DRILLERS. WATER ENCOUNTERED DURING DRILLING @ ~52' BGS. DRILLED TO ~72' BGS TODAY.

LANCE CREW (4 GUYS) LOADS SITE EW-26 @ ~17:00. QST LOADS SITE @ ~17:15.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	EW-26-(51/40)	5-24-99	SOIL	10:55	40-41	
	EW-26-(51/50)	5-24-99	SOIL	15:10	50-51	

Signatures:

Field Team Leader [signature] Date 5-24-99

Reviewer ____ Date ____

Reviewer Title ____

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.:
QST Field Team Leader: — QST Project Manager: John Mieher

Date 5-25-99 — Day of Week TUES — Page 1 of 1

Purpose of Trip DRILLING WELL EW-26

Field Team Members (Names and Initials): JOHN MICHEL; JEFF MARTIN; PETE HOFFMAN

Contacts

ARRIVE @ GATE @ 06:40. GO IN + SET UP TO DRILL EW-26. BEGIN DRILLING @ ~72' BGS AT 07:30. COLLECT EW-26 SPLIT-SPOON RINSATE SAMPLE QST-B46-(GW/SO)-5-25-99 @ 0930.

Work Completed This Date DURING DRILLING @ ~92-93' BGS, FOAMING H2O OUT THE TOP OF WELL EW-E. HAVING PROBLEMS W/ CLOGGED DISCHARGE HOSE DURING DRILLING. ENCOUNTERING WHAT (WAS) COULD BE STAINLESS STEEL SCREEN + AT ONE POINT BLEW OUT WHAT LOOKS LIKE SAND PACK. HOPEFULLY WE HAVEN'T ENCOUNTERED AN ABANDONED WELL. UNABLE TO CIRCULATE FOR ~ 1 HR. TRIP OUT BIT + CHECK FOR BLOCKAGE, LOOKS O.K. BECOMING OBVIOUS WE HAVE ENCOUNTERED AN ABANDONED S.S. WELL SCREEN + SAND PACK. ENCOUNTER POTENTIAL TOP OF BEDROCK ~115' BGS. DEL-MAR COURIER PICKS UP RINSATE SAMPLE @ 15:45. DRILL TO ~135' TODAY. 10" STEEL CASING SET TO ~135' BGS. LAYNE CREW LEAVES SITE @ 17:00. QST LEAVES SITE @ 17:15.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
QST-B46-(GW/SO)-5-25-99			H2O	0930	SPLIT-SPOON RINSATE.	
IDW-2A → IDW-2E			SOIL	11:35	ROLL-OFF BIN #4821	
EW-26-(S/122)-5-25-99			SOIL	1600	[redacted] 122'-123	
EW-26-(S/93)-5-25-99			SOIL	11:55	93-94	

Signatures:

Field Team Leader [signature] Date 5-25-99

Reviewer Date

Reviewer Title

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.:
QST Field Team Leader: — QST Project Manager: John Mieher

Date 5-26-99 — Day of Week WED — Page ____ of ____

Purpose of Trip DRILLING WELL EW-26

Field Team Members (Names and Initials): JOHN MIEHER; JEFF MARTIN; TRICIA DROBAT; PETE HOFFMAN

Contacts

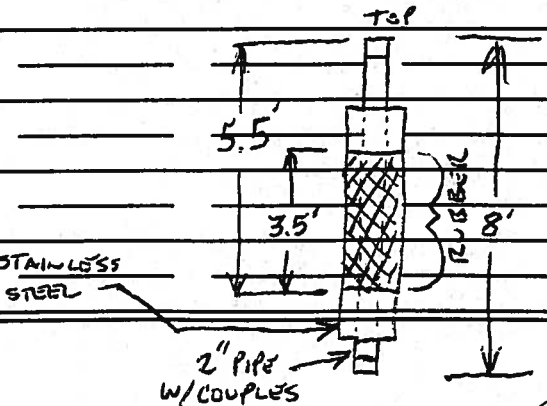
Work Completed This Date

ARRIVE @ GATE @ 06:30. DRILL CREW MAKES SOME REPAIRS ON RIG (THROTTLE CABLE). TRIP OUT 9-DEX BIT + SWITCH TO DOWN-HOLE HAMMER BIT. WILL START W/ 5½" BIT AS PACKER WILL ONLY INFLATE TO 8" DIAM. ONCE TD OF BOREHOLE IS DETERMINED WILL REAM BOREHOLE W/ 9" BIT AS PLUG-SHOE ON 10" STEEL CASING IS ONLY 9¼" DIAM. BELOW DRILLING @ 135' @ 09:30. AT 180' @ ~11:00. CLEAN HOLE + TRIP OUT BIT. TRIP IN PACKER + SET BOTTOM OF PACKER @ 169.65'. BAIL ~15 GALLONS OUT OF BOTTOM 10.5' OF BOREHOLE. WAIT ~30 MINUTES. BOREHOLE INTERVAL 169.5' - 180' MAKING SOME H_2O. COLLECT VOA SAMPLE EW-26-(169/180)-5-26-99 AT 14:25. TRIP OUT PACKER ASSEMBLY. TRIP IN 5½" BIT. DRILLING @ 180' @ 15:20. DRILL TO 200' AT 16:10. CLEAN BOREHOLE. TRIP OUT 5½" DOWN-HOLE HAMMER BIT. DONE W/ TRIP OUT @ 16:45. DECIDE TO WAIT + TRIP IN PACKER + COLLECT SAMPLE FROM 180-200' ZONE UNTIL TOMORROW MORNING DUE TO TIME. LAWNE CREW (3 GUYS) LEAVE SITE @ 17:00. QST LEAVES SITE @ 17:15.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	EW-26-(169/180)-5-26-99		H_2O	1425	169.5'-180'	

* NOTE: PACKER ASSEMBLY DIAGRAM BELOW



UN-INFLATED O.D. OF PACKER ASSEMBLY IS 4.5"

* NITROGEN GAS USED TO INFLATE RUBBER PACKER

Signatures:

Field Team Leader _____ Date 5-26-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader:

QST Project : Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Date 5-27-99 Day of Week THURS Page 1 of 1

Purpose of Trip DRILLING WELL EW-26

Field Team Members (Names and Initials)
JOHN MIEHER
JEFF MARTIN
PAUL HOFFMAN

Contacts

Work Completed This Date
ARRIVE @ GATE @ 08:45, DE-CON PACKER ASSEMBLY + BAILER, TRIP IN PACKER ASSEMBLY + SET BOTTOM OF PACKER @ 190.5' BGS. CHECK H_2O LEVEL @ ~55' BGS. BAIL OUT ~35 GALLONS + COLLECT SAMPLE EW-26-(6W/200)-5-27-99 @ 09:00. CHECK H_2O LEVEL @ ~59' BGS + RISING VERY SLOWLY. TRIP OUT PACKER ASSEMBLY, REMOVE AUXILARY GENERATOR @ 09:30. TRIP IN 5.5" HAMMER BIT. RELEASE THROTTLE CABLE @ 10:00. DRILLING @ 200' @ 10:30. AT 220' AT 11:10. CLEAN BOREHOLE. TRIP OUT BIT. DE-CON PACKER ASSEMBLY + PIG etc + TRIP IN PACKER. CHECK H_2O LEVEL @ 72' BGS. COLLECT SAMPLE EW-26-(6W/220)-5-27-99 @ 13:30. CHECK H_2O LEVEL @ ~63' BGS. TRIP OUT PACKER. TRIP IN 5.5" BIT, DRILLING @ 220' @ ~14:10. AT 240' @ 14:45. TRIP OUT 5.5" HAMMER BIT. DE-CON + TRIP IN PACKER ASSEMBLY. SET BOTTOM OF PACKER @ 232' BGS. CHECK H_2O LEVEL @ ~81' BGS + SLOWLY RISING, COLLECT SAMPLE EW-26-(6W/240)-5-27-99 @ 16:40 FROM 232-240' ZONE. CHECK H_2O LEVEL @ ~69' BGS + RISING, LAYNE CREW LEAVES SITE @ 17:00. QST LEAVES SITE @ ~17:15.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
EW-26-(6W/200)-5-27-99			H_2O	0900	190.5-200' BGS	
EW-26-(6W/220)-5-27-99			H_2O	13:30	210.5-220' BGS	
EW-26-(6W/240)-5-27-99			H_2O	16:40	232-240' BGS.	

Signatures:

Field Team Leader [signature] Date 5-27-99

Reviewer Date

Reviewer Title

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.:
QST Field Team Leader: — QST Project Manager: John Mieher

Date 5-28-99 Day of Week FRIDAY Page 1 of 1

Purpose of Trip DRILLING WELL EW-26

Field Team Members (Names and Initials)
JOHN MIECHER
JEFF MARTIN
PETER HOFFMAN

Contacts

Work Completed This Date ARRIVE @ GATE @ 06:40. TRIP OUT PACKER, BEGIN SWIVEL REPAIRS @ 07:30. AT 08:30 TRIP IN 5.5" HAMMER BIT. BEGIN DRILLING @ 240' @ 09:00. AT 260' BGS ON 5-28-99 @ 09:30. CLEAN BOREHOLE + TRIP OUT 5.5" BIT TRIP IN PACKER + SET BOTTOM OF PACKER @ 252.5'. CHECK H2O LEVEL @ ~73' + SLOWLY RISING. COLLECT SAMPLE EW-26-(GW/260)-5-28-99 @ 12:15. CHECK H2O LEVEL 94' + RISING SLOWLY. TRIP OUT 5' JOINTS + SET TOP OF PACKER @ ~144' + BOTTOM OF PACKER @ ~147.5' BGS. WILL LEAVE INFLATED PACKER AT THIS POSITION OVER THE HOLIDAY WEEKEND. SAME CREW LEAVES SITE @ 12:40.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	EW-26-(GW/260)-5-28-99		H2O	12:15	252.5-260'	

Signatures:

Field Team Leader [signature] Date 5-28-99

Reviewer Date

Reviewer Title

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: S. Willis

QST Project : Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Date 6-1-99 Day of Week Tuesday Page 1 of 1

Purpose of Trip

Field Team Members (Names and Initials)
Steve Willis (SAW)
Peter Hoffman (PH)
John Mieher (JCM)

Contacts

Work Completed This Date Arrive @ Gate 6:45 Don Ervin here. Drillers helpers arrive 7:15. John Mieher on site @ 7:30. Ream well EW-26 to 260' following removal of packer. Complete @ 3:40. 3:40-4:15 clean up

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew

Signatures:

Field Team Leader Steve Willis Date 6-1-99

Reviewer Date

Reviewer Title

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project : Estes Landfill
QST Project No.: 669 9030
QST Project Manager: John Mieher

Date 06-02-99 Day of Week WEDNESDAY Page 1 of 1

Purpose of Trip INSTALLATION EW-26

Field Team Members (Names and Initials)
PATRICIA A. DROBAT (PAD)
PETER J. HOFFMAN (PJH)

Contacts N/A

Work Completed This Date 0700 ON SITE, HOLD SAFETY MEETING, 0725 WASH OUT HOLE, PULL RODS. 0844 RODS & BIT OUT OF HOLE. 0854 PVC DELIVERED - BEGIN WELL CONSTRUCTION LAYNE HAS ORDERED 220' PVC RISER, 20' SCREEN, IN 10' SECTIONS HOWEVER 3" OF EACH 10' SECTION IS THREADED, THEREFORE IN ADDITION TO BEING SHORT 20' OF RISER, THEY WILL BE SHORT ~7.5' (ACCOUNTING FOR 2' OVER)

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew

Signatures:

Field Team Leader [signature] Date 6-2-99

Reviewer ________ Date ________

Reviewer Title ________

CONTINUED FROM PAGE 1 OF ESTES LANDFILL DAILY FIELD TRIP LOG, WEDNESDAY, JUNE 2, 1999.

STICKUP AND 6" END PLUG. 0943 SHUT DOWN TO LOCATE APPROPRIATE PLUG FOR 5" SCHED 40 STEEL PIPE. LAYNE HAS FASHIONED 18½" PVC ADAPTER (2½" ARE THREADED) TO JOIN 5" PVC (SCHED. 80) TO 5" STEEL. ADAPTER IS PVC AND HAS BEEN DECONTAMINATED ~~BEFORE~~ USE. 1040 JOHN V. (LAYNE) ON SITE W/ PULL PLUG FOR STEEL CASING. RESUME SETTING WELL, 1052: ~23' CAVE IN HOLE. BEGIN TRIPPING OUT PVC TO REOPEN HOLE. 1102 - SHUT DOWN FOR LAYNE (JOHN CALLING OFFICE WITH DON). 1110-1130 TRIP PVC OUT OF HOLE. LAYNE (2 CREW MEMBERS) OFF SITE FOR CASING. DON & HELPER TAKE LUNCH; 1130-1230. 1230-100 DOWN TIME WAIT FOR CASING TO ARRIVE. 1300-1319 DELON CASING, BEGIN SETTING CASING. 1509 SET 8 5/8" O.D. CASING IN HOLE TO ~145' BGS WHERE 8 5/8" CASING IS NOT ABLE TO PASS THROUGH 9" I.D. SHOE. LAYNE USES HAMMER TO FORCE CASING (INNER) THROUGH DRIVE SHOE OF 10" CASING. CASING ADVANCES ~1' AND IS STUCK. 1515-1609 DOWN TIME - LAYNE DETERMINING WHAT COURSE OF ACTION THEY CAN TAKE TO PULL 8 5/8" CASING. 1616 JOHN VELDMAN INSTRUCTS DRILLER TO CONTINUE ATTEMPTING TO FREE INNER CASING WHILE HE (JOHN) GOES BACK TO LAYNE'S SHOP TO FIND HAMMER CAPABLE OF PULLING CASING FREE. THIS WILL REQUIRE FABRICATION OF ADAPTER FOR SUCH PURPOSE. IF THE HAMMER CAN NOT BE LOCATED OR DOESN'T WORK, A SECOND RIG WILL BE BROUGHT TO THE SITE AND SWITCHED WITH THE AIR ROTARY RIG. JOHN OFF SITE. 1629 RIG JACKS SUBSIDING UNDER PRESSURE FROM ATTEMPTING TO PULL PIPE, STOP FOR DAY. DON CALLS JOHN V. WHO INSTRUCTS HIM TO CONTINUE TRYING UNTIL 5 PM. (NOTE THAT HE ALSO INSTRUCTED DRILLER TO USE HAMMER TO FORCE CASING) ~~I~~ HAVE INSTRUCTED CREW TO STOP FOR DAY. WE WILL START UP AGAIN AT ~~8~~ 7 AM TOMORROW WITH EITHER A NEW HAMMER OR NEW RIG OR BOTH. QST/LAYNE OFF SITE 1648 HRS

Robert A. Gobat 6-02-99

Daily Field Trip Log

Client ADEQ WQARF | QST Project : Estes Landfill
Site Location: Phoenix, AZ | QST Project No.: 669030
QST Field Team Leader: PAD | QST Project Manager: John Mieher

Date 06-03-99 | Day of Week THURSDAY | Page 1 of 1

Purpose of Trip MONITORING WELL INSTALLATION, EW-26

Field Team Members (Names and Initials)
PATRICIA A DROBAT (PAD)
PETER J HOFFMAN (PJH)
JOHN MIEHER (JCM)

Contacts N/A

Work Completed This Date ON SITE 0655. DRIVE ON SITE 0720. ATTEMPT TO FREE 8 5/8" CASING FROM 10" WITH DIFFERENT JAR HAMMER (ON SITE W/ PERRY @ 0850) 0930 ATTEMPTS TO FREE CASING NOT SUCCESSFUL. SHUT DOWN SO WAYNE CAN LOCATE ADDITIONAL EQUIPMENT TO EXTRACT CASING. NOTE: DOWN TIME UNTIL 0850 HOURS AND DOWN TIME 0930 - 1350 HOURS. 13.5 HOURS HAVE MOVED (OVER)

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew

Signatures:
Field Team Leader John A. Drobat Date 06-03-99
Reviewer _____ Date _____
Reviewer Title _____

CONTINUED FROM PAGE 1, TSTE'S LANDFILL DAILY FIELD TRIP LOG, THURSDAY, JUNE 5, 1999

RIG OFF OF HOLE AFTER CUTTING OFF 8 5/8" CASING. BECKER PERCUSSION RIG SET UP OVER CASING. 1415 MP ON SITE TO MOVE ROLL OFF TO STAGING AREA AND PULL PARTIALLY FULL ROLL OFF OVER TO EW-26. 1443 CASING (8 5/8") FREED BEGIN PULLING CASING W/BECKER. 1554 ALL 8 5/8" CASING OUT. CASING IS NOT DAMAGED. 1708 AIR ROTARY RIG SET BACK OVER HOLE READY TO START REAMING HOLE TOMORROW. OFF SITE FOR DAY.

Paul G. Day

Daily Field Trip Log

Client ADEO WOARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project : Estes Landfill
QST Project No.: 609 9038
QST Project Manager: John Mieher

Date 06-04-99 Day of Week FRIDAY Page 1 of 1

Purpose of Trip MONITORING WELL INSTALLATION EW-26

Field Team Members (Names and Initials)
PATRICIA A DROBAT (PAD)
PETER J HOFFMAN (PJH)
FERNANDO RODRIGUEZ (FR)

Contacts N/A

Work Completed This Date 0650 ON SITE. CONDUCT DAILY SAFETY MEETING. 0720 TRIP HAMMER AND RODS DOWN HOLE. BEGIN WASHING OUT HOLE. DISCHARGE WATER IS TURBID; COARSE SAND SIZED ROCK FRAGMENTS PRESENT IN WATER- JOHN V (LAYNE) INFORMS ME THAT PVC CASING SCHEDULED TO ARRIVE LAST NIGHT WILL NOT ARRIVE UNTIL THIS EVENING, AFTER WELL HAS BEEN INSTALLED THEREFORE (OVER)

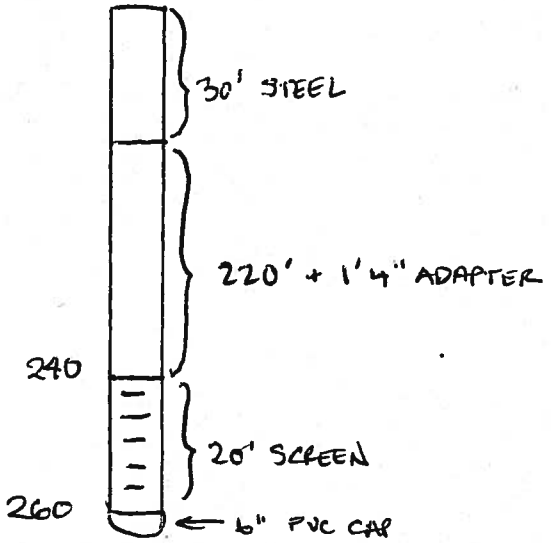
Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew

Signatures:
Field Team Leader [signature] Date 6-4-99
Reviewer _____ Date _____
Reviewer Title _____

CONTINUED FROM PAGE 1, LOG'S LANDFILL DAILY FIELD TRIP LOG, FRIDAY, JUNE 4TH 1999.

UPPER 20+ FEET OF WELL WILL NEED TO BE CASED IN 5" DIA. STEEL INSTEAD OF PVC. 0850 ENCOUNTERED WHAT APPEARS TO BE TEMPE BEDS (RED SANDSTONE) AT APPROX. 265' BGS. HAVE WASHED TO 275' DISCHARGE WATER CLEARING NICELY. 0917 TRIP RODS AND HAMMER OUT OF HOLE. 0938 RODS OUT - TAPE HOLE - HOLE OPEN TO APPROXIMATELY 273.5' BGS. 0949 BEGIN SETTING WELL 5" SCHED. 80 PVC 20' SCREEN 6" END CAP. 1040 WELL MTL (CASING & SCREEN) SET. STICKUP ON STEEL PIPE WILL BE 5'10" AS SHOWN BELOW.



270'
- 66" (PVC 9'9" LONG)
269.5'
+ 1'4" PVC ADAPTER
265'10"
- 260 SCREEN DEPTH
5'10" CASING STICKUP

14 BAGS SAND USED IN SAND PACK @ 1218 SAND PACK SET @ 236'7". BEGIN TRIPPING IN 1" TREMIE PIPE TO SET BENTONITE SEAL. 1350 BENTONITE BRIDGING IN TREMIE PIPE. 1400 JOHN (LAYNE) OFF SITE TO DEST FOR MORE COATED PELLETS. STOP WORK UNTIL PELLETS ARRIVE. CREW DECANTING WASH WATER FROM ROLL OFF INTO POLY TANK FOR DISPOSITION IN BAKER TANKS ON SITE. 1443 CONTINUE TREMMIED BENTONITE PELLETS. 1510 UNABLE TO TREMMIE PELLETS (BRIDGING). SWITCH TO BENTONITE SLURRY FOR SEAL. 1554 TREMMIE PIPE PLUGGED, BURSTING A HOSE DURING PUMPING OF BENTONITE. 1617 PUMPING THICK BENTONITE/WATER SLURRY THROUGH TREMMIE PIPE. USING ~125 GALLONS OF SLURRY. USED 3½ BAGS MAXGEL @ GRO BENTONITE. 1638 MIXING BENTONITE CEMENT GROUT. 1702 GROUTED (PARTIALLY) - 5 BAGS PORTLAND, ½ BAG BENTONITE. 1720 SITE SECURE QST/LAYNE OFF SITE FOR DAY.

Rick O. Orr 6-4-99

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project : Estes Landfill
QST Project No.: 669 9030
QST Project Manager: John Mieher

Date 05-24-99 Day of Week MONDAY Page 1 of 1

Purpose of Trip INSTALLATION OF MONITORING WELL EW-25

Field Team Members (Names and Initials): PATRICIA A. DROBAT (PAD); JEFF MARTIN (JM); JOHN MIEHER (JCM); PETER J. HOFFMAN (PJH)

Contacts N/A

Work Completed This Date DURING ADVANCED FOR INSTALLATION OF EW-25 ENCOUNTERED INTERMITTENT (INTERFINGERED) CLAY RICH ZONES BETWEEN 38' AND 69'. SPORADIC WATER PRODUCTION IN THESE ZONES. ADVANCED BORING TO 69' BGS. PULL CASING BACK 2' AND ALLOW CASING TO RECHARGE WITH GROUND WATER OVERNIGHT OFFSITE ~1030 HOURS.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
NA	EW-25(S/35) (5-24-99)	EW-25	SOIL	1201	35'-35'6"	PAD
NA	EW-25(S/45) (5-24-99)	EW-25	SOIL	1424	45'-45'9"	PAD

Signatures:

Field Team Leader Patricia A. Drobat Date 05-25-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.: 669030
QST Field Team Leader: PAD — QST Project Manager: John Mieher

Date 05 25 (24)-99 — Day of Week TUESDAY — Page 1 of 1

Purpose of Trip MONITORING WELL INSTALLATION

Field Team Members (Names and Initials): PATRICIA A. DROBAT (PAD); JOHN C. MIEHER (JCM); PETER J. HOFFMAN (PJH); JEFF MARTIN (JM)

Contacts N/A

Work Completed This Date 0830 BEGIN SET UP FOR EW-25 INSTALLATION. 0750 HRS WATER LEVER IN BORING EW-25 32.5' BGS, TOTAL DEPTH = 68' BGS. DECON WELL MATERIALS. SET SCREEN 60'-30' BGS. SAND PACK TO 27'1", BENTONITE SEAL TO 23'5" BGS BENTONITE/CEMENT GROUT TO SURFACE. PVC STICKUP 2'3", STEEL STICKUP 2'5" MOS. OFF SITE TO DECON 1223. 1330 SET UP @ EW-24. 1449 ROLL OFF OVER

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
N/A	EW-25(S/25) (5-24-99)	EW-25	SOIL	1129	25'-25'7"	PAD

Signatures:

Field Team Leader [signature] — Date 5-25-99

Reviewer _____ — Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project : Estes Landfill
QST Project No.: 6699030
QST Project Manager: John Mieher

Date 05-26-99 Day of Week WEDNESDAY Page 1 of 1

Purpose of Trip MONITORING WELL INSTALLATION

Field Team Members (Names and Initials)
PATRICIA A. GROBAT (PAD)
PETER J. HOFFMAN (PJH)
JEFF MARTIN (JM)

Contacts N/A

Work Completed This Date 0130 REFUEL RIG, BEGIN ADVANCING CASING EW-24. CASING WAS ADVANCED TO 30' BGS YESTERDAY. 1105 SET WELL. SCREENED FROM 25' -55' BGS. TOTAL DEPTH 62' BGS. TOP OF SAND PACK @ 22' BGS. TOP OF SEAL 18' 3". BENTONITE CEMENT GROUT TO SURFACE. 10" LOCKING STEEL CASING CEMENTED IN PLACE.
WELL CONSTRUCTION MATERIALS FOR EW-24 AND EW-25 SUMMARIZED ON BACK SIDE OF THIS PAGE.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
NA	QST-B50(GW/QS) (5-26-99)	EW-24	AQ	1024	NA	PJH, PAD
NA	EW-24(S/40) (5-26-99)	EW-24	SOIL	0827	40'-40'9"	PAD
NA	EW-24(S/50) (5-26-99)	EW-24	SOIL	0904	50'-50'9"	PAD

Signatures:

Field Team Leader Patricia A. Grobat Date 05-26-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project : Estes Landfill
QST Project No.: 669 9030
QST Project Manager: John Mieher

Date 06-01-99 Day of Week TUESDAY Page 1 of 1

Purpose of Trip COMPLETION OF CEMENT PADS/INSTALLATION OF BALLARDS

Field Team Members (Names and Initials) PATRICIA A. DROBAT (PAD)

Contacts N/A

Work Completed This Date ON SITE 0733. LOAD CEMENT AND MATERIALS TO CONSTRUCT PADS/INSTALL BALLARDS. BEGIN @ EW-25-0943 16 BAGS CEMENT & 3-4" DIA BALLARDS USED @ EW-25 - MOB TO EW-24. 1015 FINISH EW-24 - MOB TO EW-23 @ AIRPORT. 52 TOTAL BAGS CEMENT USED EW-24, EW-25, 6 BALLARDS.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew

Signatures:

Field Team Leader [signature] Date 06-01-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: Peter J. Hoffman

QST Project : Estes Landfill
QST Project No.: 699030
QST Project Manager: John Mieher

Date 06/03/99 Day of Week Thursday Page 1 of 1

Purpose of Trip Well Development / EW-24 & EW-25

Field Team Members (Names and Initials)
Rod / Layne
Sonny / Layne
Peter J. Hoffman PJH

Contacts Patricia Orchat, QST

Work Completed This Date ON SITE 0900. SET UP TO DEVELOP EW-25. Obtain initial sample at 0940. Surge and bail appropriate volumes. Much sediment remaining in hole. Attempt to suspend remaining sediment with additional surging. Sampled at mid-point, parameters within 10%. Continue to obtain and total purging volume. Move to EW-25. Surge and bail, slow production. (Half a bailer after 65 gals removed).

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew

Signatures:

Field Team Leader Peter J. Hoffman Date 06/03/99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project : Estes Landfill
QST Project No.: 669 9030
QST Project Manager: John Mieher

Date 06-05-99 Day of Week SATURDAY Page 1 of 1

Purpose of Trip COMPLETION OF EW-26, INSTALLED 6-5-99.

Field Team Members (Names and Initials) PATRICIA A. DROSAT (PAD)

Contacts N/A

Work Completed This Date ON SITE 0640. DON, SONNY, BRIAN ON SITE FOR LAYING. CUT OFF ~5' OF 5" CASING. BEGIN ATTEMPT AT PULLING 10" CASING. 0749 BRIAN (WAYNE) ON SITE TO RUN BECKER RIG. 0806 UNABLE TO PULL CASING W/ AIR ROTARY RIG. MOVE AIR ROTARY OFF HOLE AND MOVE BECKER INTO PLACE OVER EW-26. 0940 BEGIN PULLING 10" CASING WITH BECKER RIG. 0908 BEGIN MIXING (COVER)

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew

Signatures:

Field Team Leader Patricia A. Drosat Date 06-05-99

Reviewer _____ Date _____

Reviewer Title _____

CONTINUED FROM PAGE 1, ESTES LANDFILL DAILY FIELD TRIP REPORT
SATURDAY JUNE 5, 1999

GROUT. TAPE HOLE - OPEN TO 136'5". 0938 HAVE BEEN SHUT DOWN FOR 15 MINUTES NOW (OUT OF WATER). 0949 START UP AGAIN MIXING GROUT. 0954 BEGIN GROUTING 1033 MIXED AND PUMPED WATER, 24 #94 BAGS PORTLAND, 2 #50 BAGS BENTONITE POWDER INTO 10" CASING. STOP PUMPING TO RESUME PULLING CASING. 135' STILL ON STRING. 1144 HAVE PULLED 60' OF 10" CASING. THREADS ARE DIFFICULT TO BREAK ON CASING, THEREFORE PROCESS IS MOVING SLOWLY. CONTINUE MIXING MORE GROUT. 1204 MIXED AN ADDITIONAL 32 BAGS OF CEMENT GROUT AND PUMPED DOWN 10" CASING RESUME PULLING CASING 1301 CASING REMOVAL SLOW GOING. 90' OF CASING REMOVED THUS FAR 1349 130' CASING OUT OF HOLE. HAVE USED A TOTAL OF 56 BAGS (#94) OF CEMENT. 1412 ALL CASING OUT OF HOLE. ANNULUS OPEN TO 52'5" BGS. SECURE HOLE FOR WEEKEND, FINISH SURFACE GROUTING ON MONDAY. 1439 BRYAN WORMS OFF SITE. DON, SONNY & BRIAN MOB EQUIPMENT TO DECON PAD, 1515 EQUIPMENT DECON COMPLETE. QST/LAYNE OFF SITE @ 1519.

Daily Field Trip Log

Client ADEQ WQARF
QST Project : Estes Landfilll
Site Location: Phoenix, AZ
QST Project No.:
QST Field Team Leader:
QST Project Manager: John Mieher

Date 06/08/99 Day of Week MONDAY Page 1 of 1

Purpose of Trip Install pump / Obtain final development sample EW-24 + 25

Field Team Members (Names and Initials) Peter J. Hoffman (PJH)
Patricia Drobat (PAD)

Contacts

Work Completed This Date Load collection tank, mobe to well site EW-25 in wash 0730 Wire pump, install p.v.c. and pump. Take final sample. Perform field testing for pH, Conductivity, Temperature and Turbidity parameters after visual clearing of pumped G.W. Mobe to EW-24, repeat process 0930. At 1030 begin EW-24 pump installation, 1115, take final sample. 1130, Setup on deep well Layne must go to yard to pick additional wire for dedicated pump. 1245 PJH departing Layne yard with wire ... ove ...

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew

PJH

Signatures:

Field Team Leader ________ Date ________

Reviewer ________ Date ________

Reviewer Title ________

1320 Take initial G.W. depth and sample
Begin surging process. Remove heavy sediment (Slag in hole) w/ SS. Baker
1350 Remove purging volume w/ Layne pump
Collect in tank for disposal
1440 ~~Completed~~ Pump installed, purging commencing
1500 Take 2nd sample at app. 45 gals removed
Run parameters
1515 Water almost visually clear after 140 gallons removal
1544 200 gal. removed. Obtaining final sample
1555 Sample run. Clean up site
Transfer G.W. to Baker Tank
1610 Finish. Return instruments to Vendor.
1620

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project : Estes Landfill
QST Project No.: 669 9030
QST Project Manager: John Mieher

Date 05-27-99 Day of Week THURSDAY Page 1 of 1

Purpose of Trip MONITORING WELL INSTALLATION EW-23

Field Team Members (Names and Initials)
PATRICIA A. DROBAT (PAD)
JOHN C. MIEHER (JCM)
STEVE WILLIS (SW)

Contacts N/A

Work Completed This Date SET UP, 0830 HRS BEGIN ADVANCING CASING FOR EW-23. (NOTE ON SITE @ 0645 TO LOAD MATERIALS, MOB TO GATE 220 FOR ESCORT) COLLECT SOIL SAMPLES (10' INTERVAL) 10' - 80' BGS. ENCOUNTER TOP OF WEATHERED BEDROCK ~163' BGS; TOP OF COMPETENT ROCK ~165' BGS. WASH OUT CASING, FINISH FOR DAY ~1730 HOURS. NOTE: BEDROCK DESCRIPTION PHANERITIC PINK GRANITE.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
NA	EW-23 (5/20) (5-27-99)	EW-23	SOIL	1008	20' - 20'8"	PAD

Signatures:

Field Team Leader Patricia A. Drobat Date 5-27-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project : Estes Landfill
QST Project No.: 6699030
QST Project Manager: John Mieher

Date 05-28-99 Day of Week FRIDAY Page 1 of 1

Purpose of Trip INSTALLATION OF MONITORING WELL EW-23

Field Team Members (Names and Initials)
PATRICIA A. DROBAT (PAD)
JOHN C. KIEHER (JCM)

Contacts N/A

Work Completed This Date 0630 ON SITE - LOAD MATERIALS FOR WELL CONSTRUCTION - 0750 ON SITE @ AIRPORT. 0750 - 1100 SET WELL - BOTTOM OF WELL AT 148' 7", SCREENED 148' 1" - 118' 1" BGS. TOP OF SAND PACK @ 109', TOP OF BENTONITE SEAL @ 105' 5". 1100 - 1225 OFF SITE TO PICK UP CONCRETE & TAKE LUNCH - 1225 - GROUT FROM 105' 5" TO (OVER)

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew

Signatures:

Field Team Leader: Patricia A. Drobat Date 05-28-99

Reviewer _____ Date _____

Reviewer Title _____

GROUND SURFACE WITH BENTONITE/CEMENT GROUT. WELL MATERIALS USED IN CONSTRUCTION OF EW-23 ARE SUMMARIZED BELOW:

END CAPS - 2

SCREEN: 30', SCHEDULE 80 PVC, 0.020 SLOT

RISER 120' SCHEDULE 80 PVC

SAND PACK - 28 - #100 SILICA SAND 8x10
1 - #100 0.60 FINE SAND

BENTONITE PELLETS - 2-5 GAL BUCKETS

PORTLAND CEMENT 34 #94 BAGS

BENTONITE POWDER - 1 ~~5 GAL~~ BAG

AIRPORT-RATED WELL VAULT - 1

CLEAN UP SITE - MOB TO DELON AREA AT ESTES. MP MOVES ROLLOFF TO STAGING AREA @ GATE 220. OFF SITE TO ESTES ~ 1645 HRS.

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project : Estes Landfill
QST Project No.: 0699030
QST Project Manager: John Mieher

Date 06-01-99 Day of Week TUESDAY Page 1 of 1

Purpose of Trip ROAD BOX COMPLETION, EW-23

Field Team Members (Names and Initials) PATRICIA A. DROBAT (PAD)

Contacts N/A

Work Completed This Date ONSITE @ GATE 220 @ 1045 HRS. ESCORTED TO EW-23 @ 1155. GROUT SUBSIDED 5½ FEET. TD 69.95' BGS. USED 5 BAGS RAPID SET & 3 BAGS CEMENT FOR 2'x2' FORM.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew

Signatures:

Field Team Leader Patricia A. Drobat Date 6-01-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader:

QST Project : Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Date 06/04/99 Day of Week Page 1 of 1

Purpose of Trip Well Development / Pump Installation

Field Team Members (Names and Initials)
Ricardo Rios / Layne
Juan Rodriguez / Layne
Peter J. Hoffman / QST

Contacts

Work Completed This Date Drill crew onsite 0930. Prep for airport move. Move to SkyHarbor. 0930 Security + OSCAR 30 Escort. Remove bulk of sediments/fines. Install pump 1100. Purge appropriate volumes. 1200 Install QST pump after obtaining samples stabilized within 10%. Pump till visually clear with acceptable NTU values. Demob to Baker Tanks. Drain collection tank at Estes Site

Difficulty starting pump possibly bad

OVER

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew

Signatures:

Field Team Leader Peter J. Hoffman Date

Reviewer Date

Reviewer Title

1445 Remobe to Airport. Determine if pump is functional.
Cut down casing below well-vault.

1515 Attempt to diagnose pump problem. Assumption: pump is bad. Planning to replace.
Removal of first section reveals water.
Pump has raised some 60' Reversing polarity for event that pump was hooked up backwards.
Reversal raises H_2O, blows fuse in switch-box.
Continue P.V.C. removal to access pump.

1525

1545 Pump accessed / 115 volts / (would've run on 240V)
Plugging into 30 amp / 125 volt runs pump.

1550 Re-installing pump

1615 Installed. Taking final sample (after clearing)

1630 Pump will not yield sampling.
Checking connections

1645 Re-connection yields final sample
Agitation created by re-installation exceeds acceptable Nephelitic Turbidity Units
OSCAR ESCORT OFF PROPERTY

1655 Exit Sky Harbor
Mobe to Este Landfill

Daily Field Trip Log

Client ADEO WOARF | QST Project : Estes Landfilll
Site Location: Phoenix, AZ | QST Project No.: 66699030
QST Field Team Leader: Matthew Garlick | QST Project Manager: John Mieher

Date 5/03/99 Day of Week Monday Page 1 of 1

Purpose of Trip QST-B-2 (Soil borings)

Field Team Members (Names and Initials)

Matthew Garlick	MG	John Mieher	J.M.
Trica DROBAT	(PAD)	John Kim	J.K
Peter	?	Mark Bittner	M.B.

Contacts

Work Completed This Date Began drilling @ 15:10, sampled QST-B2-8.5 @ 15:15, Sampled @ QST-B-2 @ 15:18, Rig has cable/winch problem @ 15:20, Rig breakdown fixed @ 1550, Sampled QST-B-2-15 @ 15:55 @ QST-B-2 @ 15:55 (25') ~~...~~ No recovery, QST-B-2-25 (4:25) No recovery (Heavy cobbles), QST-B-2 @ / No Recovery @ 25' to 50' bgs. Stop Drilling @ 50' bgs (17:01 pm). Will Start @ 0700 am.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	QST-B2-8.5 (5/8.5)-5/13/99)	QST-B-2	Soil	3:15 pm	6.5-8.0'	
	QST-B-2-~~15~~ 15	QST-B-2	Soil	3:18 pm	10-11.5'	
	~~QST-B-2-25~~	~~QST-B-2~~	~~Soil~~	~~No Recovery~~		
	QST-B2-(8/15)-5/13/99					
	~~QST-B2(5/6.5)~~	~~5/3/99~~	~~Soil~~		~~5.5-6.5~~ 63.5-6.5' n.a.	

Signatures:

Field Team Leader Matthew G. Garlick Date 5/3/99

Reviewer Date

Reviewer Title

Daily Field Trip Log

Client ADEO WOARF **QST Project :** Estes Landfilll
Site Location: Phoenix, AZ **QST Project No.:** 6699030
QST Field Team Leader: Matthew Garlick **QST Project Manager:** John Mieher

Date 5/4/99 Day of Week Tuesday Page 1 of ____

Purpose of Trip [illegible] ground water samples

Field Team Members (Names and Initials)

Matthew Garlick	(MFG)	Pete [illegible]	(P)
John Mieher	JCM	Trica Drobat	(MAD)
John [illegible]	JSH		

Contacts ____

Work Completed This Date Arrived @ site 0615 waiting for gate to be opened. Gates open 6:35 am, [illegible] + QST personnel begin set-up, 0740 H&S meeting, 0745 sample QST-B2-(5/50')-5/4/99, — (Almost No recovery) [illegible], Sampled @ 850 @ QST-B2 (5/65) - 5/4/99, water encountered at 73' bgs, begin [illegible] of PVC 2" casing inside [illegible] cut 5 (5 screen, 1 blank), drums brought to site [illegible] sampling [illegible] waste/start drilling @ 14:00, QST-B1 no samples collected to 35'. Stop drilling @ 35 bgs in QST-B1 at 17:00.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	QST-B-2-(5/65')-5/3/99	QST-B-2	Soil		63.5-65.0	Recovery (64') only
Geotechnical	QST-B1	QST-B1	Soil	14:00	0-3.5'	

Signatures:

Field Team Leader ____ Date ____
Reviewer ____ Date ____
Reviewer Title ____

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.:
QST Field Team Leader: — QST Project Manager: John Mieher

Date 5/5/99 — Day of Week WED — Page 1 of 1

Purpose of Trip DRILL SOIL BORINGS, COLLECT SOIL SAMPLES, COLLECT H_2O SAMPLES

Field Team Members (Names and Initials)
JOHN MIEHER (JM) — PETER (P)
MATTHEW GARLICK (MG) — TRICIA DROBAT (TD)
JOHN KIM (JK) — JEFF MARTIN (JM)

Contacts

Work Completed This Date AT GATE @ 06:15, GATE UNLOCKED @ 06:50, LAYNE CREW ON-SITE, RESUME PULLING @ ~35' IN QST-B1 @ 07:45. DRILL QST-B1 TO 440' BGS. SOIL MOISTURE BUT NO FREE H_2O PRODUCED. PULL OFF 10' OF CASING + CHECK H_2O LEVEL. H_2O LEVEL = ~ 61.4' BGS. COLLECT WATER QUALITY (WQ) SAMPLES. FILL OUT COC'S. SET UP ~30' HT OF QST-B5 STAKE. AT 13:50 GEOTECH ON-SITE TO COLLECT SAMPLES FROM QST-B5. BEGIN DRILLING QST-B5. DRILL TO ~70' BGS IN QST-B5. STOP HERE @ 17:00 ON 5-5-99. DRILL CREW + QST CREW LEAVE SITE @ 17:30.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	QST-B1-(S/37.5)-(5-5-99)		SOIL	08:05	37.5-38.5'	
	QST-B1-(S/48)-(5-5-99)		SOIL	08:30	48-49'	JM
	QST-B1(S/54)-(5-5-99)		SOIL	08:45	54-55	
	QST-B1-(S/65)-5-5-99		SOIL	09:05	65-66	
	QST-B1-(GW/70)-(5-5-99)		H_2O	11:00	~70'	
	QST-B5-(S/20)-5-5-99		SOIL	14:55	20-21'	
	QST-B5-(S/25)-5-5-99		SOIL	1500	25-26	
	QST-B5-(S/43)-5-5-99		SOIL	1545	43-44'	
	QST-B5(S/60)-5-5-99		SOIL	1620	60-61	
	QST-B5(S/65)-5-5-99		SOIL	1640	65-66	

Signatures:
Field Team Leader JMA — Date 5-5-99
Reviewer — Date
Reviewer Title

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.:
QST Field Team Leader: — QST Project Manager: John Mieher

Date 5-6-99 — Day of Week THURSDAY — Page 1 of 1

Purpose of Trip DRILLING

Field Team Members (Names and Initials): JOHN MELLER; TRICIA ROBAT; MATT CARLISLE; JEFF MARTIN; PETER

Contacts

Work Completed This Date ARRIVE @ GATE @ 06:30. CONTINUE DRILLING QST-B5 @ 07:30. VERY SMALL AMOUNT OF H2O IN BOTTOM OF BOREHOLE OVERNIGHT (LESS THAN 5 GALLONS). DRILL TO 80' THEN RETRACT CASING TO ~70'. INSTALL 2" PVC CASING TO COLLECT H2O SAMPLES STATIC LEVEL @ ~56.1' BGS IN QST-B5. AFTER SAMPLE QST-B5-(GW/60)-5-6-99 COLLECTED DRILLERS TRIP OUT BACKFILL BOREHOLE, + DEVELOP. PETER + JEFF RE-LOCATE QST-B14 + QST-B15 PER GEOPHYSICAL SURVEY RECOMMENDATIONS. GEOTECH SHOWS @ ~11:30. AT 11:35, BEGIN GEOTECH SAMPLES + DRILLING QST B14. GEOTECH UNABLE TO OBTAIN SAMPLES FROM QST-B14. PROCEED DRILLING. AT 13:45 TD @ ~81' BGS ENCOUNTER H2O @ ~79-80'. PULL BACK CASING 42' + INSTALL 2" PVC + SEE IF WE CAN COLLECT H2O SAMPLES. CHECK H2O LEVEL @ 76.7' BGS. COLLECT H2O SAMPLE FROM QST-B14. @ 1730. DRILL CREW LEAVES @ 18:00. ASSIST PETER IN CAMP BREAKDOWN + TRICIA W/SAMPLE COLLECTION. QST DEPARTS SITE @ 19:30.

CALIBRATE OVM.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	QST-B5-(S/80)-5-6-99		SOIL	0750	80-81'	
	QST-B5-(GW/60)-5-6-99		H2O	0900	~60'	
GEOTECH	SURFACE TO ~1.5'		SOIL	~11:40		NO RECOVERY
GEOTECH	QST-B14 NO RECOVERY		SOIL		3.0-4.5	
	QST-B14-(S/30)-5-6-99		SOIL	13:55	30'-31'	
	QST-B14-(S/40)-5-6-99		SOIL	14:10	40-41	
	QST-B14-(S/50)-5-6-99		SOIL	14:20	50-51	
	QST-B14-(S/60)-5-6-99		SOIL	14:35	60-61	
	QST-B14-(S/76)-5-6-99		SOIL	15:25	76-77	
	QST-B14-(GW/80)-5-6-99		H2O	1730	~80'	

Signatures:

Field Team Leader _____ Date 5-6-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.:
QST Field Team Leader: — QST Project Manager: John Mieher

Date 5-7-99 — Day of Week FRIDAY — Page 1 of

Purpose of Trip DRILL 6 SOIL BORINGS @ ESTES LANDFILL

Field Team Members (Names and Initials): JOHN MIEHER; JEFF MARTIN; TRISHA DROBAT; PETER

Contacts

Work Completed This Date ARRIVE @ WATER @ 06:30, DRILL CREW ARRIVES @ ~06:45. WATER OPENED @ ~06:50. DRILL CREW SETS UP TO PULL CASING IN QST-B17 + THEN GROUT BOREHOLE W/ CONCRETE TRUCK. DE-HUM SET UP ON QST-B17. GEOTECH ARRIVES @ 0900. BEGIN DRILLING + SAMPLING. AT ~13:40, ENCOUNTER H_2O AFTER LUNCH BREAK @ ~82'. DRILL TO ~90' BGS + THEN RETRACT CASING TO ~80'. INSTALL 2" PVC TO ~80'. ATTEMPT TO SAMPLE QST-B17. COLLECT H_2O SAMPLES FROM QST-B17. COLLECT DUPLICATE H_2O SAMPLE HERE DESIGNATED AS QST-B27-(GW/80)-5-7-99. DRILLERS TRIP OUT + BOOM DOWN DERRICK. H_2O LEVEL IN 2" PVC = 79.8' BGS. DRILL CREW LEAVES SITE @ 16:30. QST LEAVES SITE @ 17:30.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
GEOTECH	CAP SAMPLE	QST-B17	SOIL	0905	0-1.5'	
GEOTECH	CAP SAMPLE	QST-B17	SOIL	0925	3'-4.5'	
	QST-B17-(5/15)-5-7-99		SOIL	0950	15-16	
	QST-B17-(5/65)-5-7-99		SOIL	1135	65-66	
	QST-B17-(GW/80)-5-7-99		H_2O	15:30	~80'	
	QST-B27-(GW/80)-5-7-99		H_2O	16:00	~80 (DUPLICATE)	

Signatures:

Field Team Leader _____ Date 5-7-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF　　　　QST Project : Estes Landfill

Site Location: Phoenix, AZ　　　　QST Project No.:

QST Field Team Leader: JEFF MARTIN　　　　QST Project Manager: John Mieher

Date 5-10-99　　Day of Week MONDAY　　Page 1 of 1

Purpose of Trip DRILLING SOIL BORINGS

Field Team Members (Names and Initials): JOHN MEIHER; JEFF; PETER; MATT CARLICK; TRISH PROBAT

Contacts

Work Completed This Date: ARRIVE @ WAT @ 06:45. MOVE RIG + PRE-LUN. AT ~08:30 GEOTECH ARRIVES TO COLLECT HIS SAMPLES + WE PROCEED TO DRILL QST-B19. DRILL TO ~89' BGS. SATURATED ZONE ENCOUNTERED @ ~77-81' BGS. PULL OFF ~10' OF CASING AND INSTALL 2" PVC SCREEN + CASING. NO H_2O IN 2" PVC SCREEN. LET SIT DURING LUNCH, CHECK FOR H_2O AGAIN. NO H_2O PRESENT. PULL OFF ANOTHER 10' OF STEEL CASING (70' IN THE GROUND) + CHECK FOR H_2O. H_2O IDENTIFIED @ ~83.1' BGS. ATTEMPT TO SAMPLE H_2O. COLLECT SAMPLES @ ~14:30. CHECK H_2O LEVEL AFTER SAMPLING + IDENTIFY IT @ ~72.4' BGS. AT ~15:10, DRILL CREW TRIPS OUT CASING IN QST-B19. DECON STEEL CASING. MOVE RIG TO QST-B21. WILL BEGIN DRILLING QST-B21 TOMORROW A.M. LAYNE CREW LEAVES SITE @ 16:30. QST CREW LEAVES SITE @ 17:00.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
~~50/60~~	~~GEOTECH~~	~~QST-B-19~~	~~SOIL~~	~~0840~~	~~0'-1.5'~~	
~~50/50~~	~~GEOTECH~~	~~QST-B-19~~	~~SOIL~~	~~0850~~	~~3'-4.5'~~	NO SAMPLE RECOVERED
	QST-B19-(S/40)-5-10-99		SOIL	10:25	40-41	X
	QST-B19-(S/60)-5-10-99		SOIL	10:50	60-61	
	QST-B19(S/70)-5-10-99		SOIL	11:15	70-71	X
	QST-B19-(S/80) 5-10-99		SOIL	11:45	80-81	
	QST-B19-(GW/80)-5-10-99		H_2O	14:30	~80' BGS	

Signatures:

Field Team Leader [signature]　　Date 5-10-99

Reviewer　　Date

Reviewer Title

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.:
QST Field Team Leader: J. MARTIN — QST Project Manager: John Mieher

Date 5-11-99 — Day of Week TUES — Page 1 of 1

Purpose of Trip DRILLING SOIL BORINGS

Field Team Members (Names and Initials)
JOHN MIEHER — TRICIA DROBAT
MATT LAZELLE — JEFF MARTIN
PETER HOFFMAN

Contacts

Work Completed This Date
ARRIVE @ QST'S AT DATE. DRILL CREWS ARRIVE AT 07:00, CALIBRATE OVM, GEOTECH ON-SITE SAFETY MEETING, STARTING @ 08:15 COLLECT GEOTECH SAMPLES AND BEGIN DRILLING QST-B21. ONLY 2 MEN ON MY CREW TO START THE DAY SAMPLE HAMMER T SPLIT SPOON STUCK DOWN-HOLE @ 20' BGS. TRIP OUT CASING TO RECOVER, CONTINUE DRILLING DRIVE CASING TO ~90', REMOVE 10' + INSTALL 2" PVC. CHECK H_2O LEVEL, H_2O LEVEL ~80' BGS COLLECT H_2O SAMPLE FROM QST-B21 @ 14:15, CHECK H_2O LEVEL @ ~74' BGS. PREP SAMPLES FOR SHIPMENT, COLLECT WATER LEVEL TAPE RINSATE SAMPLE QST-B40-(GW/80)-5-11-99 @ 1440. PREP SAMPLES + FILL OUT COC # 6707, RELINQUISH SAMPLES TO DORMAN COURIER @ 15:30. B16 DE-CON + MOVED TO QST-B10 + GET SET UP. GEOTECH LEAVE ON SITE. NOTE: 3rd MEMBER OF MY DRILL CREW ARRIVED DURING LUNCH BREAK, GEOTECH AT MW #16 @ ~16:10 TO COLLECT HIS SAMPLES. COLLECTS SAMPLES AT 0-1.5', 3.5-5', 8-9.5', 13.5-15': NO TRASH IDENTIFIED TO 20' BGS IN QST-B10. I OBTAINED A SAMPLE AT 10' BGS (SEE BACK). STOPPED AT 20' BGS ON 5-11-99, WILL CONTINUE TOMORROW A.M. CREW LEAVES SITE @ 17:00, QST LEAVES SITE @ 17:15

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
GEOTECH		QST-B21	SOIL	0805	0-1.5'	
GEOTECH		QST-B21	SOIL	0820	3-4.5'	
	QST-B21-(S/20')-5-11-99		SOIL	0930	20-21	
	QST-B21-(S/80)-5-11-99		SOIL	1120	80-81	
	QST-B21-(GW/80)-5-11-99		H_2O	14:15	~80'	
	QST-B40-(GW/80)-5-11-99		H_2O	14:40	~80' H_2O LEVEL TAPE RINSATE SAMPLE	
GEOTECH		QST-B10	SOIL	16:10	0-1.5	
GEOTECH		QST-B10	SOIL	1620	3-4.5	
GEOTECH		QST-B10	SOIL	1630	8-9.5	
GEOTECH		QST-B10	SOIL	1640	13.5-15'	
X	QST-B10-(S/11')-5-11-99		SOIL	1640	10-11	

Signatures:

Field Team Leader _____ Date 5-11-99

Reviewer _____ Date _____

Reviewer Title _____

Daily Field Trip Log

Client ADEQ WQARF — QST Project : Estes Landfill
Site Location: Phoenix, AZ — QST Project No.:
QST Field Team Leader: J. MARTIN — QST Project Manager: John Micheli

Date 5-12-99 Day of Week WED Page 1 of

Purpose of Trip DRILLING SOIL BORINGS

Field Team Members (Names and Initials): JOHN MICHELI, TRICIA DOBAT, MATT WALLICK, JEFF MARTIN, PETER HOFFMAN

Contacts NOTE: LOT OF BORING LOGS IN THIS FIELD BOOK. SEE ATTACHED LOGS FOR QST-B10. GUYS ARRIVE AT SITE. BEGIN DRILLING @ 20' IN QST-B10 @ 0740. ENCOUNTER H_2O IN QST-B10 DURING DRILLING @ ~53' BGS. STOP & PULL BACK CASING. SCREEN & MIND & ATTEMPT H_2O SAMPLE (SUCTION). COLLECT H_2O SAMPLE QST-B10-(6W/50)-5-12-99 FROM QST-B10. PULL CASINGS, DE-CON SET UP RIG ON QST-B9. GEOTECH ARRIVES @ 10:25 TO COLLECT SAMPLES FROM QST-B9. DRILL QST-B9 TO ~70' BGS. PULL UP 10' OF CASING & INSTALL 2" PVC. CHECK H_2O LEVEL @ ~48.2' BGS IN QST-B9. COLLECT SAMPLE OF H_2O FROM QST-B9 (QST-B9-(6W/50)-5-12-99). COLLECT SPLIT SPOON RINSEATE SAMPLE @ 15:45. DESIGNATE RINSEATE SAMPLE AS QST-B41-(6W/55)-5-12-99. COLLECT WATER LEVEL TAPE RINSEATE SAMPLE DESIGNATED QST-B32-(6W/55)-5-12-99 @ 1600. RELINQUISH A TOTAL OF 7 COOLERS (4-JEFF, 3-TRISH) TO ROMAN COURIER @ 1640. BOTH DRILL CREWS DONE @ ~16:45. FINALIZE PAPERWORK. QST LEAVES SITE @ 17:50.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
	QST-B-10-(5/40)-5-12-99		SOIL	0805	40-41	
*	QST-B-10-(5-50)-5-12-99		SOIL	0825	50-51	
	QST-B10-(6W/50)-5-12-99		H_2O	0530	~50	
GEOTECH		QST-B9	SOIL	1030	0-1.5'	
GEOTECH		QST-B9	SOIL	1040	3.4.5'	NO RECOVERY
GEOTECH		QST-B9	SOIL	1045	8.5-10'	NO RECOVERY
*	QST-B9-(5/20)-5-12-99		SOIL	1155	20-21	
	QST-B9-(5/50)-5-12-99		SOIL	1205	50-51	
*	QST-B9-(5/60)-5-12-99		SOIL	1235	60-101	
	QST-B9-(5/69)-5-12-99		SOIL	1250	69-70	
	QST-B9-(6W/50)-5-12-99		H_2O	1430	~50	
	QST-B41-(6W/55)-5-12-99		H_2O	1545	SPLIT SPOON RINSEATE SAMPLE	
	QST-B32-(6W/55)-5-12-99		H_2O	1600	H_2O LEVEL TAPE RINSEATE SAMPLE	

Signatures:

Field Team Leader [signature] Date 5-12-99

Reviewer Date

Reviewer Title

Daily Field Trip Log

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader:
QST Project: Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Date 5-13-~~67~~ 99 JM Day of Week THURS Page 1 of 1

Purpose of Trip SOIL BURIAL

Field Team Members (Names and Initials)
PETER HOFFMAN
JEFF MARTIN
TRICIA MASBAT

Contacts

Work Completed This Date 0730 ARRIVE AT SITE. MEET JOHN, TRICIA + PETER. BREAK-DOWN CANOPY. COLLECT SOIL SAMPLE FROM ROLL-OFF BIN FILL 5-WIDE MOUTH AMBER JARS. DESIGNATE IDW-1A, IDW-1B, IDW-1C, IDW-1D + IDW-1E. COLLECT SAMPLE @ 0815.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew
IDW-1A	THROUGH 1E	ROLL-OFF BIN	SOIL	0815		

Signatures:

Field Team Leader JM Date 5/13/99
Reviewer Date
Reviewer Title

Daily Field Trip Log

Client ADEQ WQARF | QST Project : Estes Landfill
Site Location: Phoenix, AZ | QST Project No.:
QST Field Team Leader: | QST Project Manager: John Mieher

Date 5-19-99 Day of Week WED Page 1 of 1

Purpose of Trip

Field Team Members (Names and Initials)
TRICIA PROJECT
PETE HOFFMAN
SCOTT MARTIN

Contacts

Work Completed This Date ARRIVE @ SITE @ 1145. NOTIFY TRICIA OF ARRIVAL CHECK-IN @ HOTEL. RETURN TO ASSIST TRICIA + PETE. ALL PERTINENT SAMPLE COLLECTION INFO IS PRESENTED IN TRICIA'S LOGBOOK. QST LEAVES SITE @ ~1230.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew

Signatures:

Field Team Leader [signature] Date 5-19-99

Reviewer Date

Reviewer Title

Daily Field Trip Log

Client ADEQ WQARF | QST Project : Estes Landfill
Site Location: Phoenix, AZ | QST Project No.:
QST Field Team Leader: | QST Project Manager: John Mieher

Date THURS | Day of Week 5-20-99 | Page ____ of ____

Purpose of Trip Drilling

Field Team Members (Names and Initials): TRICIA DROBAT; JOHN MIEHER; PETER HOFFMAN; JOHN KIM; JEFF MARTIN

Contacts
DRILLER: DON IRVINE

0700 ARRIVE AT SITE. TALK W/ JOHN. ROTARY HAS SHOWS-UP @ 07:30 MEET DON THE DRILLER. DISCUSS EW-26 SITUATION + REVIEW LOCATION. HE WILL

Work Completed This Date NEED TO PROCURE 10" CASING, BIT etc. CALIBRATE OVM. SAFETY MEETING. DON MAKES SOME RIG MODIFICATIONS. DON LEAVES SITE @ 10:30. GENERATOR ON STEAM CLEAN NOT FUNCTIONING. HE WILL ASSIST IN PREPARATION FOR DRILLING EW-26. HE WILL BE BACK OR CALL JOHN MIEHER AT THE OFFICE IF THEY AREN'T FULLY READY TO DRILL TODAY. I ASSIST TRICIA + PETER. TALK W/ JOHN MIEHER VIA PHONE + HE INDICATES HE WANTS TO DELAY STARTING EW-26 UNTIL TOMORROW. HE WILL CONTACT LAYNE + INFORM THEM. CONTINUE TO ASSIST TRICIA + PETER. QST LEAVES SITE @ ~1700.

Samples Collected

Field Group	Sample I.D.	Sample Location	Matrix	Time	Interval	Field Crew

Signatures:

Field Team Leader [signature] Date 5-20-99

Reviewer ____ Date ____

Reviewer Title ____

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No. 669903C
QST Field Team Leader Matthew Jachek	QST Project Manager John Mieher

Date: 5/4/99

Boring/Station # QST-B-2

Sample # QST-B-2-(5(65')) -5/5/99

Sample Method: Split-spoon [illegible] Depth of Sample: 15'

QC Samples (Duplicate/Split): —

Analytical Parameters: 8260 8270 6010 7471, 8080, 8082, 8141 + 8151

Analytical Laboratory and COC #: Del mar + COC II

Location: west side of Estes landfill (lower level) QST-B2

Soil Description: Moist, dark black sandy gravel w/ foreign material (wood, glass)

Remarks: Sample appears to be landfill material.

Signature: Matthew E Jachek Date: 5/4/99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader	**QST Project Manager** John Mieher

Date: 5-5-99

Boring/Station # QST-B1

Sample # QST-B1-(5/37.5')-(5-5-99)

Sample Method: Split-Spoon 1.5"x12" **Depth of Sample:** 37.5'-38.5'

QC Samples (Duplicate/Split):

Analytical Parameters: 8260, 8270, 6010, 7471, 8080, 8082, 8141, 8151

Analytical Laboratory and COC #: DCL MAR COC# 7549

Location: WEST SIDE OF ESTES LANDFILL QST-B1

Soil Description: GRAVELLY SAND

Remarks:

Signature: [signature] **Date:** 5-5-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader	**QST Project Manager** John Mieher

Date: 5-5-99

Boring/Station # QST - B1

Sample # QST - B1 - (54) - (5-5-99)

Sample Method: SPLIT-SPOON **Depth of Sample:** 54'-55'

QC Samples (Duplicate/Split):

Analytical Parameters: 8260, 8270, 6010, 7471, 8080, 8082, 8141, 8151

Analytical Laboratory and COC #: DELMAR COC # 7549

Location: WEST SIDE OF ESTES LANDFILL QST-B1

Soil Description: GRAVELLY SAND

Remarks:

Signature: [signature] **Date:** 5-5-99

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-5-99

Boring/Station # QST - BS

Sample # QST - BS - (S/20) - 5-5-99
1.5" D.A SPLIT-SPOON

Sample Method: PENETROMETER Depth of Sample: ~ 20'-21'

QC Samples (Duplicate/Split):

Analytical Parameters: 8260, 8270, 6010, 7471, 8080, 8082, 8141, 8151

Analytical Laboratory and COC #: DATA MAR COC # 6696

Location: QST - BS JUST SE of OLD AIR STRIPPER

Soil Description: SAND w/ ORGANIC + OTHER DEBRIS MIXED

Remarks:

Signature: [signature] Date: 5-6-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader	**QST Project Manager** John Mieher

Date: 5-5-99

Boring/Station # QST-BS

Sample # QST-BS-(S/43')-5-5-99

Sample Method: 1.5" O.A SPLIT SPOON **Depth of Sample:** ~43'-44'

QC Samples (Duplicate/Split):

Analytical Parameters: 8260, 8270, 6010, 7471, 8081, 8082, 8141, 8151

Analytical Laboratory and COC #: DEL MAR COC # 6696

Location: QST-BS SE OF OLD AIR STRIPPER

Soil Description: SAND W/ OCCASIONAL GRAVELS

Remarks:

Signature: [signature] **Date:** 5-6-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader	**QST Project Manager** John Mieher

Date: 5-6-99

Boring/Station # QST - B14

Sample # QST-B14-(5/50)-5-6-99

Sample Method: SPLIT SPOON **Depth of Sample:** 50-51'

QC Samples (Duplicate/Split):

Analytical Parameters: SAME AS OTHERS

Analytical Laboratory and COC #: DELMAR COC # 7630

Location: WEST END OF ELEVATED SOIL PILE

Soil Description: GRAVELLY SAND W/ TRASH

Remarks:

Signature: [signature] **Date:** 5-6-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader	**QST Project Manager** John Mieher

Date: 5-6-99

Boring/Station # QST-B14

Sample # QST-B14-(S76)-5-6-99

Sample Method: SPLIT SPOON **Depth of Sample:** 76-77

QC Samples (Duplicate/Split):

Analytical Parameters: SAME AS OTHERS

Analytical Laboratory and COC #: PEIMAR COC# 7630

Location: WEST END OF ELEVATED SOIL PILE

Soil Description: SANDY GRAVEL

Remarks:

Signature: [signature] **Date:** 5-6-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader	**QST Project Manager** John Mieher

Date: 5-7-99

Boring/Station # QST-B17

Sample # QST-B17-(S/15)-5-7-99

Sample Method: SPLIT SPOON **Depth of Sample:** 15-16

QC Samples (Duplicate/Split):

Analytical Parameters: SAME

Analytical Laboratory and COC #: DELMAR COC #

Location: SOUTH EDGE OF ELEVATED SOIL PILE

Soil Description: GRAVELLY SAND, SOME DEBRIS

Remarks:

Signature: [signature] **Date:** 5-7-99

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-7-99

Boring/Station # IST-B17

Sample # QST-B17-(5/65)-5-7-99

Sample Method: SPLIT SPOON Depth of Sample: 65-66

QC Samples (Duplicate/Split):

Analytical Parameters: SAME

Analytical Laboratory and COC #: PERKIN COC #

Location: SOUTH SIDE OF EXCAVATED SOIL PILE,

Soil Description: GRAVELLY SAND, NO TRASH

Remarks:

Signature: [signature] Date: 5-7-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader	**QST Project Manager** John Mieher

Date: 5-10-99

Boring/Station # QST-B19

Sample # QST-B19-3.5-5-10-99

Sample Method: SPLIT SPOON **Depth of Sample:** 40-41

QC Samples (Duplicate/Split):

Analytical Parameters: SAME

Analytical Laboratory and COC #: PELMAR COC # 6705

Location: SOUTH EDGE OF EXCAVATED SOIL PILE EAST OF QST-B17

Soil Description: GRAVELLY SAND

Remarks:

Signature: **Date:** 5-10-99

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-10-99

Boring/Station # QST-B19

Sample # QST-B19-(S1701-5-10-99

Sample Method: SPLIT SPOON Depth of Sample: 70-71

QC Samples (Duplicate/Split):

Analytical Parameters: SAME

Analytical Laboratory and COC #: DELMAR COC# 6705

Location: SOUTH SIDE OF ELEVATED SOIL PILE EAST OF QST-B17

Soil Description: SILTY GRAVELLY SAND

Remarks:

Signature: [signature] Date: 5-10-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader	**QST Project Manager** John Mieher

Date: 5-11-99

Boring/Station # QST B21

Sample # QST-B21-[illegible]

Sample Method: SPLIT [illegible] **Depth of Sample:** 20 21

QC Samples (Duplicate/Split): —

Analytical Parameters: SAME

Analytical Laboratory and COC #: TCL VOA COC # 6707

Location: SOUTH EDGE OF EXCAVATION SOIL PILE NE OF QST-B19.

Soil Description: SAND

Remarks:

Signature: [signature] **Date:** 5-11-99

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-11-99

Boring/Station # QST-B21

Sample # QST-B21-(8/20)-5-11-99

Sample Method: Split Spoon Depth of Sample: 20-21'

QC Samples (Duplicate/Split): —

Analytical Parameters: Same

Analytical Laboratory and COC #: Pel mar COC # 6707

Location: South east of elevated soil pile NE of QST-B19

Soil Description: Silty gravelly sand

Remarks:

Signature: [signature] Date: 5-11-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader	**QST Project Manager** John Mieher

Date: 5-11-99 (DELIVERED TO LAB ON 5-12-99)

Boring/Station # QST-B10

Sample # QST-B10-(S1.0)-5-11-99

Sample Method: SPLIT SPOON **Depth of Sample:** 10-11'

QC Samples (Duplicate/Split):

Analytical Parameters: SAME

Analytical Laboratory and COC #: ALMAC COC # 012028

Location: QST-B10 EAST END OF LANDFILL AREA LOWER TER.

Soil Description: GRAVELLY SAND

Remarks:

Signature: [signature] **Date:** 5-12-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader	**QST Project Manager** John Mieher

Date: 5-12-99

Boring/Station # QST-B1C

Sample # QST-B1C-(5/50)-5-12-99

Sample Method: SPLIT SPOON **Depth of Sample:** 50-57

QC Samples (Duplicate/Split): —

Analytical Parameters: SAME

Analytical Laboratory and COC #: ALMAC COC# 012028

Location: QST-B1C EAST END OF LANDFILL, LOWER TIER

Soil Description: SILTY GRAVELLY SAND

Remarks:

Signature: [signature] **Date:** 5-12-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader	**QST Project Manager** John Mieher

Date: 5-12-99

Boring/Station # QST-B9

Sample # QST B9 - S(20) - 5-12-99

Sample Method: SPLIT SPOON **Depth of Sample:** 20-21

QC Samples (Duplicate/Split):

Analytical Parameters: SAME

Analytical Laboratory and COC #: SUMMA COC # 012028

Location: LOWER TIER, EAST SIDE, WEST OF QST-B10

Soil Description: GRAVELLY SAND

Remarks:

Signature: **Date:** 5-12-99

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-12-99

Boring/Station # QST-B9

Sample # QST-B9-(5.5D)-5-12-99

Sample Method: Split Spoon Depth of Sample: 50-51

QC Samples (Duplicate/Split): —

Analytical Parameters: SAME

Analytical Laboratory and COC #: DELMAR COC # 012028

Location: Lower Tier, East side, West of QST-B10

Soil Description: SLTY GRAVELLY SAND

Remarks:

Signature: [signature] Date: 5-12-99

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-13-01

Boring/Station # ROLL-OFF BIN

Sample # IDW-1A THROUGH E (5 ARBITRARY QUART-SIZED JARS)
STAINLESS STEEL SPOON

Sample Method: T BOWL Depth of Sample: ~1 FOOT BELOW EXPOSED SURFACE

QC Samples (Duplicate/Split): —

Analytical Parameters:

Analytical Laboratory and COC #:

Location: ROLL-OFF BIN

Soil Description: SOIL CUTINGS FROM ALL SOIL BORINGS DRILLED TO DATE

Remarks:

Signature: [signature] Date: 5-15-01

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6694030
QST Field Team Leader JAH	**QST Project Manager** John Mieher

Date: 5-4-99

Boring/Station # QST-B3

Sample # QST-B3-(5/75)-(5-4-99)

Sample Method: SPLIT SPOON WITH BRASS RINGS (2.5" DIA) **Depth of Sample:** 7.5 - 75'10"

QC Samples (Duplicate/Split): NONE

Analytical Parameters: VOC, SVOC, TOTAL METALS, TOTAL MERCURY, PCBS ORGANOCHLORINE/ORGANOPHOSPHOROUS PESTICIDES, ORGANOCHLORINE HERBICIDES

Analytical Laboratory and COC #: DEL MAR 6B-7586

Location: SW CORNER OF LANDFILL

Soil Description: saturated, red-brown, sandy GRAVEL, much clay, subround to rounded gravel

Remarks: BOTTOM OF QST-B3 SAMPLE.
WATER ENCOUNTERED @ ~ 73' BGS
P.I.D. - 2.5 ppm
NO REFUSE ENCOUNTERED.

Signature: John T. Hart **Date:** 5-4-99

Soil Sampling Data Form

Client ADEQ WQARF — QST Project Estes Landfill
Site Location Phoenix, AZ — QST Project No. 6699030
QST Field Team Leader PATRICIA DUGGAN — QST Project Manager John Mieher

Date: 5-4-99

Boring/Station # QST-B3 ~~(5)~~

Sample # QST-B3-(5/45)-(5/4/99)

Sample Method: SPLIT SPOON (2.5" DIA) AND BRASS RINGS — Depth of Sample: 45 - 45'5"

QC Samples (Duplicate/Split): NONE

Analytical Parameters: VOC, SVOC, PCB, ORGANOCHLORINE / ORGANOPHOSPHOROUS PESTICIDES TOTAL METALS, TOTAL MERCURY, ORGANOCHLORINE HERBICIDES

Analytical Laboratory and COC #: DEL MAR GB-~~7549~~ 7584

Location: SW CORNER OF LANDFILL

Soil Description: red-brown, slightly moist, fine SAND, some well rounded gravel, some silt.

Remarks: PID = 3.9 ppm
NO WATER ENCOUNTERED BEFORE/INCLUDING THIS SAMPLE.
NO REFUSE ENCOUNTERED.

Signature: [signature] Date: 5-4-99

Soil Sampling Data Form

Client ADEQ WOARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6699030
QST Field Team Leader VAI	**QST Project Manager** John Mieher

Date: 5-5 99

Boring/Station # QST-B4

Sample # QST-B4 (S/25)-(5/4/99)

Sample Method: 2.5" DIA. SPLIT SPOON WITH BRASS RING **Depth of Sample:** 25'

QC Samples (Duplicate/Split): NA

Analytical Parameters: TOC By Walkley-Black @

Analytical Laboratory and COC #: DA MAR ANALYTICAL GB-1548

Location: WESTERN CENTRAL PORTION OF LANDFILL

Soil Description: slightly moist red-brown, sandy GRAVEL, much clay; no refuse

Remarks:

Signature: [signature] **Date:** 5-5-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6699030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-5-99

Boring/Station # QST-B4

Sample # QST-B4-(S/~~49~~ 55)-(5-4-99) 49 ~~55~~

Sample Method: 2.5" SPLIT SPOON WITH BRASS RINGS **Depth of Sample:** 55

QC Samples (Duplicate/Split): NONE

Analytical Parameters: TOC By Walkley-Black

Analytical Laboratory and COC #: Del Mar GB-7548

Location: WESTERN CENTRAL PORTION OF LANDFILL

Soil Description: Slightly moist, red-brown gravely SAND, trace clay, gravel subround to round.

Remarks:

Signature: [signature] **Date:** 5-5-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 609 9030
QST Field Team Leader PAT	**QST Project Manager** John Mieher

Date: 5-5-99

Boring/Station # QST-B4

Sample # QST-B4-(S/55)-(5-4-99)

Sample Method: 2.5" dia. SPLIT SPOON WITH BRASS RINGS **Depth of Sample:** 55'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: SVOC, VOC, PCB, TOTAL METALS, TOTAL MERCURY, ORGANOPHOSPHOROUS/ORGANOCHLORINE PESTICIDES, ORGANOCHLORINE HERBICIDES

Analytical Laboratory and COC #: DET MAR GB-1549

Location: 8th WESTERN CENTRAL PORTION OF LANDFILL

Soil Description: slightly moist red-brown gravely SAND, trace clay, gravel subround to round

Remarks:

Signature: [signature] **Date:** 5-5-99

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No. 6699030
QST Field Team Leader PAD	QST Project Manager John Mieher

Date: 5-5-99

Boring/Station # QST-B4

Sample # QST B4 (S/35) 5-4-99

Sample Method: split spoon w/ brass ring Depth of Sample: 35'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: VOC, SVOC, PESTICIDES / PCB, METALS, MERCURY, HERBICIDES

Analytical Laboratory and COC #: Del Mar GB-7549

Location: western central portion of landfill

Soil Description: slightly moist, red-brown sandy GRAVEL much clay, no refuse

Remarks:

Signature: [signature] Date: 5-5-99

Soil Sampling Data Form

Client ADEQ WOARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No. 669903C
QST Field Team Leader (AM)	QST Project Manager John Mieher

Date: 5-6-99

Boring/Station # QST-B6

Sample # QST-B6 (S1S6) (5-6-99)

Sample Method: encore/brass 2.5" dia split spoon Depth of Sample: 50'-50'6"

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270 8081, 8082, 8141 8151, ~~8~~ 6010, 7471

Analytical Laboratory and COC #: Del mar GB-6696

Location: NEXT TO CONCRETE PIPES (NORTH SIDE)

Soil Description: slightly moist, red-brown gravelly fine SAND trace clay, some med-coarse sand

Remarks: PID = 149.0 ppm

Signature: [signature] Date: 5-6-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-6-99

Boring/Station # QST-B6

Sample # QST-B6-(S/55)-(5-6-99)

Sample Method: 2.5" dia split spoon with brass rings, encore sampler **Depth of Sample:** 55'-65'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, 6010, 7471, 8081, 8082, 8141, 8151

Analytical Laboratory and COC #: Del Mar GB-6696

Location: NORTHERN SIDE CONCRETE PIPES

Soil Description: slightly moist red-brown, gravelly fine SAND, trace clay, some medium-coarse sand.

Remarks: P.I.D = 7.0 ppm

Signature: [signature] **Date:** 5-6-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-6-99

Boring/Station # QST-B15

Sample # QST-B15-(S/39)-(5-6-99)

Sample Method: 2.5" split spoon sampler with brass rings; encore sampler **Depth of Sample:** 39@ 50'-50'5" 39@

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, 6010/7174, 8088@, 8082, 8141, 8151

Analytical Laboratory and COC #: Del Mar 63-7630

Location: NORTH SIDE SITE, TOP OF LANDFILL SOUTH OF ACCESS RAMP

Soil Description: slightly moist, brown silty SAND, trace clay, trace gravel, some refuse (glass, plastic)

Remarks: P.I.D HEADSPACE = 19.3 ppm

Signature: [signature] **Date:** 5-6-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-6 99

Boring/Station # QST-B15

Sample # QST-B15-(S/66)-(5-6-99)

Sample Method: 2.5" SPLIT SPOON WITH BRASS RINGS & ENCORE SAMPLER **Depth of Sample:** 66' - 66' 8"

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, 6010, 7174, 8081, 8082, 8141, 8151

Analytical Laboratory and COC #: DEL MAR GB-7630

Location: NORTH SIDE SITE, TOP OF LANDFILL, SOUTH OF ACCESS RAMP

Soil Description: moist dark brown sandy CLAY, some gravel, no refuse

Remarks: PID HEADSPACE = 0.0 ppm

Signature: [signature] **Date:** 5-6-99

Soil Sampling Data Form

Client ADEQ WQARF | QST Project Estes Landfill
Site Location Phoenix, AZ | QST Project No. 6609 9030
QST Field Team Leader PAM | QST Project Manager John Mieher

Date: 5-7-99

Boring/Station # QST-B16

Sample # QST-B16-(S/30)(5-7-99)

Sample Method: 2.5" split spoon with brass rings, encore sampler Depth of Sample: 26-27.5' BGS

QC Samples (Duplicate/Split): DUPLICATE OF QST-B16 (S/26) (5-7-99)

Analytical Parameters: 8270, 8081, 8082, 8141, 8151, 6010, 7174

Analytical Laboratory and COC #: DEL MAR

Location: NORTH SIDE OF SITE, ELEVATED PORTION OF LANDFILL EAST OF ACCESS RAMP

Soil Description: slightly moist dark-brown to black, fine silty SAND, some gravel and refuse

Remarks: PID HEADSPACE 27.5 3 ppm

Signature: [signature] Date: 5-7-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6699030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-7-99

Boring/Station # QST-B16

Sample # QST-B16(S/26)-(5-7-99)

Sample Method: 2.5" dia. SPLITSPOON WITH BRASS RINGS, encore sampler **Depth of Sample:** 26-27.5' BGS

QC Samples (Duplicate/Split): DUPLICATE OF THIS SAMPLE SUBMITTED AS QST-B16(S/30)-(5-7-99)

Analytical Parameters: 8270, 6010, 7104, 8081, 8082, 8141, 8151

Analytical Laboratory and COC #: DEL MAR

Location: NORTH SIDE OF SITE ELEVATED PORTION OF LANDFILL EAST OF ACCESS RAMP

Soil Description: slightly moist, dark brown-black, fine silty SAND, some gravel and refuse

Remarks: PID HEADSPACE = 278.3 ppm.

Signature: [signature] **Date:** 5-7-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6699030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-10-99

Boring/Station # QST-B18

Sample # QST-B18(S/40)(5-10-99)

Sample Method: Split Spoon (2.5" dia) with brass rings and Encore Sampler **Depth of Sample:** 40'-40'8" (JM)

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, 8081, 8082, 6010, 7471, 8141, 8151

Analytical Laboratory and COC #: Del Mar GB-6705

Location: North central portion of elevated section of landfill (JM)

Soil Description: MOIST, DARK BROWN, SILTY FINE SAND, SOME GRAVEL, NO REFUSE (JM)

Remarks: PID = 0.2 ppm (JM)

Signature: [signature] **Date:** 5-10-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6099080
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-10-99

Boring/Station # QST-B18

Sample # QST-B18(S/TH)(5-10-99) *

Sample Method: 2.5' dia split spoon with brass rings and encore sampler **Depth of Sample:** 64-64'9" *

QC Samples (Duplicate/Split): NONE

Analytical Parameters: ~~8260, 8270, 6010, 1411, 8111, 8151, 5081, 5082~~ SEE REMARKS

Analytical Laboratory and COC #: DEL MAR GB-6705

Location: NORTH CENTRAL PORTION OF ELEVATED SECTION OF LANDFILL

Soil Description: tan, brown, fine silty SAND, some clay and gravel; no refuse

Remarks: * THIS SAMPLE WAS INCORRECTLY LABELED AS QST-B18(S/TH)(5-10-99). IT SHOULD BE LABELED QST-B18(S/5')(5-10-99). NOTE THAT ONLY SOME CLIENT SAMPLE VOLUME FOR VOC SHOT ANALYSES WAS OBTAINED

Signature: [signature] **Date:** 5-10-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAUL	**QST Project Manager** John Mieher

Date: 5-11-99

Boring/Station # QST-B2C

Sample # QST-B2C(5/7.6)(5-11-99)

Sample Method: 2.5" DIA SPLIT SPOON WITH BRASS RINGS ~~AND ENCORE~~ (3M) **Depth of Sample:** 76-77.5' BGS

QC Samples (Duplicate/Split): NONE

Analytical Parameters: TCC BY WALKLEY-BLACK

Analytical Laboratory and COC #: DEL MAR GB-6707

Location: EASTERNMOST BORING, ELEVATED SECTION OF LANDFILL, NORTHERN SIDE.

Soil Description: red-brown, slightly moist, fine to coarse SAND and GRAVEL, some silt, clay

Remarks: PID = 0.0 ppm

Signature: [signature] **Date:** 5-11-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-11-99

Boring/Station # GST-B2C

Sample # GST-B2C (9'6 4)(5-11-99)

Sample Method: 2 5" SPLIT SPOON WITH BRASS RINGS AND ENCORE **Depth of Sample:** 6'4 - 6'4' 11"

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, SVOC, 8091, 8082, 6010, 7471, 8141, 8151

Analytical Laboratory and COC #: DEL MAR GB-6707

Location: EASTERNMOST BEING ELEVATED PORTION OF LANDFILL, NORTHERN SIDE

Soil Description: slightly moist, tan-brown, silty fine to medium SAND, some gravel, trace clay

Remarks: PID = 0.3 ppm

Signature: [signature] **Date:** 5-11-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6649030
QST Field Team Leader PHD	**QST Project Manager** John Mieher

Date: 5-11-99

Boring/Station # GS-320

Sample # GST-320 (5/25)(5-11-99)

Sample Method: 2.5" dia. SPLIT SPOON SAMPLER WITH BRASS RINGS AND ENCORE **Depth of Sample:** 25-26.5'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, 3015, 8082, 8141, 8151, 6010, 7471

Analytical Laboratory and COC #: DEL MAR GB6707

Location: EASTERN-MOST ZONE, ELEVATED PORTION OF LANDFILL, NORTHERN SIDE

Soil Description: Slightly moist, silty black fine SAND AND GRAVEL, intermingled with refuse (wood, paper)

Remarks: PID = 92 ppm

Signature: [signature] **Date:** 5-11-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-12-99

Boring/Station # QST-B8

Sample # QST-B8(3/45)(5-11-99)

Sample Method: 2.5" dia SPLIT SPOON WITH BRASS RINGS & ENCORE **Depth of Sample:** 45'-45'7"

QC Samples (Duplicate/Split): N/A

Analytical Parameters: 8260, 8270, 8081, 8082, 8141, 8151, 6010, 7471

Analytical Laboratory and COC #: DEL MAR 0120137

Location: WEST OF PREVIOUS DISPOSAL PIT, SOUTH SIDE OF LANDFILL

Soil Description: Slightly moist, red-brown, fine to medium SAND AND GRAVEL, little silt; no refuse.

Remarks: PID = 0.0 ppm

Signature: [signature] **Date:** 5-12-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6699030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-12-99

Boring/Station # QST-B8

Sample # QST-B8(S/35)(5-11-99)

Sample Method: 2.5" DIA. SPLIT SPOON WITH BRASS RINGS & ENCORE **Depth of Sample:** 35-35'8"

QC Samples (Duplicate/Split): N/A

Analytical Parameters: 8260, 8270, 8081, 8082, 8141, 8151, 6010, 7471

Analytical Laboratory and COC #: DEL MAR 01037

Location: WEST OF PREVIOUS DISPOSAL PIT, SOUTH SIDE OF LANDFILL

Soil Description: no refuse, slightly moist, brown medium SAND, some fine sand and gravel, trace silt

Remarks: PID = 0.0 PPM

Signature: [signature] **Date:** 5-12-99

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No. 669 9030
QST Field Team Leader PAD	QST Project Manager John Mieher

Date: 5-12 99

Boring/Station # QST-B8

Sample # QST-B8(S/57)(5-12-99)

Sample Method: 2.5 'dia - SPLIT SPOON WITH BRASS RINGS Depth of Sample: 57'-57'11"

QC Samples (Duplicate/Split): NONE

Analytical Parameters: ASTM D2487

Analytical Laboratory and COC #: DELMAR 012037

Location: WEST OF PREVIOUS DISPOSAL PIT, SOUTH SIDE OF LANDFILL

Soil Description: red-brown, slightly moist, clayey angular gravel, some f-c sand.

Remarks: PID=0.0 ppm

Signature: [signature] Date: 5-12-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6699030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-12-99

Boring/Station # QST-B7

Sample # QST-B7(S155)(5-12-99)

Sample Method: 2.5"dia SPLIT SPOON WITH BRASS RINES AND ENDCAP **Depth of Sample:** 55'-56'2"

QC Samples (Duplicate/Split): NONE

Analytical Parameters: TOC(Walkley-Black), 8260, 8270, 8081, 8082, 8141, 8151 6010, 7471

Analytical Laboratory and COC #: DEL MAR 012037

Location: WEST OF DISPOSAL PIT, EAST OF AIR STRIPPER

Soil Description: moist, red-brown, clayey fine SAND, some m-c sand, and gravel; no refuse

Remarks: PID = 4.1 ppm

Signature: [signature] **Date:** 5-12-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9037
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-12-99

Boring/Station # QST-B7

Sample # (QST-B7)(S/37)(5-12-99

Sample Method: 2.5" dia. SPLIT SPOON WITH BRASS RINGS & ENCORE **Depth of Sample:** 37' - 37' 4"

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, 8081, 8082, 8141, 8151, 6010, 7471

Analytical Laboratory and COC #: DEL MAR 012037

Location: WEST OF DISPOSAL PIT, EAST OF AIR STRIPPER

Soil Description: dry, brown-red fine silty SAND AND GRAVEL, trace clay, no refusal

Remarks: PID = 2.8 ppm

Signature: [signature] **Date:** 5-12-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6699030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-12-99

Boring/Station # GST-B7

Sample # (GST-B7)(5/5)(5-12-99)

Sample Method: 2.5" dia. SPLIT SPOON WITH BRASS RINGS **Depth of Sample:** 5' - 6.5'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: ASTM D2487

Analytical Laboratory and COC #: DEL MAR 012637

Location: WEST OF DISPOSAL PIT, EAST OF AIR STRIPPER

Soil Description: dry, red-brown silty SAND and sandy SILT, some gravel, no refuse.

Remarks: PID = 0.6 ppm

Signature: [signature] **Date:** 5-12-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6099030
QST Field Team Leader PAT	**QST Project Manager** John Mieher

Date: 5-14-99

Boring/Station # GST-B11

Sample # GST-B11(3.5)(5-14-99)

Sample Method: 3.5" DIA SPLIT SPOON W/ FIT BRASS LINES & ENCORE **Depth of Sample:** 5'-5.5'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260 8270 8081 8082 8141 8151, 6010, 7471

Analytical Laboratory and COC #: DELMAR 012074

Location: 25' NORTH OF FENCELINE, MID-SITE, ALONG ACCESS ROAD

Soil Description: slightly moist, brown silty SAND, some gravel, no refuse

Remarks: PID = 3.9 ppm

Signature: [signature] **Date:** 5-14-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader TD	**QST Project Manager** John Mieher

Date: 05-19-99

Boring/Station # QST-B11

Sample # QST-B11 (S1061/5-19-99)

Sample Method: 2.5" dia. Split spoon WITH BRASS RINGS & ENCORE SAMPLER **Depth of Sample:** 66' - 66'8"

QC Samples (Duplicate/Split): NONE

Analytical Parameters: E26C, E27C, E08I, 8082, E141, 8151, 6010, 7471

Analytical Laboratory and COC #: DEL MAR 012074

Location: 25' NORTH OF FENCE, CENTRAL PORTION OF SITE IN ACCESS RD

Soil Description: slightly moist, red-brown silty SAND with gravel, trace clay.

Remarks: PID = 2.1 ppm

Signature: [signature] **Date:** 05-19-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-19-99

Boring/Station # GSI-B11

Sample # GSI B11/S/65'(5-19-99)

Sample Method: 2.5" SPLIT SPOON WITH BRASS RINGS **Depth of Sample:** 58'-69'5"

QC Samples (Duplicate/Split): NONE

Analytical Parameters: TO BE DETERMINED

Analytical Laboratory and COC #:

Location: 25' NORTH OF FENCELINE, IN ACCESS ROAD, CENTRAL PORTION OF SITE

Soil Description: Saturated, red-brown clayey GRAVEL, with silt, no odor.

Remarks: SAMPLE COLLECTED BELOW THE WATER TABLE
PID = 0.2 ppm

Signature: [signature] **Date:** 5-19-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-20-99

Boring/Station # QST-B12

Sample # QST-B12(S/45)(5-20-99

Sample Method: 2.5" dia SPLIT SPOON WITH BRASS RINGS & ENCORE **Depth of Sample:** 45'-45' 8"

QC Samples (Duplicate/Split): DUPLICATE OF THIS SAMPLE SUBMITTED AS QST-B39(S/55)(5-20-99)

Analytical Parameters: 8260, 8270, 8081, 8082, 8141, 8151, 6010/7471

Analytical Laboratory and COC #: DEL MAR 12002

Location: QST-B12, ALONG SALT RIVER ACCESS RD.

Soil Description: MOIST TO SATURATION, FINE TO MEDIUM SAND, TRACE SILT, SOME GRAVEL, NO ODOR

Remarks: PID

Signature: [illegible] **Date:** 5-20-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6990.30
QST Field Team Leader [illegible]	**QST Project Manager** John Mieher

Date: 5-20-99

Boring/Station # QST-B12

Sample # QST-B39 (S/55) (5-20-99)

Sample Method: 2.5" DIA. SPLIT SPOON WITH BRASS RINGS AND ENCORE **Depth of Sample:** 45'-45'8"

QC Samples (Duplicate/Split): THIS SAMPLE IS A DUP. OF QST-B12 (S/45) (5-20-99)

Analytical Parameters: 8260, 8270, 8081, 8082, 8141, 8151, 6010/7471

Analytical Laboratory and COC #: DEL MAR 12007

Location: QST-B12 ALONG SALT RIVER ACCESS RD.

Soil Description: [illegible] TO MEDIUM SAND TRACE [illegible] SOME GRAVEL AC FINES

Remarks: [illegible]

Signature: [illegible] **Date:** [illegible]

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No. 669 9030
QST Field Team Leader [illegible]	QST Project Manager John Mieher

Date: [illegible]

Boring/Station # [illegible]

Sample # [illegible]

Sample Method: [illegible] Depth of Sample: 34'-34'5"
WITH BRASS RINGS [illegible]

QC Samples (Duplicate/Split): NONE

Analytical Parameters: [illegible] 8141 8151 [illegible] 7471, TC (WALKLEY-BLACK)

Analytical Laboratory and COC #: [illegible] MAR [illegible]

Location: [illegible] ROAD NORTH OF SITE

Soil Description: [illegible] FINE - MED. SAND, SOME GRAVEL, LITTLE [illegible]

Remarks: PID = 1.5 PPM

Signature: [illegible] Date: [illegible] 96

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** [illegible]
QST Field Team Leader [illegible]	**QST Project Manager** John Mieher

Date: [illegible]

Boring/Station # [illegible]

Sample # [illegible]

Sample Method: [illegible] **Depth of Sample:** [illegible]
WITH BRASS RINGS - ENCORE

QC Samples (Duplicate/Split): [illegible]

Analytical Parameters: [illegible]

Analytical Laboratory and COC #: [illegible]

Location: [illegible]

Soil Description: [illegible]

Remarks: [illegible]

Signature: [illegible] **Date:** [illegible]

Soil Sampling Data Form

Client ADEQ WOARF
Site Location Phoenix, AZ
QST Field Team Leader

QST Project Estes Landfill
QST Project No.
QST Project Manager John Mieher

Date:

Boring/Station #

Sample #

Sample Method: Depth of Sample:

QC Samples (Duplicate/Split): SAME QST B38(S/SC)(5-20 99) IS A DUPLICATE OF THIS SAMPLE

Analytical Parameters: VOC 8260, SVOC 8270, 8141, 8151, 6010, 7471

Analytical Laboratory and COC #:

Location:

Soil Description:

Remarks: PID: 2.1 ppm

Signature: Date:

Soil Sampling Data Form

Client ADEQ WQARF | QST Project Estes Landfill
Site Location Phoenix, AZ | QST Project No. [illegible]
QST Field Team Leader [illegible] | QST Project Manager John Mieher

Date: [illegible]

Boring/Station # [illegible]

Sample # [illegible]

Sample Method: [illegible] Depth of Sample: [illegible]
[illegible]

QC Samples (Duplicate/Split): [illegible]

Analytical Parameters: [illegible]

Analytical Laboratory and COC #: [illegible]

Location: [illegible]

Soil Description: [illegible]

Remarks: [illegible]

Signature: [illegible] Date: [illegible]

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No. 960930
QST Field Team Leader [illegible]	QST Project Manager John Mieher

Date: [illegible]

Boring/Station # [illegible]

Sample # [illegible]

Sample Method: [illegible] Depth of Sample: [illegible]

QC Samples (Duplicate/Split): [illegible]

Analytical Parameters: [illegible]

Analytical Laboratory and COC #: [illegible]

Location: [illegible]

Soil Description: [illegible]

Remarks: [illegible]

Signature: [illegible] Date: [illegible]

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 64 9020
QST Field Team Leader	**QST Project Manager** John Mieher

Date:

Boring/Station #

Sample #

Sample Method: Depth of Sample: 0 - 0.5'

QC Samples (Duplicate/Split):

Analytical Parameters:

Analytical Laboratory and COC #:

Location:

Soil Description:

Remarks:

Signature: **Date:**

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-21-99

Boring/Station # EW-26

Sample # EW-26-(5/10)-5-21-99

Sample Method: SPLIT SPOON Depth of Sample: ~10'-11'

QC Samples (Duplicate/Split): —

Analytical Parameters: METHOD 8260

Analytical Laboratory and COC #: DEL MAR COC# 012050

Location: EW-26 JUST EAST OF EW-15

Soil Description: SAND W/ DEBRIS

Remarks:

Signature: [signature] Date: 5-21-99

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-24-99

Boring/Station # EW-26

Sample # EW-26-(5/40)-5-24-99

Sample Method: SPLIT SPOON Depth of Sample: 40-41'

QC Samples (Duplicate/Split):

Analytical Parameters: VOC, TOC

Analytical Laboratory and COC #: PEIMAR COC# 012039

Location: EW-26 JUST EAST of EW-15

Soil Description: SANDY GRAVEL

Remarks:

Signature: [signature] Date: 5-24-99

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-24-99

Boring/Station # EW-26

Sample # EW-26-(50/50)-5-24-99

Sample Method: Split-Spoon Depth of Sample: 50-51

QC Samples (Duplicate/Split):

Analytical Parameters: VOC, TDC

Analytical Laboratory and COC #: Del Mar COC # 012039

Location: EW-26 Just East of EW-15

Soil Description: Gravelly Sand / Sandy Gravel

Remarks:

Signature: [signature] Date: 5-24-99

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-25-99

Boring/Station # EW-26

Sample # EW-26-(5/93)-5-25-99

Sample Method: SPLIT-SPOON Depth of Sample: 93-94

QC Samples (Duplicate/Split):

Analytical Parameters: TOC (WALKLEY-BLACK) * NOTE: DID NOT SUBMIT TO LAB PER JOHN MIEHER

Analytical Laboratory and COC #: DELMAR ~~COC # 6703~~

Location: EW-26

Soil Description: COURSE SAND PREDOMINANTLY

Remarks: RETAINED SAMPLE RESEMBLES SAND PACK MATERIAL USED IN WELL CONSTRUCTION.

Signature: [signature] Date: 5-25-99

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-25-99

SAMPLE TIME

Boring/Station # ROLL-OFF BIN WEST of EW-26 #4821 11:35

Sample # IDW-2A THROUGH IDW-2E (5-AMBER QUART SIZED JARS)

COMPOSITE SAMPLE USING

Sample Method: STAINLESS STEEL BOWL + SPOON Depth of Sample: ~1' BELOW SOIL SURFACE

QC Samples (Duplicate/Split):

Analytical Parameters:

Analytical Laboratory and COC #:

Location: ROLL-OFF BIN # 4821 WEST OF WELL EW-26

Soil Description: MOIST SAND + GRAVEL

Remarks:

Signature: [signature] Date: 5-25-99

Soil Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-26-99

Boring/Station # EW-26

Sample # EW-26-(5/122)-5-25-99

Sample Method: SPLIT SPOON Depth of Sample: 122-123

QC Samples (Duplicate/Split):

Analytical Parameters: TOC

Analytical Laboratory and COC #: DELMAR COC # 012040

Location: EW-26 JUST EAST OF EW-15

Soil Description: SILTY SAND

Remarks:

Signature: [signature] Date: 5-26-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-24-99

Boring/Station # EW-24 (25')

Sample # EW-25 (S/35)(5-24-99)

Sample Method: SPLIT SPOON WITH BRASS RINGS AND ENCORE **Depth of Sample:** 35'-35'6"

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, 8081, 8082, 8141, 8151, 6010, 7471

Analytical Laboratory and COC #: DEL MAR

Location: SALT RIVER BED NORTH OF SITE

Soil Description: RED BROWN, DRY SILTY SAND AND GRAVEL SOME CLAY, NO REFUSE

Remarks: PID = 2.4 ppm.

Signature: Robert A. Dubat **Date:** 5-24-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAO	**QST Project Manager** John Mieher

Date: 5-24-99

Boring/Station # EW-25

Sample # EW-25(S/45)(5-24-99)

Sample Method: SPLIT SPOON SAMPLER WITH BRASS RINGS AND ENCORE **Depth of Sample:** 45'-45'9"

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, 8081, 8082, 8141, 8151, 6010, 7471

Analytical Laboratory and COC #: DEL MAR

Location: SALT RIVER BED, NORTH OF SITE.

Soil Description: MOIST, RED-BROWN SILTY/CLAYEY SAND AND FINE GRAVEL NO ODOR

Remarks: PID = 4.2 ppm

Signature: John A. Mieher **Date:** 5-25-99

WATER ONLY

~~Soil~~ Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-26-99

Boring/Station # EW-24

Sample # QST-B50 (8145) (5-26-99) EW-24

Sample Method: SPLIT SPOON **Depth of Sample:** N/A
RINSEATE

QC Samples (Duplicate/Split): RINSEATE

Analytical Parameters: 8260, 8270 8081, 8082, 8141, 8151, GC(C, 7471

Analytical Laboratory and COC #: DEL MAR GB-

Location: EW-24 SALT RIVER CHANNEL.

Soil Description: N/A

Remarks: NONE

Signature: John A. Mieher **Date:** 5-26-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6699030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-27-99

Boring/Station # EW-23

Sample # EW-23 (S/20) (5-27-99)

Sample Method: SPLIT SPOON WITH BRASS RINGS **Depth of Sample:** 20'-20'8"

QC Samples (Duplicate/Split): NONE

Analytical Parameters: ASTM D-2487

Analytical Laboratory and COC #: DEL MAR 012075

Location: EW-23, SKY HARBOR AIRPORT, NORTH OF SALT RIVER.

Soil Description: dry to moist, tan fine silty SAND, trace medium sand, trace gravel

Remarks:

Signature: [signature] **Date:** 5-27-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5/4/99

Boring/Station # QST-B-2

Sample # QST-B2-(GW/73)-5/4/99 - 9:41am

Sample Method: bailer through 2" screen PVC **Depth of Sample:** 73' bgs

QC Samples (Duplicate/Split):

Analytical Parameters: E260, E270, 6010/7471, 8081, 8082, 8141, 8151, E260-Trip blank.

Analytical Laboratory and COC #: Del Mar and COC #

Location: QST-B-2

Groundwater Description: Cloudy - Alot of TSS - silts/clays in water.

Remarks:

Signature: Matthew [illegible] **Date:** 5/4/99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-5-99

Boring/Station # QST-B1

Sample # QST-B1-(GW/70)-(5-5-99)

Sample Method: BAILER THROUGH 2" PVC Depth of Sample: ~70' BGS

QC Samples (Duplicate/Split):

Analytical Parameters: 8260, 8270, 6010/7471, 8081, 8082, 8141, 8151, 8260 (TRIP BLANK)

Analytical Laboratory and COC #: DENAR COC # 7626

Location: QST B-1

Groundwater Description: TURBID

Remarks:

Signature: [signature] Date: 5-5-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-6-99

Boring/Station # QST-B5

Sample # QST-B5-(GW/60)-5-6-99

Sample Method: BAILER INSIDE 2" PVC SCRE ~70'365 Depth of Sample: 260' 365

QC Samples (Duplicate/Split):

Analytical Parameters: 8260, 8270, 6010, 7471, 8081, 8082, 8141, 8151

Analytical Laboratory and COC #: DEL MAR COC # 7628

Location: QST-B1 JUST SE OF OLD AIR STRIPPER

Groundwater Description: TURBID

Remarks:

Signature: [signature] Date: 5-6-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-6-99

Boring/Station # QST-B14

Sample # QST-B14-(GW/80)-5-6-99

Sample Method: BAILER IN 2" PVC Depth of Sample: ~80' BGS

QC Samples (Duplicate/Split):

Analytical Parameters: 8260, 8270, 6010, 7471, 8081, 8082, 8141, 8151

Analytical Laboratory and COC #: DCL MAC COC# 7629

Location: WEST END OF ELEVATED SOIL AREA

Groundwater Description: TURBID

Remarks:

Signature: [signature] Date: 5-6-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-7-99

Boring/Station # QST-B17-E

Sample # QST-B17-(GW/80')-5-7-99

Sample Method: BAILER, 2" PVC Depth of Sample: ~80'

QC Samples (Duplicate/Split): DUPLICATE SAMPLE QST-B27-(GW/80)-5-7-99

Analytical Parameters: SAME

Analytical Laboratory and COC #: ALSAR COC #

Location: SOUTH SIDE OF ELEVATED SOIL PILE.

Groundwater Description: SLIGHTLY TURBID

Remarks:

Signature: [signature] Date: 5-7-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-10-99

Boring/Station # QST-B19

Sample # Bailer 1-2" PVC Pipe
QST-B19-GW-80-5-10-99

Sample Method: Depth of Sample: ~80'

QC Samples (Duplicate/Split):

Analytical Parameters: Same

Analytical Laboratory and COC #: Delmar COC # 6705

Location: South edge of elevated soil pile east of QST-B17

Groundwater Description: Turbid

Remarks:

Signature: [signature] Date: 5-10-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: [illegible]

Boring/Station #: [illegible]

Sample #: [illegible]

Sample Method: [illegible] Depth of Sample: [illegible]

QC Samples (Duplicate/Split): [illegible]

Analytical Parameters: [illegible]

Analytical Laboratory and COC #: [illegible]

Location: [illegible]

Groundwater Description: [illegible]

Remarks:

Signature: [illegible] Date: 5-11-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-11-99

Boring/Station # WATER LEVEL TAPE RINSATE SAMPLE

Sample # WST-ESL-RINSATE-5-11-99

Sample Method: WEIGHT WITH SAMPLE CONTAINERS DI WATER OVER TAPE Depth of Sample: N/A

QC Samples (Duplicate/Split): DUPLICATE H2O OVER TAPE RINSATE

Analytical Parameters: SAME

Analytical Laboratory and COC #: ACCUTEST COC # 6727

Location:

Groundwater Description: CLEAR

Remarks:

Signature: Date: 5-11-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-12-99

Boring/Station # QST - B10

Sample # QST-B10-(GW-50)-5-12-99

Sample Method: BAILER IN 2" PVC Depth of Sample: ~50'

QC Samples (Duplicate/Split): —

Analytical Parameters: SAME

Analytical Laboratory and COC #: XENCO COC # 012028

Location: QST-B10 EAST END OF LANDFILL AREA, UNDER DIR.

Groundwater Description: TURBID

Remarks:

Signature: [signature] Date: 5-12-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader	**QST Project Manager** John Mieher

Date: 5-12-99

Boring/Station # GST-B9

Sample # GST-B9-GWSD-5-12-99

Sample Method: BAILER INSIDE 3" PC **Depth of Sample:** ~52'

QC Samples (Duplicate/Split): —

Analytical Parameters: SAME

Analytical Laboratory and COC #: DEL MAR COC #. 012028

Location: LOWER TCA EAST SIDE. WEST OF GST-B10

Groundwater Description: TURBID

Remarks:

Signature: [signature] **Date:** 5-12-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-12-99

Boring/Station # GA [illegible] 4C

Sample # QST-BW-[illegible]-GW-55'-5-12-99
RUN DI H2O [illegible]

Sample Method: INTO SAMPLE BOTTLES Depth of Sample: — NA

QC Samples (Duplicate/Split): SPLIT SPOON RINSEATE SAMPLE

Analytical Parameters: 5 [illegible]

Analytical Laboratory and COC #: DEL MAR COC # 012028

Location: N/A

Groundwater Description: NA

Remarks:

Signature: [illegible] Date: 5-12-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-12-99

Boring/Station #: HA-1C

Sample #: QST-1332-GW-SS-5-12-99
RUN DI H2O OVER THE LABEL

Sample Method: TAPE WEIGHT + INTO SAMPLE CONTAINERS Depth of Sample: N/A

QC Samples (Duplicate/Split): WATER LEVEL TAPE RINSATE SAMPLE

Analytical Parameters: SAME

Analytical Laboratory and COC #: DELMAR COC # 012028

Location: N/A

Groundwater Description: N/A

Remarks:

Signature: [signature] Date: 5-12-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-25-99

Boring/Station # SPLIT-SPOON RINSATE SAMPLE

Sample # QST-B46-(EW/SO)-5-25-99 09:30 AM

Sample Method: RUN DI H_2O OVER SPLIT-SPOON SAMPLER + INTO SAMPLE CONTAINERS Depth of Sample: NA

QC Samples (Duplicate/Split): QA/QC RINSATE SAMPLE FOR WELL EW-26

Analytical Parameters: METHODS 8260, 8270, 6010/7471, 8081, 8082, 8141 + 8151

Analytical Laboratory and COC #: DEL MAR COC # 6703

Location:

Groundwater Description:

Remarks:

Signature: J Mieher Date: 5-25-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-26-99

Boring/Station # EW-26

Sample # EW-26-(GW/180)-5-26-99

Sample Method: BAILER W/PACKER ASSEMBLY Depth of Sample: 169.5-180'

QC Samples (Duplicate/Split):

Analytical Parameters: VOC'S METHOD 8021B

Analytical Laboratory and COC #: DEL MAR COC # 012040

Location: EW-26 IN ZONE ISOLATED BY PACKER (169.5-180' BGS)

Groundwater Description: STRONG TURBID

Remarks: BAILED ~15 GALLONS OF H_2O PRIOR TO SAMPLING. BAILED BOREHOLE ESSENTIALLY DRY + ALLOWED TO RECHARGE FOR ~30 MINUTES PRIOR TO SAMPLE COLLECTION.

Signature: [signature] Date: 5-26-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-27-99

Boring/Station # EW-26

Sample # EW-26-(GW/200)-5-27-99

Sample Method: BAILER + PACKER ASSEMBLY Depth of Sample: 190.5 - 200' BGS

QC Samples (Duplicate/Split):

Analytical Parameters: VOC METHOD 8021 B

Analytical Laboratory and COC #: SEL MAN COC # 6699

Location: EW-26 PACKER BOTTOM @ 190.5'

Groundwater Description: VERY TURBID

Remarks: 2" PIPE W/ H_2O FROM 55' TO 190.5' = 135.5' @ (.163 GAL/FT.)
= 22.08 GALLONS

IN 5.5" BOREHOLE ⇒ 9.5' @ 1.234 GAL/FT = 11.72 GALLONS
TOTAL OF 35 GALLONS BAILED PRIOR TO SAMPLING.

Signature: [signature] Date: 5-27-99

Hydropunch Sampling Data Form

Client ADEQ WOARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-27-99

Boring/Station # EW-26

Sample # EW-26-(GW/220)-5-27-99

Sample Method: BAILER W/ PACKER ASSEMBLY Depth of Sample: 210.5-220' BGS

QC Samples (Duplicate/Split):

Analytical Parameters: VOC'S METHOD 8260 PER JOHN MIEHER

Analytical Laboratory and COC #: COLUMBIA ANALYTICAL SERVICES ~~[illegible]~~ JM

Location: EW-26 PACKER BOTTOM @ 210.5

Groundwater Description: TURBID BUT CLEANER THAN SAMPLE FROM 180-210' ZONE.

Remarks: 2" PIPE W/ H_2O FROM 72 TO 210.5 = 138.5 ft x (.163 $\frac{GAL}{ft}$) = 22.58 GALS

IN 5.5" DIAM BOREHOLE → 9.5 ft x (1.234 $\frac{GAL}{ft}$) = 11.72 GAL

BAILED A TOTAL OF ~~[illegible]~~ 40 GALLONS PRIOR TO SAMPLING. JM

Signature: [signature] Date: 5-27-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-27-99

Boring/Station # EW-26

Sample # EW-26-(LW/240)-5-27-99
BAIL W/ PACKER

Sample Method: ASSEMBLY Depth of Sample: 232'-240'

QC Samples (Duplicate/Split):

Analytical Parameters: VOC METHOD ~~8021 B~~ 8260 PER JOHN MIEHER

Analytical Laboratory and COC #: COLUMBIA ANALYTICAL SERVICES

Location: EW-26 BOTTOM OF PACKER @ 232'

Groundwater Description: SLIGHTLY TURBID

Remarks: 2" PIPE W/ H_2O FROM 81 TO 232 = 151 ft x (.163 $\frac{GAL}{ft}$)
= 24.61 GAL

IN 5.5" BOREHOLE → 8 ft x (1.234 $\frac{GAL}{ft}$) = 9.87 GAL
BAILED A TOTAL OF ~ 40 GALLONS PRIOR TO SAMPLING.

Signature: [signature] Date: 5-27-99

Hydropunch Sampling Data Form

Client ADEQ WOARF	QST Project Estes Landfill
Site Location Phoenix, AZ	QST Project No.
QST Field Team Leader	QST Project Manager John Mieher

Date: 5-28-99

Boring/Station # EW-26

Sample # EW-26-(GW/260)-5-28-99

Sample Method: BAILER W/ PACKER ASSEMBLY Depth of Sample: 252.5' - 260'

QC Samples (Duplicate/Split):

Analytical Parameters: VOC's 8260 COLUMBIA ANALYTICAL SERVICES

Analytical Laboratory and COC #:

Location: EW-26

Groundwater Description: SLIGHTLY TURBID

Remarks: 2" PIPE W/ H_2O FROM 73 TO 252.5 = 179.5 ft x (.163 $\frac{GAL}{ft}$) = 29.25 GAL

1 - 5.5" BOREHOLE → 7.5 ft x (1.234 $\frac{GAL}{ft}$) = 9.26

BAILED A TOTAL OF ~42 GALLONS PRIOR TO SAMPLING.

Signature: Date: 5-28-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader [illegible]	**QST Project Manager** John Mieher

Date: 5-4-99

Boring/Station # B-3

Sample # QST-B3-(GW/78)-(5/4/99)

Sample Method: TEFLON BAILER **Depth of Sample:** 78'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: VOC, SVOC, ORGANOCHLORINE/ORGANO PHOSPHOROUS PEST PCB, METALS, MERCURY, CHLORINATED HERBICIDES

Analytical Laboratory and COC #: DEL MAR 6B-1586

Location: BORING QST-B3

Groundwater Description: RED-BROWN, SILTY

Remarks: SAMPLED FROM 2" SCHEDULE 40 PVC /10 SLOT SCREEN (5' SCREEN TEMPORARY WELL (NO SAND PACK). WELL MATERIAL WAS STEAM CLEANED PRIOR TO SETTING WELL.

COLLECTED SAMPLE @ 1020 (MEG & PAD SAMPLING)

Signature: [signature] **Date:** 5-4-99

Soil Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAT	**QST Project Manager** John Mieher

Date: 5-5-99

Boring/Station # QST - B4

Sample # QST-B4-(S/55)-(5-4-99)

Sample Method: 2.5" dia. SPLIT SPOON WITH BRASS RINGS **Depth of Sample:** 55'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: SVOC, VOC, PCB, TOTAL METALS, TOTAL MERCURY, ORGANOPHOSPHOROUS/ORGANOCHLORINE PESTICIDES, ORGANOCHLORINE HERBICIDES

Analytical Laboratory and COC #: DEL MAR 6B-1549

Location: S/C WESTERN CENTRAL PORTION OF LANDFILL

Soil Description: slightly moist, red-brown gravely SAND, trace clay, gravel subround to round

Remarks:

Signature: [signature] **Date:** 5-5-99

Hydropunch Sampling Data Form

Client ADEQ WOARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 609020
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-5-99

Boring/Station # QST-B4

Sample # QST-B4-(GW/78(GR)/69)-(5-5-99)

Sample Method: TEFLON BAILER **Depth of Sample:** ~~67-62~~ 78' BGS (GR)

QC Samples (Duplicate/Split): NONE

Analytical Parameters: VOC, SVOC, ORGANOCHLORINE/ORGANOPHOSPHOROUS PESTICIDES CHLORINATED HERBICIDES, METALS, MERCURY

Analytical Laboratory and COC #: DELMAR GB-7548'

Location: BORING QST-B4

Groundwater Description: red-brown, silty

Remarks: COLLECT SAMPLE FROM TEMPORARY 2" DIA./SCHED. 40 PVC WELL W/ 5' SCREEN — NO SAND PACK.

Signature: [signature] **Date:** 5-5-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-6-99

Boring/Station # QST-B6

Sample # QST-B6-(GW/70)-(5-6-99)

Sample Method: teflon bailer **Depth of Sample:** ~65-70' BGS

QC Samples (Duplicate/Split): NONE

Analytical Parameters: VOC, SVOC ORGANOCHLORINE/ORGANOPHOSPHORUS PESTICIDES, PCBS TOTAL METALS/ TOTAL mercury, organochlorine herbicides

Analytical Laboratory and COC #: del Mar BB-6695

Location: QST-B6
NORTH WEST CENTRAL POYTION OF SITE
NEAR CONCRETE PIPES

Groundwater Description: SILTY, red-brown.

Remarks:

Signature: Date: 5-6-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-6-99

Boring/Station # QST-B15

Sample # QST-B15(GW/85)-(5-6-99)

Sample Method: teflon bailer **Depth of Sample:** ~85'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, 8081, 8082, 6010, 7174, 8141, 8151

Analytical Laboratory and COC #: DEL MAR 68-76729

Location: NORTH SIDE OF UPPER LANDFILL SOUTH OF ACCESS RAMP

Groundwater Description: red-brown, silty

Remarks: SAMPLED VIA BAILER IN 2" SCHED. 40 PVC WELL 5' SCREEN SET 80-85' BGS. PVC WAS DECON'D PRIOR TO INSTALLATION.

Signature: Patrick A. Probst **Date:** 5-6-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader	**QST Project Manager** John Mieher

Date: 5-7-99

Boring/Station # QST-B16

Sample # QST-B16-(GW/80)-(5-7-99) 1625 hours

Sample Method: tefion bailer **Depth of Sample:** ~75-80'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8270, 8081, 8082, 6010, 7174, 8141, 8151, 8260

Analytical Laboratory and COC #: DEL MAR

Location: NORTH CENTRAL PORTION OF ELEVATED PORTION OF LANDFILL

Groundwater Description: Silty

Remarks: Sampled within 2" schad 40 PVC PIPE

Signature: [signature] **Date:** 5-7-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6699030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-10-99

Boring/Station # QST-B18

Sample # QST-B18(GW/85)-(5-10-99)

Sample Method DISPOSABLE BAILER (TEFLON) **Depth of Sample:** ~80-85'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, 8081, 8082, 8141, 8151, 6010, 7471

Analytical Laboratory and COC #: DEL MAR GB-6705

Location: NORTH CENTRAL PORTION OF ELEVATED LANDFILL

Groundwater Description: BROWN, SILTY

Remarks:

Signature: John G. Dun **Date:** 5-11-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.**
QST Field Team Leader	**QST Project Manager** John Mieher

Date: @ ~~QST~~ 05-11-99

Boring/Station # QST-B20

Sample # QST-B20(GW/80)(5-11-99)

Sample Method: Split spoon rinseate **Depth of Sample:** N/A

QC Samples (Duplicate/Split): SPLIT SPOON RINSEATE, QST-B20

Analytical Parameters: 8260, 8270, 8081, 8082, 8141, 8151, 6010, 7471

Analytical Laboratory and COC #: DELMAR

Location: NORTH SIDE ELEVATED PORTION OF LANDFILL, EASTERN-MOST BORING

Groundwater Description: CLEAR

Remarks:

Signature: [signature] **Date:** 5-11-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 699030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-11-99

Boring/Station # QST-B20

Sample # QST-B20 (GW/80)(5-11-99)

Sample Method: bailer (teflon) **Depth of Sample:** 80'-85'

QC Samples (Duplicate/Split): sample QST-B31(GW/80)(5-11-99) is a duplicate of this sample

Analytical Parameters: 8260, 8270, 6010, 7471, 8081, 8082, 814, 851

Analytical Laboratory and COC #: DEL MAR GB6707

Location: NORTHERN EDGE OF SITE, ELEVATED PORTION OF LANDFILL, EASTERN MOST BORING

Groundwater Description: SILTY (moderate to slightly)

Remarks:

Signature: John A. Dey **Date:** 5-11-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-11-99

Boring/Station # QST-B20

Sample # QST-B31(GW/80)(5-11-99)

Sample Method: teflon bailer **Depth of Sample:** 80-85'

QC Samples (Duplicate/Split): DUPLICATE OF QST-B20(GW/80)(5-11-99)

Analytical Parameters: 8260, 8270, 8081, 8082, 8141, 8151, 6010, 7471

Analytical Laboratory and COC #: DEL MAR GB-6707

Location: NORTHERN EDGE OF SITE, ELEVATED PORTION OF LANDFILL, EASTERNMOST BORING

Groundwater Description: SILTY (MODERATE TO SLIGHTLY

Remarks:

Signature: [signature] **Date:** 5-11-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6699030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-12-99

Boring/Station # QST-B8

Sample # QST-B8(GW/65)(5-12-99)

Sample Method: TEFLON BAILER **Depth of Sample:** 60'-65'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, 8081, 8082, 6010, 7471, 8151, 8141

Analytical Laboratory and COC #: DEL MAR 012037

Location: WEST OF DISPOSAL PIT, SOUTHERN SIDE OF SITE

Groundwater Description: MODERATELY SILTY, red-brown

Remarks:

Signature: Patrick A. Orobat **Date:** 5-12-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6699030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-12-99

Boring/Station # QST-B7

Sample # QST-B7(GW/63)(5-12-99)

Sample Method: teflon bailer **Depth of Sample:** 63'-58'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, 8081, 8082, 8141, 8151, 6010, 7471

Analytical Laboratory and COC #: DEL MAR 012037

Location: WEST OF DISPOSAL PIT, EAST OF AIR STRIPPER

Groundwater Description: SILTY, RED-BROWN

Remarks:

Signature: Patrick A. Hobbs **Date:** 5-12-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-12-99

Boring/Station # QST-B7

Sample # QST-B33(GW/65)(5-12-99)

Sample Method: rinseate blank, split spoon **Depth of Sample:** —

QC Samples (Duplicate/Split): rinseate blank, QST-B7 SPLIT SPOON

Analytical Parameters: 8260, 8270, ~~6010~~ 6010B, 7471, 8141, 8151

Analytical Laboratory and COC #: DEL MAR 012037

Location:

Groundwater Description: CLEAR

Remarks:

Signature: John C. Osbat **Date:** 5-12-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6699030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 05-19-99

Boring/Station # QST-B11

Sample # QST-B11 (GW/75) (5-19-99)

Sample Method: Teflon bailer **Depth of Sample:** 70-75' BGS

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, 8141, 8151, 8081, 8082, 6010, 7471

Analytical Laboratory and COC #: DEL MAR 012074

Location: 25' NORTH OF FENCE, NORTH SIDE OF CENTRAL PORTION OF SITE, IN ACCESS ROAD.

Groundwater Description: red-brown, silty, odorous (leachate-like odor)

Remarks:

Signature: [signature] **Date:** 05-19-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAM	**QST Project Manager** John Mieher

Date: 05-19-99

Boring/Station # QST-B12

Sample # QST-B34(60)(60)(5-19-99)

Sample Method: SPLIT SPOON RINSEATE **Depth of Sample:**

QC Samples (Duplicate/Split): RINSEATE

Analytical Parameters: 8260, 8270 8081, 8082, 8141, 8151, 6010, 7471, TOC BY WALKLEY-BLACK

Analytical Laboratory and COC #: DEL MAR 012074

Location: BORING QST-B12, ALONG NORTHERN ACCESS RD.

Groundwater Description: CLEAR (DI WATER)

Remarks:

Signature: [signature] **Date:** 05-19-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 6699050
QST Field Team Leader JAD	**QST Project Manager** John Mieher

Date: 5-20-99

Boring/Station # GSI-B12

Sample # GST-B12(GW/55)(5 20-99)

Sample Method: TEFLON BAILER **Depth of Sample:** 50'-55'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, EDB1, EDB2, 8141, 8151, 6010, 7471

Analytical Laboratory and COC #: DEL MAR C12002

Location: SALT RIVER ACCESS ROAD, NORTH OF SITE.

Groundwater Description: SILTY, RED-BROWN

Remarks:

Signature: [signature] **Date:** 5-21-99

Hydropunch Sampling Data Form

Client ADEQ WQARF	**QST Project** Estes Landfill
Site Location Phoenix, AZ	**QST Project No.** 669 9030
QST Field Team Leader PAD	**QST Project Manager** John Mieher

Date: 5-20-99

Boring/Station # GST B13

Sample # GST B13(EW/EC)(5-20-99)

Sample Method: TEFLON BAILER **Depth of Sample:** 55-60'

QC Samples (Duplicate/Split): NONE

Analytical Parameters: 8260, 8270, E081, E082, E141, E151, 6010; 7471

Analytical Laboratory and COC #: DEL MAR 017002

Location: SALT RIVER ACCESS ROAD, NORTH OF SITE

(B13)

Groundwater Description: SILTY, RED-BROWN

(M)

Remarks:

(M)

Signature: Patricia A Rabbat **Date:** 5-21-99

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL **Date:** 5-12-99

Well ID: PP-5 **Time:** 11:45 AM

Sampled By: ~~FRER~~ FERNANDO R. **QST Project #:** _____

PROBE VOLUME:

Length of Probe: ~~9'10"~~ 73"

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 73" ~~110"~~ (depth) x 0.04 x 5 = ~~23.6~~ 14.6 (cu-ft)

EVACUATION METHOD: GAST 4Z026 VACUUM PUMP

TOTAL VOLUME EVACUATED: 5 MIN.

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 1.2% LEL (ppm)

Comustible Gas Meter (O_2 %) ~~.05~~ .5 (ppm)

Sample ID: PP-5

Sample Analysis: _____

_____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LAND FILL **Date:** 5-12-99

Well ID: PP-4 **Time:** 12:30PM

Sampled By: FR **QST Project #:** _____

PROBE VOLUME:

Length of Probe: 73.5"

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____(depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 73.5"(depth) x 0.04 x 5 = 14.7 (cu-ft)

EVACUATION METHOD: GAST SAMPLE PUMP

TOTAL VOLUME EVACUATED: 5 MIN

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 21.2% LEL (ppm)

Comustible Gas Meter (O_2 %) 0.4% O2 (ppm)

Sample ID: PP-4

Sample Analysis: _____

_____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: Estes Landfill **Date:** 5. 12 .99

Well ID: PP-17 **Time:** 1517

Sampled By: D. Kudlicki **QST Project #:**

PROBE VOLUME:

Length of Probe: 132"

Diameter of Probe: 2"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: 132" (depth) x 0.163 x 5 = 107.58 (cu-ft)

1-inch Probe: _____ (depth) x 0.04 x 5 = _____ (cu-ft)

EVACUATION METHOD: GAST Sample Pump

TOTAL VOLUME EVACUATED: 6 min

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.0 (ppm)

Comustible Gas Meter (O_2 %) 19.9 % (ppm)

Sample ID: PP-17

Sample Analysis:

Laboratory:

Chain-of-Custody #:

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: Estes Landfill **Date:** 5.12.99

Well ID: PP-16 **Time:** 1558

Sampled By: D Kudlicki **QST Project #:** _____

PROBE VOLUME:

Length of Probe: 240"

Diameter of Probe: 2"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: 240" (depth) x 0.163 x 5 = 195.6 (cu-ft)

1-inch Probe: _____ (depth) x 0.04 x 5 = _____ (cu-ft)

EVACUATION METHOD: GAST Sample Pump

TOTAL VOLUME EVACUATED: 10 min

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.0% (ppm)

Comustible Gas Meter (O_2 %) 16.9% (ppm)

Sample ID: PP-16

Sample Analysis: _____

_____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL **Date:** 05-14-99

Well ID: PP-12S **Time:** 36@ 1100 HRS

Sampled By: PAD, PJH **QST Project #:** 669 9030

PROBE VOLUME: 0.3 - 0.4 cfm

Length of Probe: 60" (5')

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5' (depth) x 0.04 x 5 = 1.0 (cu-ft) = 3.33 min

EVACUATION METHOD: GAST SAMPLE PUMP, 0.3CFM CAPACITY

TOTAL VOLUME EVACUATED: 5 min x 0.3 cfm = 1.5 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) ~~0.5~~ ~~0.6~~ % 44% (ppm) @

Comustible Gas Meter (O_2 %) 0.5% (ppm)

Sample ID: ~~QST~~ PP-12 (V-5) (5-14-99) 1136 HOURS @

Sample Analysis: METHANE ASTM D-1945

Laboratory: AIR TOXICS, LTD. FOLSOM, CA

Chain-of-Custody #: ~~018875-1~~ @ NOT SUBMITTED

QST ENVIRONMENTAL
Methane Probe Sampling Data

Site ID: ESTES LANDFILL **Date:** 5-14-99

Well ID: PP-12D **Time:** 1152

Sampled By: PAD, PJH **QST Project #:** 6699030

PROBE VOLUME:

Length of Probe: 19'

Diameter of Probe: ~~2"~~ 1" (m)

MAXIMUM EVACUATION VOLUME: (m)

2-inch Probe: ~~19~~ (depth) x 0.163 x 5 = ~~15.4~~ (m) (cu-ft) ~~15.4 cf~~ (m) ~~0.3 cfm~~ =

1-inch Probe: 19 (depth) x 0.04 x 5 = 3.8 (cu-ft)

$\frac{3.8\ CF}{0.3\ CFM} = 12.7\ MIN$

EVACUATION METHOD: GAST PUMP

TOTAL VOLUME EVACUATED: 18 MIN. @ 0.3 cfm = 5.4 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 46.4 % ~~(ppm)~~ (m)

Comustible Gas Meter (O_2 %) 0.5 % ~~(ppm)~~ (m)

Sample ID: PP-12 (V/19) (5-14-99)

Sample Analysis: METHANE ASTM - D-1945

Laboratory: AIR TOXICS

Chain-of-Custody #: 018875-1

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL **Date:** 5-14-99

Well ID: PP-13S **Time:** 1226

Sampled By: PAD, PJH **QST Project #:** 1669 9030

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5 ~~FT~~ (depth) x 0.04 x 5 = 1.0 (cu-ft) $\frac{1.0\ ft^3}{0.3\ cfm} = 3.3$ MIN

EVACUATION METHOD: GAST 0.3 CFM PUMP

TOTAL VOLUME EVACUATED: 4.25 MIN @ 0.3 cfm = 1.3 ft^3

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.7 % ~~(ppm)~~

Comustible Gas Meter (O_2 %) 20.8 % ~~(ppm)~~

AMBIENT AIR
0.0% methane
21.7% O_2

Sample ID: N/A

Sample Analysis: N/A

N/A

Laboratory: N/A

Chain-of-Custody #: N/A

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL **Date:** 5-14-99

Well ID: PP-13D **Time:** 1239

Sampled By: PAD, PJH **QST Project #:** 6699030

PROBE VOLUME:

Length of Probe: 17'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 17 (depth) x 0.04 x 5 = 3.4 (cu-ft) $\frac{3.4\ ft^3}{0.3\ cfm} = 11.33\ min$

EVACUATION METHOD: BAST 0.3 cfm PUMP

TOTAL VOLUME EVACUATED: 12.25 min @ 0.3 cfm = 3.675 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 46.5 % (ppm)

Comustible Gas Meter (O_2 %) 0.6 % ~~(ppm)~~ (%)

Sample ID: PP-13 (V/17) (5-14-99)

Sample Analysis: METHANE ASTM D-1945

Laboratory: AIR TOXICS

Chain-of-Custody #: 018875-1

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL **Date:** 5-14-99

Well ID: PP-11S **Time:** 1338

Sampled By: PAD, PJH **QST Project #:** 669 9030

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5 (depth) x 0.04 x 5 = 1.0 (cu-ft) = $\frac{1.0\ ft^3}{0.3\ cfm}$ = 3.3 min.

EVACUATION METHOD: GAST 0.3 cfm PUMP

TOTAL VOLUME EVACUATED: 4 mins @ 0.30 cfm = 1.2 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 22.5 (ppm)

Comustible Gas Meter (O_2 %) 0.9 (ppm)

Sample ID: N/A

Sample Analysis: N/A

Laboratory: N/A

Chain-of-Custody #: N/A

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL **Date:** 5-14-99

Well ID: PP-11D **Time:** ~~1334~~ 1342 (PM)

Sampled By: PAD, PJH **QST Project #:** 6699030

PROBE VOLUME:

Length of Probe: 19'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 19 (depth) x 0.04 x 5 = 3.8 (cu-ft) $\frac{3.8 ft^3}{0.3 cfm}$ = 12.7 min

EVACUATION METHOD: GAST 0.3 CFM PUMP

TOTAL VOLUME EVACUATED: 13.1 MIN @ 0.3 cfm = 3.93 ft^3

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 43.7 (ppm)

Comustible Gas Meter (O_2 %) ~~6.6%~~ 0.4@% (ppm)

Sample ID: PP-11 (V/19)(5-14-99)

Sample Analysis: ASTM D 1945 METHANE

Laboratory: AIRTOXICS

Chain-of-Custody #: 018875-1

QST ENVIRONMENTAL
Methane Probe Sampling Data

Site ID: ESTES LANDFILL **Date:** 5-14-99

Well ID: PP-3D **Time:** 1424

Sampled By: PAD, PJH **QST Project #:** 6699030

PROBE VOLUME:

Length of Probe: 19'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 19' (depth) x 0.04 x 5 = 3.8 (cu-ft) $\frac{3.8\ ft^3}{0.3\ cfm} = 12.7$ MIN.

EVACUATION METHOD: CAST 0.3 cfm PUMP

TOTAL VOLUME EVACUATED: 13 MIN. @ 0.3 cfm = 3.9 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 10.1% ~~(ppm)~~

Comustible Gas Meter (O_2 %) 0.4% ~~(ppm)~~

Sample ID: N/A

Sample Analysis: N/A

N/A

Laboratory: N/A

Chain-of-Custody #: N/A

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL **Date:** 5-14-99

Well ID: PP-3S **Time:** 1430

Sampled By: PAD, PJH **QST Project #:** 669 9030

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: 1 4

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5' (depth) x 0.04 x 5 = 1.0 (cu-ft) $\frac{1.0 ft^3}{0.3 cfm} = 3.33 min$

EVACUATION METHOD: GAST 0.3 cfm PUMP

TOTAL VOLUME EVACUATED: 4 MINUTES @ 0.3 cfm = 1.2 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 21.9% ~~(ppm)~~

Comustible Gas Meter (O_2 %) 0.3% ~~(ppm)~~

Sample ID: PP-3 (V15) (5-14-99)

Sample Analysis: ASTM D 1945 (METHANE)

Laboratory: AIR TOXICS

Chain-of-Custody #: 018875-1

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL **Date:** 5-14-99

Well ID: PP-2D **Time:** 1502

Sampled By: PAD, PJH **QST Project #:** 6699030

PROBE VOLUME:

Length of Probe: 19'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 19' (depth) x 0.04 x 5 = 3.8 (cu-ft)

$\frac{3.8 ft^3}{0.3 cfm}$ = 12.7 min

EVACUATION METHOD: GAST 0.3 cfm PUMP

TOTAL VOLUME EVACUATED: 13.5 min @ 0.3 cfm = 4.05 ft^3

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.0% (ppm)

Comustible Gas Meter (O_2 %) 3.4% (ppm)

Sample ID: N/A

Sample Analysis: N/A

N/A

Laboratory: N/A

Chain-of-Custody #: N/A

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL **Date:** 5-14-99

Well ID: PP-2S **Time:** 1509

Sampled By: PAD, PJH **QST Project #:** 6699030

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5' (depth) x 0.04 x 5 = 1.0 (cu-ft)

$\frac{1.0 ft^3}{0.3} = 3.33$ MIN

EVACUATION METHOD: GAST 0.3 CFM PUMP

TOTAL VOLUME EVACUATED: 4 min @ 0.3 CFM = 1.2 ft^3

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.0% (ppm)

Comustible Gas Meter (O_2 %) 3.7% (ppm)

Sample ID: ~~N/A~~ PP-2(V/5)(5-17-99)

Sample Analysis: ~~N/A~~ ASTM D1945

~~N/A~~ METHANE

Laboratory: ~~N/A~~ AIR TOXICS

Chain-of-Custody #: ~~N/A~~ 018875-2

NOTE: PURGED 5 VOLS. AGAIN ON 5-17-99 AND COLLECTED SAMPLE.

1537 HOURS

CH_4 = 0.0%

O_2 = 18.0%

TEMP 99°

BAROMETRIC = 28.

PURGED 6 MINS. @ 0.18 CFM

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES **Date:** 05-14-99

Well ID: PP-6D **Time:** 1536

Sampled By: PAD, PJH **QST Project #:** 6699030

PROBE VOLUME:

Length of Probe: 19'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 19' (depth) x 0.04 x 5 = 3.8 (cu-ft)

$\frac{3.8 ft^3}{0.3 cfm} = 12.7 MIN$

EVACUATION METHOD: GAST 0.3 cfm pump

TOTAL VOLUME EVACUATED: 13.5 min @ 0.3 cfm = 4.05 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 28.4 % (ppm)

Comustible Gas Meter (O_2 %) 0.4 % ~~(ppm)~~ ©

Sample ID: PP-6 (V/19) (5-14-99)

Sample Analysis: ASTMD 1945 METHANE

Laboratory: AIR TOXICS

Chain-of-Custody #: 018875-1

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES **Date:** 05-14-99

Well ID: PP-65 **Time:** 1541 ~~ft~~ @

Sampled By: PAD, PJH **QST Project #:** 6699030

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5' (depth) x 0.04 x 5 = 1.0 (cu-ft) 1.0 ft³ = @ 3.3 min .30 cfm

EVACUATION METHOD: GAST 0.3 cfm pump

TOTAL VOLUME EVACUATED: 4 min @ 0.3 cfm = 1.2 cfm

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 23 % (~~ppm~~)

Comustible Gas Meter (O_2 %) 0.3 % (~~ppm~~) @

Sample ID: N/A

Sample Analysis: N/A

Laboratory: N/A

Chain-of-Custody #: N/A

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 05-17-99

Well ID: PP-10 D Time: 0945

Sampled By: PAD, PJH QST Project #: 669 9030

PROBE VOLUME:

Length of Probe: 19'

Diameter of Probe: 1

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 19 (depth) x 0.04 x 5 = 3.8 (cu-ft)

$\frac{3.8 \text{ cf}}{0.3 \text{ cfm}} = 12.7 \text{ MIN}$

EVACUATION METHOD: GAST 0.3 cfm PUMP

TOTAL VOLUME EVACUATED: 18 MIN @ 0.3 cfm = 5.4 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 15.1 % (ppm)

Comustible Gas Meter (O_2 %) 0.1 % ~~(ppm)~~

Sample ID: PP-10(V/19)(5-17-99)

Sample Analysis: ASTM D1945 - METHANE

Laboratory: AIR TOXICS

Chain-of-Custody #: 018875-2

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 5-17-99

Well ID: PP-105 Time: 0950

Sampled By: PAD, PJH QST Project #: 6699030

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5' (depth) x 0.04 x 5 = 1.0 (cu-ft) = 3.33 MINS

EVACUATION METHOD: CAST 0.3 CFM PUMP

TOTAL VOLUME EVACUATED: 5 MINUTES @ 0.3 CFM = 1.5 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 14 3% ~~(ppm)~~

Comustible Gas Meter (O_2 %) 0.2% ~~(ppm)~~

Sample ID: N/A

Sample Analysis: N/A

Laboratory: N/A

Chain-of-Custody #: N/A

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 5-14-99

Well ID: PP-7D Time: 1608

Sampled By: PAD, PJH QST Project #: 6699030

PROBE VOLUME:

Length of Probe: 19'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 19 (depth) x 0.04 x 5 = 3.8 (cu-ft)

3.8 cf / 0.3 cfm = 12.7 min (M)

EVACUATION METHOD: GAST 0.3 cfm PUMP

TOTAL VOLUME EVACUATED: 13 min. @ 0.3 cfm = 3.9 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 18.4% ~~(ppm)~~

Comustible Gas Meter (O_2 %) 0.4% ~~(ppm)~~

Sample ID: PP-7(V/19)(5-14-99)

Sample Analysis: ASTM D-1945 METHANE

Laboratory: AIR TOXICS

Chain-of-Custody #: 018875-1

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 05-14-99

Well ID: PP-7S Time: 1612

Sampled By: PAD, PJH QST Project #: 669 9030

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5' (depth) x 0.04 x 5 = 1.0 (cu-ft) = 3.3 MIN

EVACUATION METHOD: GAST 0.3 CFM PUMP

TOTAL VOLUME EVACUATED: 4 MIN. @ 0.3 CFM = 12 CF

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 14.9% ~~(ppm)~~

Comustible Gas Meter (O_2 %) 0.2% ~~(ppm)~~

Sample ID: N/A

Sample Analysis: N/A

Laboratory: N/A

Chain-of-Custody #: N/A

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 5-17-99

Well ID: PP-18D Time: 0954

Sampled By: PAD, PJH QST Project #: 6699030

PROBE VOLUME:

Length of Probe: 19'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 19' (depth) x 0.04 x 5 = 3.8 (cu-ft) $\frac{3.8\ cf}{0.3\ cfm} = 12.7\ min$

EVACUATION METHOD: GAST 0.3 cfm PUMP

TOTAL VOLUME EVACUATED: 18 min @ 0.3 cfm = 5.4 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 15 % (ppm)

Comustible Gas Meter (O_2 %) 0.1 % (ppm)

Sample ID: PP-18(V/19)(5-17-99)*

Sample Analysis: METHANE
ASTM D-1945

Laboratory: AIR TOXICS

Chain-of-Custody #: @18875-2

* DUPLICATE SAMPLE OF PP-10(V/19)(5-17-99)

QST ENVIRONMENTAL
Methane Probe Sampling Data

Site ID: ESTES LANDFILL **Date:** 05-17-99

Well ID: PP-15D **Time:** 1130

Sampled By: PAD, PJH **QST Project #:** 669 9030

PROBE VOLUME:

Length of Probe: 17'

Diameter of Probe: 1/2" COPPER TUBING FROM G.S., CONSTRUCTION UNKNOWN BELOW GRADE, ASSUME 1" DIA.

MAXIMUM EVACUATION VOLUME:

2-inch Probe: ______ (depth) x 0.163 x 5 = ______ (cu-ft)

1-inch Probe: 17' (depth) x 0.04 x 5 = 3.4 (cu-ft) 3.4 cf / 0.18 cfm = ~19 MINS.

EVACUATION METHOD: THOMAS 0.18 Cfm PUMP (SN 059400004598)

TOTAL VOLUME EVACUATED: 22 MINS @ 0.18 = 3.96 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.0% (ppm)

Comustible Gas Meter (O_2 %) 18.2% (ppm)

Sample ID: ~~N/A~~ PP-15(V/17)(5-17-99) 1424 HRS.

Sample Analysis: ~~N/A~~ METHANE ASTM D1945

Laboratory: ~~N/A~~ AIR TOXICS

Chain-of-Custody #: ~~N/A~~ 018875-2

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL **Date:** 5-17-99

Well ID: PP-15S **Time:** 1138

Sampled By: PAD, PJH **QST Project #:** 6699080

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: 1/2" COPPER TUBING ABOVE G.S., CONSTRUCTION BELOW GRADE UNKNOWN; ASSUME 1" DIA.

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5 (depth) x 0.04 x 5 = 1.0 (cu-ft) $\frac{1.0\ cf}{0.18\ cfm} = 5.6\ min$

EVACUATION METHOD: THOMAS 0.18 CFM PUMP

TOTAL VOLUME EVACUATED: 6 MINS. @ 0.18 cfm = 1.08 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.0% ~~(ppm)~~

Comustible Gas Meter (O_2 %) 19.6% ~~(ppm)~~

Sample ID: N/A

Sample Analysis: N/A

Laboratory: N/A

Chain-of-Custody #: N/A

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 5-17-99

Well ID: PP-15 Time: 1141

Sampled By: PAD, PJH QST Project #: 669 9030

PROBE VOLUME:

Length of Probe: N/A

Diameter of Probe: N/A

MAXIMUM EVACUATION VOLUME:

2-inch Probe: N/A (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: N/A (depth) x 0.04 x 5 = _____ (cu-ft)

EVACUATION METHOD: THOMAS 0.18 CFM PUMP

TOTAL VOLUME EVACUATED: N/A

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.0% N/A (M) ~~(ppm)~~

Comustible Gas Meter (O_2 %) 20.5% N/A (C) ~~(ppm)~~

Sample ID: PP-19(V/S)(5-17-99)*

Sample Analysis: METHANE ASTM D-1945

Laboratory: AIR TOXICS

Chain-of-Custody #: 018875-2

* AMBIENT AIR BLANK

QST ENVIRONMENTAL
Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 5-17-99

Well ID: PP-14D Time: 1221

Sampled By: PAD, PJH QST Project #: 669 9030

PROBE VOLUME:

Length of Probe: 20'

Diameter of Probe: 1/2" COPPER TUBING.

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 20' (depth) x 0.04 x 5 = 4.0 (cu-ft)

$\frac{4.0 \text{ cf}}{0.18 \text{ cfm}} = 22.2_{\text{MIN.}}$

EVACUATION METHOD: THOMAS 0.18 cfm PUMP

TOTAL VOLUME EVACUATED: 23 MIN @ 0.18 cfm = 4.14 cf.

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.0 % ~~(ppm)~~ (%)

Comustible Gas Meter (O_2 %) 10.4 % ~~(ppm)~~ (%)

Sample ID: N/A

Sample Analysis: N/A

Laboratory: N/A

Chain-of-Custody #: N/A

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL **Date:** 05-17-99

Well ID: PP-14S **Time:** 1228

Sampled By: PAD, PJH **QST Project #:** 669030

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: ½" COPPER TUBING

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5 (depth) x 0.04 x 5 = 1.0 (cu-ft) $\frac{1.0 cf}{0.18 cfm} = 5.6$ MIN.

EVACUATION METHOD: THOMAS 0.18 cfm PUMP

TOTAL VOLUME EVACUATED: 6 MIN @ 0.18 cfm = 1.08 cf.

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.0 % ~~(ppm)~~

Comustible Gas Meter (O_2 %) 16.9 % ~~(ppm)~~

Sample ID: ~~N/A~~ (M) PP-14(U/S)(5-17-99) 1416 HRS

Sample Analysis: ~~N/A~~ (M) METHANE

~~N/A~~ (M) ASTM D 1945

Laboratory: ~~N/A~~ (M) AIR TOXICS

Chain-of-Custody #: ~~N/A~~ (M) 018875-2

QST ENVIRONMENTAL
Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 5-17-99

Well ID: PP-9D Time: 1302

Sampled By: PAD, PJH QST Project #: 669 9030

PROBE VOLUME:

Length of Probe: 19'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 19 (depth) x 0.04 x 5 = 3.8 (cu-ft)

$\frac{3.8 cf}{0.18 cfm} = 21.1 MIN$

EVACUATION METHOD: THOMAS 0.18 CFM PUMP

TOTAL VOLUME EVACUATED: 23 MIN @ 0.8 cfm = 4.14 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.0% (ppm)

Comustible Gas Meter (O_2 %) 19.5 % (ppm)

Sample ID: N/A

Sample Analysis: N/A

Laboratory: N/A

Chain-of-Custody #: N/A

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 05-17-99

Well ID: PP-9S Time: 1308

Sampled By: PAD, PJH QST Project #: 6699030

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5' (depth) x 0.04 x 5 = 1.0 (cu-ft)

$\frac{1.0\ cf}{0.18\ cfm} = 5.6\ MIN$ ~~cf~~ (m)

EVACUATION METHOD: THOMAS 0.18 cfm PUMP

TOTAL VOLUME EVACUATED: 6 MIN @ 0.18 cfm = 1.08 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 3.4% ~~(ppm)~~ (%)

Comustible Gas Meter (O_2 %) 1.6% (ppm)

Sample ID: PP-9(V/5)(5-17-99)

Sample Analysis: ASTM D 1945
METHANE

Laboratory: AIR TOXICS

Chain-of-Custody #: 01887J-2

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 5-17-99

Well ID: PP-865A Time: 1356

Sampled By: PAD, PJH QST Project #: 6699030

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5' (depth) x 0.04 x 5 = 1.0 (cu-ft) ≈ 5.6 MIN

EVACUATION METHOD: THOMAS 0.18 cfm PUMP

TOTAL VOLUME EVACUATED: 6 MIN @ 0.18 cfm = 1.08 cf.

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.5% (ppm)

Comustible Gas Meter (O_2 %) 0.5% (ppm)

Sample ID: N/A

Sample Analysis: N/A

Laboratory: N/A

Chain-of-Custody #: N/A

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 05-17-99

Well ID: PP-1D Time: 1516

Sampled By: PAD, PJH QST Project #: 6699030

PROBE VOLUME:

Length of Probe: 191

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 19 (depth) x 0.04 x 5 = 3.8 (cu-ft) ~21.1 MIN

EVACUATION METHOD: THOMAS 0.18 cfm PUMP

TOTAL VOLUME EVACUATED: 22 MINS @ 0.18 CFM

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0% ~~(ppm)~~

Comustible Gas Meter (O_2 %) 16.5% ~~(ppm)~~

Sample ID: PP-1 (V/19) (5-17-99)

Sample Analysis: ASTM D 1945 METHANE

Laboratory: AIR TOXICS

Chain-of-Custody #: 018875-2

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 5-17-99

Well ID: PP-18S (M) Time: 1444

Sampled By: PAD, PJH QST Project #: 6699030

PROBE VOLUME:

Length of Probe: ~~14~~ 5' (M)

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5' (depth) x 0.04 x 5 = 1.0 (cu-ft) ~ 5.6 MIN

EVACUATION METHOD: THOMAS 0.18 CFM PUMP.

TOTAL VOLUME EVACUATED: 6 MINS @ 0.18 cfm = 1.08 cf.

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.0% ~~(ppm)~~

Comustible Gas Meter (O_2 %) 15.2% ~~(ppm)~~

Sample ID: N/A

Sample Analysis: N/A

Laboratory: N/A

Chain-of-Custody #: N/A

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 5-17-99

Well ID: PP-20 (PP-95) Time: 1315

Sampled By: PAD, PJH QST Project #: 1669 9030

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5' (depth) x 0.04 x 5 = _____ (cu-ft)

EVACUATION METHOD: THOMAS 0.18 CFM PUMP

TOTAL VOLUME EVACUATED: _____

FIELD ANALYSIS:

Comustible Gas Meter (Methane) _____ (ppm)

Comustible Gas Meter (O_2 %) _____ (ppm)

Sample ID: PP-20 (V/19)(5-17-99) *

Sample Analysis: METHANE

Laboratory: AIR TOXICS

Chain-of-Custody #: _____

* DUPLICATE SAMPLE OF PP-9 (V/5)(5-17-99)

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 5-17-99

Well ID: PP-8D Time: 1351

Sampled By: PAD, PJH QST Project #: 6699030

PROBE VOLUME:

Length of Probe: 19'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 19' (depth) x 0.04 x 5 = 3.8 (cu-ft) = 21.1 MIN

EVACUATION METHOD: THOMAS 0.18 cfm PUMP

TOTAL VOLUME EVACUATED: 23 MIN @ 0.18 cfm

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 36.4 % ~~(ppm)~~

Comustible Gas Meter (O_2 %) 0.3 (ppm)

Sample ID: PP-8(V/19)(5-17-99)

Sample Analysis: ASTM D 1945 METHANE

Laboratory: AIR TOXICS

Chain-of-Custody #: 018875-2

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 05-17-99

Well ID: PP-9S Time: 1308

Sampled By: PAD, PJH QST Project #: 6699030

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5' (depth) x 0.04 x 5 = 1.0 (cu-ft)

1.0 cf / 0.18 cfm = 5.6 MIN

EVACUATION METHOD: THOMAS 0.18 cfm PUMP

TOTAL VOLUME EVACUATED: 6 MIN @ 0.18 cfm = 1.08 cf

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 3.4% ~~(ppm)~~ (%)

Comustible Gas Meter (O_2 %) 1.6% (ppm)

Sample ID: PP-9(V/5)(5-17-99)

Sample Analysis: AS+MD 1945 METHANE

Laboratory: AIR TOXICS

Chain-of-Custody #: 01887J-2

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 5-17-99

Well ID: PP-8D Time: 1351

Sampled By: PAD, PJH QST Project #: 6699030

PROBE VOLUME:

Length of Probe: 19'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 19' (depth) x 0.04 x 5 = 3.8 (cu-ft) = 21.1 MIN

EVACUATION METHOD: THOMAS 0.18 cfm PUMP

TOTAL VOLUME EVACUATED: 23 MIN @ 0.18 cfm

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 36.4 % ~~(ppm)~~

Comustible Gas Meter (O_2 %) 0.3 (ppm)

Sample ID: PP-8 (V/19) (5-17-99)

Sample Analysis: ASTM D 1945 METHANE

Laboratory: AIR TOXICS

Chain-of-Custody #: 018875-2

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 5-17-99

Well ID: PP-865A Time: 1356

Sampled By: PAD, PJH QST Project #: 6699030

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5' (depth) x 0.04 x 5 = 1.0 (cu-ft) ≈ 5.6 MIN

EVACUATION METHOD: THOMAS 0.18 cfm PUMP

TOTAL VOLUME EVACUATED: 6 MIN @ 0.18 cfm = 1.08 cf.

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.5 % (ppm)

Comustible Gas Meter (O_2 %) 0.5 % (ppm)

Sample ID: N/A

Sample Analysis: N/A

Laboratory: N/A

Chain-of-Custody #: N/A

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 05-17-99

Well ID: PP-1D Time: 1516

Sampled By: PAD, PJH QST Project #: 6699030

PROBE VOLUME:

Length of Probe: 191

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 19 (depth) x 0.04 x 5 = 3.8 (cu-ft) ~21.1 MIN

EVACUATION METHOD: THOMAS 0.18 cfm PUMP

TOTAL VOLUME EVACUATED: 22 MINS @ 0.18 CFM

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0% ~~(ppm)~~

Comustible Gas Meter (O_2 %) 16.5% ~~(ppm)~~

Sample ID: PP-1 (V/19) (5-17-99)

Sample Analysis: ASTM D 1945 METHANE

Laboratory: AIR TOXICS

Chain-of-Custody #: 018875-2

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL

Date: 5-17-99

Well ID: PP-1 (M) S

Time: 1444

Sampled By: PAD, PJH

QST Project #: 6699030

PROBE VOLUME:

Length of Probe: ~~15~~ 5' (M)

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5' (depth) x 0.04 x 5 = 1.0 (cu-ft)

~ 5.6 MIN

EVACUATION METHOD: THOMAS 0.18 CFM PUMP

TOTAL VOLUME EVACUATED: 6 MINS @ 0.18 cfm = 1.08 cf.

FIELD ANALYSIS:

Comustible Gas Meter (Methane) 0.0% ~~(ppm)~~

Comustible Gas Meter (O_2 %) 15.2% ~~(ppm)~~

Sample ID: N/A

Sample Analysis: N/A

Laboratory: N/A

Chain-of-Custody #: N/A

QST ENVIRONMENTAL

Methane Probe Sampling Data

Site ID: ESTES LANDFILL Date: 5-17-99

Well ID: PP-20 (PP-95) Time: 1315

Sampled By: PAD, PJH QST Project #: 1669 9030

PROBE VOLUME:

Length of Probe: 5'

Diameter of Probe: 1"

MAXIMUM EVACUATION VOLUME:

2-inch Probe: _____ (depth) x 0.163 x 5 = _____ (cu-ft)

1-inch Probe: 5' (depth) x 0.04 x 5 = _____ (cu-ft)

EVACUATION METHOD: THOMAS 0.18 CFM PUMP

TOTAL VOLUME EVACUATED: _____

FIELD ANALYSIS:

Comustible Gas Meter (Methane) _____ (ppm)

Comustible Gas Meter (O_2 %) _____ (ppm)

Sample ID: PP-20 (V/19)(5-17-99) *

Sample Analysis: METHANE

Laboratory: AIR TOXICS

Chain-of-Custody #: _____

* DUPLICATE SAMPLE OF PP-9 (V/5) (5-17-99)

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes Landfill **Date:** 06/09/98

Well ID: EW-NE **Time:** 0943

Sampled By: Peter J. Hoffman/Fernando Rodriguez **QST Project #:** 6699031

WATER VOLUME:

Depth to Bottom of Casing: 100.00

Depth to Water: 51.52

Total Water Column (feet): 48.48

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

*4.5-inch well: 0.826 x 48.48 = 40.04 x3 = 120.13

PURGING METHOD: Dedicated pump

Disposition of Purged Water: CLEAR TO EVE

FIELD ANALYSIS:

	Initial 1320	1st volume 1334	2nd 1338	3rd 1342	[redacted]	Final Depth to G.W = 51.42 Final
pH:	6.89	6.92	6.94	6.93		6.93
Temperature (°C):	25.26	[redacted]	26.48	25.60		24.26
Conductivity (µmhos):	Std 887.00 Cond. 892.00	890.00 894.00	902 904	886.00 895.00		886.00
Turbidity (NTU):	3.38	1.55	5.12	1.81		9.92
ORP:	82.3	69.7	71.2	61.2		73.3
Dissolved Oxygen:	249.9	488.0	391.14	423.5		93.6

TOTAL VOLUME OF WATER PURGED: [redacted] 145 gallons

Sample ID: EW-NE-GW-(6-9-99)

Sample Analyzed for: _____

Laboratory: Del Mar Analytical

Chain-of-Custody #: 012078 + GB 6737

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Sky Harbor Airport **Date:** 06/10/99

Well ID: EW-23 **Time:** 0920

Sampled By: Peter J. Hoffman/Fernando Rodriguez **QST Project #:** 669903.4

WATER VOLUME:

Depth to Bottom of Casing: 150.00'

Depth to Water: 70.50

Total Water Column (feet): 79.50

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x 79.50 = 81.09 x3 = 243.27

4.5-inch well: 0.826 x _____ = _____ x3 = _____

PURGING METHOD: Dedicated Pump.

Disposition of Purged Water: Relatively Sediment and Fines free / CLEAR

FIELD ANALYSIS: Initial 1018 | 1st Volume 1029 | 2nd Volume 1044 | 3rd Volume 1056 | Final 1130 | Final Depth to G.W. 70.43'

	Initial 1018	1st Volume 1029	2nd Volume 1044	3rd Volume 1056	Final 1130		
pH:	7.18	7.16	7.16	7.16	7.18		
Temperature (°C):	25.40	24.22	24.24	24.24	25.26		
Conductivity (µmhos): SPC	931.00	846.00	884.00	889.0	896.00		
Turbidity (NTU): ORP / DRT	-163.4 / 30.6 DRT	-156.2 / 8.44 DRT	-154.7 / 3.32	-154.4 / 3.04	-152.8 / 3.64		
ORP:	15.1	-4.9	-4.8	-4.8	4.8		
Dissolved Oxygen:	353.3	414.3	349.9	404.5	510.2		

TOTAL VOLUME OF WATER PURGED: _____

Sample ID: EW-23-GW-(6-10-99)

Sample Analyzed for: RSK SOP 145, 8260, 415.1, Dissolved TOC 415.1, 4500 H, P, Total Metals 6010 B + Fe II

Hg 7470, 6010 B

Laboratory: Del Mar

Chain-of-Custody #: GB-10804 + GB-10806

QST ENVIRONMENTAL

Well Sampling Data

Site ID: Airport

Date: ~~06/14/99~~ PJH 06/15/99 0830 PJH

Well ID: EW-22

Time: ~~1308~~ PJH ~~0910~~ PJH

Sampled By: Peter J. Hoffman, Matthew Garlick

QST Project #: 6899C031

WATER VOLUME:

Depth to Bottom of Casing: 150.00

Depth to Water: 69.79

Total Water Column (feet): 80.21

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x ~~80.21~~ = ~~81.81~~ x3 = ~~245.44~~

4.5-inch well: 0.826 x 80.21 = 66.25 x3 = 198.76

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Light brown, rusty initially. Clean to almost clear after 1st volume

Final Depth to G.W. 69.96

FIELD ANALYSIS:

	Initial 0836	1st 0839	2nd 0842	3rd 0858	Final 0908		
pH:	7.20	7.14	7.14	7.14	7.18		
Temperature (°C):	24.55	24.49	24.54	24.53	25.36		
Conductivity (μmhos): Spc / Cnd	990.00 / 981.00	996.0 / 986.0	1010.0 / 1001.0	1020 / 1011	996.00 / 1004.00		
Turbidity (NTU): Cnd / VSS	2.97 / -153.4	4.54 / -153.7	5.63 / -153.6	3.76 / -153.5	3.42 / -156.0		
ORP:	-14.9	-15.3	-15.9	-16.5	-64.3		
Dissolved Oxygen:	494.8	584.0	616.2	653.0	579.0		

TOTAL VOLUME OF WATER PURGED: ~~225 gallons~~ PJH

Sample ID: EW-22-GW-(6-15-99) (0900)

Sample Analyzed for:

Laboratory: Del Mar

Chain-of-Custody #: ~~GB-10811 + GB-10810~~ PJH GB-10821 + GB-10822

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes Landfill **Date:** 06/11/99

Well ID: EW-1 **Time:** 0908

Sampled By: Peter J. Hoffman, Matthew Garlick **QST Project #:** 669C36

WATER VOLUME:

Depth to Bottom of Casing: 103.00

Depth to Water: 68.87

Total Water Column (feet): 34.13

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x 34.13 = 28.19 x3 = 84.57

PURGING METHOD: Dedicated pump

Disposition of Purged Water: Light clouding

FIELD ANALYSIS: Initial 0945; 1st Vol 0944; 2nd Vol 0952; 3rd Vol 1000; Final 1256; Final depth to GW 68.95

pH:	7.03	7.02	7.02	7.02	7.08		
Temperature (°C):	24.96	25.17	25.11	25.13	25.57		
Conductivity (µmhos): SPC	1109.0	1116.0	1110.0	1109.0	1114.0		
Turbidity (NTU): TSC / DRT	159.6 / 116.	167.0 / 3.9	156.6 / 0.60	156.4 / 0.39	-164.7 / 0.62		
ORP:	46.3	91.0	64.0	63.5	25.1		
Dissolved Oxygen:	752.6	848.2	886.0	824.0	812.2		

TOTAL VOLUME OF WATER PURGED: 164.57 gals

Sample ID: EW-1-GW-(6-11-99)

Sample Analyzed for: _____

Laboratory: Del Mar

Chain-of-Custody #: 012026 + GB 10845

QST ENVIRONMENTAL
Well Sampling Data

Site ID: ____________

Date: 06/11/99 ~~10~~ pjh

Well ID: EW-25

Time: [illegible]

Sampled By: Peter J. Hoffman / Matthew Garlick

QST Project #: 6699030

WATER VOLUME:

Depth to Bottom of Casing: 60.00

Depth to Water: 30.77

Total Water Column (feet): 29.33

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x 29.33 = 29.81 x3 = 89.43

4.5-inch well: 0.826 x ______ = ______ x3 = ______

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: ____________

FIELD ANALYSIS:

Final Depth to G.W. 35.65

	Initial 1405	First Volume 1411	2nd 1415	3rd 1421	Final 1427		
pH:	7.02	7.07	7.05	7.08	7.10		
Temperature (°C):	25.44	25.24	25.07	25.13	25.49		
Conductivity (μmhos): Sp (→)	837.0c / 843.0c	851.0c / 850.0c	852.cc / 833.cc	856.cc / 848.cc	845.cc / 854.cc		
Turbidity (NTU): YSI / ORP	-166.9 / 57.6	-164.9 / 344.0	-163.5 / 577.cc	-145.7 / 1411 cc	-159.cc / 124.1		
ORP:	46.9	-9.1	7.1	14.8	37.6		
Dissolved Oxygen:	726.7	492.7	886.9	892.3	48.8		

TOTAL VOLUME OF WATER PURGED: 180 gals

Sample ID: EW-25-GW-(6-11-99)

Sample Analyzed for: ____________

Laboratory: Del Mar

Chain-of-Custody #: 012025 + GB-10807

QST ENVIRONMENTAL

Well Sampling Data

Site ID: Estes / on 40th St. Date: 06/15/99

Well ID: EW-4 Time: 1015

Sampled By: Peter J. Hoffman CAM Matthew Garlick M.G. QST Project #: 6699031

WATER VOLUME:

Depth to Bottom of Casing: 100.00

Depth to Water: 62.61

Total Water Column (feet): 37.39

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x 37.39 = 30.88 x3 = 92.65

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Relatively clear at onset. Clear till Final

FIELD ANALYSIS:

Final Depth to G.W. Unable to obtain due to physical restraint

	Initial 1026	1st 1029	2nd 1032	3rd 1035	Final 1050		
pH:	7.04	7.03	7.03	7.03	7.04		
Temperature (°C):	24.28	24.49	24.95	24.83	28.88		
Conductivity (µmhos): Spc	1328 1384	1350.0 1369.0	1350 1405	1329 1401	1332 1446		
Turbidity (NTU): Redox	14.43 -166.1	4.44 -164.4	0.80 -161.8	3.29 -161.2	2.96 -161.3		
ORP:	-118.2	-150.0	-141.3	-143.2	-360.0		
Dissolved Oxygen:	381.0	446.9	504.9	424.1	370.8		

TOTAL VOLUME OF WATER PURGED: 120 gallons

Sample ID: EW-4-GW-(6·15·99)

Sample Analyzed for: _____

Laboratory: Del Mar

Chain-of-Custody #: GR-10824 + GR 10823

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes Landfill / Waste Mgmt Property **Date:** 06/14/99

Well ID: EW-18 **Time:** 1440

Sampled By: Peter J. Hoffman PJH / Matthew Garlick MG **QST Project #:** 6699031

WATER VOLUME:

Depth to Bottom of Casing: 95.00

Depth to Water: 63.47

Total Water Column (feet): 31.53

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x 31.53 = 26.04 x3 = 78.13

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Onsite

FIELD ANALYSIS:

Final Depth to G.W. 63.65

	Initial 1452		1st 1459	2nd	3rd 1506	Final 1533	
pH:	6.91		6.92	6.91	6.91	6.92	
Temperature (°C):	29.67		29.03	28.93	29.13	28.62	
Conductivity (µmhos): Spc	1354 1437		1340 1440	1337.6 1438.6	1335.0 1439.0	1328.0 1423.0	
Turbidity (NTU): ORP / DO	134.8 -143.2		38.3 -169.1	3.14 -164.2	1.62 -164.3	1.58 -164.3	
ORP:	-88.5		-45.2	-33.5	-28.4	-23.2	
Dissolved Oxygen:	344.9		296.2	525.0	628.2	580.9	

TOTAL VOLUME OF WATER PURGED: _____

Sample ID: EW-18-GW-(6-14-99)

Sample Analyzed for: _____

Laboratory: Del Mar

Chain-of-Custody #: GB-10818 + GB 10819

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes Landfill / WASit **Date:** 06/14/99

Well ID: EW-9 **Time:** 1315

Sampled By: Peter J. Hoffman, Matthew Garlick **QST Project #:** 66

WATER VOLUME:

Depth to Bottom of Casing: 90.00

Depth to Water: 48.02

Total Water Column (feet): 41.98

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x 41.98 = 34.68 x3 = 104.02

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Lightly clouded to clear at end

FIELD ANALYSIS:

Final Depth to G.W. Sample @ 1340: 47.85

	Initial 1319	1st 1324	2nd 1336	3rd 1343	Final 1355		
pH:	6.95	6.95	6.95	6.95	7.04		
Temperature (°C):	26.41	26.62	26.57	26.68	27.23		
Conductivity (µmhos): SpC	1095 1130	1091 1127	1090 1124	1091 1126	1094 1132		
Turbidity (NTU): DO 1355	3.9 -141.3	2.8 -160.3	2.9 -162.4	0.6 -165.9	1.89 -169.2		
ORP:	-49.0	-41.3	-37.4	-31.4	-19.4		
Dissolved Oxygen:	522.1	541.2	548.4	605.5	509.6		

TOTAL VOLUME OF WATER PURGED: 200 gallons

Sample ID: EW-9-GW-(6.14.99)

Sample Analyzed for: _____

Laboratory: DEL MAR

Chain-of-Custody #: GB-6702 + GB-10817

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes Landfill/Wash **Date:** 06/14/99

Well ID: EW-11 **Time:** 1030

Sampled By: Peter J. Hoffman, Matthew Garlick **QST Project #:** 6694031

WATER VOLUME:

Depth to Bottom of Casing: 90.00

Depth to Water: 50.12

Total Water Column (feet): 39.88

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x 39.88 = 32.94 x3 = 98.82

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Relatively clear, light rust cloudy. Considerable clearing after 2nd volume

Final Depth to G.W. 50.29

FIELD ANALYSIS:

	Initial 1047	1st Volume 1054	2nd Volume 1105	3rd Volume 1116	Final 1132		
pH:	7.05	7.03	7.01	7.04	7.06		
Temperature (°C):	25.26	25.16	25.30	25.34	25.60		
Conductivity (µmhos): Spec	748.0	744.0	758.00	744.0	744.0		
	731.0	745.0	762.00	736.0	783.0		
Turbidity (NTU): DRT	183	59.9	4.89	38.6	34.6		
YSI	-165.6	-159.9	-150.1	-154.7	-153.9		
ORP:	-54.3	-28.4	23.7	56.9	68.5		
Dissolved Oxygen:	238.1	597.4	681.00	716.0	646.0		

TOTAL VOLUME OF WATER PURGED: _____

Sample ID: EW-11-GW-(6-14-99)

Sample Analyzed for: _____

Laboratory: Del Mar CQM

Chain-of-Custody #: ~~GB 6702 + GB 10812~~ GB-10810 + GB 10811

QST ENVIRONMENTAL

Well Sampling Data

Site ID: Estes

Date: 06/15/99

Well ID: EW-8

Time: 1400

Sampled By: Peter J. Hoffman PJH; Matthew Garlick M.G

QST Project #: 669031

WATER VOLUME:

Depth to Bottom of Casing: 201.00

Depth to Water: 66.30

Total Water Column (feet): 134.70

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x ______ = ______ x3 = ______

4.5-inch well: 0.826 x 134.70 = 111.26 x3 = 333.78

PURGING METHOD: Dedicated pump

Disposition of Purged Water: Grey/green initially, improving rapidly to lightly clouded. Bringing up fine black sediment. Final Depth to GW: No measurement / well constant

FIELD ANALYSIS:

	Initial 1400	1st 1430	~~2nd~~ Pump dry 150 gallons (1500)	~~3rd~~ Final (1514)			
pH:	8.65	8.68	8.76	8.46			
Temperature (°C):	26.85	27.90	29.76	27.60			
Conductivity (μmhos): Spc	520.00 / 538.00	~~520.00~~ 549.00	~~524.00~~ 542.00	~~525.00~~ 550.00			
Turbidity (NTU): ART / YSI	29.1 / -191.5	52.1 / -166.6	10.4 / -164.0	23.0 / -164.0			
ORP:	-635.3	-153.9	222.1	204.2			
Dissolved Oxygen:	546.3	387.4	358.4	524.8			

TOTAL VOLUME OF WATER PURGED: 165 gallons

Sample ID: EW-8-GW-(6.15.99) (1500)

Sample Analyzed for: ______

Laboratory: Del Mar

Chain-of-Custody #: GB-10824 + GB10825

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes Landfill **Date:** 06/16/99

Well ID: EW-5 **Time:** 0930

Sampled By: Peter J. Hoffman, Matthew Carlick **QST Project #:** 669031

WATER VOLUME:

Depth to Bottom of Casing: 150.00

Depth to Water: 67.00

Total Water Column (feet): 83.00

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x 83.00 = 68.55 x3 = 205.67

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Light cloudy initially. Cleared considerably thru process. Clear at end.

FIELD ANALYSIS:

Final Depth to GW: 69.10'

	Initial 1007	1st 1014	2nd 1026	3rd 1028	Final		
pH:	6.69	6.76	6.52	6.63	6.74		
Temperature (°C):	27.43	27.47	27.47	29.86	30.43		
Conductivity (µmhos): SpC	1302.0 1310.0	1300.0 1309.0	1349.0 1366.0	1295.0 1364.0	1305.0		
Turbidity (NTU): ORP ±5E	1.02 -169.7	1.00 -162.3	0.41 -163.3	1.12 -162.4	0.36 -162.4		
ORP:	-14.5	-32.5	-0.6	-31.4	-31.2		
Dissolved Oxygen:	299.1	425.6	458.2	483.5	348.2		

TOTAL VOLUME OF WATER PURGED: [redacted] 215 gallons

Sample ID: EW-5-GW-(6-16-99)

Sample Analyzed for: _____

Laboratory: Del Mar

Chain-of-Custody #: GB-10829 + GB 10830

QST ENVIRONMENTAL

Well Sampling Data

Site ID: Estes Landfill **Date:** 06/16/99

Well ID: EW-19 **Time:** 12:45

Sampled By: Peter J. Hoffman PJH, Matthew Garlick M.G. **QST Project #:** 6699031

WATER VOLUME:

Depth to Bottom of Casing: 112.00

Depth to Water: 63.78

Total Water Column (feet): 48.22

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x ____ = ____ x3 = ____

4.5-inch well: 0.826 x 48.22 = 39.82 x3 = 119.46

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Relatively clear. Start to finish

FIELD ANALYSIS: Final Depth to 6[illegible] 63.62

	Initial 1244	1st 1252	2nd 1257	3rd 1302	Final 1315		
pH:	7.12	7.11	7.09	7.10	7.10		
Temperature (°C):	25.98	25.99	25.96	26.18	26.84		
Conductivity (µmhos): SpC	1114.0 / 1140.0	1122.00 / 1114.00	1154.0 / 1148.0	1127.0 / 1154.6	1179.0 / 1168.0		
Turbidity (NTU): DMT / REE	66.3 / -160.2	27.18 / -160.8	8.4 / -159.9	[illegible] / -159.4	2.82 / -189.6		
ORP:	-33.5	-30.1	-12.2	8.4	8.2		
Dissolved Oxygen:	162.1	165.6	153.2	148.2	215.7		

TOTAL VOLUME OF WATER PURGED: 180 gallons

Sample ID: EW-19-GW-(6.16.99) (1910)

Sample Analyzed for: ____

Laboratory: Del Mar

Chain-of-Custody #: GB-10833 + GB 10834

QST ENVIRONMENTAL

Well Sampling Data

Site ID: Estes Landfill **Date:** 06/16/99

Well ID: EW-26 **Time:** 1515

Sampled By: Peter J. Hoffman CGH. / Matthew Garlick M.G. **QST Project #:** 6699031

WATER VOLUME:

Depth to Bottom of Casing: 260.00

Depth to Water: 58.20

Total Water Column (feet): 201.80

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x 201.80 = 205.83 x3 = 617.50

4.5-inch well: 0.826 x ______ = ______ x3 = ______

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Milky white to start. Clearing at app. 20 gallons. Clouding at 100 gallons. Clearing at 110 gals. Clouding at 140 gals. Milky white at 205 gallons. Clearing at 400 gallons till finish CLEAR

FIELD ANALYSIS:

	Initial [illegible]	1st 1620	2nd 1757	3rd 1906	Final		
pH:	7.61	9.42	8.35	8.52	8.24		
Temperature (°C):	26.03	26.23	25.67	25.74	25.77		
Conductivity (μmhos): Spc	1359.0 / 1384.0	1349.0 / 1374.0	1289.0 / 1306.0	1301.0 / 1322.0	1318.0 / 1335.0		
Turbidity (NTU):	174.0 / -165.5	11.64 / -160.0	116 / -159.8	64.5 / -158.1	73.4 / -157.4		
ORP:	-44.5	118.6	150.3	164.3	184.2		
Dissolved Oxygen:	107.0	83.1	104.8	[illegible]	430		

Cal 104.0 102.9 DA

Final Depth to G.W. = Instrument Failure

TOTAL VOLUME OF WATER PURGED: ______

Sample ID: EW-26-GW-(6.16.99)

Sample Analyzed for: ______

Laboratory: Del Mar

Chain-of-Custody #: GB-10814 + GB-10815

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes Landfill **Date:** 06/17/99

Well ID: EW-15 **Time:** 0915

Sampled By: Peter J. Heffman PJH, Matthew Garlick M.G. **QST Project #:** 6699031

WATER VOLUME:

Depth to Bottom of Casing: 160.00

Depth to Water: 60.00

Total Water Column (feet): 100.00

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x ______ = ______ x3 = ______

4.5-inch well: 0.826 x 100 = 82.60 x3 = 247.80

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Relatively clear at onset.

FIELD ANALYSIS: Final Depth to G.W.: 60.76

	Initial 0930	1st 0938	~~2nd~~ WELL RUN DRY	~~3rd~~ Final			
pH:	7.24	7.45	X	6.96			
Temperature (°C):	25.79	26.63	X	26.49			
Conductivity (µmhos): Spc	1210 1229	1237.0 1249.0	X	1323 1363			
Turbidity (NTU):	91.5 ~~-163.7~~	6.53 -159.0	X	25.6 -159.7			
ORP:	-224.4	-207.7	X	→ -63.4			
Dissolved Oxygen:	6.2	3.1	X	→ 11.5			

TOTAL VOLUME OF WATER PURGED: ______

Sample ID: EW-15-GW-(6·17·99) (0950)

Sample Analyzed for: ______

Laboratory: Del Mar

Chain-of-Custody #: GB-10836 + GB-10837

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes Landfill
Well ID: EW-E
Sampled By: Peter J. Hoffman / Matthew Garlick
Date: ~~06/17/99~~ 06/22/99
Time: ~~1115~~ 0800
QST Project #: 6699031

WATER VOLUME:

Depth to Bottom of Casing: 100.00
Depth to Water: 56.91
Total Water Column (feet): 43.09

Decon. 2" Grundfos pump
15 gallon - Alconox - Soap/Kettle - For 15 min. Flush
10 gallons = Tap water 15 min. Flush
10 gallons - D.I. @ gallon 8
TWC Equipment blanks were collected Event-GW-(6/22/99)

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____
4.5-inch well: 0.826 x 4' = _____ x3 = _____
4.0 inch well: 0.62 x 43.09 = 26.71 x3 = 80.14

PURGING METHOD: _____

Disposition of Purged Water: Pumped Into Baker tank on-site.

FIELD ANALYSIS:

Final Depth to GW: 56.72

	Initial 1133	1st	2nd	3rd	Final		
pH:	6.55	6.59	6.07	6.10	6.17		
Temperature (°C):	28.68	28.61	28.01	27.98	27.99		
Conductivity (µmhos):	1018.0	1266.0	1273.0	1269.0	1100.00		
Turbidity (NTU):	150.5 (x100)	156 (max)	154 (x100)	~~max~~ (x100)	158.8		
ORP:	213.3	37.1	74.0	78.0	79.0		
Dissolved Oxygen:	14.2%	-22%	20.2%	20.1%	30.08		

TOTAL VOLUME OF WATER PURGED: 92.10 gallons

Sample ID: EW-E-GW-(6.17.99)

Sample Analyzed for: See chain of custodies

Laboratory: Del Mar

Chain-of-Custody #: GB-10838 + GB-10839

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes Landfill **Date:** 06/17/99

Well ID: EW-PZ1 **Time:** 1515

Sampled By: Peter J. Hoffman CHH / Matthew Garrick M.G. **QST Project #:** 669931

WATER VOLUME:

Depth to Bottom of Casing: 80.00

Depth to Water: 55.85

Total Water Column (feet): 24.15

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x _____ = _____ x3 = _____

4.0 inch well: 0.653 x 24.15 = 14.99 x3 = 44.91

PURGING METHOD: _____

Disposition of Purged Water: Grey/green very cloudy. Clearing to light grey (50 gals.) Final Depth to GW 64.12

FIELD ANALYSIS:

	Initial 1535	1st 1543	2nd 1610	3rd 1639	Final 1700		
pH:	6.53	7.52	6.91	6.96	7.12		
Temperature (°C):	28.96	30.31	30.67	30.82	34.64		
Conductivity (µmhos): SpC / YSI	1042.0 / 1158.0	1014.0 / 1159.0	1193.0 / 1265.0	1148.0 / 1288.0	1167.0 / 1310.		
Turbidity (NTU): ORP / YSI	96.3 / -168.6	235 / -168.8	153 / -168.8	56.5 / -168.6	26.4 / -170.3		
ORP:	-175.8	-114.7	195.4	208.1	198.0		
Dissolved Oxygen:	53.9	N/A 5.5 CHH	7.2	8.6	7.5		

TOTAL VOLUME OF WATER PURGED: _____

Sample ID: EW-PZ1-GW-(6.17.99) (1650)

Sample Analyzed for: _____

Laboratory: Del Mar

Chain-of-Custody #: GB-10840 + GB10844

Organic Vapor Analyzer (OVA) Calibration

Client: ADEO WOARF
QST Project: Estes Landfill
Site Location: Phoenix, AZ
QST Project No.: 6694030
QST Field Team Leader: Matthew E. Garlick
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date	Time (Military)	Calibration Gas Conc. (ppm)	Instrument Response (ppm)	Comments	[1]
OVA-580B	37590-256	5/3/99	1220	100 ppm	112 ppm	Instrument Responded well	
OVA-580B	37590-856	5/4/99	1350	100 ppm	110 ppm	Instrument had to be Calibrated twice before holding Calibration	
OVA-58B	37590-256	5/5/99	0730	100 ppm	114 ppm	INSTRUMENT HAD TROUBLE CALIBRATING.	
OVA-581	OVM #4	5/6/99	0720	100 ppm	81 ppm	O.K.	JM
OVA-58B	OVM #4	5/6/99	1500	100 ppm	109 ppm	O.K.	MG
OVA-580B	OVM #4	5/7/99	0745	100 ppm	104 ppm	O.K.	JM
OVA-580B	OVM #4	5/10/99	0730	100 ppm	108 ppm	OK	JM
OVA-580B	OVM #4	5/11/99	0715	100 ppm	109 ppm	OK	JM
OVA-580B	OVM #4	5/12/99	0730	100 ppm	110 ppm	OK	JM
OVA-580B	OVM #1	5/20/99	0800	100 ppm	108 ppm	OK	JM
OVA-580B	OVM #1	5/21/99	0745	100 ppm	108 ppm	OK	JM

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader: Matthew E. Garlick Date: 5/3/99

Reviewer: ______________________ Date: ______________

Reviewer Title: ______________________

Organic Vapor Analyzer (OVA) Calibration

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: Matthew E. Garlick
QST Project: Estes Landfill
QST Project No.: 6699030
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date	Time (Military)	Calibration Gas Conc. (ppm)	Instrument Response (ppm)	Comments	[1]
OVM-580B	37590-256	5/4/99	0730	100 ppm	121 ppm	Instrument appears to be losing calibration.	

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader_____ Date_____

Reviewer_____ Date_____

Reviewer Title_____

Organic Vapor Analyzer (OVA) Calibration

Client: ADEO WOARF
Site Location: Phoenix, AZ
QST Field Team Leader: PATRICIA A DROBAT
QST Project: Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date	Time (Military)	Calibration Gas Conc. (ppm)	Instrument Response (ppm)	Comments	[1]
MINI RAE	251185	5-3-99	1145	100 ISOBUTYLENE	100	unit calibrates OK.	PAD

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader [signature] Date 5-4-99

Reviewer _____ Date _____

Reviewer Title _____

Organic Vapor Analyzer (OVA) Calibration

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PATRICIA A. DROBAT
QST Project: Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date	Time (Military)	Calibration Gas Conc. (ppm)	Instrument Response (ppm)	Comments	[1]
MINIRAE	201185	5/4/99	0715	100 ppm Isobutylene	100.0 ppm	Works OK	PAD

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader Patricia A. Drobat Date 5-4-99

Reviewer _____ Date _____

Reviewer Title _____

Organic Vapor Analyzer (OVA) Calibration

Client: ADEO WOARF
Site Location: Phoenix, AZ
QST Field Team Leader: ~~PATRICIA A. DROBAC~~

QST Project: Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date	Time (Military)	Calibration Gas Conc. (ppm)	Instrument Response (ppm)	Comments	[1]
MINIRAE	201185	5-5-99	0800	100 ppm Isobutylene	100	calibrated well, new battery	~~PAD~~

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader [signature] Date 5-5-99

Reviewer _____ Date _____

Reviewer Title _____

Organic Vapor Analyzer (OVA) Calibration

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PATRICIA DROBAT
QST Project: Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date	Time (Military)	Calibration Gas Conc. (ppm)	Instrument Response (ppm)	Comments	[1]
minirae	101317	5-6-99	0903	99.7	99.8	fully charged	PAD

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader Patricia A. Drobat Date 5-6-99

Reviewer _____ Date _____

Reviewer Title _____

Organic Vapor Analyzer (OVA) Calibration

Client: ADEO WOARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project: Estes Landfill
QST Project No.: 669 9080
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date	Time (Military)	Calibration Gas Conc. (ppm)	Instrument Response (ppm)	Comments	[1]
MINIRAE	101317	5-7-99	0732	99.7	99.8	instrument fully charged	PAD

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader Ruth A. Crockett Date 5-7-99

Reviewer _____ Date _____

Reviewer Title _____

Organic Vapor Analyzer (OVA) Calibration

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: DAD

QST Project: Estes Landfill
QST Project No.: 6699030
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date	Time (Military)	Calibration Gas Conc. (ppm)	Instrument Response (ppm)	Comments	[1]
MINIRAE	101317	5-10-99	0920	99.7	99.6	fully charged	DAD

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader [signature] Date 5-10-99

Reviewer _____ Date _____

Reviewer Title _____

Organic Vapor Analyzer (OVA) Calibration

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project: Estes Landfill
QST Project No.: 10699030
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date	Time (Military)	Calibration Gas Conc. (ppm)	Instrument Response (ppm)	Comments	[1]
MINIROE	101317	5-11-99	0719	99.7	99.7	instrument fully charged	PAD
MINIRAE	101317	5-12-99	0725	99.7	99.8	instrument fully charged	PAD

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader _____ Date _____

Reviewer _____ Date _____

Reviewer Title _____

Organic Vapor Analyzer (OVA) Calibration

Client: ADEO WOARF
Site Location: Phoenix, AZ
QST Field Team Leader: PAD

QST Project: Estes Landfill
QST Project No.: 669030
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date	Time (Military)	Calibration Gas Conc. (ppm)	Instrument Response (ppm)	Comments	[1]
THERMO OVM	580B - 32776-243	5-24-99	0857	100	107	INSTRUMENT FULLY CHARGED	PAD
THERMO OVM #1		5-26-99	0730	100	108	INSTRUMENT FULLY CHARGED	PJH
CGI GA-90 1261		5-26-99	0730	CH_4 - 15%. CO_2 - 15%.	CH_4 15.3% CO_2 15.5%	INSTRUMENT FULLY CHARGED	PJH

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader_____ Date_____

Reviewer_____ Date_____

Reviewer Title_____

Water Level Indicator Calibration

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader:

QST Project: Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date & Time (Military)	Battery Check	Probe Check	Tape Cable Check	Comments	[1]

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader_____ Date_____

Reviewer_____ Date_____

Reviewer Title_____

Turbidity Meter Calibration

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader:

QST Project: Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date & Time (Military)	Battery Check	Meter Zeroing Check	Turbidity Standard. (NTU)	Instrument Response (NTU)	Comments & Initials
LaMotte 2008	26857 3448-3496	06/07/11 0815	✓	0.90	0.5	0.8	BJH
				9.40	9.9	9.90	

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader_____ Date_____

Reviewer_____ Date_____

Reviewer Title_____

Field Water Quality Meter Calibration Form

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader:

QST Project: Estes Landfill
QST Project No.:
QST Project Manager:

Instrument: Hydac pH, Cond. + Temp. Date: 06/07 0800
Person Performing Calibration: Peter J. Hoffman

	Initial Reading	Adjusted Reading	Time
Temperature			
Conductivity			
High-Level Concentration			
Mid-Level Concentration			
Low-Level Concentration			
pH			
Standard	~~7.0~~ 6.48	7.0	06/07 0800 → 4 hrs.
Standard	8.49	10.0	06/07 0805
Standard			
Turbidity			
Standard			
DissolvedOxygen			
Standard			
Oxydation/Reduction Potential (ORP)			
Standard			

Signatures:

Crew Leader: Peter J. Hoffman Date: 06/07/99

Reviewer: Date:

Reviewer Title:

Field Water Quality Meter Calibration Form

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: Peter Hoffman
QST Project: Estes Landfill
QST Project No.: 6699.030
QST Project Manager: John Mitcher

Instrument YSI 610 DM + YSI 6820 Date 06/14/99
Person Performing Calibration Peter J. Hoffman

	Initial Reading	Adjusted Reading	Time
Temperature	32.06		0605
Conductivity			
High-Level Concentration 1000 uS/cm	972	989	0605
Mid-Level Concentration			
Low-Level Concentration			
pH			
Standard 7	6.92	7.02	0606
Standard 10	7.02	9.96	0610
Standard			
Turbidity See Turbidity Calibration Sheet			
Standard			
DissolvedOxygen			
Standard 29.94	125.6	99.6	0615/0625
Oxydation/Reduction Potential (ORP) Factory Calibrated			
Standard			

Signatures:
Crew Leader Peter J. Hoffman Date 06/14/99
Reviewer _____ Date _____
Reviewer Title _____

Turbidity Meter Calibration

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader:

QST Project: Estes Landfill
QST Project No.: C699036
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date & Time (Military)	Battery Check	Meter Zeroing Check	Turbidity Standard. (NTU)	Instrument Response (NTU)	Comments & Initials
HF Scientific DRT-15CE	35135	06/09/99 1300	OK	✓	0.02 0.10 0.100	0.02 0.10 0.100	OK
H.F.S DRT-15CE	35135	06/10/99 0940	OK	✓	0.02 10.00 100.00	0.01 9.98 99.98	?
HFS DRT-15CE	35135	06/11/99 0940	OK	✓	0.02 10.00 100.00	0.02 10.00 100.00	
HFS DRT-15CE	35135	06/14/99 0936	OK	✓	0.02 10.02 100.00	0.02 10.02 100.00	MG
HFS DRT-15CE	35135	06/15/99 0949/50	OK	✓	0.02 10.00 100.00	0.02 10.03 100.00	
HFS DRT-15CE	35135	06/16/99 0900	OK	✓	0.02 10.02 100.00	0.02 10.02 100.0	
HFS DRT-15CE	35130	06/17/99 0825	OK	✓	0.02 10.00 100.00	0.02 10.00 100.00	

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader _____ Date _____

Reviewer _____ Date _____

Reviewer Title _____

Water Level Indicator Calibration

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader:

QST Project: Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date & Time (Military)	Battery Check	Probe Check	Tape Cable Check	Comments	[1]
KECK ET-89	QST 100 FT	06/08/99 1200	N/A √ OK	√ OK	√ OK	Good shape	
Envirosupply IT-746	16980	06/09/99 1235	N/A √ OK	√ OK	√ OK	Needed smaller probe for old well access	
Envirosupply IT-746	16980	06/09/99	√ OK	√ OK	√ OK	FINE	
KECK ET-89	QST 100 FT	06/10/99 0900	√	√	√	OK	
KECK ET-89	QST 100 FT	06/11/99 0940	√	√	√	OK	
KECK ET-89	QST 100 FT	06/14/99 0900	√	√	√	OK	
KECK ET-89	QST 100 FT	06/15/99	√	√	√	OK	
KECK ET-89	QST 100 FT	06/16/99 0940	√	√	√	OK	
KECK ET-89	QST 100 FT	06/17/99 0935	√	√	√	OK	

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader _____ Date _____

Reviewer _____ Date _____

Reviewer Title _____

Field Water Quality Meter Calibration Form

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader: M. Garlick

QST Project: Estes Landfill
QST Project No.: 6699031 TASK 0300
QST Project Manager: John Miehe

Instrument YSI - 610 Dm + YSI 6820 Date June 22, 1999
Person Performing Calibration M. Garlick

		Initial Reading	Adjusted Reading	Time
Temperature	Factory calibrated	27.11 29.22 30.10	—	0645
Conductivity				
High-Level Concentration	1000 µS/cm	969	995	0725
Mid-Level Concentration	—	—	—	—
Low-Level Concentration	1000 µS/cm	920	992	0723
pH				
Standard 7	2-point calibration	6.81	7.05	0710
Standard 10		7.50	9.93	0712
Standard		N/A	N/A	N/A
Turbidity				
Standard 0.02 10.0 100.0		0.03	0.02	0700
DissolvedOxygen				
Standard		123.2	99.2	0718
Oxydation/Reduction Potential (ORP)				
Standard	Factory calibrated...	—	—	—

Signatures:

Crew Leader M. Garlick Date June 22, 1999

Reviewer _____ Date _____

Reviewer Title _____

Field Water Quality Meter Calibration Form

Client: ADEO WOARF
QST Project: Estes Landfill
Site Location: Phoenix, AZ
QST Project No.: 6699030
QST Field Team Leader: M. GARLICK
QST Project Manager: John Mieher

Instrument YSI - 610 DM + YSI 6820 Date 6/11/99
Person Performing Calibration M. GARLICK

		Initial Reading	Adjusted Reading	Time
Temperature	Factory calibrated	27.26		0745 06/14
		28.60	32.23 06/14	06/15
		31.86		06/16
Conductivity				
High-Level Concentration	1000 uS/cM N.A.	969	990	0750 06/14
	1000 uS/cM N.A.	[illegible] 927	928	0638 06/15
Mid-Level Concentration	1000 uS/cM NA	991	[illegible] 1000	0738 06/16
	1000 uS/cM	846	880	06/17
Low-Level Concentration				
pH	06/17 6.11 7.04 0810 6.82 10.00			
7 Standard		7.23	7.0	0810 06/14
		7.18	7.0	0638 06/15
10 Standard		9.98	10.0	0815 06/14
		9.86	10.0	0640 06/15
Standard	4 STANDARD	7.90	[illegible] 7.05	0741 06/16
	10 STANDARD	8.55	9.94	0745 06/16
Turbidity				
Standard	100 NTU SEE Turbidity Meter Calibration Sheet for QST-15CE	99.2	100.0	0710 06/14
Dissolved Oxygen				
Standard	29.94 STANDARD PRESSURE	92.1	98.3	0820/0830 06/14
		93.2	99.4	0645/0700 06/15
Oxydation/Reduction Potential (ORP)		94.3	94.7 [illegible]	0415/0425 06/16
Standard	Factory calibrated	50.0	[illegible] 32.8	[illegible] 0440/0450

Signatures:

Crew Leader Matt Darlick CGM Date 6/11/99

Reviewer Date 6/14/99

Reviewer Title

QST, Inc.

Water Level Indicator Calibration

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader:
QST Project: Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date & Time (Military)	Battery Check	Probe Check	Tape Cable Check	Comments	[1]
KECK ET-89	491	05.27.99	ok	ok	ok		PAD
POWERS WELL SOUNDER	432	06/04/99 0900	ok	ok	OK	Lynes Eqpt.	[illegible]

[1] Initials of Person Performing Calibration

Signatures:

Crew Leader________________ Date____________

Reviewer________________ Date____________

Reviewer Title________________

Turbidity Meter Calibration

Client: ADEQ WQARF
Site Location: Phoenix, AZ
QST Field Team Leader:
QST Project: Estes Landfill
QST Project No.:
QST Project Manager: John Mieher

Instrument Type	Instrument Serial Number	Date & Time (Military)	Battery Check	Meter Zeroing Check	Turbidity Standard. (NTU)	Instrument Response (NTU)	Comments & Initials
LaMotte (Model) 2020	2006 3449-3896	06/04 1040	✓	✓	0.5 9.9	0.8 9.9	off .3 low range PJH

[1] Initials of Person Performing Calibration PJH Peter J. Hoffman

Signatures:

Crew Leader ______ Date ______

Reviewer ______ Date ______

Reviewer Title ______

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes **Date:** 07/07/99

Well ID: EW-NE **Time:** 1230

Sampled By: PJH **QST Project #:** 669903.1

WATER VOLUME:

Depth to Bottom of Casing: _____

Depth to Water: _____

Total Water Column (feet): _____

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x _____ = _____ x3 = _____

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Onsite Baker Tank

FIELD ANALYSIS:

20gal 40gal 60gal

pH:							
Temperature (°C):	26.2	26.6	26.6				
Conductivity (µmhos):							
Turbidity (NTU):							
~~ORP~~: DO %	39.8	40.0	41.1				
Dissolved Oxygen: mg/l	2.86	2.92	3.08				

TOTAL VOLUME OF WATER PURGED: 60 gals

Sample ID: _____

Sample Analyzed for: _____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes **Date:** 07/07/99

Well ID: EW-1 **Time:** 1315

Sampled By: PJH **QST Project #:** _____

WATER VOLUME:

Depth to Bottom of Casing: _____

Depth to Water: _____

Total Water Column (feet): _____

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x _____ = _____ x3 = _____

PURGING METHOD: Submersible Pump

Disposition of Purged Water: Onsite Baker Tank

FIELD ANALYSIS:

20gal 40 60

pH:							
Temperature (°C):	25.8	25.6	25.5				
Conductivity (µmhos):							
Turbidity (NTU):							
~~ORP:~~ DO %	5.2	4.8	5.9				
Dissolved Oxygen: mg/l	0.41	0.36	0.44				

TOTAL VOLUME OF WATER PURGED: 60 gallons

Sample ID: _____

Sample Analyzed for: _____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes **Date:** 07/07/99

Well ID: Ew-11 **Time:** 1350

Sampled By: PJH **QST Project #:** 6659031

WATER VOLUME:

Depth to Bottom of Casing: _____

Depth to Water: _____

Total Water Column (feet): _____

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x _____ = _____ x3 = _____

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: On-site Baker Tank

FIELD ANALYSIS:

20 gal 40 60

pH:							
Temperature (°C):	25.6	25.6	25.7				
Conductivity (µmhos):							
Turbidity (NTU):							
~~ORP~~: DO %	8.2	9.1	9.2				
Dissolved Oxygen: mg/l	0.62	0.70	0.71				

TOTAL VOLUME OF WATER PURGED: 60 gallons

Sample ID: _____

Sample Analyzed for: _____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes **Date:** 07/07/99

Well ID: EW-24 **Time:** 1430

Sampled By: RJH **QST Project #:** 6699031

WATER VOLUME:

Depth to Bottom of Casing: _____

Depth to Water: _____

Total Water Column (feet): _____

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x _____ = _____ x3 = _____

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Onsite Baker Tank

FIELD ANALYSIS:

20gal 40 60

pH:							
Temperature (°C):	25.5	25.9	25.9				
Conductivity (µmhos):							
Turbidity (NTU):							
~~ORP:~~ DO %	4.0	4.2	4.3				
Dissolved Oxygen: mg/l	0.29	0.30	0.32				

TOTAL VOLUME OF WATER PURGED: 60 gallons

Sample ID: _____

Sample Analyzed for: _____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL
Well Sampling Data

Site ID: ESTES **Date:** 07/07/99

Well ID: EW-9 **Time:** 1500

Sampled By: PJH **QST Project #:** 664803.1

WATER VOLUME:

Depth to Bottom of Casing: _____

Depth to Water: _____

Total Water Column (feet): _____

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x _____ = _____ x3 = _____

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Onsite Baker Tank

FIELD ANALYSIS:

	gallons 20	40	60				
pH:							
Temperature (°C):	26.7	26.9	26.9				
Conductivity (µmhos):							
Turbidity (NTU):							
~~ORP:~~ DO %	3.7	4.0	3.9				
Dissolved Oxygen: mg/l	0.27	0.30	0.29				

TOTAL VOLUME OF WATER PURGED: 60 gallons

Sample ID: _____

Sample Analyzed for: _____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL
Well Sampling Data

Site ID: ESTES **Date:** 07/07/99

Well ID: EW-4 **Time:** 1550

Sampled By: NJH **QST Project #:** 669021

WATER VOLUME:

Depth to Bottom of Casing: _____

Depth to Water: _____

Total Water Column (feet): _____

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x _____ = _____ x3 = _____

PURGING METHOD: Submersible Pump

Disposition of Purged Water: Onsite Baker Tank

FIELD ANALYSIS:

	Gallons 20	40	60				
pH:							
Temperature (°C):	27.0	27.4	27.4				
Conductivity (µmhos):							
Turbidity (NTU):							
~~ORP:~~ DO OTO	3.0	2.9	3.3				
Dissolved Oxygen: mg/l	0.20	0.24	0.24				

TOTAL VOLUME OF WATER PURGED: 60 gallons

Sample ID: _____

Sample Analyzed for: _____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes **Date:** 07/07/89

Well ID: EW-19 **Time:** 1620

Sampled By: PSH **QST Project #:** 668031

WATER VOLUME:

Depth to Bottom of Casing: _____

Depth to Water: _____

Total Water Column (feet): _____

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x _____ = _____ x3 = _____

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Baker Tank 60 Gallons

FIELD ANALYSIS:

	20	40	60				
pH:							
Temperature (°C):	26.0	26.2	26.2				
Conductivity (μmhos):							
Turbidity (NTU):							
~~ORP:~~ DO %	8.0	8.2	8.2				
Dissolved Oxygen: mg/l	0.60	0.62	0.62				

TOTAL VOLUME OF WATER PURGED: 60 gallons

Sample ID: _____

Sample Analyzed for: _____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes **Date:** 07/08/99

Well ID: EW-26 **Time:** 1708

Sampled By: PJH **QST Project #:** 6699081

WATER VOLUME:

Depth to Bottom of Casing: _____

Depth to Water: _____

Total Water Column (feet): _____

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x _____ = _____ x3 = _____

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Baker Tank

FIELD ANALYSIS:

	Gallons 20	40	60				
pH:							
Temperature (°C):	24.2	24.6	24.7				
Conductivity (µmhos):							
Turbidity (NTU):							
~~ORP:~~ DO %	4.4	4.5	4.7				
Dissolved Oxygen: mg/l	0.35	0.36	0.38				

TOTAL VOLUME OF WATER PURGED: 60 gallons

Sample ID: _____

Sample Analyzed for: _____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes **Date:** 07/02/93

Well ID: EW-15 **Time:** 1735

Sampled By: PJH **QST Project #:** 6696031

WATER VOLUME:

Depth to Bottom of Casing: _____

Depth to Water: _____

Total Water Column (feet): _____

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x _____ = _____ x3 = _____

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Baker Tank

FIELD ANALYSIS:

	GALLONS 20	40	60				
pH:							
Temperature (°C):			25.8				
Conductivity (µmhos):							
Turbidity (NTU):							
~~ORP~~: DO %	4.7	5.1	5.2				
Dissolved Oxygen: mg/l	0.38	0.40	0.41				

TOTAL VOLUME OF WATER PURGED: 60 gallons

Sample ID: _____

Sample Analyzed for: _____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes **Date:** 07/08/99

Well ID: EW-18 **Time:** 0700

Sampled By: PJH **QST Project #:** 6659031

WATER VOLUME:

Depth to Bottom of Casing: _____

Depth to Water: _____

Total Water Column (feet): _____

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x _____ = _____ x3 = _____

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Baker Tank Gallons

FIELD ANALYSIS:

	20	40	60				
pH:							
Temperature (°C):	28.6	28.6	28.9				
Conductivity (µmhos):							
Turbidity (NTU):							
~~ORP:~~ DO %	4.5	4.5	4.7				
Dissolved Oxygen: mg/l	0.33	0.33	0.34				

TOTAL VOLUME OF WATER PURGED: 60 gallons

Sample ID: _____

Sample Analyzed for: _____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes **Date:** 07/08/99

Well ID: EW-22 **Time:** 0850

Sampled By: PJH **QST Project #:** 669031

WATER VOLUME:

Depth to Bottom of Casing: _____

Depth to Water: _____

Total Water Column (feet): _____

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x _____ = _____ x3 = _____

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Baker Tank

FIELD ANALYSIS:

Gallons
20 40 60

pH:							
Temperature (°C):	24.1	24.0	24.2				
Conductivity (µmhos):							
Turbidity (NTU):							
~~ORP:~~ DO %	5.9	6.0	6.1				
Dissolved Oxygen: mg/l	0.49	0.49	0.50				

TOTAL VOLUME OF WATER PURGED: 60 gallons

Sample ID: _____

Sample Analyzed for: _____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes **Date:** 07/08/99

Well ID: EW-23 **Time:** 0930

Sampled By: PJH **QST Project #:** 669503.1

WATER VOLUME:

Depth to Bottom of Casing: _____

Depth to Water: _____

Total Water Column (feet): _____

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x _____ = _____ x3 = _____

PURGING METHOD: Dedicated Pump

Disposition of Purged Water: Baker Tank Gallons

FIELD ANALYSIS:

	20	40	60				
pH:							
Temperature (°C):	24.6	24.8	24.8				
Conductivity (µmhos):							
Turbidity (NTU):							
~~ORP~~: DO %	4.3	4.5	4.4				
Dissolved Oxygen: mg/l	0.33	0.35	0.34				

TOTAL VOLUME OF WATER PURGED: 60 gallons

Sample ID: _____

Sample Analyzed for: _____

Laboratory: _____

Chain-of-Custody #: _____

QST ENVIRONMENTAL
Well Sampling Data

Site ID: Estes **Date:** 07/08/99

Well ID: EW-PZ1 **Time:** 1115

Sampled By: PJH **QST Project #:** 669903.1

WATER VOLUME:

Depth to Bottom of Casing: _____

Depth to Water: _____

Total Water Column (feet): _____

MAXIMUM PURGE VOLUME:

5-inch well: 1.02 x _____ = _____ x3 = _____

4.5-inch well: 0.826 x _____ = _____ x3 = _____

PURGING METHOD: Portable Grund for 2" pump

Disposition of Purged Water: Baker Tank

FIELD ANALYSIS:

	gallons 20	30	40				
pH:							
Temperature (°C):	27.0	27.6	27.8				
Conductivity (µmhos):							
Turbidity (NTU):							
~~ORP~~: DO %	5.3	5.4	5.5				
Dissolved Oxygen: mg/l	0.39	0.40	0.40				

TOTAL VOLUME OF WATER PURGED: 40 gallons

Sample ID: _____

Sample Analyzed for: _____

Laboratory: _____

Chain-of-Custody #: _____

hydroGEOPHYSICS, Inc.

May 10, 1999 (*amended*)

Mr. John Mieher, R.G.
QST Environmental
426 N. 44th St., Suite 110
Phoenix, Arizona 85008

Re: Geophysical Survey Results for Estes Landfill Borehole Sites

(*amended - changes shown in italics*)

Dear John,

The purpose of this letter report is to describe the logistics, results, and interpretation of geophysical surveys that were completed at the former Estes Landfill Site located in Phoenix, Arizona.

The main objective of the geophysical surveys was to "clear" the proposed borehole sites within a portion of the Estes Landfill.

The landfill is located on the south bank of the Salt River at 40th Street. The proposed borehole sites are within the current (relocated) landfill. Our geophysical investigation was limited to eight separate sites; each consisting of a 100-foot by 100-foot square area. On the attached plots of the geophysical survey results the preliminary monitoring well sites are plotted black ✡ symbols for reference. Recommended well sites based on geophysical results are shown as red ✡ symbols.

Recommended sites were chosen where it was interpreted that the original proposed sites were in areas of potentially high concentrations of landfill debris. Some (most) sites are so cluttered with debris so as to render them virtually "unclearable". Consequently, well sites recommended in those instances are simply the least of the evils and are not truly "cleared" of debris. Additionally, because of the masking effect of the near-surface debris, trash below 20 to 30 feet is extremely difficult to reliably detect, let alone characterize.

I. Types of Surveys & Logistics

The geophysical surveys were performed within eight grids, totaling 80,000 square feet of coverage. Three methods were initially proposed and tested on a single representative site; electromagnetic (EM) conductivity, magnetic gradiometry, and ground penetrating radar (GPR). Of the three types of surveys that were initially proposed and tested on one site, the GPR method was deemed to contribute minimal interpretation value and therefore was not used beyond the first test site. Based on preliminary results, magnetic gradiometer and EM conductivity surveys were conducted within all grid areas.

Mr. Bart Stewart, Chief Surveyor, completed all surveys beginning Monday, April 26, through Wednesday, April 28, 1999.

Each grid area was centered on preliminary monitor well locations. A few are off center due to fill patterns or other logistical reasons. Each grid was measured using chain and compass. Grid corners were staked and painted with orange paint on the ground. Ten foot grid lines were similarly painted along the northern and southern boundaries of the grids.

A. Electromagnetic Conductivity Survey

The EM survey for each grid was completed using a Geonics EM-31 ground conductivity meter. Data were recorded continuously along lines with a 5-foot spacing. Data density along the lines is approximately one data point every 2 feet. Loop orientation was horizontal (vertical axis) and boom orientation was in-line. Both quadrature (conductivity) and in-phase (metal detection) data were recorded. The EM-31 survey data are presented in color-contoured plan on Figures 14-em, 15-em, 16-em, 17-em, 18-em, 19-em, 20-em and 21-em.

The relatively shallow depth of investigation of the EM-31 conductivity meter is determined by the frequency used (<10,000 Hz), the loop spacing (12 feet), and the loop orientation (horizontal). Deeper seeking EM systems lack the surface resolution necessary to clear the shallow area around a borehole site.

B. Magnetics Survey

The magnetic gradiometer survey for each grid was completed using a Geometrics G-858G cesium vapor magnetometer-gradiometer. Data were recorded continually along 5-foot spaced lines. Data density along the lines is approximately two data points per 1 foot. The magnetics survey data are presented in color-contoured plan on Figures 14-mag, 15-mag, 16-mag, 17-mag, 18-mag, 19-mag, 20-mag and 21-mag.

Depth of investigation in magnetic surveying is determined by the wavelengths of the responses. Since the grids are limited in size to 100 feet, the logical cutoff for depth of investigation is no greater than half that spacing, or 50 feet. The gradiometer mode of operation is extremely sensitive to very shallow (<5 feet) ferrous debris.

II. Survey Results & Interpretation

A. Electromagnetic Conductivity (EM-31) Survey

For each grid area, two components of the EM field are presented: quadrature conductivity and in-phase response. The maximum depth of investigation of the EM-31 system is approximately 20 feet, but most data represent a volume average of all material occurring from the surface to 20 feet.

Data are contoured with blues (cold colors) representing low conductivities and reds (hot colors) representing high conductivities. Yellow colors represent background for the area.

Conductivity highs and lows for this survey are local and may or may not compare in magnitude with other surveys. High concentrations of metal will produce strong negative responses in both the conductivity and in-phase data. Geologic target responses generally show as modest deviations from background.

The salient characteristic of each of the EM plots is the somewhat uniform distribution of relatively small, closed-contour patterns. Overall, each site is virtually stippled with these small. These types of responses in both the conductivity and in-phase data can be attributed to buried debris. The higher amplitude, closed-contour responses simply represent larger, localized concentrations of metallic debris.

Broader or larger-area type responses (high or low conductivity) probably represent changes in soil characteristics or changes in a more uniform distribution of landfill material.

On a few grids a decrease in conductivity parallel to the landfill edge (and parallel to the appropriate grid boundary) is indicated. This is likely due to the decrease in moisture content observed at the edges of elevated landfills.

B. Magnetics Survey

For each grid area, two components of the magnetics survey are presented: total field and vertical gradient responses. The magnitude of magnetic responses are a function of both depth of burial and size of causative body.

Data are contoured with blues (cold colors) and reds (hot colors) that represent mostly dipolar responses. Yellow colors represent background for the area. Magnetic highs and lows for each grid area are local and may or may not compare in magnitude with other grid areas. High concentrations of metal will produce strong, localized dipolar responses in both the vertical gradient and total field data. Geologic target responses generally show as modest linear responses from background, mostly noticeable in total field plots.

Based on the pattern of the magnetic responses, most of the EM-31 responses are correlated with and probably attributable to buried debris. Overall, each site is moderately to severely stippled with small to medium magnetic responses. This is attributed to ferrous debris.

III. Conclusions and Recommendations

The most salient responses observed in the data are related to landfill debris. Each site evaluated has numerous indications of shallow conductive and ferrous metallic signatures. Specific recommendations for any proposed relocations of the originally proposed borehole locations are dependent on the presence of low gradients in all four plots in the same area. For the most part, this virtually eliminates 80 to 90 percent of each surveyed site because of the high density of landfill debris. Nevertheless, locations deemed the best under the circumstances have been determined and are presented here. Following in sequential order, the proposed location of borings is discussed.

1. B-14 Area

B-14 site is the westernmost site of those surveyed. The originally proposed borehole site was at grid location (50E,50N). The new proposed borehole site is placed at grid location (90E, 15N).

2. B-15 Area

B-15 site was the first site surveyed for the proof-of-concept test. The originally proposed borehole site was at grid location (50E, 50N). The new proposed borehole site is placed at grid location (55E, 95N). Note the strong total-field magnetic and vertical magnetic gradient responses in the vicinity of grid location (95E,40N). This is the location of the twinned shallow boreholes evident on the surface.

3. B-16 Area

☞ B-16 site was located near the northern edge of the landfill. The grid was displaced thirty feet to the south so that the originally proposed borehole was at grid location (50E,80N). The new proposed borehole site is placed at grid location (90E,75N). *This grid is canted approximately 26 degrees west of north so that the north grid boundary is parallel with the landfill boundary.*

4. B-17 Area

☞ B-17 site is located just west of the depression where an old production well is located. The originally proposed borehole site was at grid location (*70E, 50N*). The new proposed borehole site is placed at grid location (90E,05N).

5. B-18 Area

B-18 site is located east of site B-16. The originally proposed borehole site was at grid location (50E,50N). The new proposed borehole site is placed at grid location (25E,15N).

6. B-19 Area

B-19 site is located along the south boundary of the landfill. The grid was displaced twenty feet to the north so that the originally proposed borehole was at grid location (50E,30N). The new proposed borehole site is place at grid location (80E,10N).

7. B-20 Area

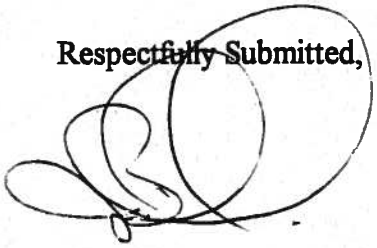
B-20 site is the northeasternmost site. The originally proposed borehole site was at grid location (50E,50N). The new proposed borehole site is placed at grid location (80E,15N).

8. B-21 Area

B-21 is the southeasternmost site. The originally proposed borehole site was at grid location (50E,50N). The new proposed borehole site is placed at grid location (90E,90N).

Thank you for allowing us to be involved with this project. If you have questions, concerns or comments, please call.

Respectfully Submitted,



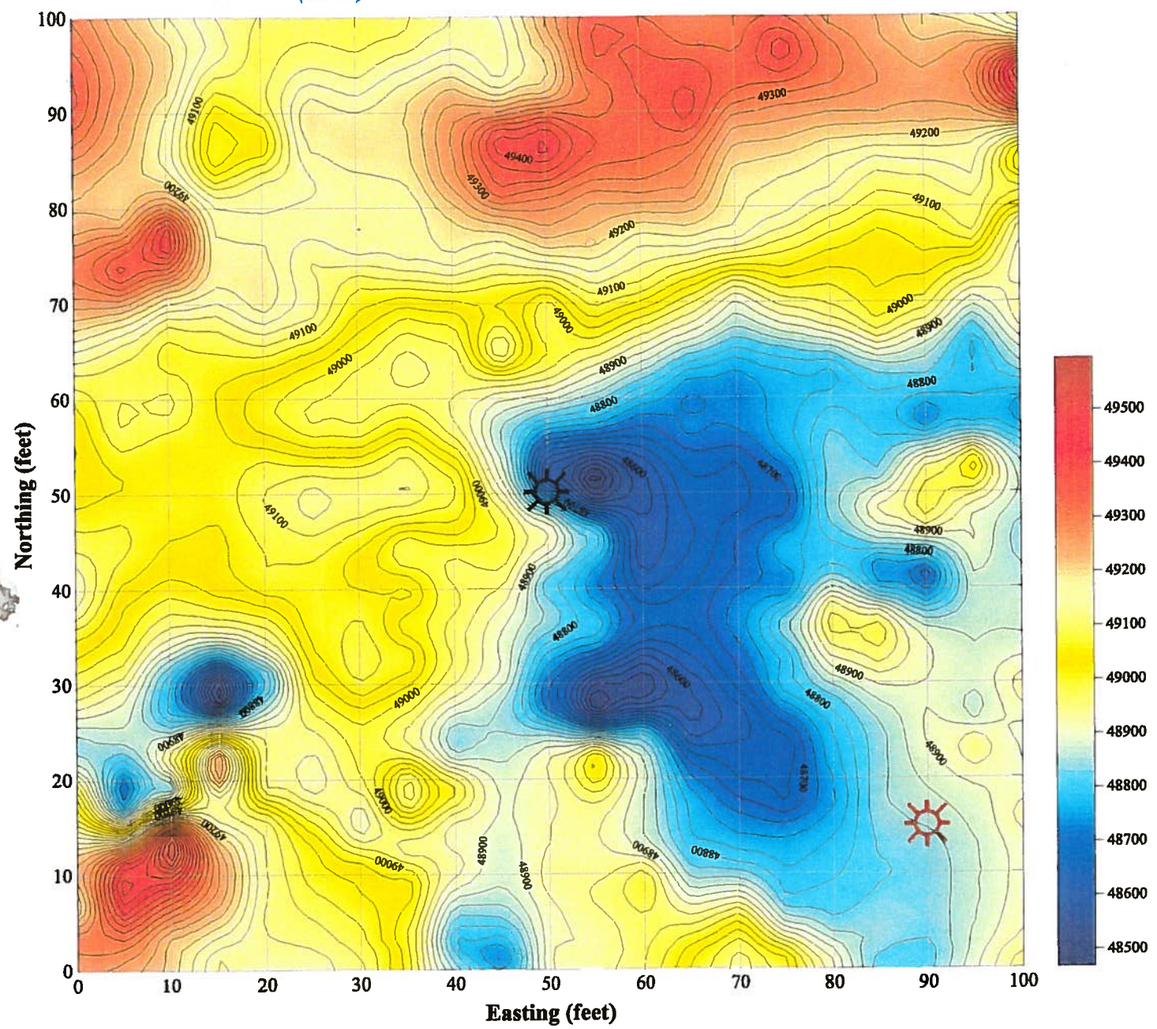
James B. Fink, Ph.D., P.E. (geophysical)
President

Copy/files
Enclosures/ Figures 14-em, 15-em, 16-em, 17-em, 18-em, 19-em, 20-em, 21-em,
14-mag, 15-mag, 16-mag, 17-mag, 18-mag, 19-mag, 20-mag, 21-mag

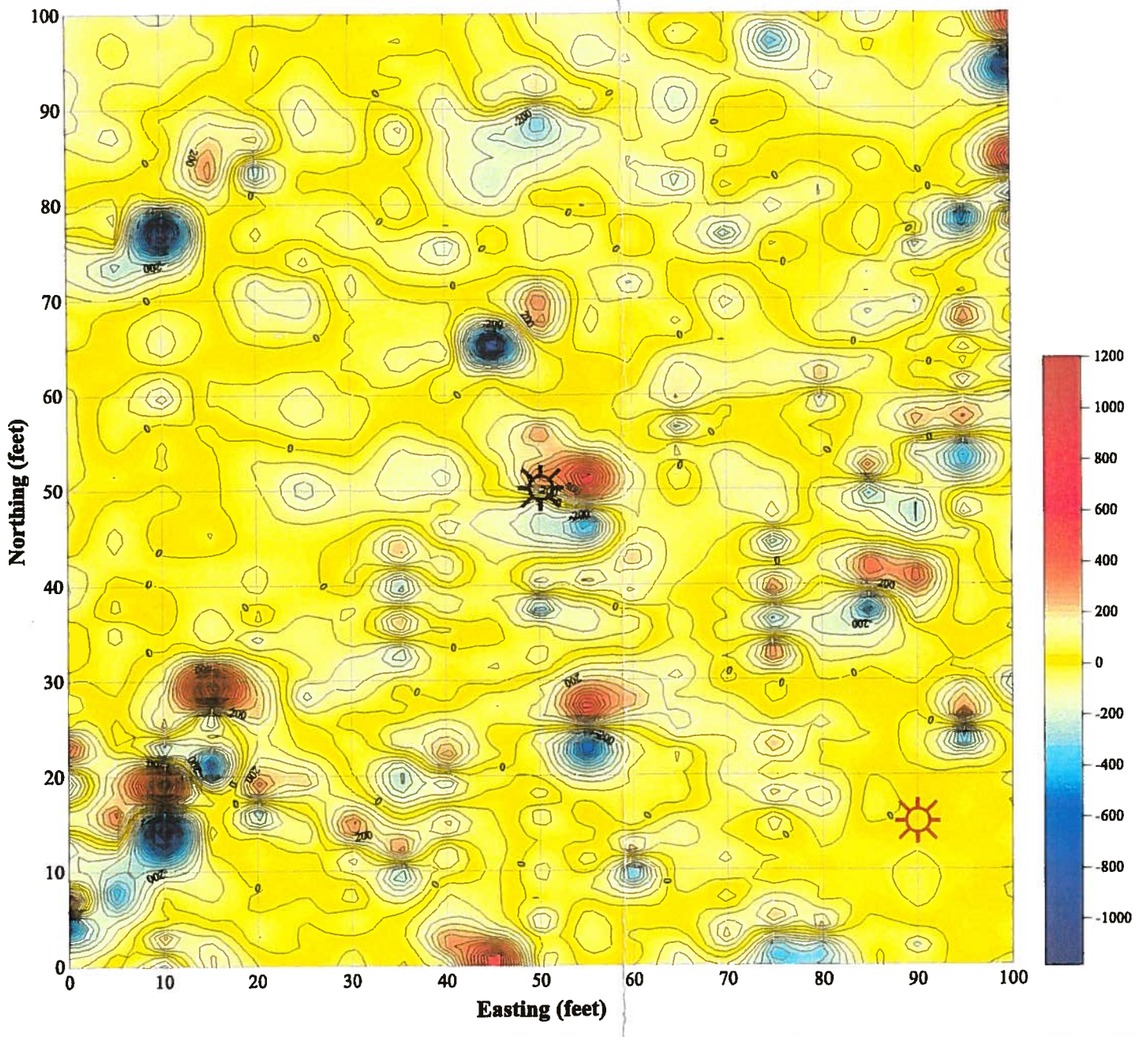
\\Jim\e\JOBS\QST Estes Landfill\Letter Report, Estes Landfill Borehole Site Clearing.wpd

Proposed Boring Location "QST-B14"

Total Field (nT)



Vertical Gradient (nT)



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Recorder:	internal
Serial Number:	N/A

PROCESSING	
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Gridding Method:	Kriging
Cell Size:	100 rows X 100 columns
Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet)
0 5 10 15 20 25

..... originally proposed borehole location

..... revised borehole location

N

Magnetic Survey

QST Environmental
Estes Landfill
Phoenix, AZ

Date: *April 1999* **Fig.** *14-mag*

14742

FILE: B14-MAG.SRF B14MAG.DAT | 1999-027 | 05/07/99 12:26:19

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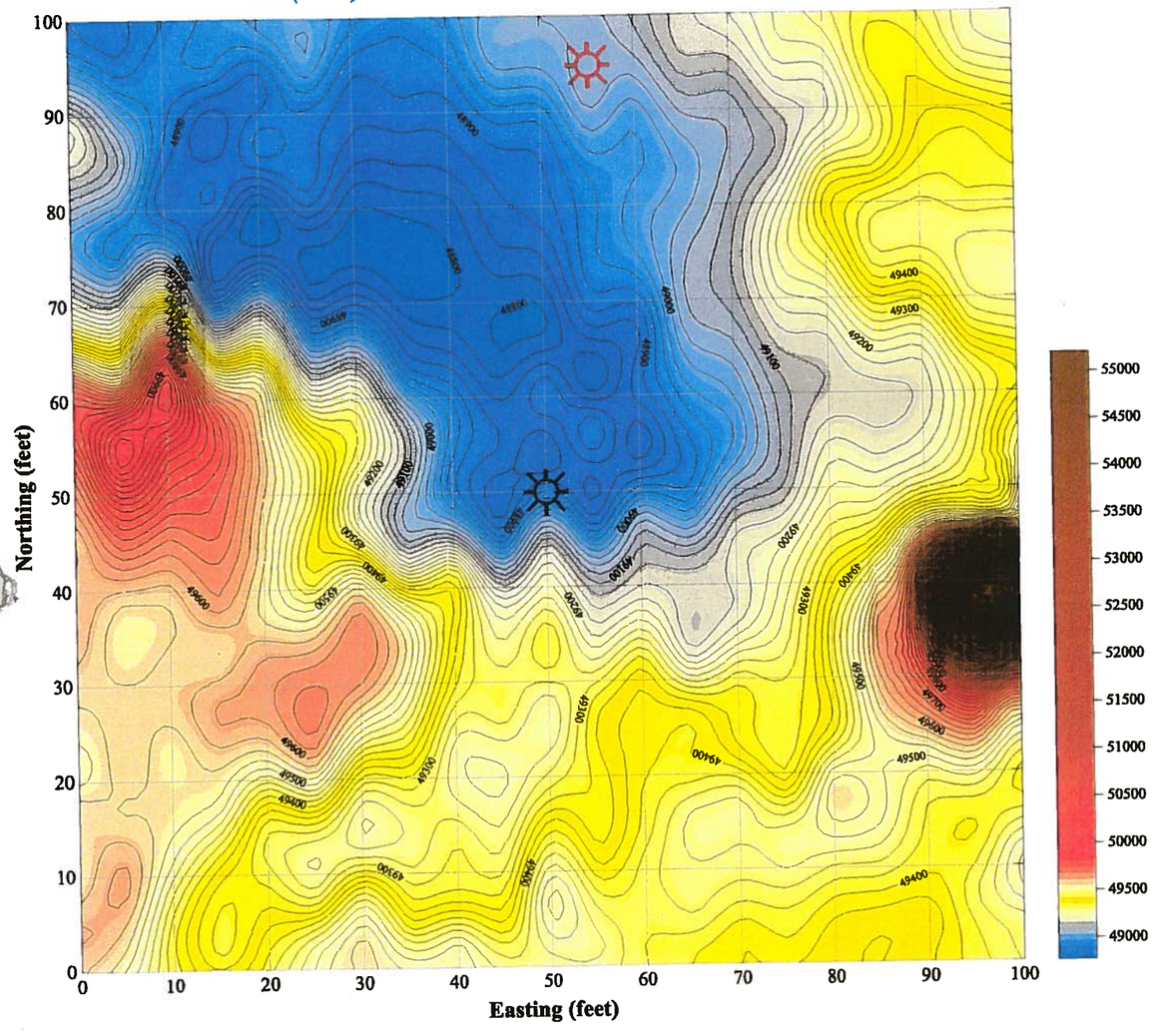
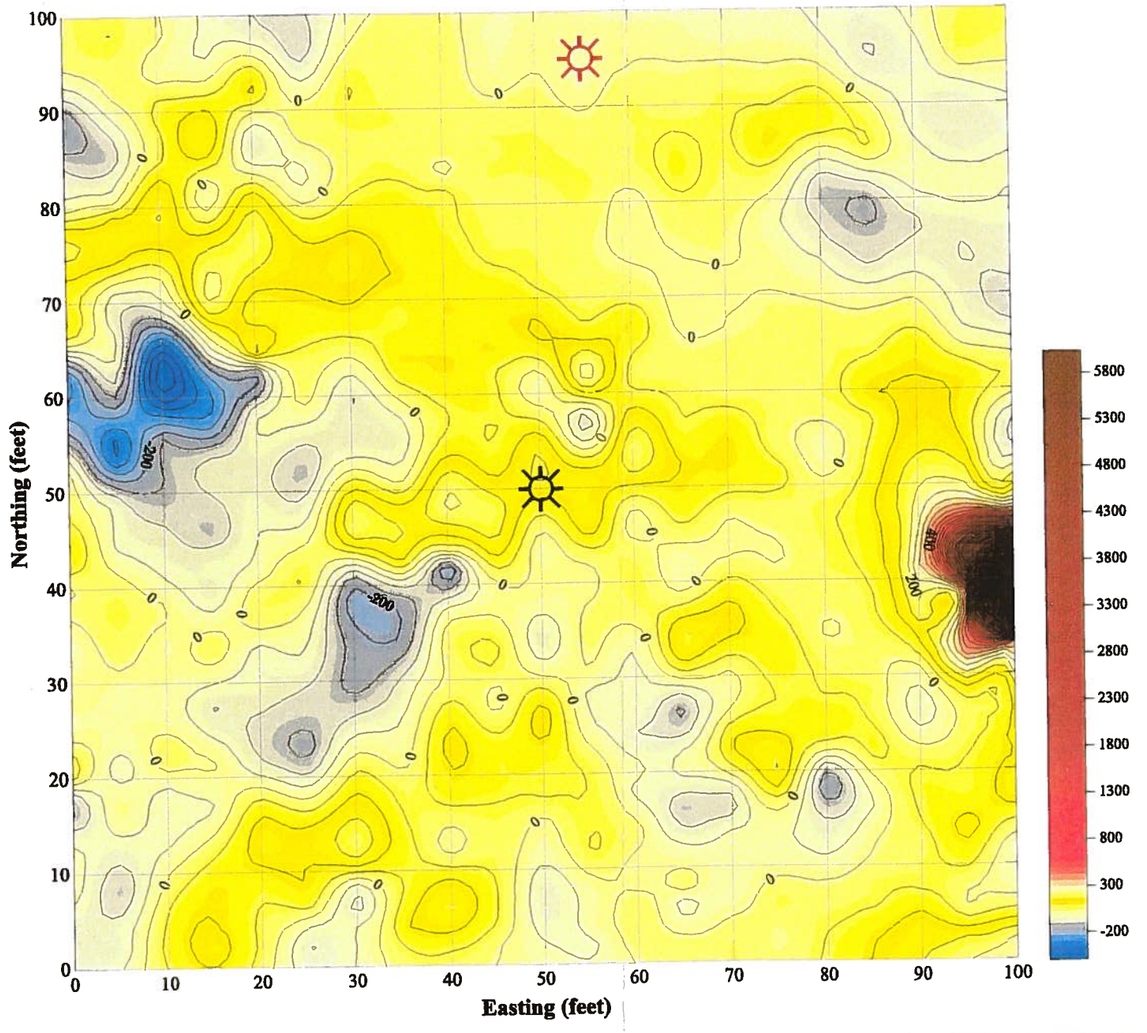
Proposed Boring Location "QST-B15"

Total Field (nT)



Vertical Gradient (nT)



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PROCESSING	
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Gridding Method:	Kriging
Cell Size:	100 rows X 100 columns
Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet)
0 5 10 15 20 25

..... originally proposed borehole location

..... revised borehole location

N

Magnetic Survey

QST Environmental
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Phoenix, AZ

14742

Date: *April 1999* **Fig.** *15-mag*

1999-027 | 05/10/99 10:10:08

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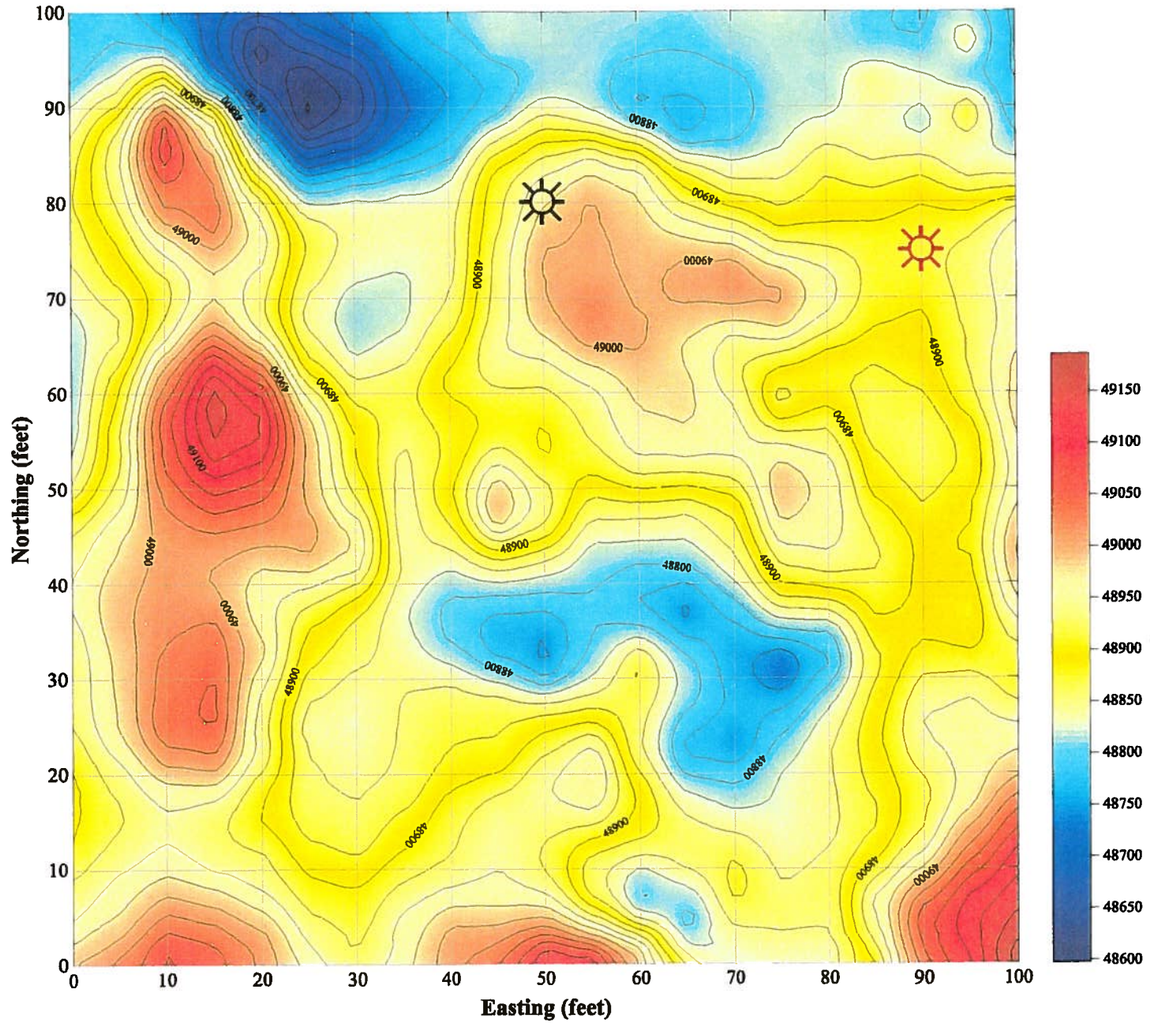
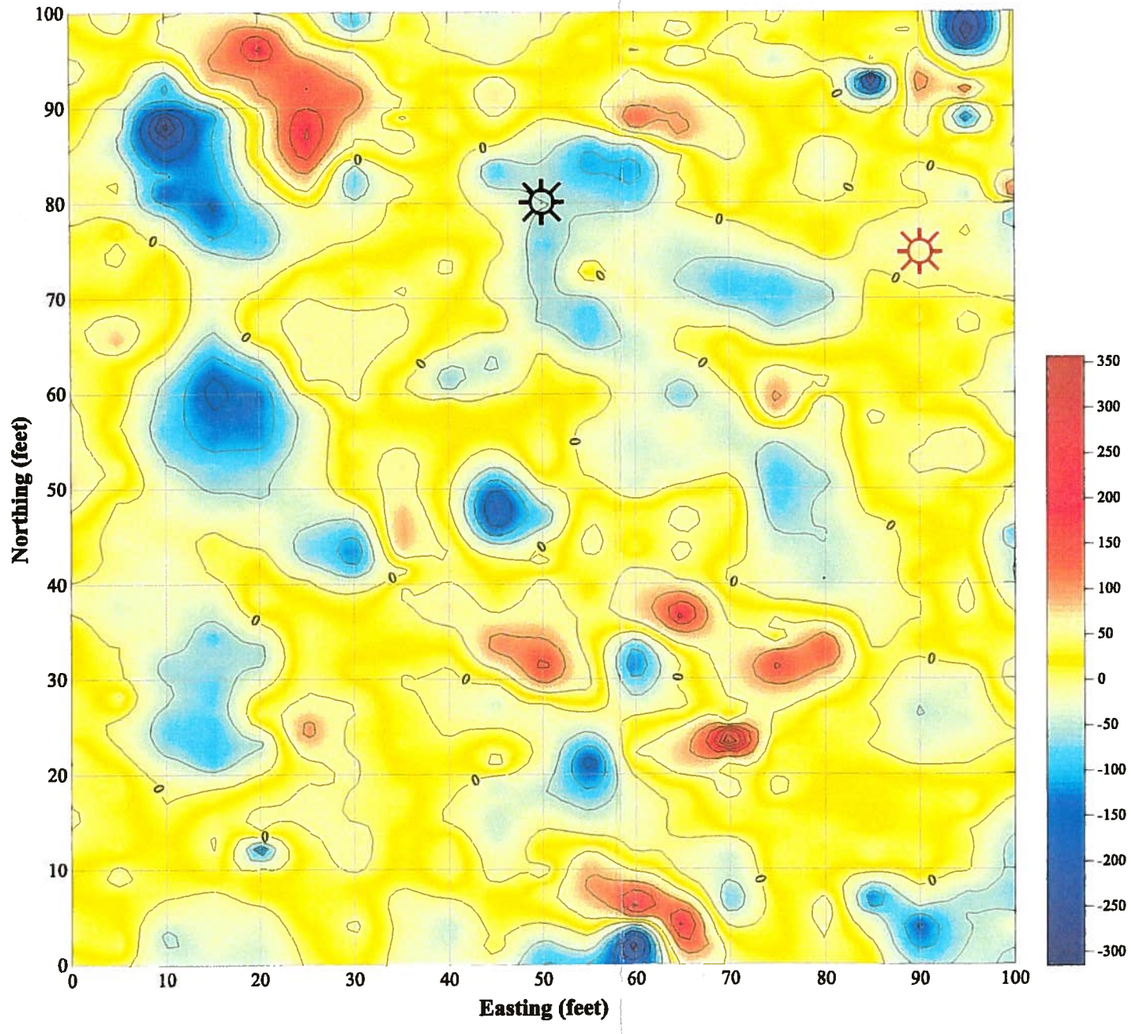
FILE: B15-MAG.SRF B15MAG.DAT

Proposed Boring Location "QST-B16"

Total Field (nT)



Vertical Gradient (nT)



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Recorder:	internal
Serial Number:	N/A

PROCESSING

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Gridding Method:	Kriging
Cell Size:	100 rows X 100 columns
Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet)
0 5 10 15 20 25

☼ ..... originally proposed borehole location

☼ ..... revised borehole location

N

Magnetic Survey

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Date: *April 1999* Fig. *16-mag*

FILE: B16-MAG.SRF B16MAG.DAT | 1999-027 | 05/07/99 12:19:07

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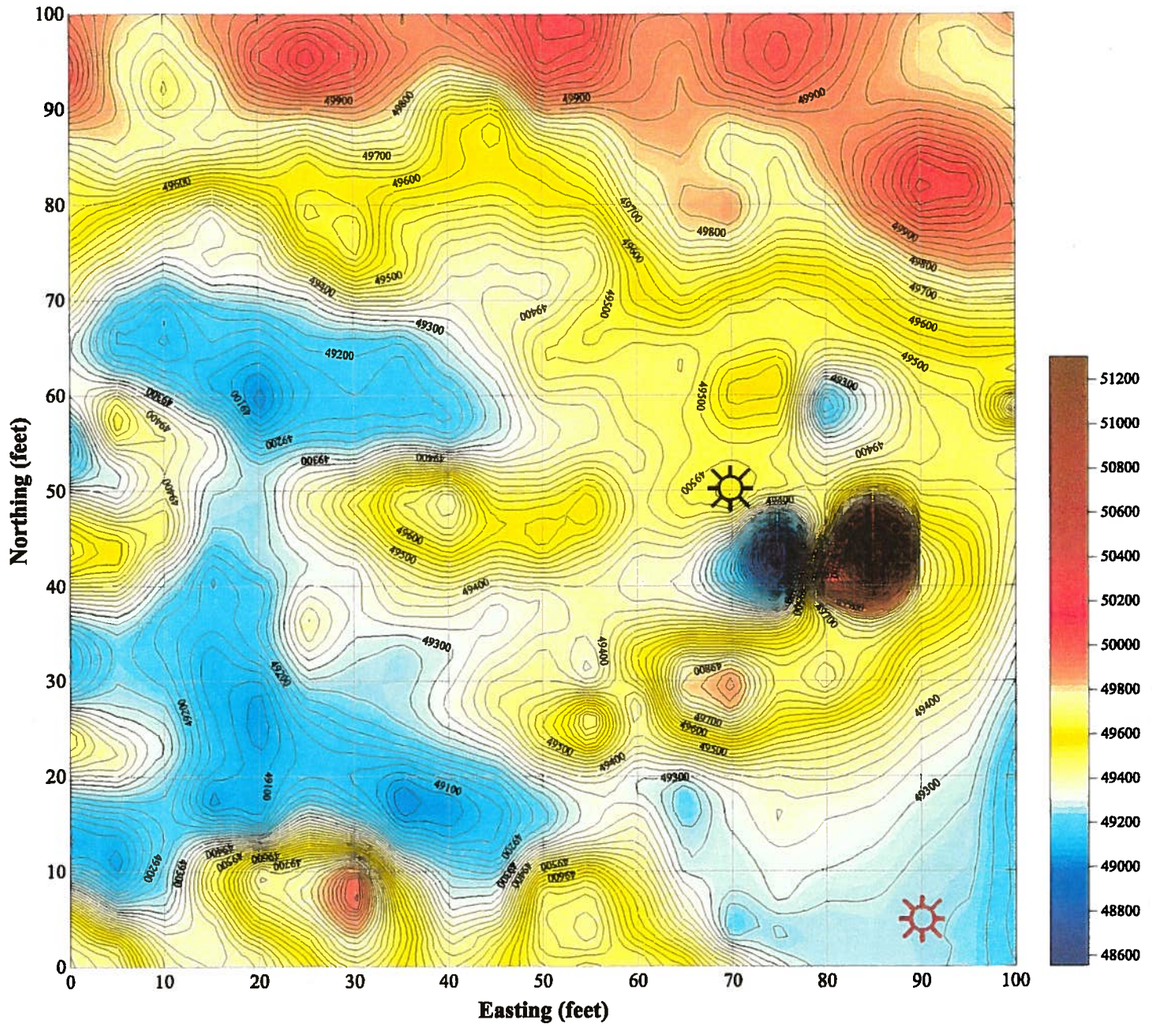
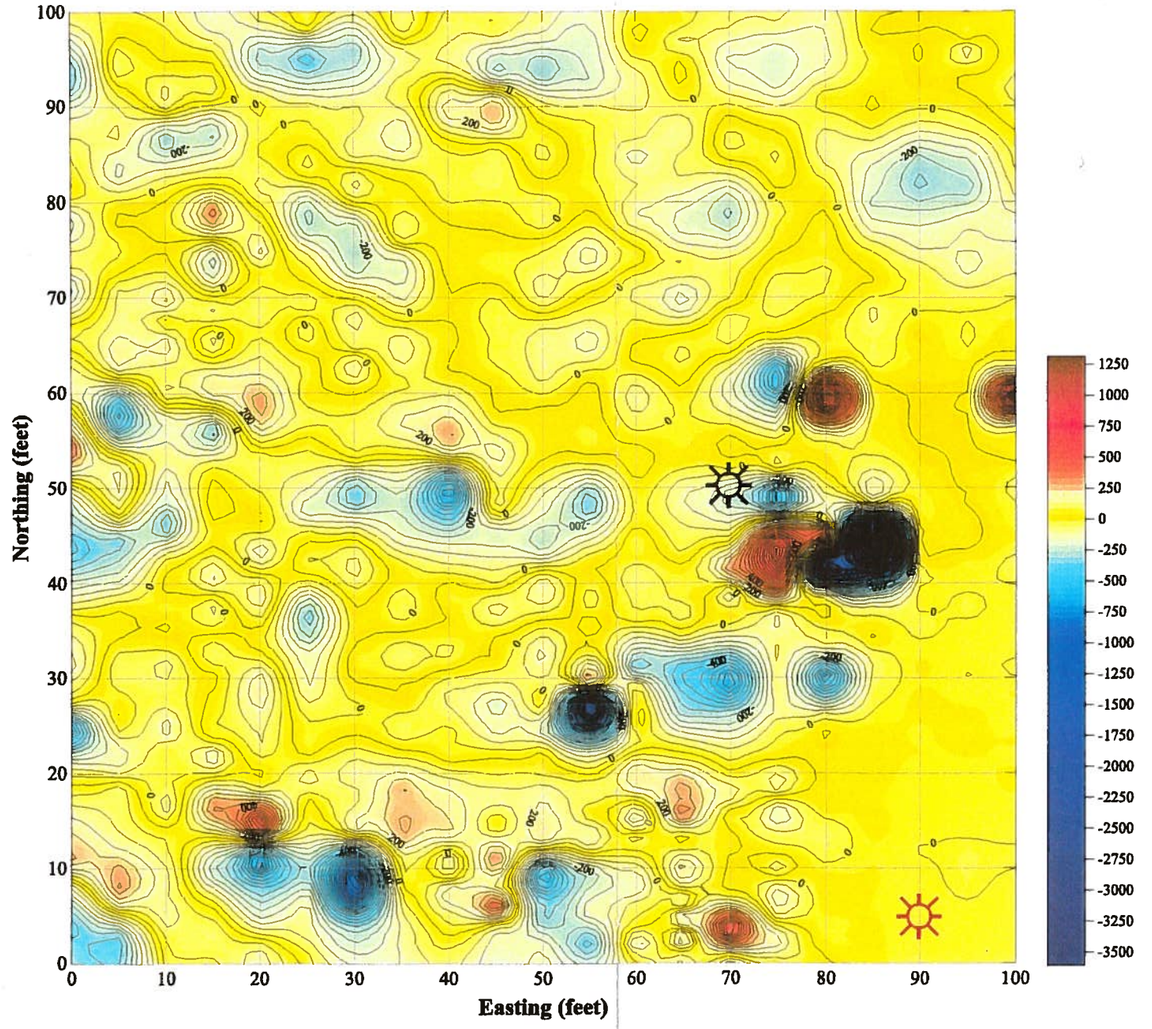
Proposed Boring Location "QST-B17"

Total Field (nT)



Vertical Gradient (nT)



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Recorder:	internal
Serial Number:	N/A

PROCESSING

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Gridding Method:	Kriging
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Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet)
0 5 10 15 20 25

☼ ..... originally proposed borehole location

☼ ..... revised borehole location

N

Magnetic Survey

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Phoenix, AZ

Date: *April 1999* | Fig. *17-mag*

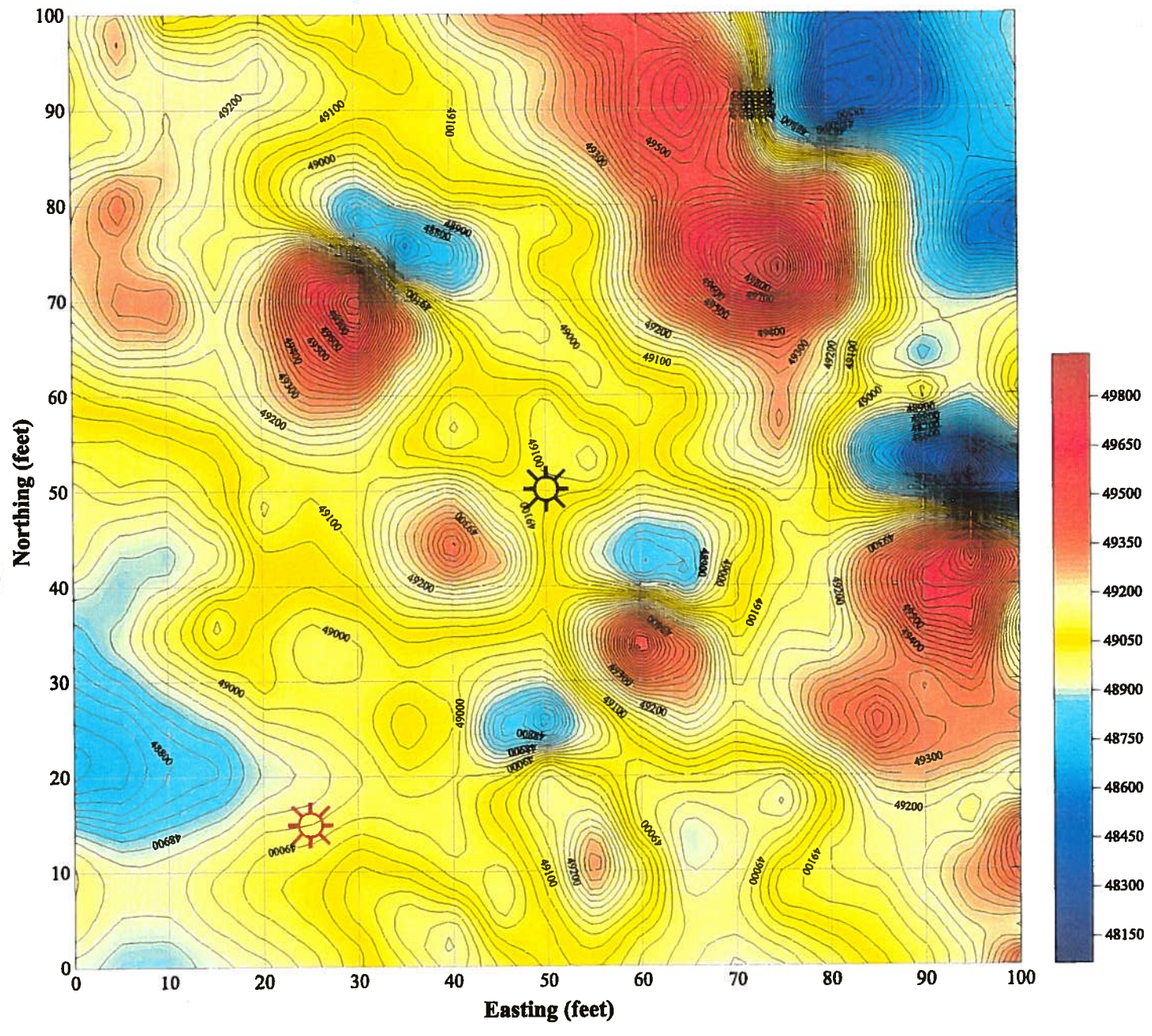
14742

FILE: B17-MAG.SRF B17MAG.DAT | 1999-027 | 05/07/99 12:14:30

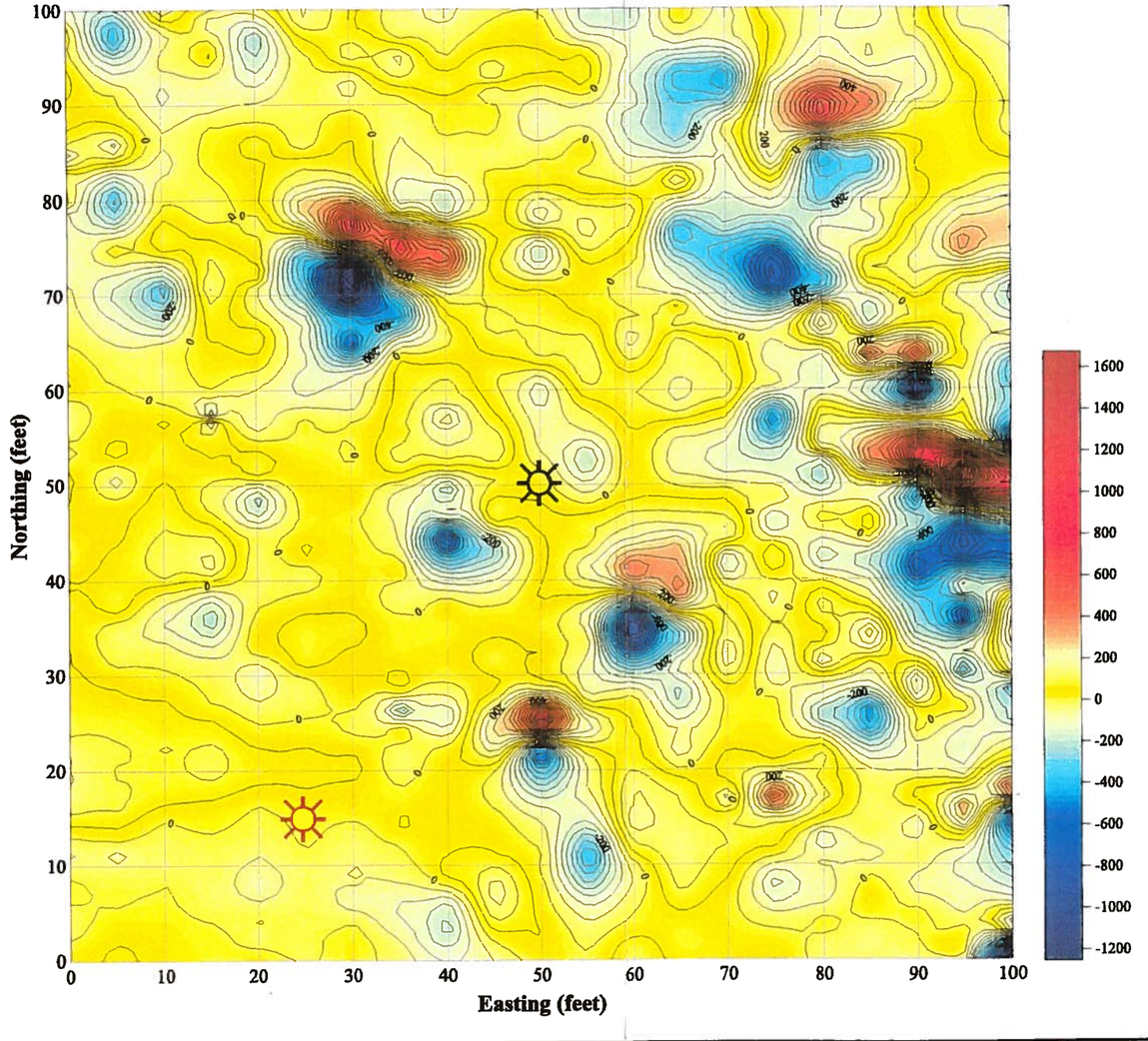
5865 S. Old Spanish Trail • Tucson, AZ 85747 • (520) 647-3315

Proposed Boring Location "QST-B18"

Total Field (nT)



Vertical Gradient (nT)



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PROCESSING	
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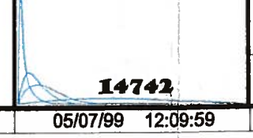
Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet)
0 5 10 15 20 25

..... originally proposed borehole location

..... revised borehole location

N



Magnetic Survey

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Estes Landfill
Phoenix, AZ

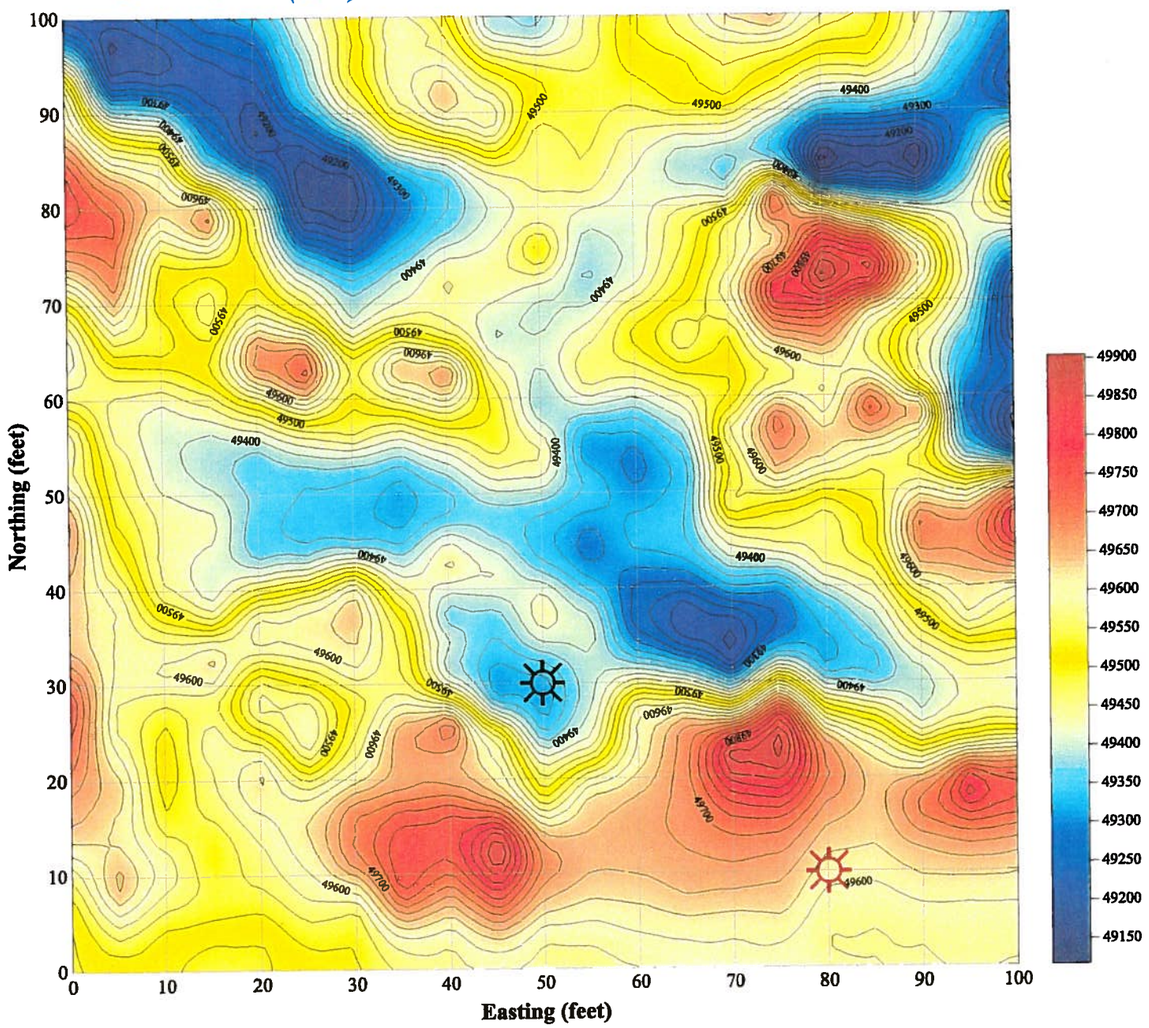
Date: *April 1999* | **Fig.** *18-mag*

FILE: B18-MAG.SRF B18MAG.DAT | 1999-027 | 05/07/99 12:09:59

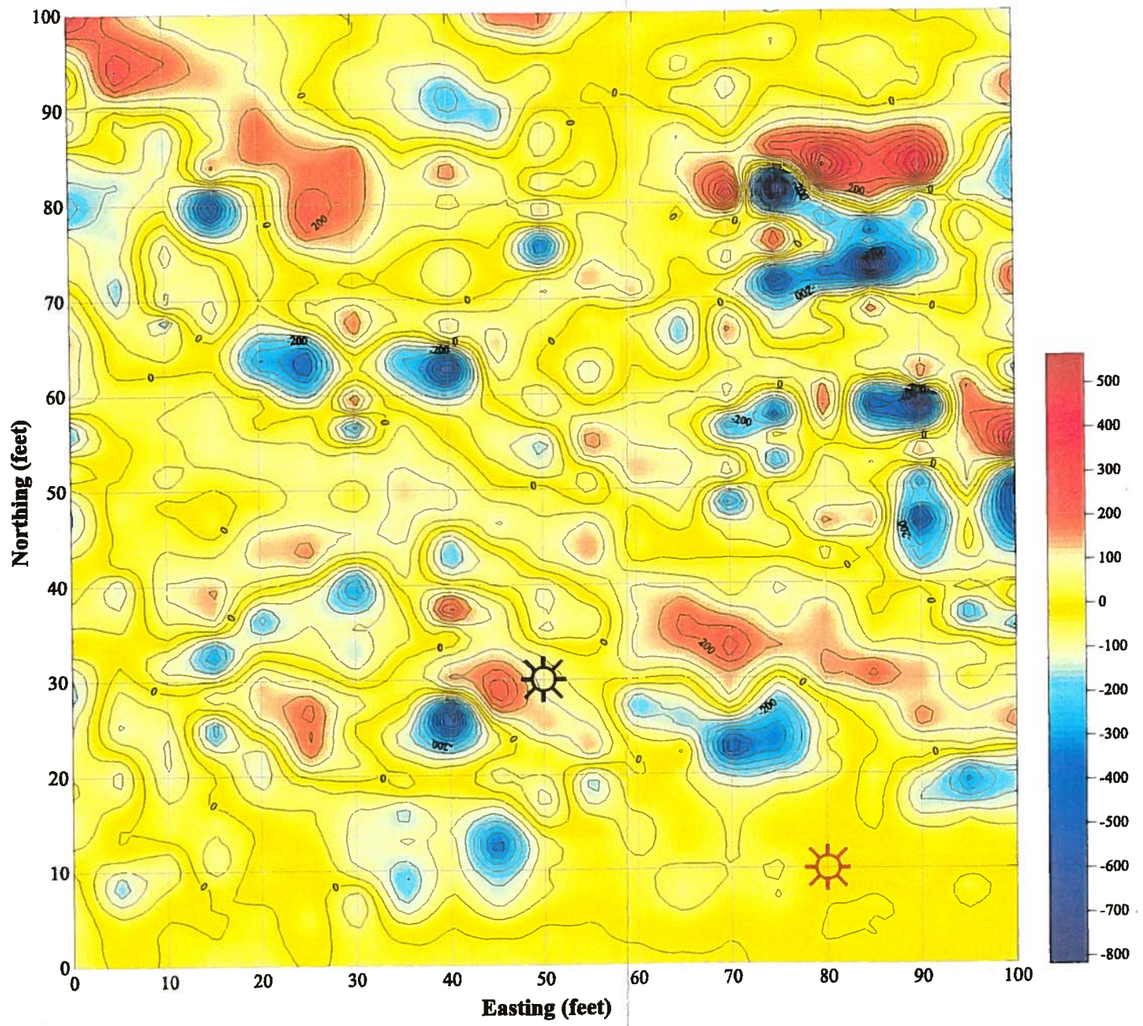
5865 S. Old Spanish Trail • Tucson, AZ 85747 • (520) 647-3315

Proposed Boring Location "QST-B19"

Total Field (nT)



Vertical Gradient (nT)



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Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet)
0 5 10 15 20 25

..... originally proposed borehole location
..... revised borehole location

N

Magnetic Survey

QST Environmental
Estes Landfill
Phoenix, AZ

Date: *April 1999* **Fig.** *19-mag*

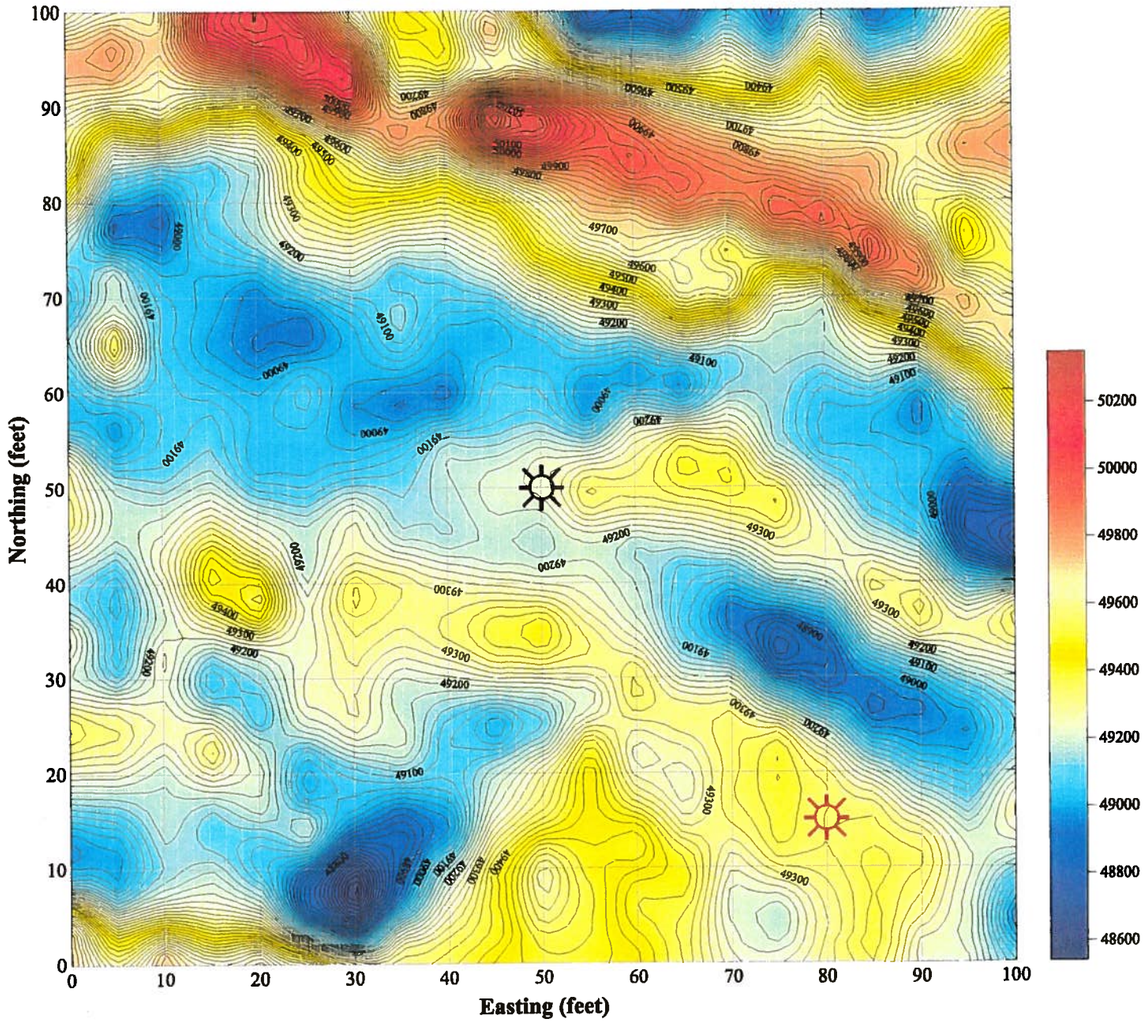
14742

FILE: B19-MAG.SRF B19MAG.DAT | 1999-027 | 05/07/99 12:05:14

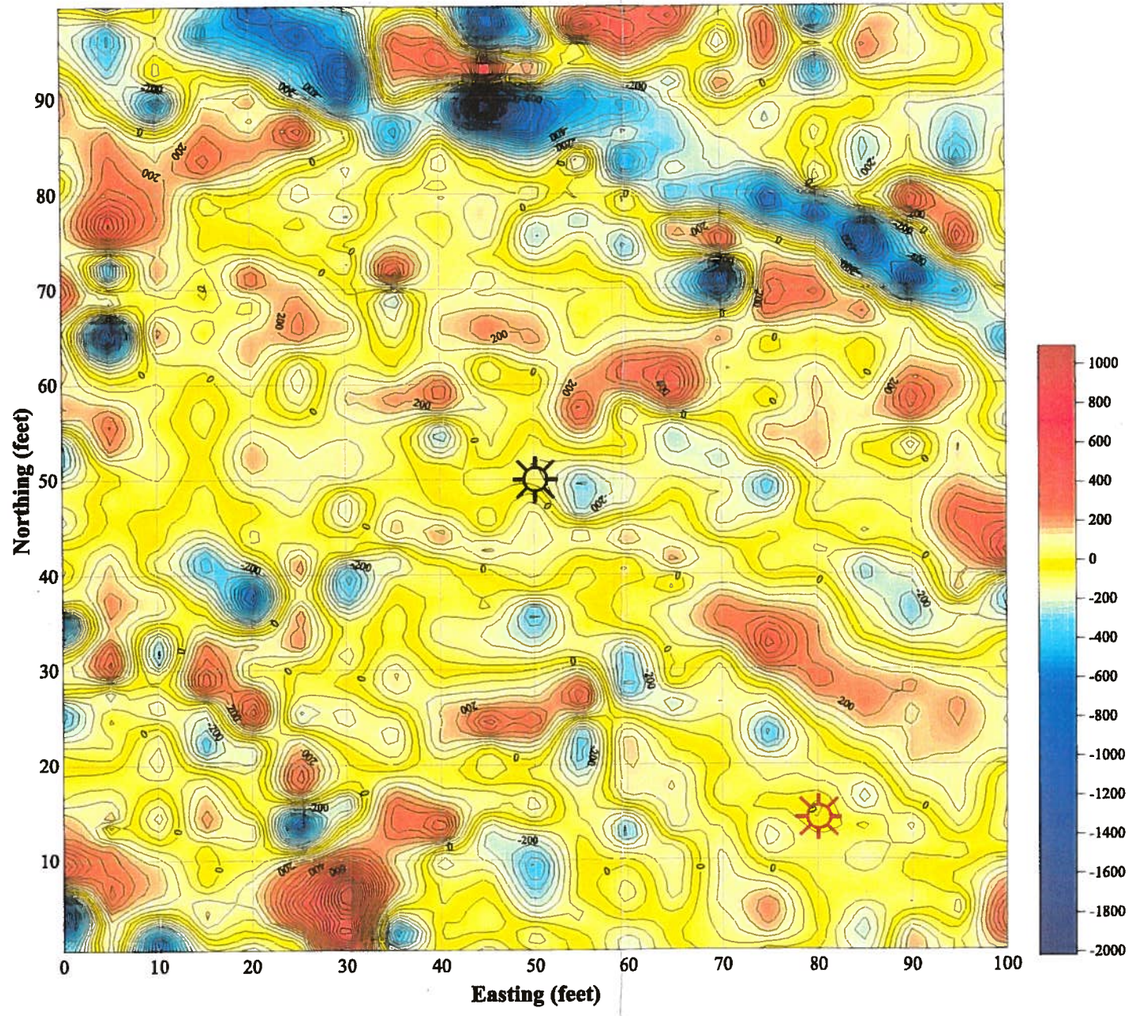
5865 S. Old Spanish Trail • Tucson, AZ 85747 • (520) 647-3315

Proposed Boring Location "QST-B20"

Total Field (nT)



Vertical Gradient (nT)



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PROCESSING	
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Gridding Method:	Kriging
Cell Size:	100 rows X 100 columns
Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet)
0 5 10 15 20 25

..... originally proposed borehole location

..... revised borehole location

N

Magnetic Survey

QST Environmental
Estes Landfill
Phoenix, AZ

Date: *April 1999* **Fig.** *20-mag*

14742

FILE: B20-MAG.SRF B20MAG.DAT | 1999-027 | 05/07/99 11:48:17

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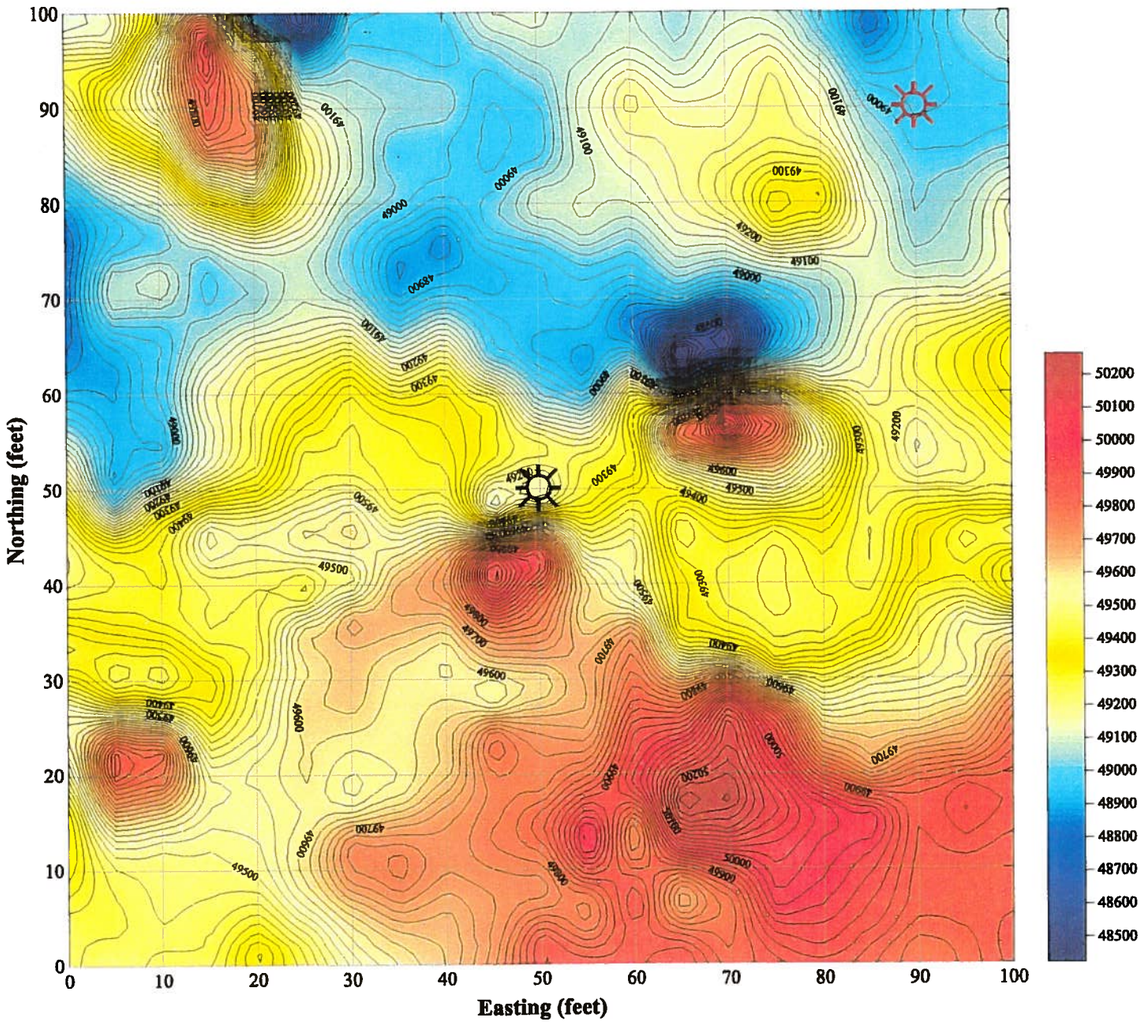
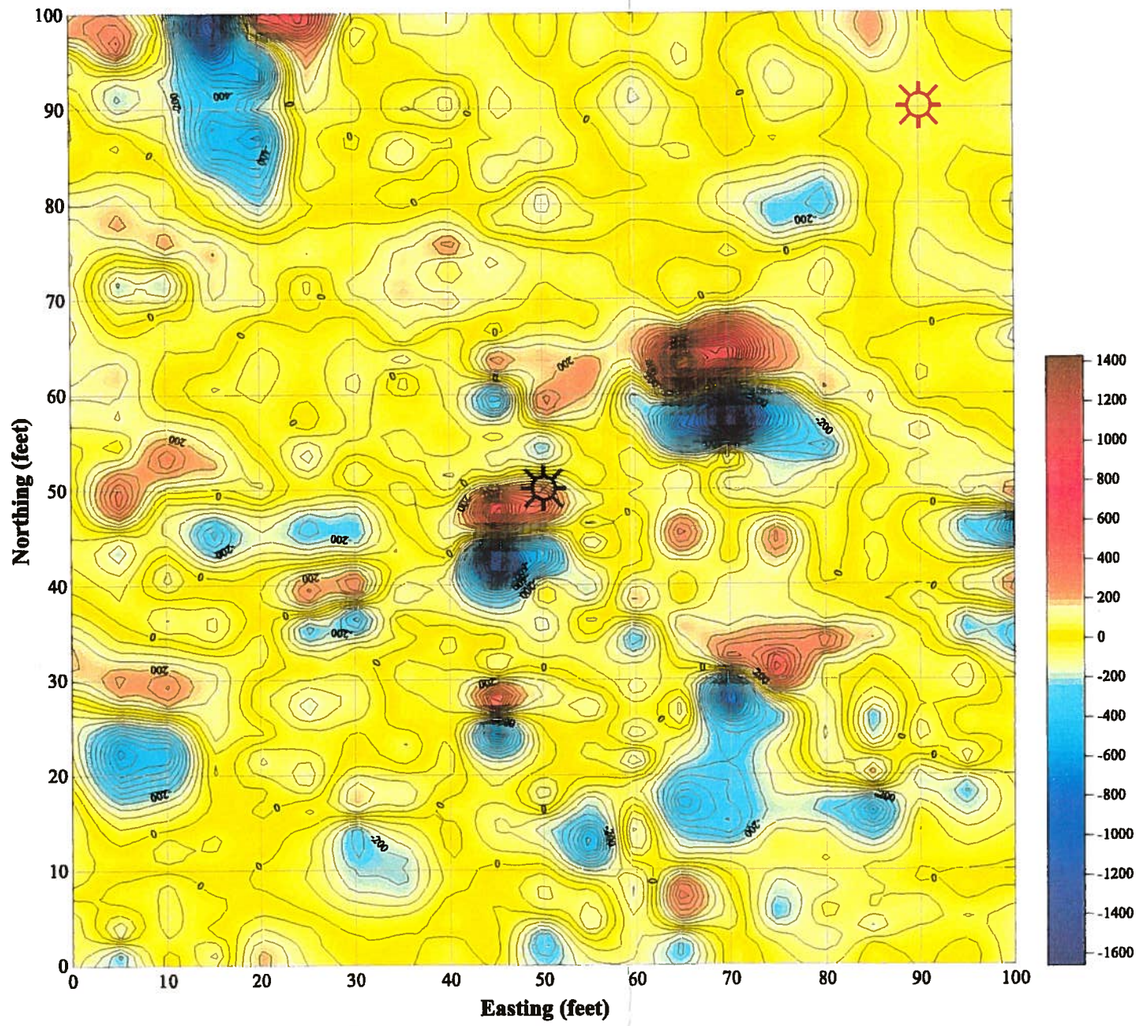
Proposed Boring Location "QST-B21"

Total Field (nT)



Vertical Gradient (nT)



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Recorder:	internal
Serial Number:	N/A

PROCESSING	
Filter:	None
Gridding Method:	Kriging
Cell Size:	100 rows X 100 columns
Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet)
0 5 10 15 20 25

..... originally proposed borehole location
..... revised borehole location

N

Magnetic Survey

QST Environmental
Estes Landfill
Phoenix, AZ

14742

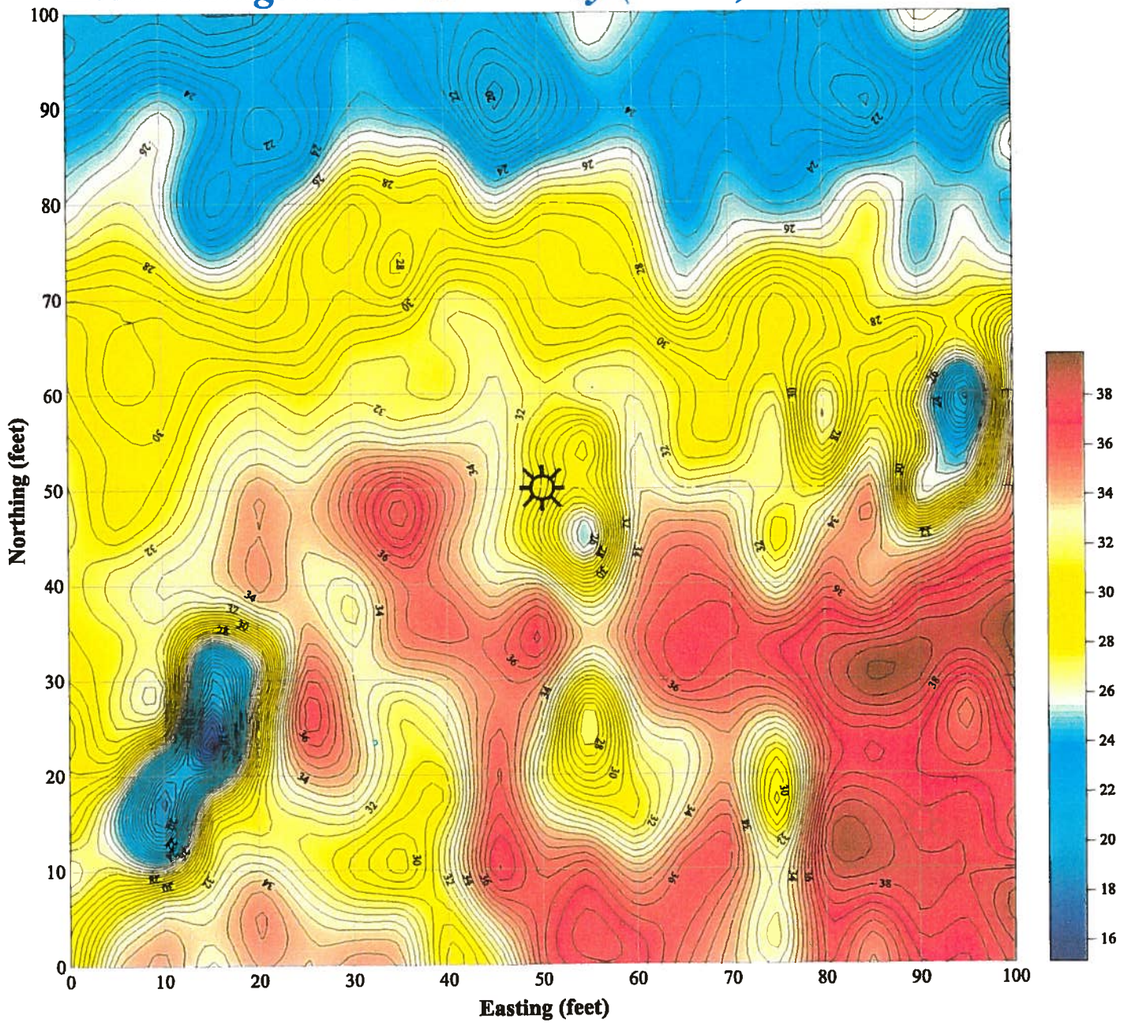
Date: *April 1999* | **Fig.** *21-mag*

FILE: B21-MAG.SRF B21MAG.DAT | 1999-027 | 05/10/99 10:15:55

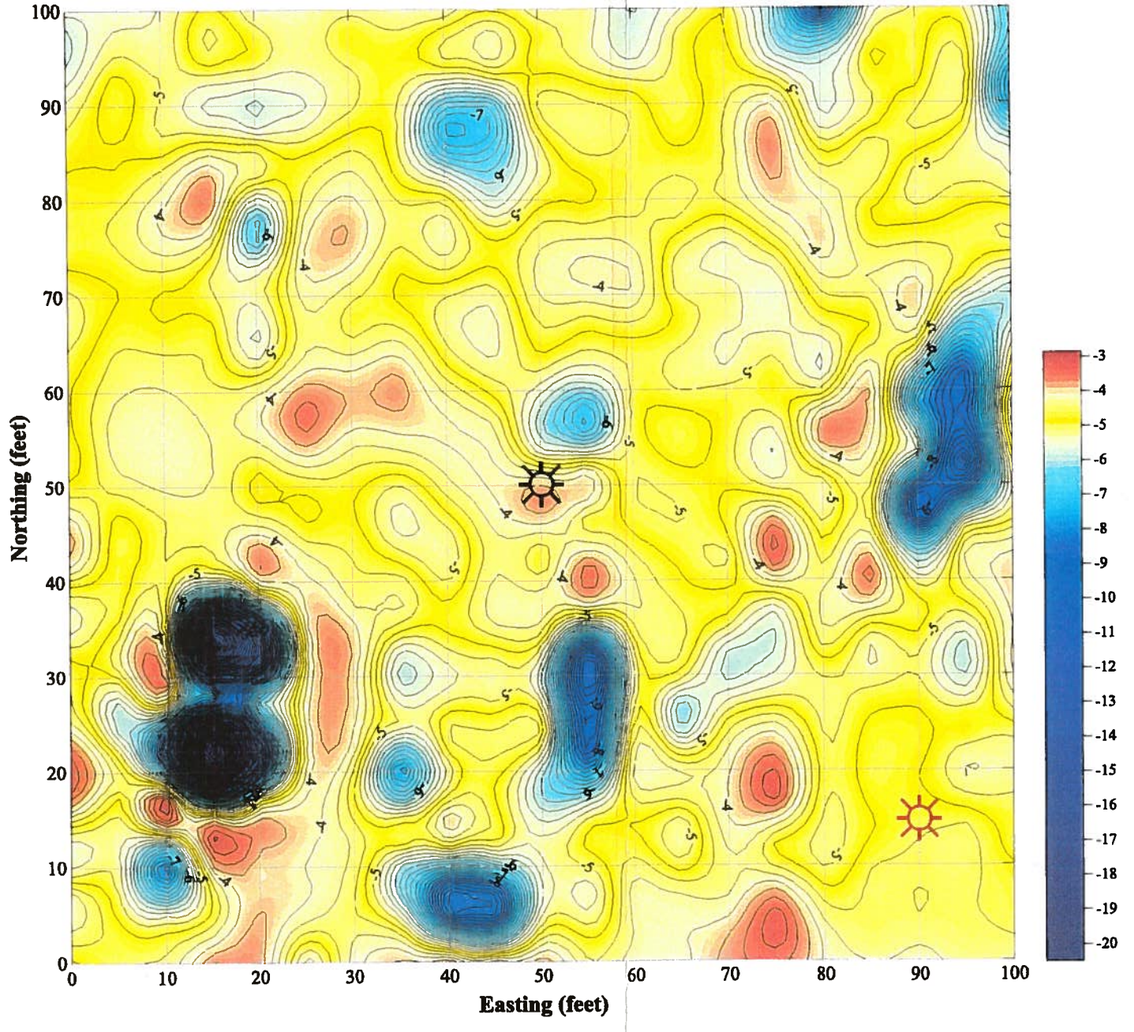
5865 S. Old Spanish Trail • Tucson, AZ 85747 • (520) 647-3315

Proposed Boring Location "QST-B14"

Electromagnetic Conductivity (mS/m)



Electromagnetic In-phase (ppt)



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Unit:	Geonics EM-31
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Sampling Interval:	0.5 seconds
Recorder:	Omnidata Polycorder
Serial Number:	P72-0377

PROCESSING

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Gridding Method:	Kriging
Cell Size:	100 rows X 100 columns
Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet)
0 5 10 15 20 25

☼ ..... originally proposed borehole location

☼ ..... revised borehole location

N

Electromagnetic Survey

14742

QST Environmental
Estes Landfill
Phoenix, AZ

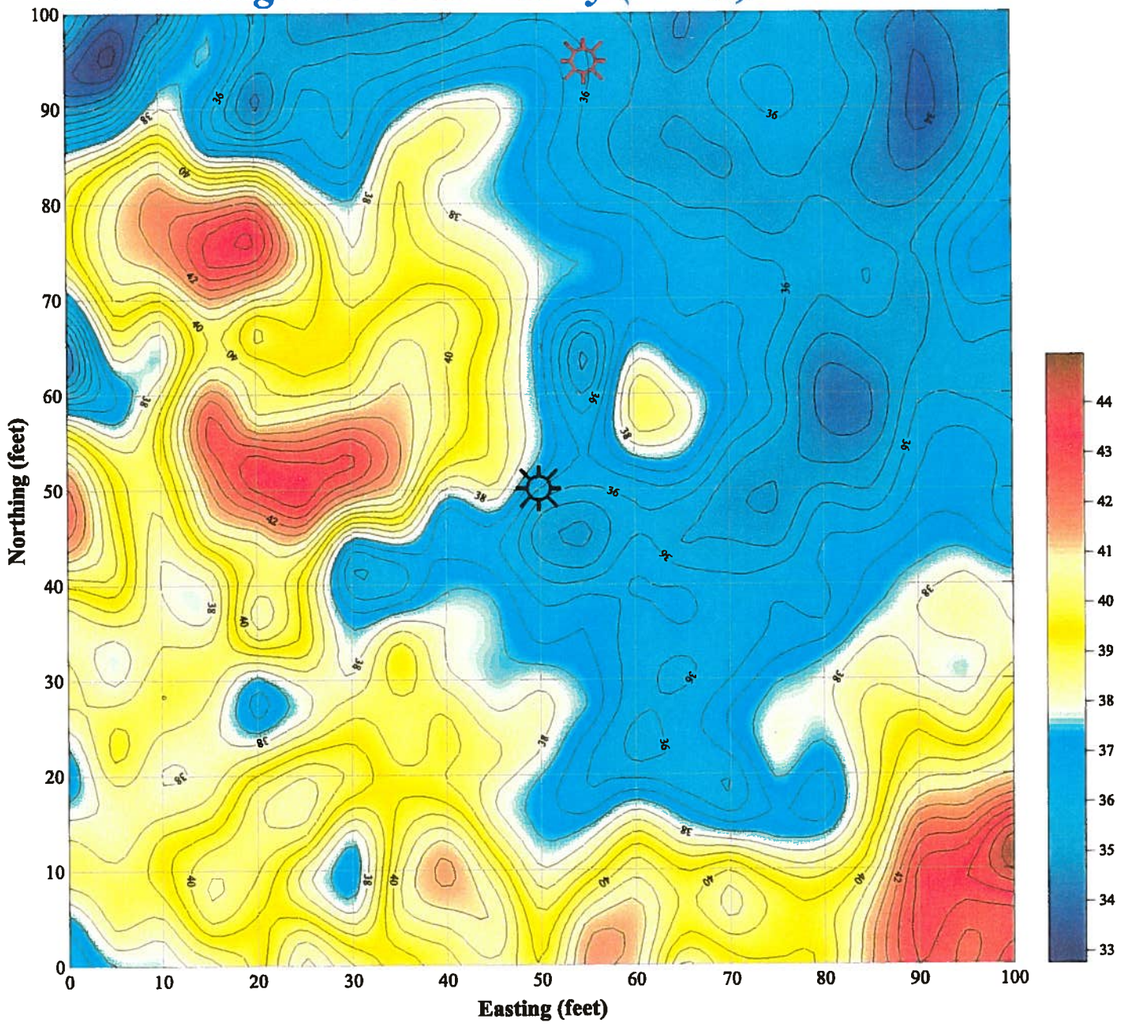
Date: *April 1999* **Fig.** *14-em*

FILE: B14-EM.SRF B14EM.DAT | 1999-027 | 05/07/99 11:17:48

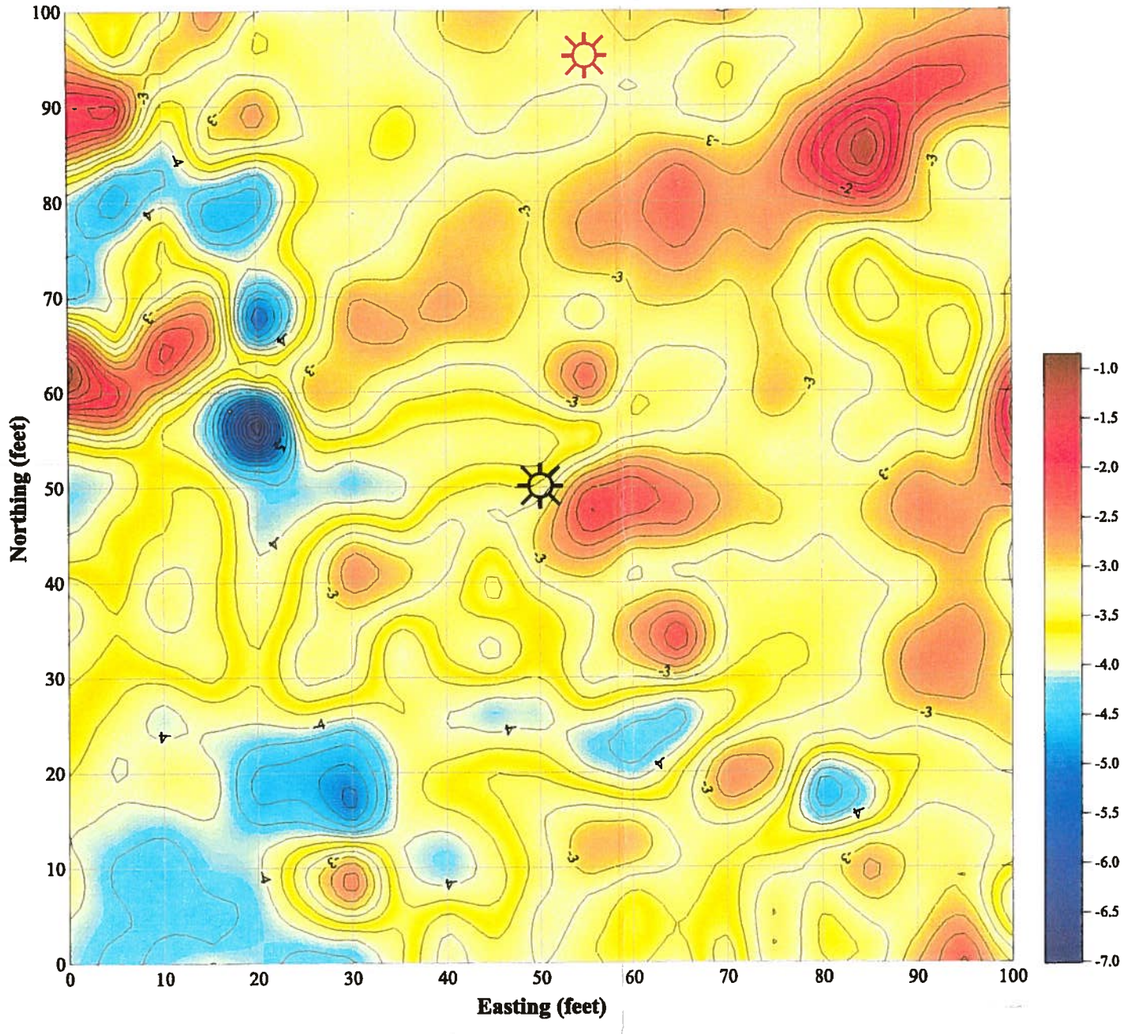
5865 S. Old Spanish Trail • Tucson, AZ 85747 • (520) 647-3315

Proposed Boring Location "QST-B15"

Electromagnetic Conductivity (mS/m)



Electromagnetic In-phase (ppt)



EQUIPMENT

Unit:	Geonics EM-31
Serial Number:	9315007
Sampling Interval:	0.5 seconds
Recorder:	Omnidata Polycorder
Serial Number:	P72-0377

PROCESSING

Filter:	None
Gridding Method:	Kriging
Cell Size:	100 rows X 100 columns
Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet)
0 5 10 15 20 25

..... originally proposed borehole location

..... revised borehole location

N

Electromagnetic Survey

QST Environmental
Estes Landfill
Phoenix, AZ

14742

Date: *April 1999* **Fig.** *15-em*

FILE: B15-EM.SRF B15EM.DAT | 1999-027 | 05/07/99 11:10:57

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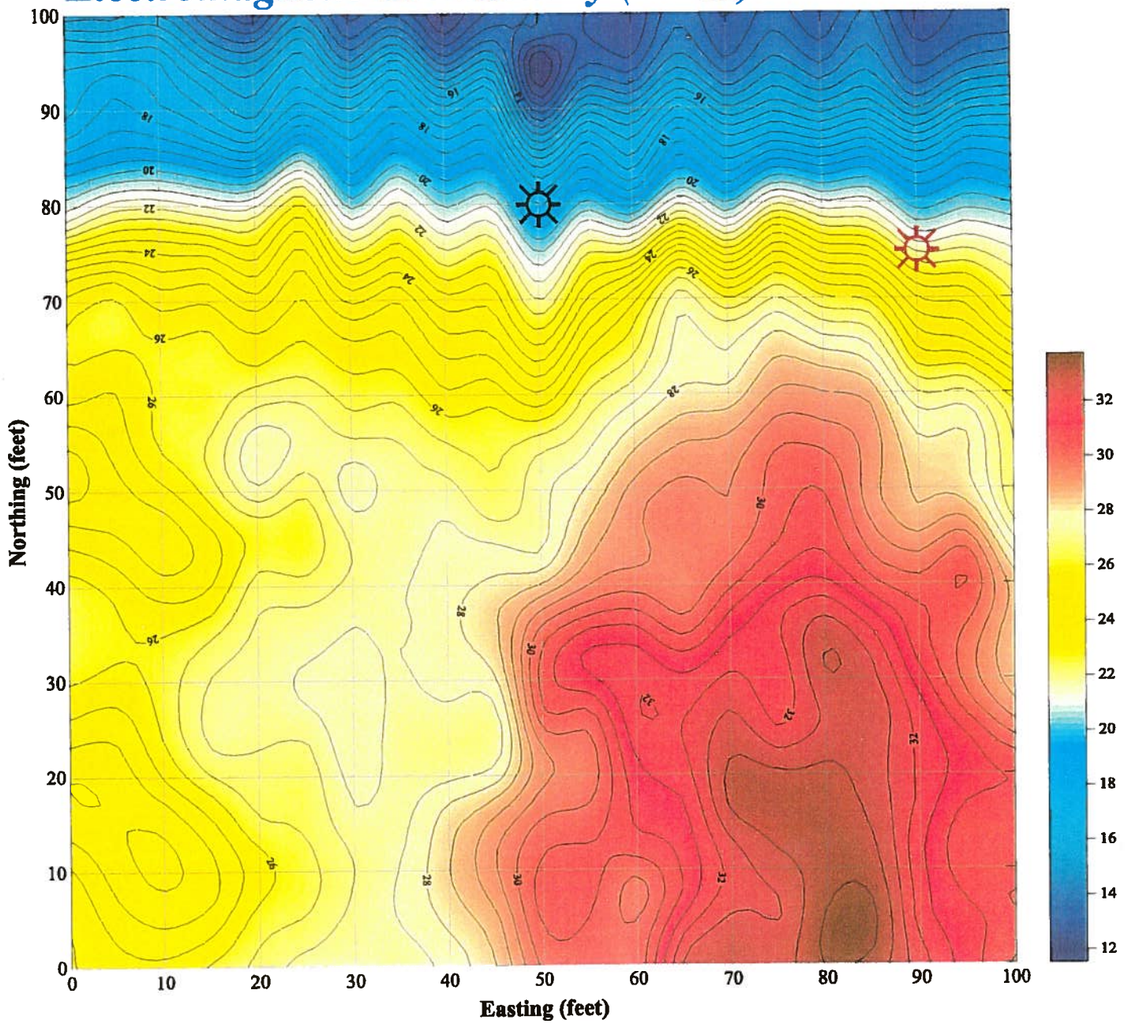
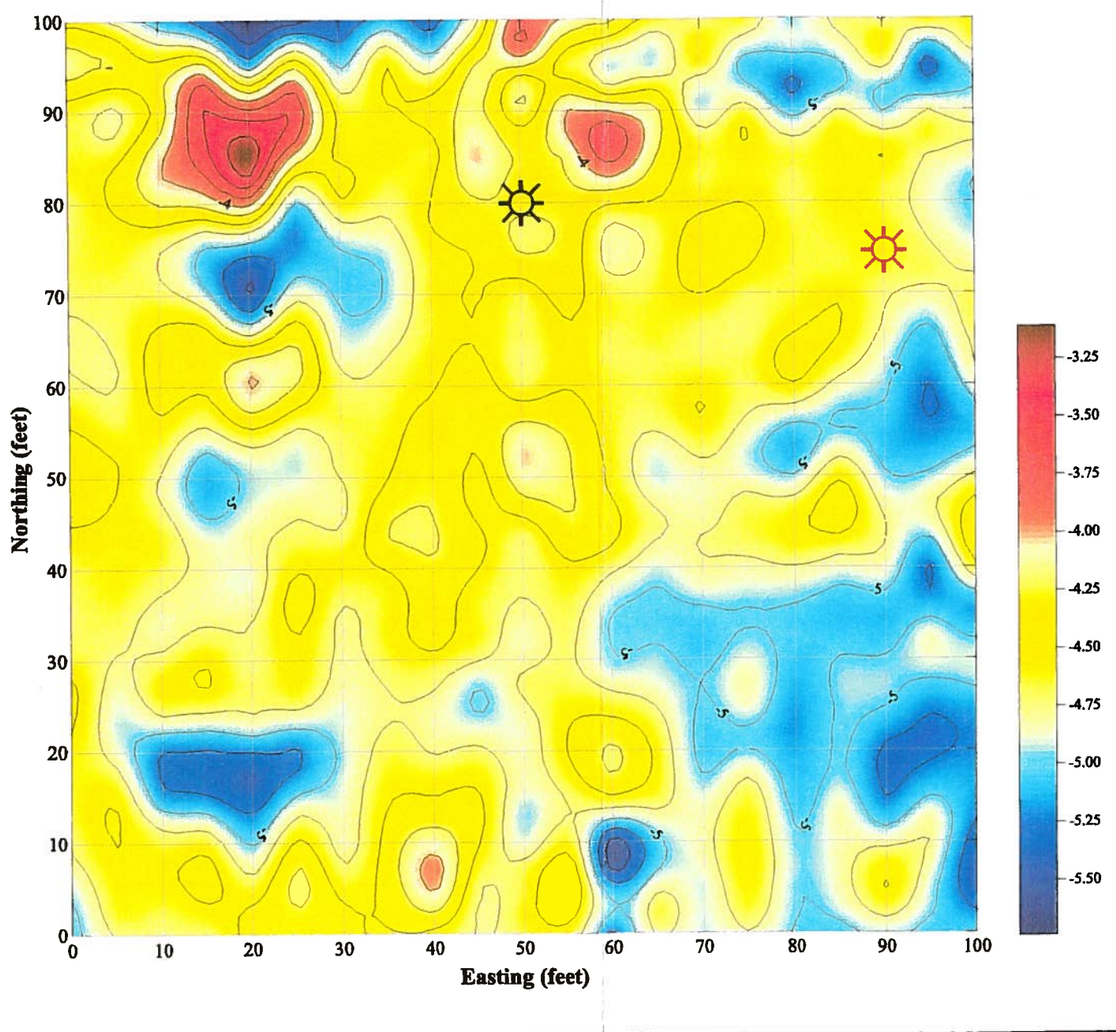
Proposed Boring Location "QST-B16"

Electromagnetic Conductivity (mS/m)



Electromagnetic In-phase (ppt)



EQUIPMENT

Unit:	Geonics EM-31
Serial Number:	9315007
Sampling Interval:	0.5 seconds
Recorder:	Omnidata Polycorder
Serial Number:	P72-0377

PROCESSING

Filter:	None
Gridding Method:	Kriging
Cell Size:	100 rows X 100 columns
Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

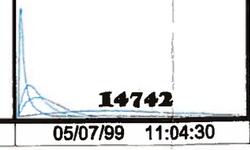
(feet)
0 5 10 15 20 25

☼ ..... originally proposed borehole location

☼ ..... revised borehole location

N26°W

Electromagnetic Survey



QST Environmental
Estes Landfill
Phoenix, AZ

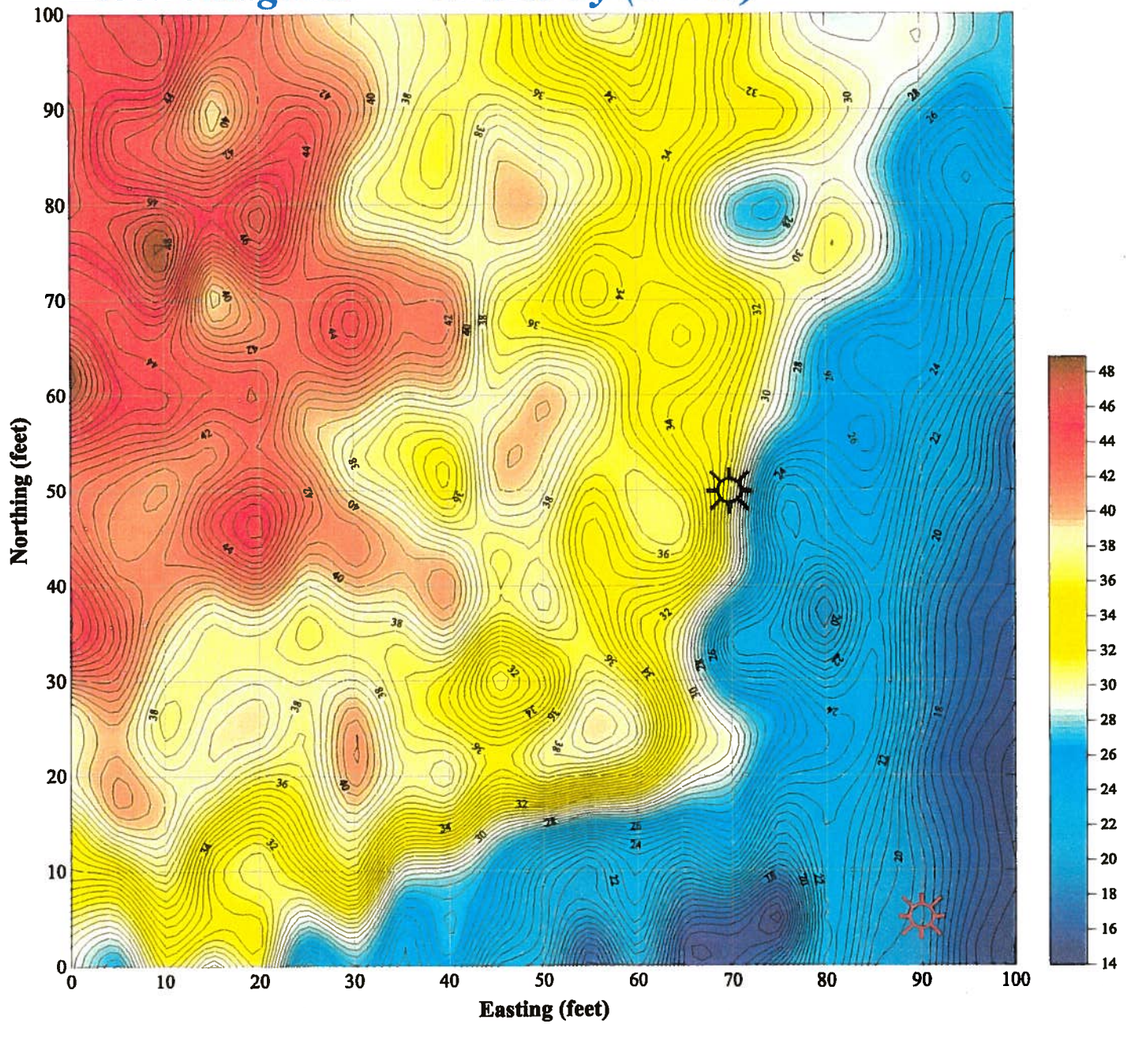
Date: *April 1999* **Fig.** *16-em*

FILE: B16-EM.SRF B16EM.DAT | 1999-027 | 05/07/99 11:04:30

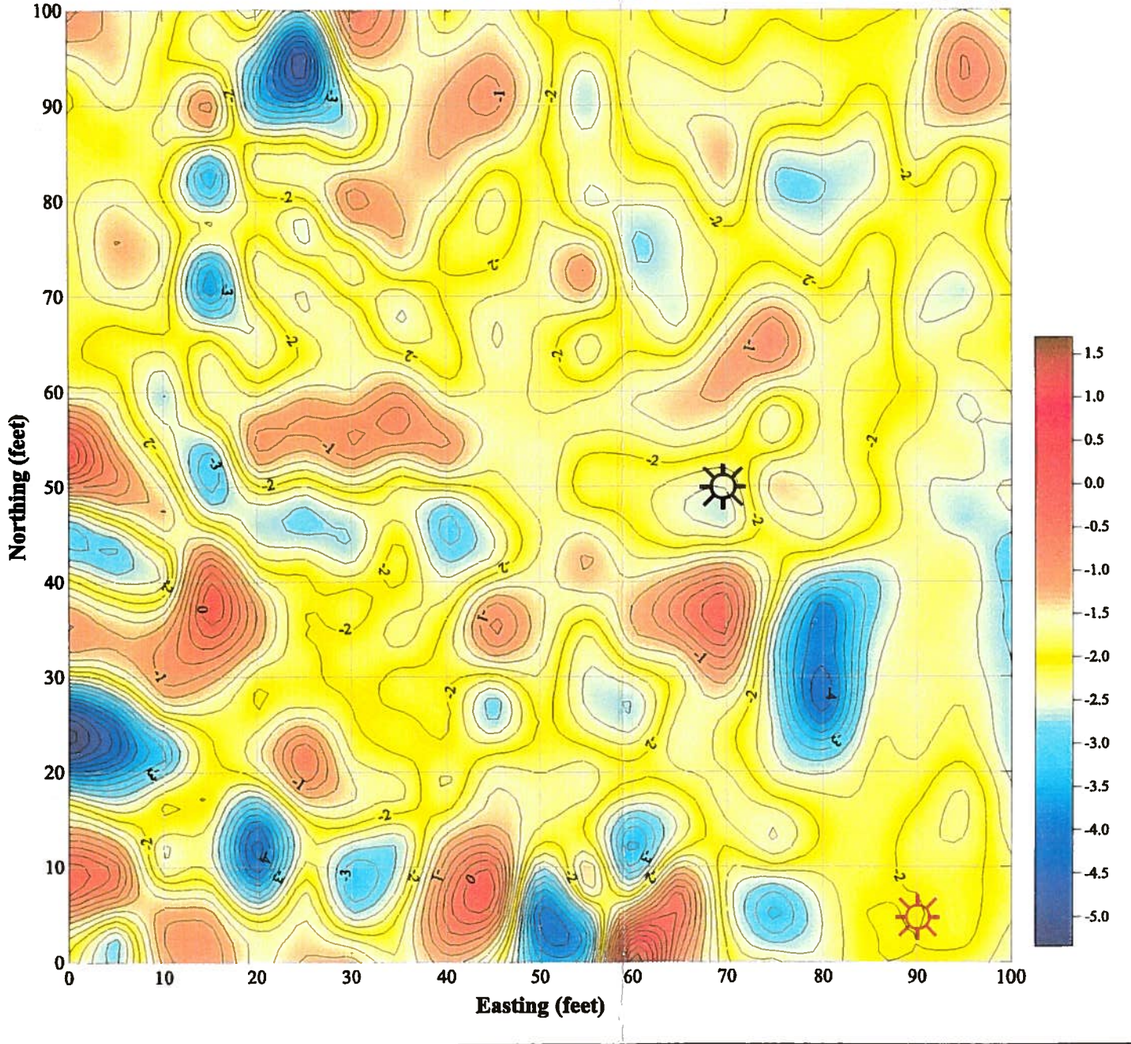
5865 S. Old Spanish Trail • Tucson, AZ 85747 • (520) 647-3315

Proposed Boring Location "QST-B17"

Electromagnetic Conductivity (mS/m)



Electromagnetic In-phase (ppt)



EQUIPMENT

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Serial Number:	9315007
Sampling Interval:	0.5 seconds
Recorder:	Omnidata Polycorder
Serial Number:	P72-0377

PROCESSING

Filter:	None
Gridding Method:	Kriging
Cell Size:	100 rows X 100 columns
Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet) 0 5 10 15 20 25

☼ ..... originally proposed borehole location

☼ ..... revised borehole location

N

Electromagnetic Survey

14742

QST Environmental
Estes Landfill
Phoenix, AZ

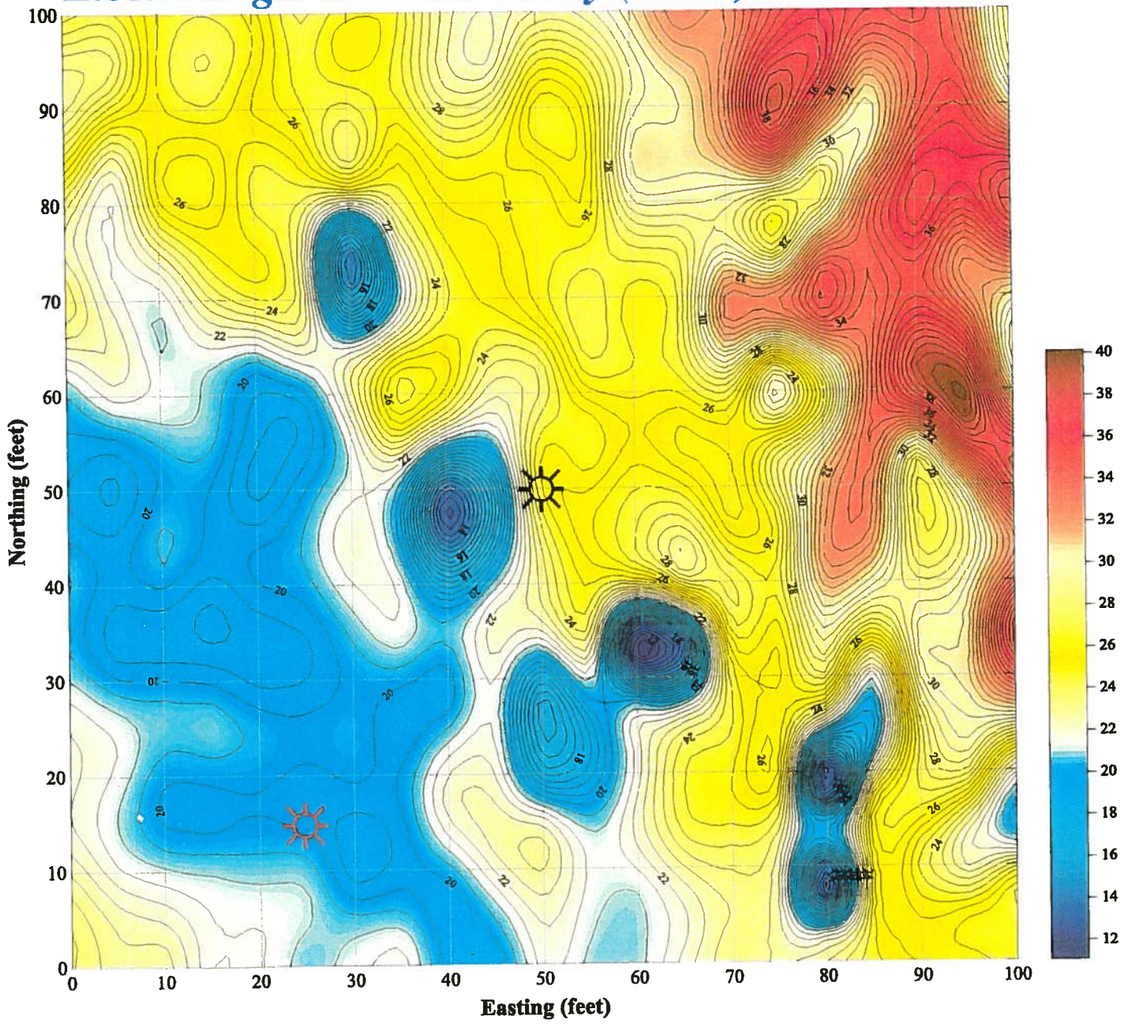
Date: *April 1999* **Fig.** *17-em*

FILE: B17-EM.SRF B17EM.DAT | 1999-027 | 05/07/99 10:55:52

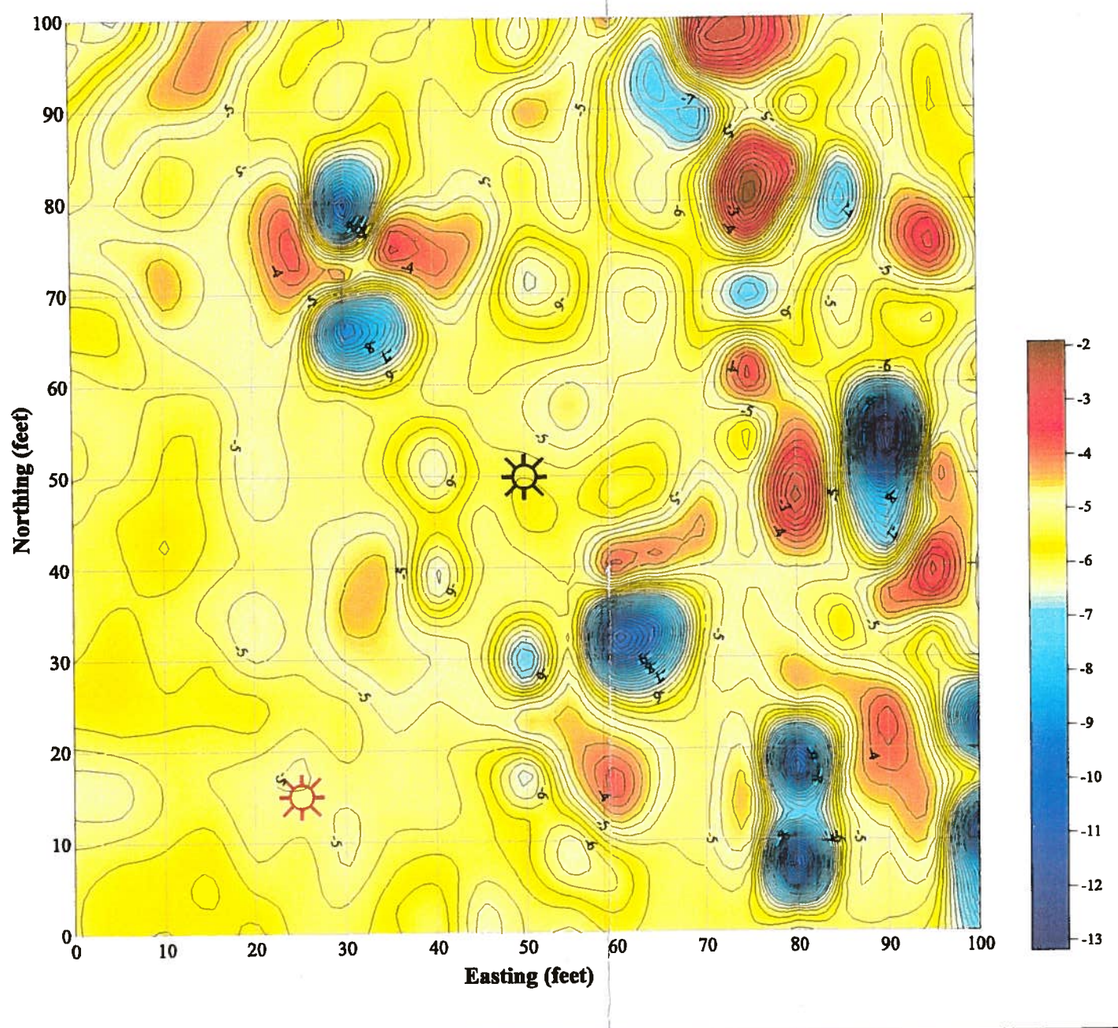
5865 S. Old Spanish Trail • Tucson, AZ 85747 • (520) 647-3315

Proposed Boring Location "QST-B18"

Electromagnetic Conductivity (mS/m)



Electromagnetic In-phase (ppt)



EQUIPMENT	
Unit:	Geonics EM-31
Serial Number:	9315007
Sampling Interval:	0.5 seconds
Recorder:	Omnidata Polycorder
Serial Number:	P72-0377

PROCESSING	
Filter:	None
Gridding Method:	Kriging
Cell Size:	100 rows X 100 columns
Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet)
0 5 10 15 20 25

..... originally proposed borehole location
..... revised borehole location

N26°W

Electromagnetic Survey

QST Environmental
Estes Landfill
Phoenix, AZ

Date: *April 1999* **Fig.** *18-em*

14742

1999-027 | 05/07/99 10:51:11

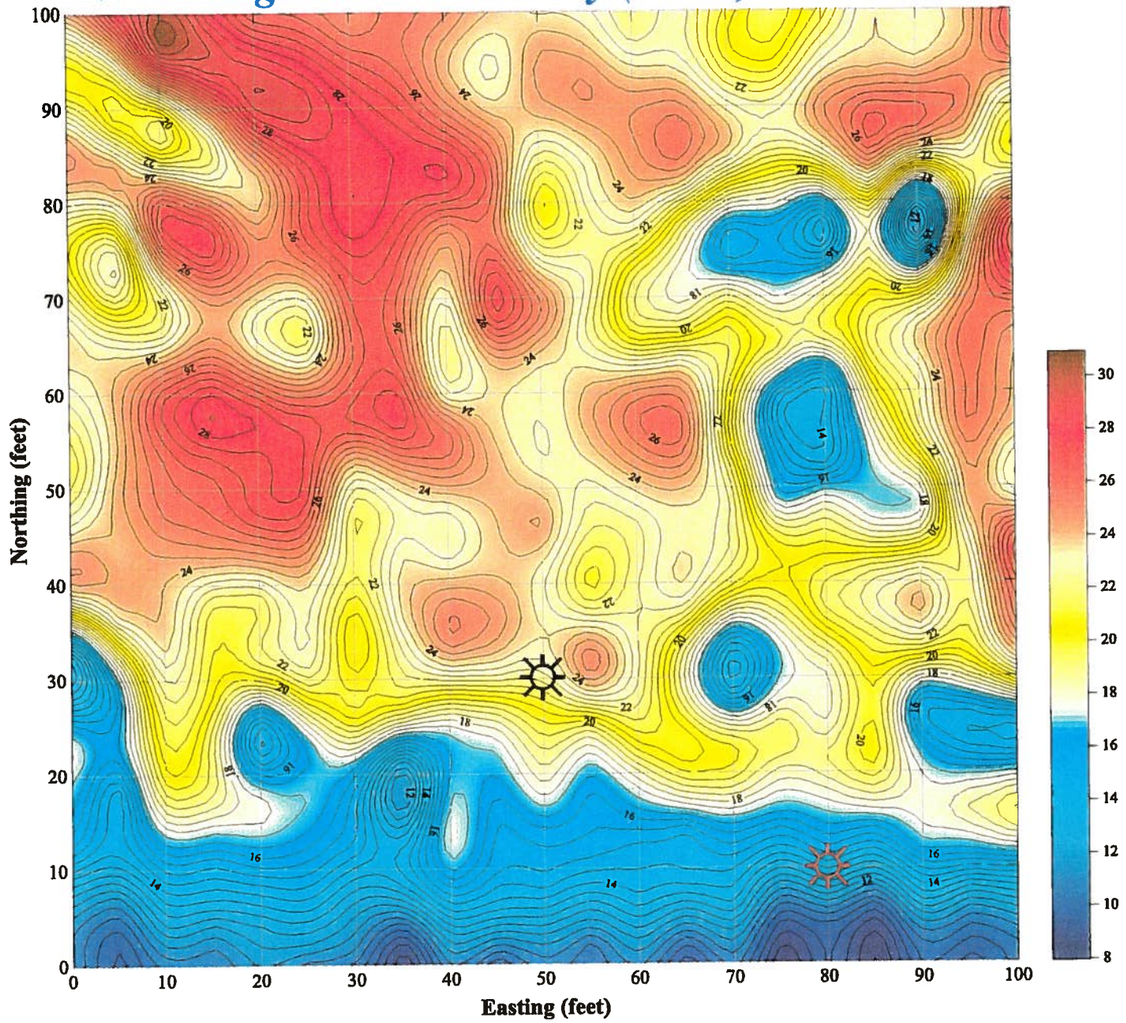
FILE: B18-EM.SRF B18EM.DAT

5865 S. Old Spanish Trail • Tucson, AZ 85747 • (520) 647-3315

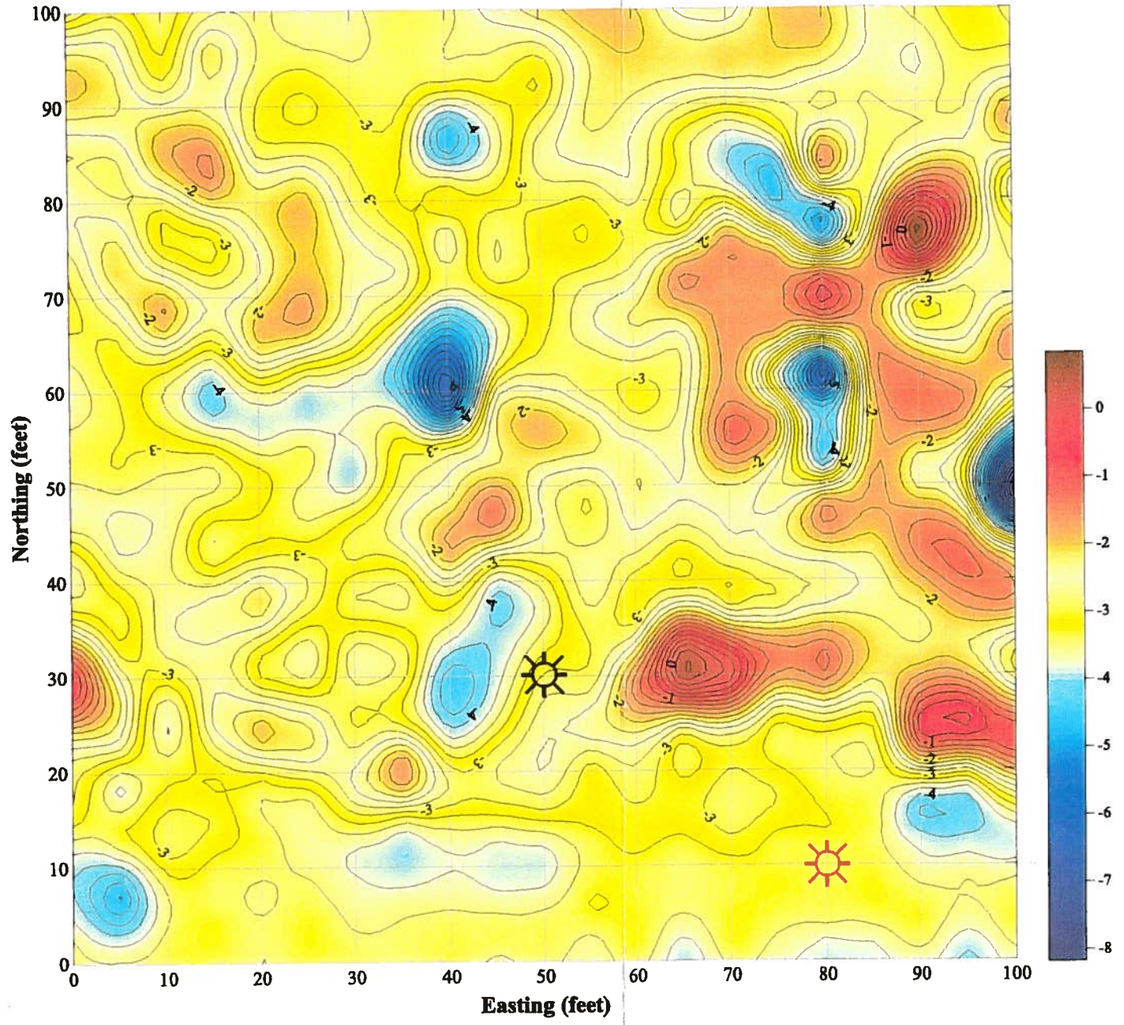
hydroGEOPHYSICS, Inc.

Proposed Boring Location "QST-B19"

Electromagnetic Conductivity (mS/m)



Electromagnetic In-phase (ppt)



EQUIPMENT	
Unit:	Geonics EM-31
Serial Number:	9315007
Sampling Interval:	0.5 seconds
Recorder:	Omnidata Polycorder
Serial Number:	P72-0377

PROCESSING	
Filter:	None
Gridding Method:	Kriging
Cell Size:	100 rows X 100 columns
Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet)
0 5 10 15 20 25

..... originally proposed borehole location
..... revised borehole location

N

Electromagnetic Survey

14742

QST Environmental
Estes Landfill
Phoenix, AZ

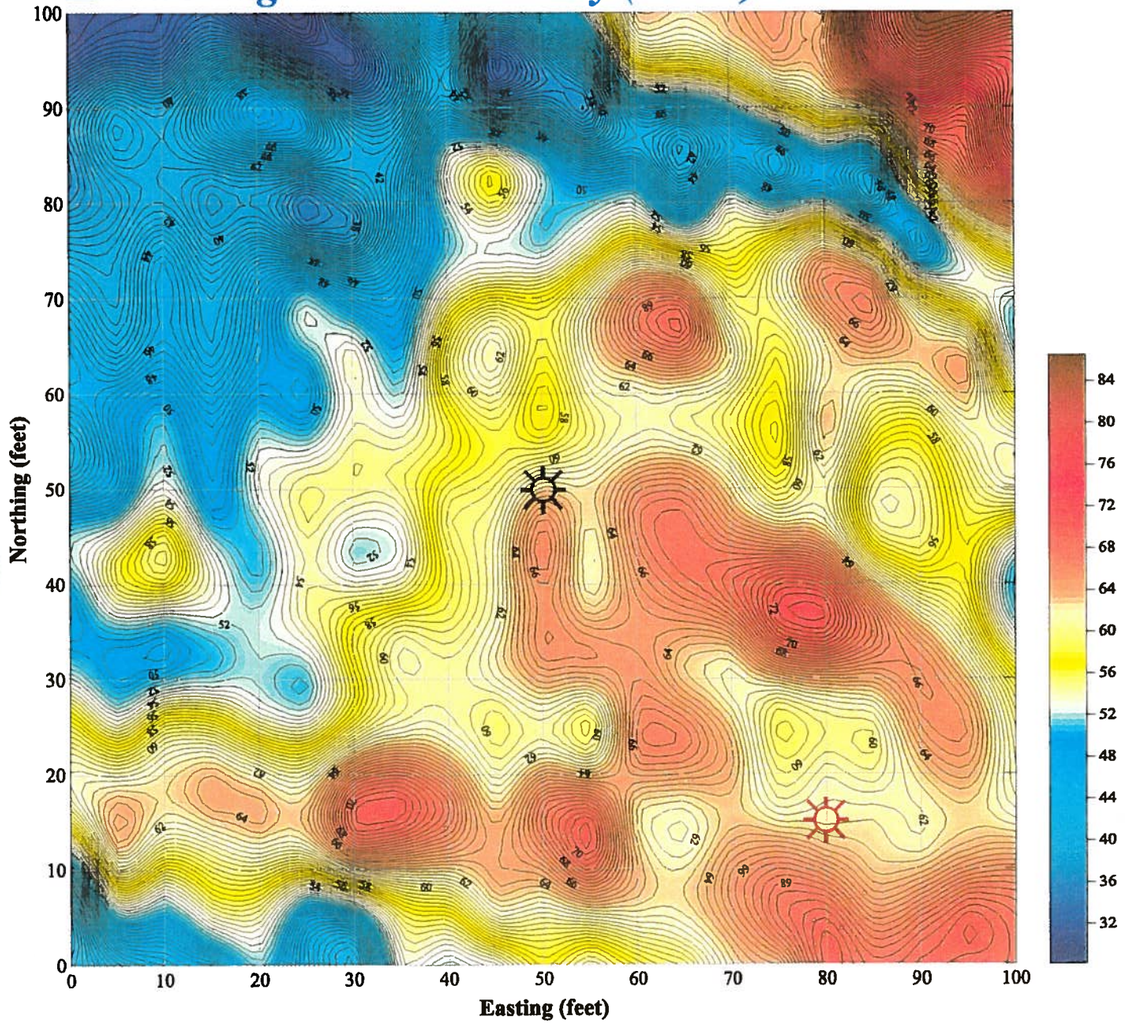
Date: *April 1999* **Fig.** *19-em*

FILE: B19-EM.SRF B19EM.DAT | 1999-027 | 05/07/99 10:44:10

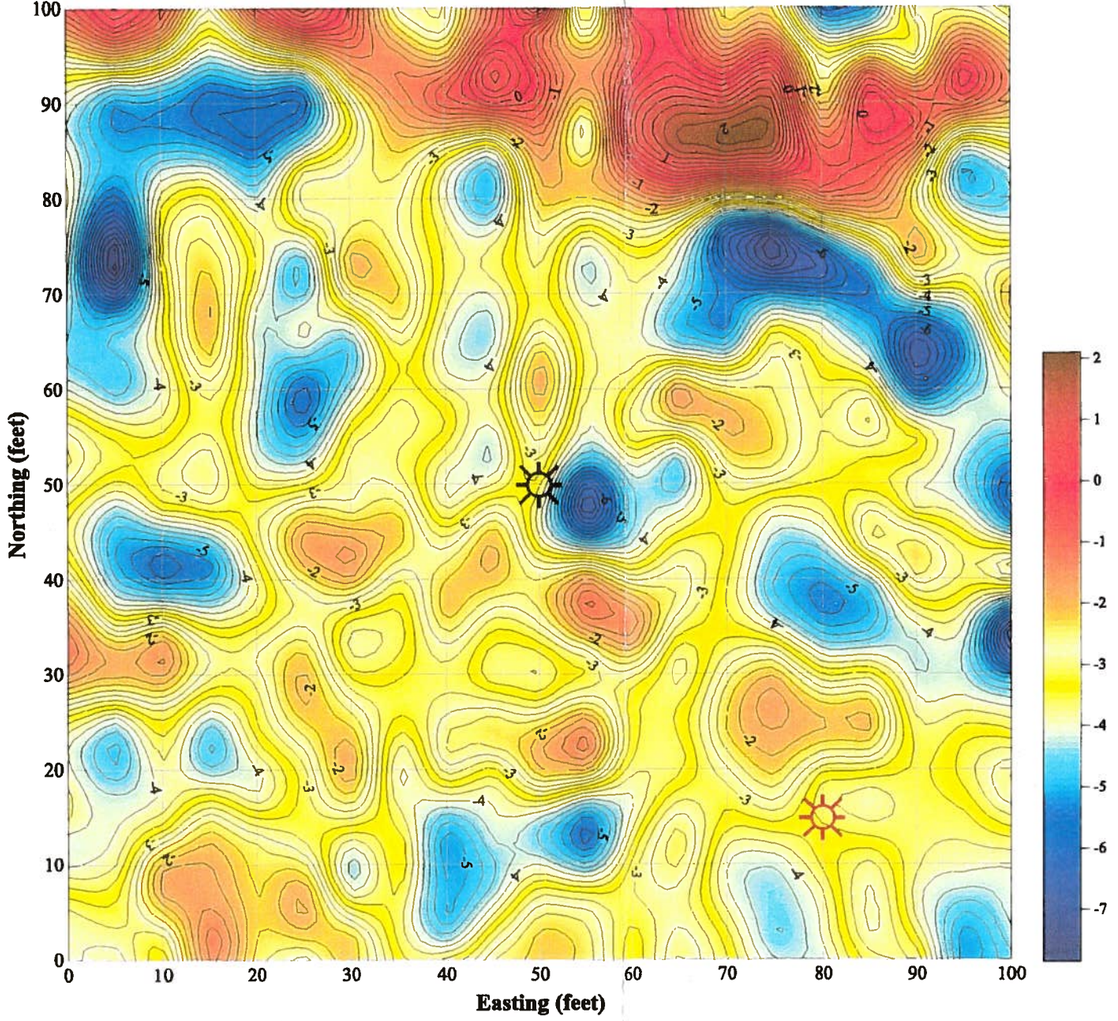
5865 S. Old Spanish Trail • Tucson, AZ 85747 • (520) 647-3315

Proposed Boring Location "QST-B20"

Electromagnetic Conductivity (mS/m)



Electromagnetic In-phase (ppt)



EQUIPMENT

Unit:	Geonics EM-31
Serial Number:	9315007
Sampling Interval:	0.5 seconds
Recorder:	Omnidata Polycorder
Serial Number:	P72-0377

PROCESSING

Filter:	None
Gridding Method:	Kriging
Cell Size:	100 rows X 100 columns
Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet)
0 5 10 15 20 25

..... originally proposed borehole location

..... revised borehole location

N

Electromagnetic Survey

QST Environmental
Estes Landfill
Phoenix, AZ

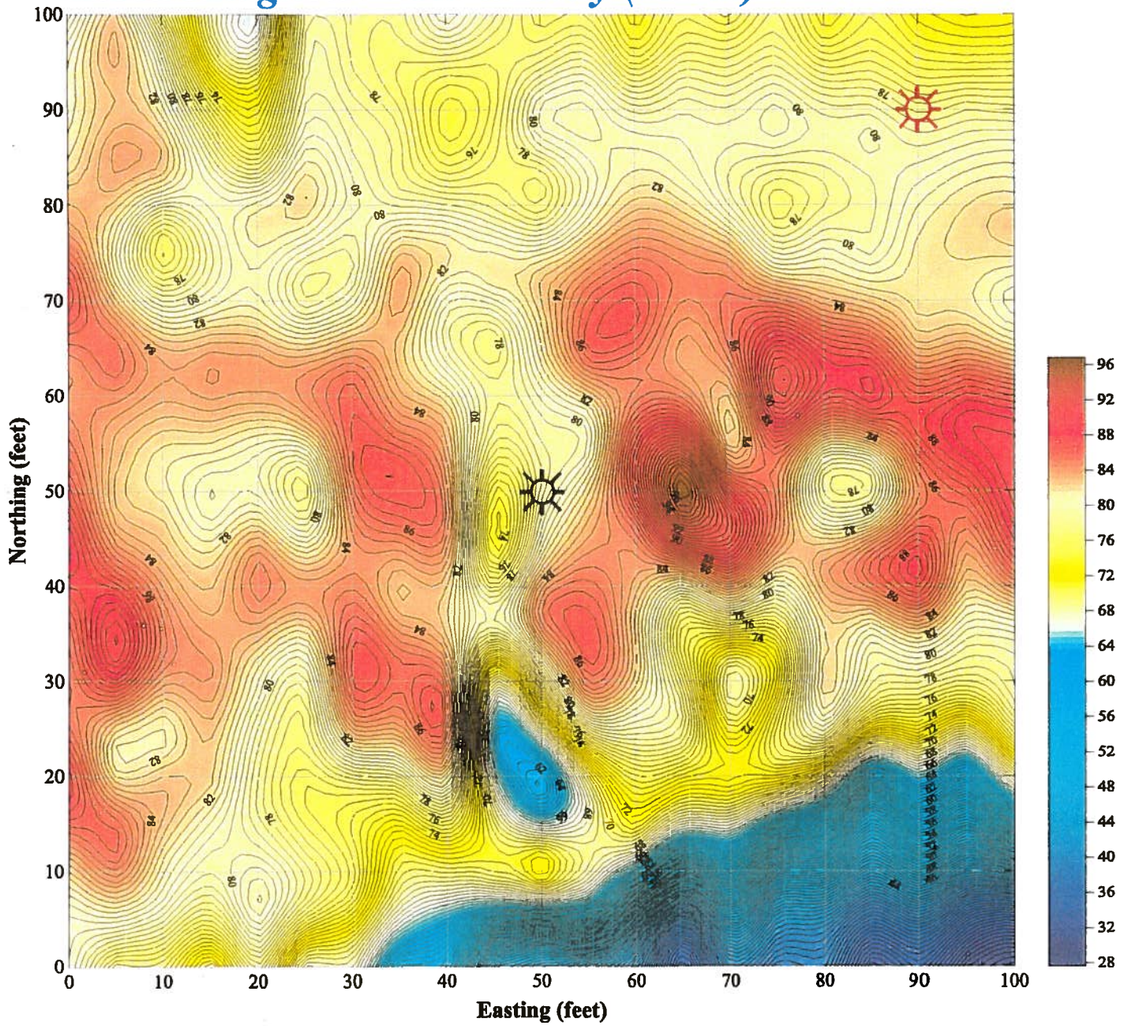
Date: *April 1999* **Fig.** *20-em*

FILE: B20-EM.SRF B20EM.DAT | 1999-027 | 05/06/99 15:35:55

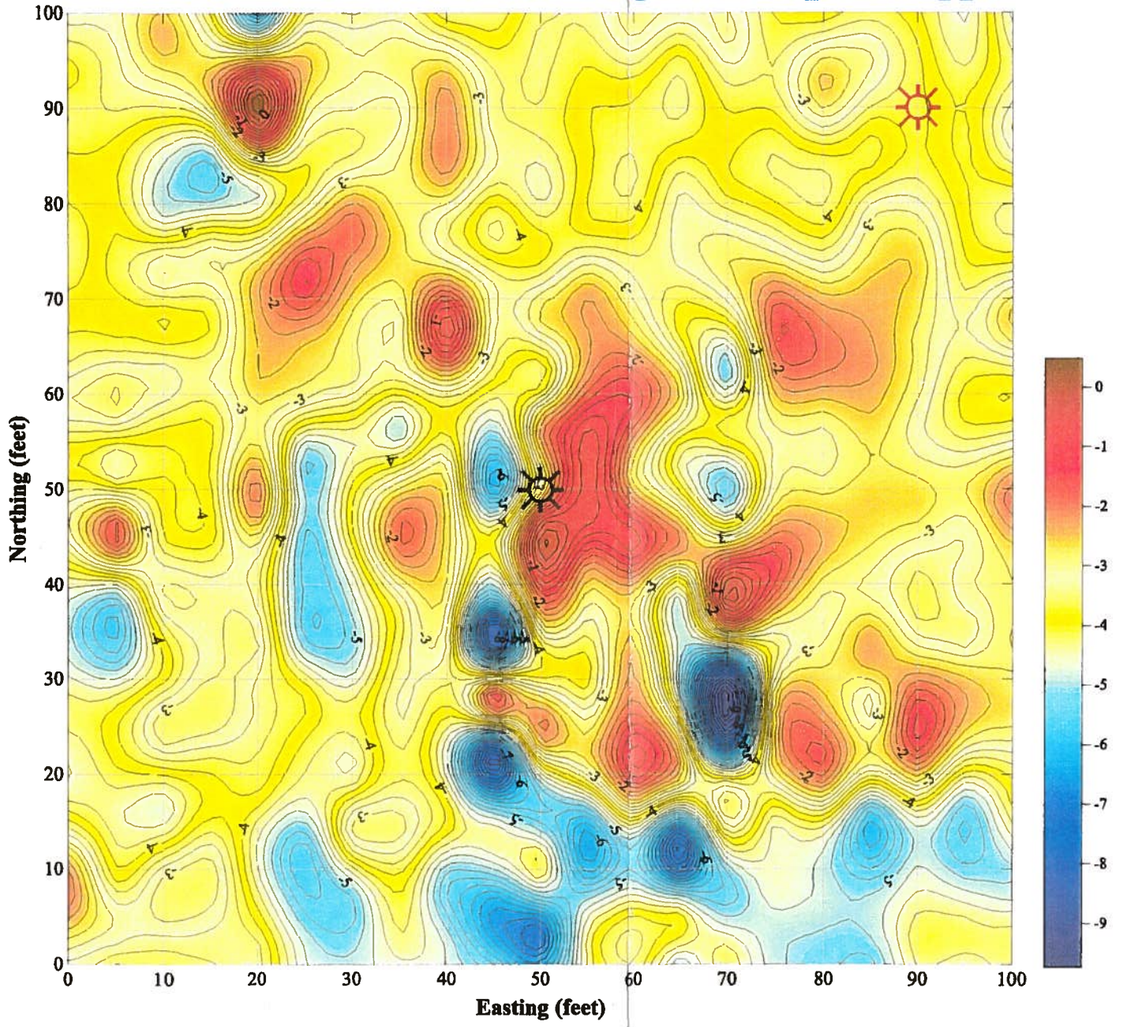
5865 S. Old Spanish Trail • Tucson, AZ 85747 • (520) 647-3315

Proposed Boring Location "QST-B21"

Electromagnetic Conductivity (mS/m)



Electromagnetic In-phase (ppt)



EQUIPMENT

Unit:	Geonics EM-31
Serial Number:	9315007
Sampling Interval:	0.5 seconds
Recorder:	Omnidata Polycorder
Serial Number:	P72-0377

PROCESSING

Filter:	None
Gridding Method:	Kriging
Cell Size:	100 rows X 100 columns
Trend Bias:	None
Line Spacing:	5 feet
Coordinate System:	Local (feet)

(feet)
0 5 10 15 20 25

..... originally proposed borehole location

..... revised borehole location

N

14742

Electromagnetic Survey

QST Environmental
Estes Landfill
Phoenix, AZ

Date: *April 1999* **Fig.** *21-em*

FILE: B21-EM.SRF B21EM.DAT | 1999-027 | 05/06/99 15:28:43

5865 S. Old Spanish Trail • Tucson, AZ 85747 • (520) 647-3315

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-1

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	J. Martin	SAMPLING METHOD	Split Spoon
DATE DRILLED	5/5/99	DATE DRAWN	7-11-99
DRILLED BY	Layne	DRAWN BY	D. PESKIN
HOLE DIAMETER	9"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0		SM	50/6"	1	Silty sand, dry, light brown, with trace gravel
			56/2"	2	
5			60/4"	3	Rock fragments
10			50/0"	4	
			50/3"	5	
15					
		GP	50/2"	6	
20			50/2"	7	
			50/16"	8	
25					
30			50/2"	9	
35		GM	50/6"	10	Rock fragments, increase in moisture, some fines, dark brown
		GP	60/3"	11	Sandy gravel, fine to medium gravel, fond to medium sand, brown slightly moist
40					
45			63/4"	12	
		SP	60/5"	13	
50					

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Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-1

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	J. Martin	SAMPLING METHOD	Split Spoon
DATE DRILLED	5/5/99	DATE DRAWN	7-11-99
DRILLED BY	Layne	DRAWN BY	D. PESKIN
HOLE DIAMETER	8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50					Gravely sand, fine to medium sand. slightly moist, brown, fine to coarse gravel
55			75/9"	14	
60					Groundwater Encountered at 61'
65			65/12"	15	
70		SP			
75			75/18"	16	Gravely sand, fine to medium sand, very moist, brown, ~15% fines, fine to medium gravel
80					
85			70/12"	17	
			65/12"	18	
90					Total boring depth 89'
95					
100					

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Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-2

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: M. Garlick	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/3/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	USCS	Blows/Ft	Samples	DESCRIPTION
0	GM	7/37/50	1	Sandy gravel, dry, light reddish brown, with trace silt and clay
	SW	7/24/13	2	Sand, fine to medium, dry, dark brown, with trace gravel
	FL			Landfill debris, sandy gravel with debris, moist dark black
5		6/8/7	3	
		6/9/7	4	
10				
15		27/32/38	5	
20				
25	GP	27/37/50	6	Cobbles with a minor sand and silt
30				
35		50/0'	7	
40				
45			8	
50				

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-2

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: M. Garlick	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/3/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50			22/50	9	
55		GP	150/0"	10	
60			150/0"	11	
65			75/6"	12	Sandy clay, moist, reddish brown, with trace gravel
70		CL			Groundwater encountered at 73' Total boring depth 76'
75					
80					
85					
90					
95					
100					

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Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-3

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/3/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0		SM	12/41/45	1	Silty sand, dry, reddish brown, with some cobbles
			32/7/8	2	
5			50/50	3	Sand, fine, dry, grey to reddish grey, with trace silt and gravel
			28/50	4	
10					
			17/24/15	5	
15		SP	35/50	6	As above but slightly damp
20					
25		GP	28/50	7	Cobbles and gravel, dry
			26/50	8	Fine sand, slightly damp, grey to reddish brown, some gravel
30		SW			
35			30/50	9	Gravel
40		GP			
45			50/5"	10	Fine sand, slightly moist, redish brown, some gravel and silt
		SP			
50					

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07-28-

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LOG OF BORING QST-B-3

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/3/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50		GP	20/50	11	
55			15/14/50	12	Sandy gravel, moist, reddish brown, much clay
			35/50	13	
60					
65		GC	23/50	14	
			25/50	15	
70					Groundwater encountered
75			18/50	16	As above but saturated
					Total boring depth 78'
80					
85					
90					
95					
100					

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07-28

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LOG OF BORING QST-B-4

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/4/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0		SM	1/38/40	1	Silty sand, dry, tan, with some gravel
					Landfill debris
			50/1"	2	
5			20/15/10	3	
10		FL			
15			50/5"	4	
20					
25			25/50	5	Sandy gravel, slightly moist, reddish brown, much clay
30					
35		GC	45/50	6	
40					
45			6/50	7	Gravelly sand, slightly moist, reddish brown, trace clay
		SP			
50			5/11/50	8	

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Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-4

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/4/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50–67		SP	27/50 (55); 50/5' (65)	9 (55); 10 (65)	
67					Groundwater encountered
67–78		0			
80					Total boring depth 78'

Depth scale: 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100

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07-28-

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-5

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: J. Martin	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/5 - 5/6/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0					Landfill debris
5			100/5"	1	
10			65/6"	2	
15		FL	83/10"	3	
20			100/6"	4	
25			81/6"	5	
30					
35			95/8"	6	Sand, medium, slightly moist, brown, occasional fine to medium gravel
40			105/6"	7	
45		SP	78/12"	8	
50					

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LOG OF BORING QST-B-5

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: J. Martin	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/5 - 5/6/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50					
		SP			
55			105/6"	9	
					Gravely silty sand, slightly moist, brown, medium sand, fine to medium gravel
60			80/6"	10	
65			40/4"	11	
		GC			
70			50/4"	12	Groundwater encountered 70'
75			100/5"	13	
80		SP	75/12"	14	Sand, saturated, brown, medium sand, occational fine gravel
85					Total boring depth 81'
90					
95					
100					

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07-28

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LOG OF BORING QST-B-6

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/5 - 5/6/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0		FL	50/3"	1	Landfill debris
			50/1"	2	
5			9/50	3	
10					
15			50/1"	4	
20					
25			50/3"	5	Gravelly fine sand, slightly moist, reddish brown, with trace silt and gravel
			10/50	6	
30					
35		SW	50/5"	7	
			50/6"	8	
40					
45			10/50	9	
50					

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07-28-

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LOG OF BORING QST-B-6

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/5 - 5/6/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50					
55			18/25/30	10	As above but some medium to coarse sand
60					
65		SW	50/1"		Groundwater encountered @ 67'
70					As above but saturated
75					
					Total boring depth 78'
80					
85					
90					
95					
100					

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07-28

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-7

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/12/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0		SM	16/24/35	1	Silty sand, dry, reddish brown, some gravel
			25/50	2	
5		FL	24/29/31	3	Landfill debris
10					
15					
20					
25					
30					
35		SM	50/3"	4	Silty sand, dry, reddish brown, some gravel, trace clay
			50/4"	5	
40					
45			7/50	6	
50					

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A HACTEC COMPANY

LOG OF BORING QST-B-7

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/12/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50		SM			As above but some medium to coarse sand
55			10/38/50	7	Clayey fine sand, moist, reddish brown, some medium to coarse sand and gravel
60		SC			Groundwater encountered @ 63'
65					As above but saturated
70			7/11/50	8	Total boring depth 70'
75					
80					
85					
90					
95					
100					

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07-28-

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-8

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/11 - 5/12/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0		SM	24/50	1	Silty fine sand, dry, reddish brown, some gravel and cobbles
5			31/32/40	2	
			50/5"	3	
10			26/39/36	4	
15		FL	50/5"	5	Landfill debris
20					
25					
30					
35		SW	36/50	6	Medium sand, slightly moist, reddish brown, some fine sand and gravel, trace silt
40					
45			43/50	7	
50					

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07-26

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-8

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/11 - 5/12/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50		SW			
55					As above but some medium to coarse sand
			5/50	8	Clayey gravel, slightly moist, reddish brown, some fine to coarse sand
60		GC			Groundwater encountered at 61'
					As above but saturated
65					Total boring depth 65'
70					
75					
80					
85					
90					
95					
100					

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07-2

Environmental Science & Engineering, Inc.
a IMACTEC company

LOG OF BORING QST-B-9

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: J. Martin	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/12/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0		SP			Gravely sand, dry, fine to medium sand, light brown, fine to medium gravel
5			60/2'	1	
10			87/3'	2	
15			70/2'	3	
20			50/6'	4	
25					
30			75/2'	5	
35			55/3'	6	
40			50/3'	7	
45			60/4'	8	
50					

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07-28

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-9

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: J. Martin	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/12/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50			50/4'	9	
55					
60		GM	50/5'	10	
65					As above but saturated
					Groundwater encountered @ 68'
70		SP	50/9'	11	Gravely sand, saturated, fine to medium sand, brown, fine to medium gravel
					Total boring depth 70'
75					
80					
85					
90					
95					
100					

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07-29-

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-10

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: J. Martin	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/11 - 5/12/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0		SP	60/2'	1	Gravely sand, dry, fine to medium sand, light brown, fine to medium gravel
5			65/6'	2	
10			50/4'	3	
15			60/2'	4	
20			62/4'	5	
25			65/2'	6	
30			70/6'	7	
35		GM	60/4'	8	Silty gravely sand, moist, brown, fine to medium sand, fine to medium gravel
40					Groundwater encountered @ 53'
45					Total boring depth 53'
50					
55					

c:\aca\geo\estes\qst-b-10.bor

07-28-

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-11

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/19/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0		GM	50/4"	1	Silty gravel with sand, dry, reddish brown
5		SM	42/50	2	Silty sand, slightly moist, brown, some gravel
			50/5"	3	
10				4	
15		FL	14/13/1	5	Debris
20					
25			50/4"	6	
30					
35					
40					
45		GC	50/5"	7	Sandy Gravel with clay, dry, brown
50					

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07-28

Environmental Science & Engineering, Inc.
A MACTEC Company

LOG OF BORING QST-B-11

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/19/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50					
		GC			
55			50/5'	8	Gravel, dry, mixed lithologies
		GW			
			50/5'	9	Sandy Gravel with clay, dry, brown
60		GC			
65					
		SM	22/50	10	Silty sand, slightly moist, reddish brown, some gravel, trace clay
					Groundwater encountered @ 68'
		GC	9/7/50	11	Clayey gravel with silt, saturated, reddish brown
70		0			
75					Total boring depth 75'
80					
85					
90					
95					
100					

07-28-... c:\aca\geo\estes\qst-b-11.bor

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-12

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/19/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0		SM	50/2"	1	Silty sand, dry, dark brown, little gravel, trace of landfill debris
5			40/50	2	
			50/5"	3	
10					
15		FL	50/3"	4	Landfill debris
20			50/3"	5	
25					
30					
35		SW	50/5"	6	Fine to medium sand, slightly moist, grey, some gravel
40		GM	50/5"	7	Gravel with clay, moist, reddish brown, fine to medium sand, some silt
45		SW	42/50	8	Fine to medium sand, moist, reddish brown, some gravel, trace silt Groundwater encountered @ 50'
50					

c:\ace\geo\estes\qst-b-12.bor

07-26

Environmental Science & Engineering, Inc.
A WACTEC Company

LOG OF BORING QST-B-12

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/19/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50		GP	8/50	9	
55		GC	15/50	10	Clayey sand and gravel, moist, reddish brown
					Total boring depth 57'
60					
65					
70					
75					
80					
85					
90					
95					
100					

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07-28

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-13

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/20/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0		SM	50/3"	1	Silty sand and gravel, dry, reddish brown
			50/6"	2	
5			50/4"	3	
10					From 5 to 20 feet no sample recovery
15			50/5"	4	
20			30/50	5	
25		GP	2/50	6	Gravel
30		SP	50/5"	7	Fine sand and gravel, moist, brown, some silt
35		SW	37/50	8	Fine sand, moist, brown, some silt, trace gravel
40			17/50	9	
45			20/50	10	
50					

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07-28-

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-13

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/20/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50			50/5"		Clayey sand and gravel, moist, reddish brown, some silt
55		GC	50/5"	12	
60		0			Groundwater encountered @ 60'
65					Total boring depth 65'
70					
75					
80					
85					
90					
95					
100					

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07-26

Environmental Science & Engineering, Inc.
A HALLIBURTON COMPANY

LOG OF BORING QST-B-14

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: J. Martin	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/6/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0					Overburden to 4 feet
5			62/6"	1	Landfill debris
10			80/6"	2	
15		FL	85/6"	3	
20			50/6"	4	
25			50/2"	5	
30			51/4"	6	Gravely sand, slightly moist, fine to medium sand, black
35					
40		SP	75/16"	7	As above but brown
45					
50					

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07-26-

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-14

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: J. Martin	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/6/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50			50/12"	8	Sand, gravel and landfill debris
55					
60			75/6"	9	
65		FL			
70			90/4"	10	
75			75/5"	11	
					Sandy gravel, very moist, brown, fine to medium gravel, fine to medium sand
80		GW			Groundwater encountered @ 79'
					Total boring depth 81'
85					
90					
95					
100					

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07-28

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-15

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/6/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0		SM	50/3"	1	Silty fine sand, dry, reddish brown, trace gravel
5		FL	10/50	2	Landfill debris
			26/50	3	
20			22/50	4	Landfill debris mixed with silty sand, slightly moist, brown, some gravel
25			25/50	5	
40		SM	50/5"	6	Silty sand, slightly moist, brown, trace clay, trace gravel, some debris
45			10/50	7	
50					

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07-28

Environmental Science & Engineering, Inc.
A MACTEC Company

LOG OF BORING QST-B-15

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/6/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	USCS	Blows/Ft	Samples	DESCRIPTION
50–66	SM	23/50	8	
66–76	CL	8/50	9	Sandy clay, moist, dark brown, some gravel
76–80	GP	14/50	10	Fine sandy gravel, slightly moist, brown to tan, some silt/clay Groundwater encountered @ 80'
80	GC	50/5'	11	Gravel, saturated, some greyish brown clay

Total boring depth 80'

Depth scale: 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100

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07-28

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-16

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/9 - 5/10/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0			27/50	1	Silty sand, dry, reddish brown, with cobbles
5			36/50	2	Sandy silt, dry, dark brown, some gravel, medium to coarse sand
10					
15			37/50	3	Silty sand, dry, dark brown, some gravel, medium to coarse sand
20					
25		SM	44/22/33	4	Fine silty sand, slightly moist, dark brown to black, some gravel and landfill debris
30					
35					
40					
45					
50					

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07-28

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-16

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/9 - 5/10/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50					
55			37/50	5	
60			50/5"	6	Landfill debris
65		SM	13/50	7	Silty sand with gravel, moist, brown, some medium to coarse sand
70					
75			24/50	8	Silty fine sand, moist, reddish brown, some gravel, medium to coarse sand Total boring depth 75'
80					
85					
90					
95					
100					

07-28 c:\ace\geo\estes\qst-b-16.bor

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-17

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: J. Martin	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/7/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0					Overburden to 40 feet
5			60/2"	1	
10			58/11"	2	
15		FL	50/6"	3	Gravely sand with some landfill debris to 35 feet
20					
25			50/2"	4	
30			85/3"	5	
35			50/5"	6	Gravely sand
40		SP	75/4"	7	
45			50/5"	8	
50					

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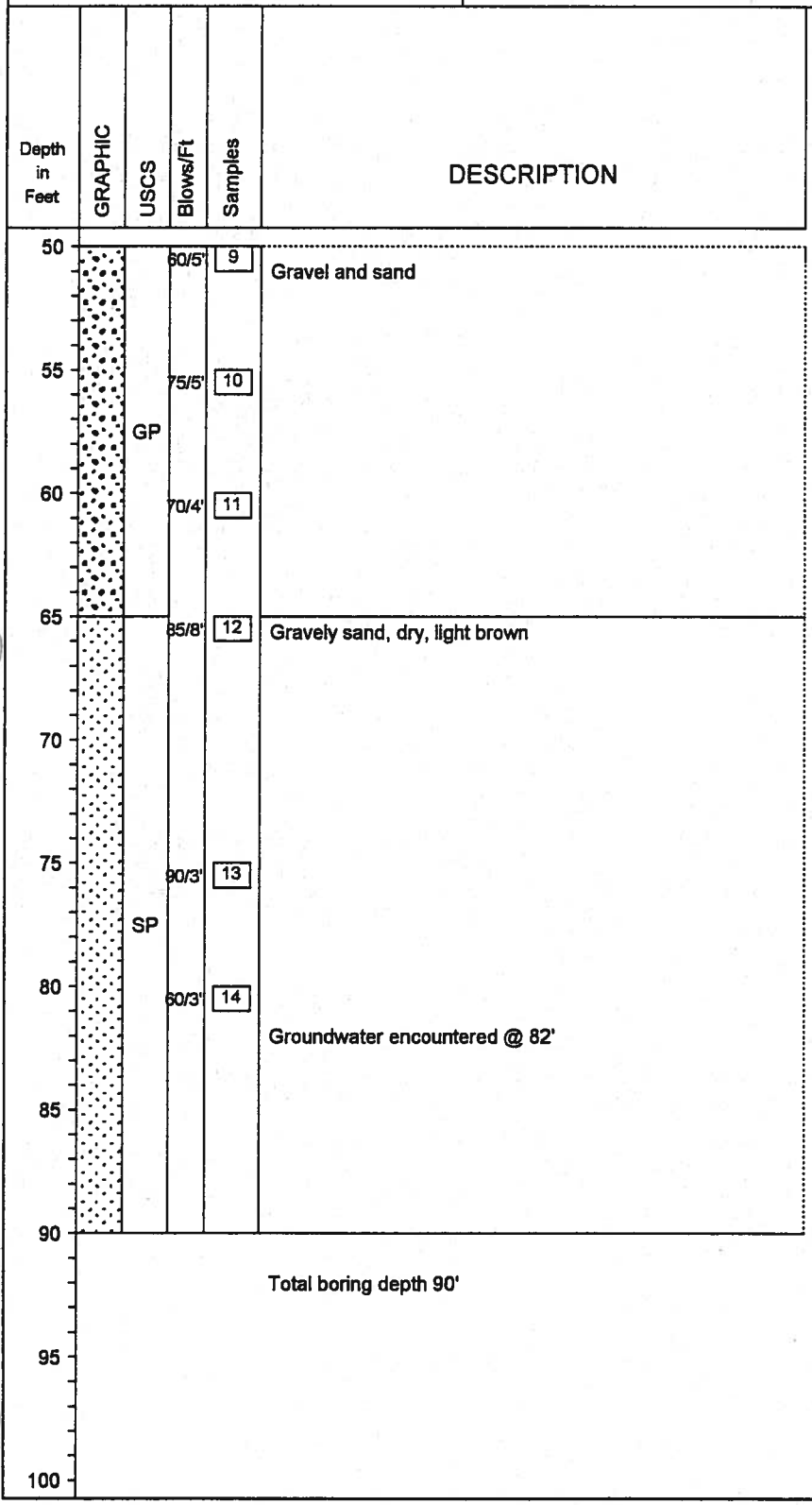
07-25

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-17

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: J. Martin	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/7/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		



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07-26

Environmental Science & Engineering, Inc.
(A PACTEC COMPANY)

LOG OF BORING QST-B-18

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/10/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0		SM	50/3"	1	Silty fine sand and gravel, dry, reddish brown
			50/3"	2	
5			23/50	3	Gravel and cobbles
10					
15			50/5"	4	
20		GP			
25			50/5"	5	
30			50/5"	6	
35					
40			23/50	7	Silty fine sand, moist, dark brown, some gravel
45		SM	11/26/50	8	Landfill debris to 60 feet
50					

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07-28-

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-18

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/10/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50					
55		SM			
60			21/50	9	
					Silty fine sand and gravel, tan to brown, some clay and gravel
65			12/50	10	
			23/50	11	Fine to medium sand, slightly moist, reddish brown, some silt and gravel
70					
75					
		SW			
80					
85					Groundwater encountered @ 85'
90					
					Total boring depth 90'
95					
100					

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07-28-

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-19

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: J. Martin	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/10/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0					Overburden, silty gravelly sand with some landfill debris
5			50/4"	1	Sand gravel and landfill debris to 40 feet
10			80/6"	2	
15			50/4"	3	
20		FL	50/1"	4	
25			50/1"	5	
30			50/2"	6	
35			50/1"	7	
40			77/5"	8	Gravely sand, dry, fine to medium sand, fine to mediun gravel
45		SP			
50					

07-28- c:\acs\geo\estes\qst-b-19.bor

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-19

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: J. Martin	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/10/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50		SP	74/1'	9	
55			75/2'	10	
60			90/6'	11	
65					
70			85/4'	12	Silty gravely sand, moist, brown, fine to medium sand, fine to medium gravel
75		GM	70/3'	13	
80			60/3'	14	Groundwater encountered @ 83'
85					Total boring depth 83'
90					
95					
100					

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07-28-

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-20

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/11/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0		SM	50/5"	1	Silty fine sand, dry, redish brown, some gravel
			50/1"	2	
5			50/4"	3	
10					
15					
20					
25		FL	20/12/20	4	Silty fine sand and gravel, slightly moist, black, intermingled with landfill debris
30					
35			50/5"	5	
40					
45					
50					

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Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-20

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. Drobat	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/11/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50					
55		FL			
60			50/5'	6	
65			8/50	7	Silty fine sand, slightly moist, tan to brown, some gravel, trace clay
70		SM			
75					
		SP	6/30/50	8	Fine to coarse sand and gravel, slightly moist, reddish brown, some silt /clay
					~~Groundwater encountered @ 78'~~
80					
85		0			
90					
					Total boring depth 90'
95					
100					

07-28- c:\acs\geo\estes\qst-b-20.bor

Environmental Science & Engineering, Inc.
A HACTEC COMPANY

LOG OF BORING QST-B-21

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: J. Martin	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/11/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
0					Silty gravelly sand cap
5			50/3"	1	Gravel, sand and landfill debris to 75 feet
10			65/4"	2	
15			60/3"	3	
20			72/5"	4	
25		FL	70/4"	5	
30			65/2"	6	
35			62/4"	7	
40			69/2"	8	
45			55/4"	9	
50					

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07-28-

Environmental Science & Engineering, Inc.

LOG OF BORING QST-B-21

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: J. Martin	SAMPLING METHOD	: Split Spoon
DATE DRILLED	: 5/11/99	DATE DRAWN	: 7-11-99
DRILLED BY	: Layne	DRAWN BY	: D. PESKIN
HOLE DIAMETER	: 8"		

Depth in Feet	GRAPHIC	USCS	Blows/Ft	Samples	DESCRIPTION
50			63/2"	10	
55			58/1"	11	
60			70/1"	12	
65		FL	75/2"	13	
70			60/3"	14	
75			75/3"	15	Fine to medium sand, saturated, brown, some fine gravel
80		SP	73/4"	16	Groundwater encountered @ 80'
85		0			
90					Total boring depth 90'
95					
100					

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07-2

Environmental Science & Engineering, Inc.

LOG OF BORING EW-23

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP;	: P. DROBAT	SAMPLING METHOD	: SPLIT SPOON
DATE DRILLED	: 5-27-99	DATE DRAWN	: 7-11-99
DRILLED BY	: LAYNE	DRAWN BY	: R. CURTIS
HOLE DIAMETER	: "8"/10"		

Depth in Feet	GRAPHIC	USCS	Blow Count	Samples	DESCRIPTION
0					Moist, dark brown, fine silty sand, some gravel, trace clay
10			18/35/50/2"	1	
15		SM			
20			30/50/2"	2	Dry to moist, tan fine silty sand, trace medium sand, trace gravel
25					
30			9/25/50/3"	3	Gravel
35					
40			29/50/2"	4	Moist, red-brown, clayey fine sand and gravel, some medium to coarse sand
45					Encountered water intermittently wet/dry cuttings
50		GC	13/33/50/3"	5	Wet, brown - red fine sand with clay, some gravel
55					
60			12/50/5"	6	No recovery - quartzite cobble in spoon tip
65					
70			26/50/3"	7	Moist, red - tan fine sand with silt, trace clay
75		SM			
80			50/6"	8	Moist, red - brown, clayey fine sand and gravel, some medium to coarse sand
85		GC			

Well: EW-23

Well Construction Information

WELL CONSTRUCTION
Date Completed : 5-28-99
Hole Diameter : 10"
Drilling Method : AP1000

WELL CASING
Material : sch. 80 pvc
Diameter : 5"

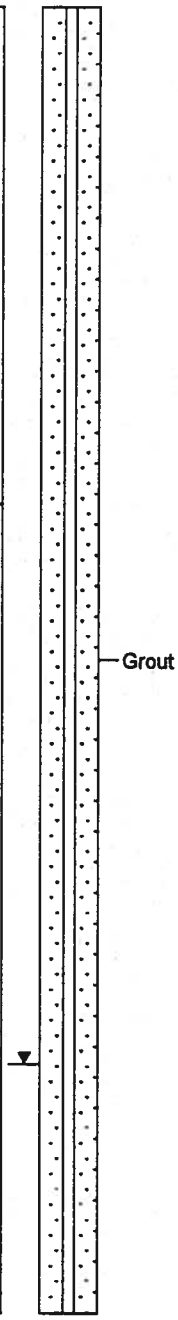
WELL SCREEN
Material : sch. 80 pvc
Diameter : 5"
Opening : 0.020"

SAND PACK : 8-12 silica sand

ANNULUS SEAL : bentonite

WELL SEAL
Material : bentonite
Diameter : 5"

NOTES
Completed
Flush to ground surface



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07-26

Environmental Science & Engineering, Inc.

LOG OF BORING EW-23

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP:	: P. DROBAT	SAMPLING METHOD	: SPLIT SPOON
DATE DRILLED	: 5-27-99	DATE DRAWN	: 7-11-99
DRILLED BY	: LAYNE	DRAWN BY	: R. CURTIS
HOLE DIAMETER	: "8"/10"		

Depth in Feet	GRAPHIC	USCS	Blow Count	Samples	DESCRIPTION
85					
90					
95					
100					
105					
110					
115					
120					
125		GC			
130					
135					
140					
145					
150					
155					
160					
165					top of bedrock (weathered pink granite) Total boring depth 165'
170					

Well Construction Information

WELL CONSTRUCTION
Date Completed : 5-28-99
Hole Diameter : 10"
Drilling Method : AP1000

WELL CASING
Material : sch. 80 pvc
Diameter : 5"

WELL SCREEN
Material : sch. 80 pvc
Diameter : 5"
Opening : 0.020"

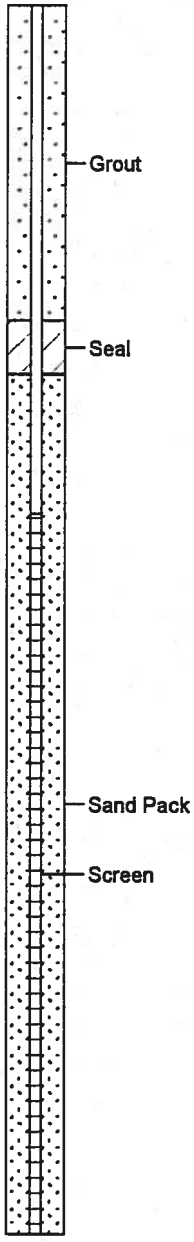
SAND PACK : 8-12 silica sand

ANNULUS SEAL : bentonite

WELL SEAL
Material : bentonite
Diameter : 5"

NOTES
Completed
Flush to ground surface

Well: EW-23



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07-28

Environmental Science & Engineering, Inc.

LOG OF BORING EW-24

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. DROBAT	SAMPLING METHOD	:
DATE DRILLED	: 5-27-99	DATE DRAWN	: 7-11-99
DRILLED BY	: LAYNE	DRAWN BY	: R. CURTIS
HOLE DIAMETER	: 5"		

Depth in Feet	GRAPHIC	USCS	Blow Count	Samples	DESCRIPTION
0		SM			Dry to moist, red brown to red, fine silty sand and fine gravel
5			9/50/6"	1	Wet
10		SC			
15			50/6"	2	Wet, red-brown clayey fine sand and fine gravel
20					
25			50/6"	3	
30		SM	20/50/4"	4	Moist, red-brown silty sand and gravel
35					
40			23/50/3"	5	Moist, red-brown clayey sand and gravel, no refuse, fine sand
45					
50		SC	15/50/2"	6	Moist, red-brown clayey fine to coarse sand and gravel
55					
60					
65					Total boring depth 62'

Well Construction Information

WELL CONSTRUCTION
Date Completed : 5-28-99
Hole Diameter : 10"
Drilling Method : AP1000

WELL CASING
Material : sch. 80 pvc
Diameter : 5"

WELL SCREEN
Material : sch. 80 pvc
Diameter : 5"
Opening : 0.020"

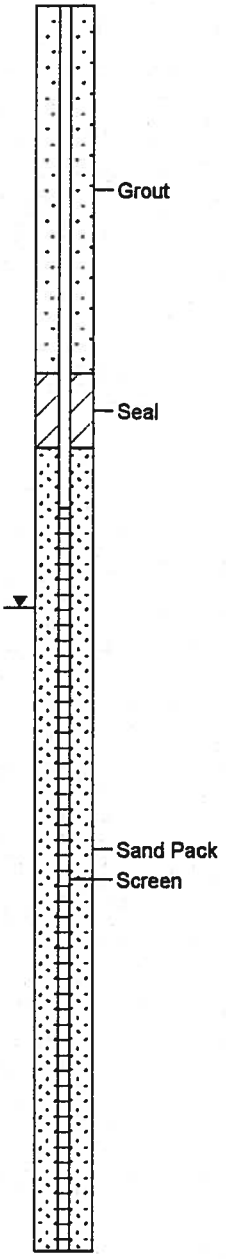
SAND PACK : 8-12 silica sand

ANNULUS SEAL : bentonite

WELL SEAL
Material : bentonite
Diameter : 5"

NOTES
Completed with steel conductor casing approx. 3' above gravel surface

Well: EW-24



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07-28-

Environmental Science & Engineering, Inc.

LOG OF BORING EW-25

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. DROBAT	SAMPLING METHOD	: SPLIT SPOON
DATE DRILLED	: 5-24-99	DATE DRAWN	: 7-11-99
DRILLED BY	: LAYNE	DRAWN BY	: R. CURTIS
HOLE DIAMETER	: 5"		

Depth in Feet	GRAPHIC	USCS	Blow Count	Samples	DESCRIPTION
0					
5		SC	50/6"	1	Moist, dark brown - black, clayey fine sand, trace gravel w/ refuse (glass, wood etc.)
10					Wet, red-brown to brown clayey fine sand and fine silty sand, trace wood
15			5/18/16	2	
20					
25			18/50/1"	3	Dry red-brown silty fine sand and fine coarse gravel
30					
35			29/50/0"	4	Red-brown, dry silty sand and gravel, some clay
40		SM			
45			27/50/3"	5	Moist, red-brown silty/clayey sand and fine gravel
50					
55			10/15/50/4"	6	Moist, red-brown clayey sand and fine to medium gravel
60					
65					
70					Total boring depth 69'
75					

Well Construction Information

WELL CONSTRUCTION
Date Completed : 5-25-99
Hole Diameter : 10"
Drilling Method : AP1000

WELL CASING
Material : sch. 80 pvc
Diameter : 5"

WELL SCREEN
Material : sch. 80 pvc
Diameter : 5"
Opening : 0.020"

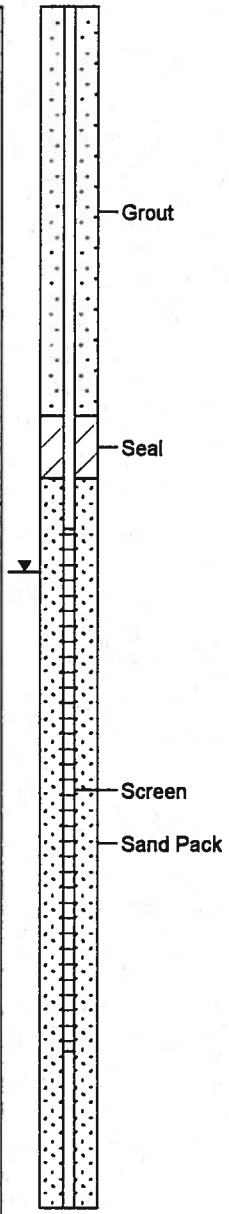
SAND PACK : 8-12 silica sand

ANNULUS SEAL : bentonite

WELL SEAL
Material : bentonite
Diameter : 5"

NOTES
Completed with steel conductor casing approximately 2.5' above ground surface

Well: EW-25



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07-28-

Environmental Science & Engineering, Inc.

LOG OF BORING EW-26

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. DROBAT	SAMPLING METHOD	: SPLIT SPOON
DATE DRILLED	: 5-21-99 / 6-4-99	DATE DRAWN	: 7-11-99
DRILLED BY	: LAYNE	DRAWN BY	: R. CURTIS
HOLE DIAMETER	: 8"10"		

Well: EW-26

Depth in Feet	USCS	Blow Count	Samples	DESCRIPTION
0–15	SP	75/18"	1	Sand, fine to medium, dark brown, slightly moist, some fine gravel, landfill debris Sand, dark brown, slightly moist, landfill debris
15–20	SW	-	2	Gravelly sand, fine to coarse sand, fine to coarse gravels, occasional cobbles, less landfill debris
20–26	GW	75/11"	3	Sandy gravel, gray to brown, dry
26–28	SW			gravelly sand, brown, fine to coarse gravel, moist
28–50	GW	100/4" 105/3" 100/10"	4 5 6	Sandy gravel, brown to gray, fine to coarse sand, dry
50–62	SM			Gravelly to silty sand, brown, fine to medium sand, moderately dense, saturated
62–69	GC			Clayey gravel with sand, brown, fine to medium sand, saturated
69–82	GP			Silty to sandy gravel, brown, fine to coarse sand, dense, moist to saturated
82–85	GC			Clayey gravel with sand,
85–100	SP	140/10"	7	Gravelly sand with silt, gray-brown, fine to coarse sand

Well Construction Information

WELL CONSTRUCTION	
Date Completed	: 6-5-99
Hole Diameter	: 10"
Drilling Method	: ODEX
WELL CASING	
Material	: sch. 80 pvc
Diameter	: 5"
WELL SCREEN	
Material	: sch. 80 pvc
Diameter	: 5"
Opening	: 0.020"
SAND PACK	: 8-12 silica sand
ANNULUS SEAL	: bentonite
WELL SEAL	
Material	: bentonite
Diameter	: 5"

NOTES

Completed with steel conductor casing approximately 5' above ground surface

Grout

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07-28

Environmental Science & Engineering, Inc.
PACTEC

LOG OF BORING EW-26

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. DROBAT	SAMPLING METHOD	: SPLIT SPOON
DATE DRILLED	: 5-21-99 / 6-4-99	DATE DRAWN	: 7-11-99
DRILLED BY	: LAYNE	DRAWN BY	: R. CURTIS
HOLE DIAMETER	: 8"10"		

Depth in Feet	GRAPHIC	USCS	Blow Count	Samples	DESCRIPTION
100					
105					
110		SP			
115					Sand, gray to light brown, mostly coarse sand (sand pack material) red to gray breccia fragments starting at approx. 100', saturated
120					
125		SP			Gravelly sand with silt, red-brown, ~~fine to coarse sand, breccia~~ fragments
130					
135					Bedrock, fragmented breccia, dark brown and red to gray, subangular to angular, fine to coarse foliated granitic clasts
140					
145					
150					
155					
160		0			Bedrock, fragmented breccia, dark brown and red to gray, subangular to angular, fine to coarse foliated granitic clasts
165					
170					
175					
180					
185					
190					
195					
200					

Well Construction Information

WELL CONSTRUCTION
Date Completed : 6-5-99
Hole Diameter : 10"
Drilling Method : ODEX

WELL CASING
Material : sch. 80 pvc
Diameter : 5"

WELL SCREEN
Material : sch. 80 pvc
Diameter : 5"
Opening : 0.020"

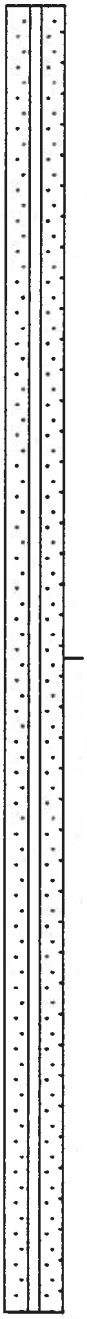
SAND PACK : 8-12 silica sand

ANNULUS SEAL : bentonite

WELL SEAL
Material : bentonite
Diameter : 5"

NOTES
Completed with steel conductor casing approximately 5' above ground surface

Well: EW-26



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Environmental Science & Engineering, Inc.
A MACTEC Company

LOG OF BORING EW-26

ADEQ
WQARF Section
3033 N. Central Ave.
Phoenix, AZ

QST REP	: P. DROBAT	SAMPLING METHOD	: SPLIT SPOON
DATE DRILLED	: 5-21-99 / 6-4-99	DATE DRAWN	: 7-11-99
DRILLED BY	: LAYNE	DRAWN BY	: R. CURTIS
HOLE DIAMETER	: 8"10"		

Depth in Feet	GRAPHIC	USCS	Blow Count	Samples	DESCRIPTION
200–265		0			Bedrock, fragmented breccia, dark brown and red to gray, subangular to angular, fine to coarse foliated granitic clasts
					Bedrock, fragmented breccia, dark brown and red to gray, subangular to angular, fine to coarse foliated granitic clasts
265–275		0			Bedrock, sandstone, red to brown, fine to coarse sand
275					Total boring depth 275'

Depth scale: 200, 205, 210, 215, 220, 225, 230, 235, 240, 245, 250, 255, 260, 265, 270, 275, 280, 285, 290, 295, 300

Well Construction Information

WELL CONSTRUCTION
Date Completed : 6-5-99
Hole Diameter : 10"
Drilling Method : ODEX

WELL CASING :
Material : sch. 80 pvc
Diameter : 5"

WELL SCREEN :
Material : sch. 80 pvc
Diameter : 5"
Opening : 0.020"

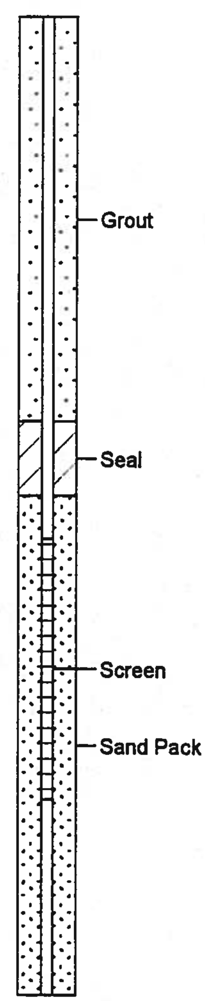
SAND PACK : 8-12 silica sand

ANNULUS SEAL : bentonite

WELL SEAL :
Material : bentonite
Diameter : 5"

NOTES
Completed with steel conductor casing approximately 5' above ground surface

Well: EW-26



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07-28

Southwest Geophysical Services, Inc.

COMPANY	QST ENVIRONMENTAL
WELL ID	EW-26
FIELD	
COUNTY	MARICOPA
STATE	ARIZONA

CO WELL FLD CTY STE FILING No

LOCATION

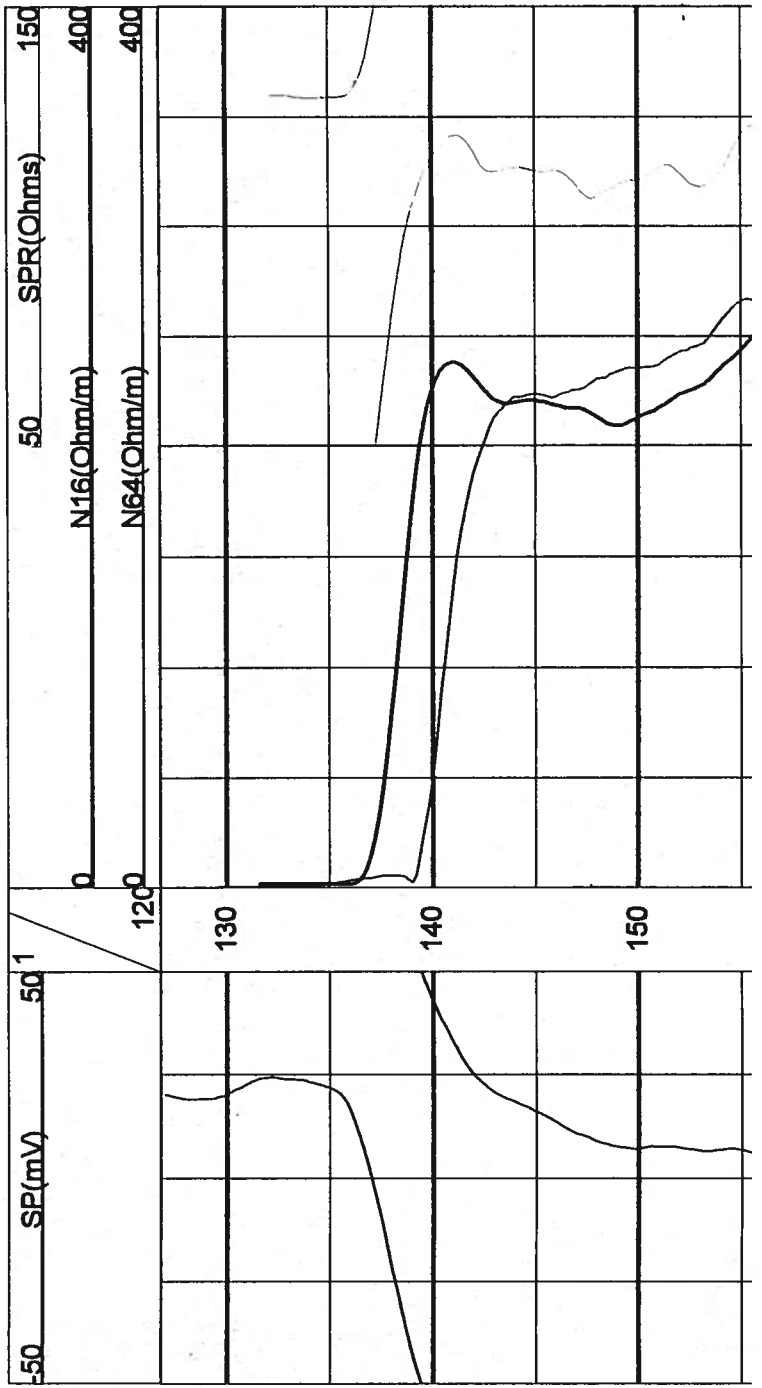
SEC TWP RGE

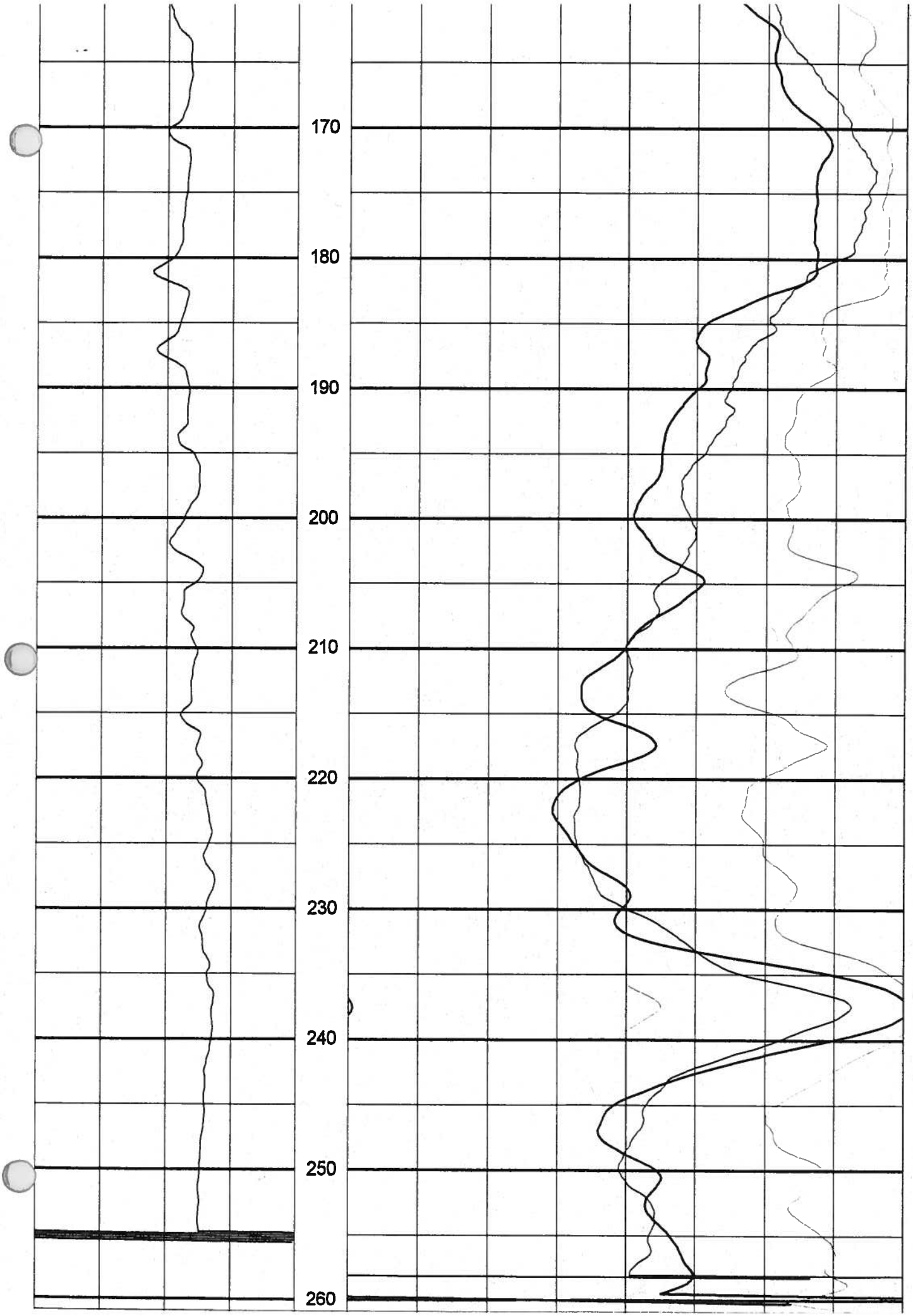
OTHER SERVICES

PERMANENT DATUM		ELEVATION	K.B.
LOG MEAS. FROM	GROUND LEVEL	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM			G.L.

DATE	6-1-99	TYPE FLUID IN HOLE	
RUN No	1	SALINITY	
TYPE LOG	E-LOG	DENSITY	
DEPTH-DRILLER	262 FT	LEVEL	
DEPTH-LOGGER	261.7 FT	MAX. REC. TEMP.	
BTM LOGGED INTERVAL	261.7 FT		
TOP LOGGED INTERVAL	135 FT		
OPERATING RIG TIME			
RECORDED BY	K. MITCHELL		
WITNESSED BY	J. MIEHER		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	10"	SURFACE	235 FT	10"		SURFACE	235 FT
2	6 1/2"	235 FT	262 FT				



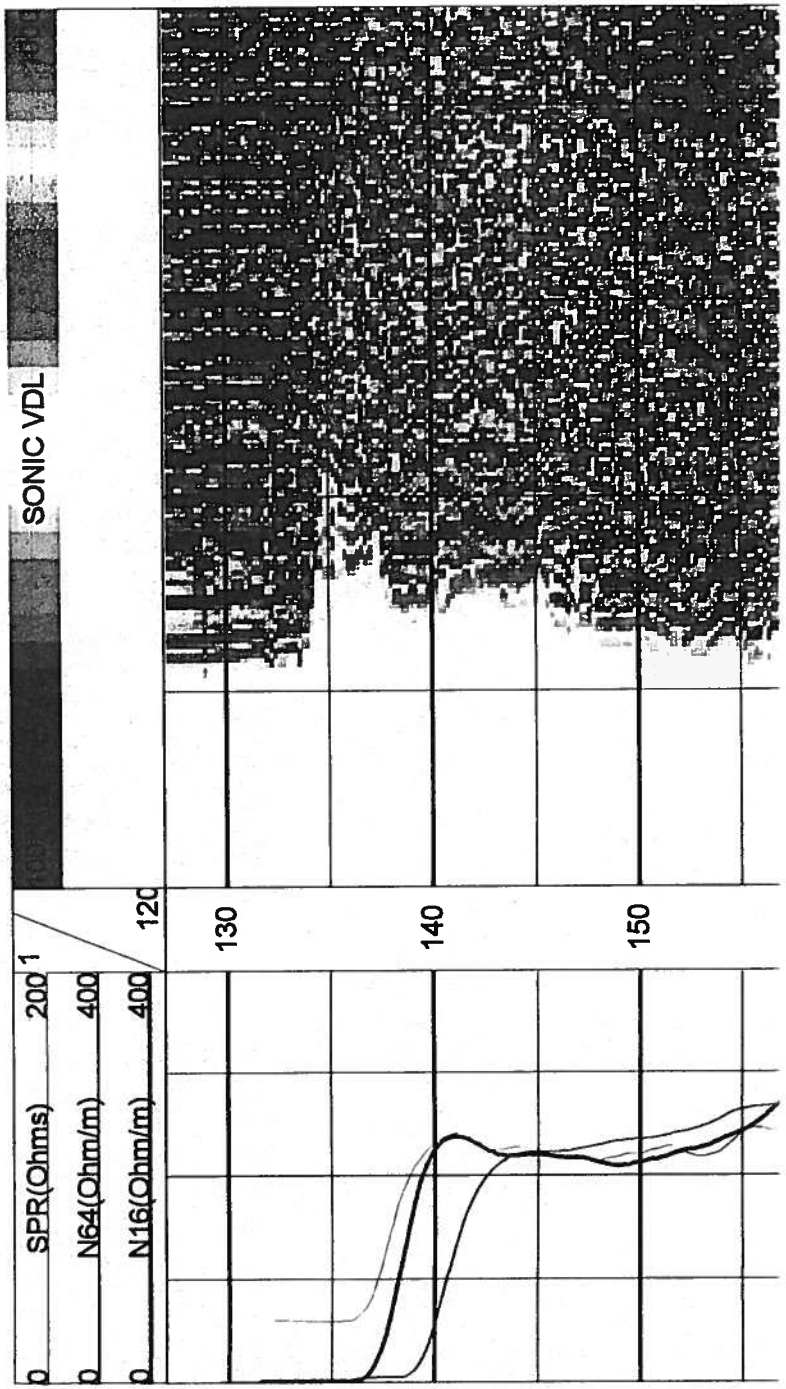

170
180
190
200
210
220
230
240
250
260

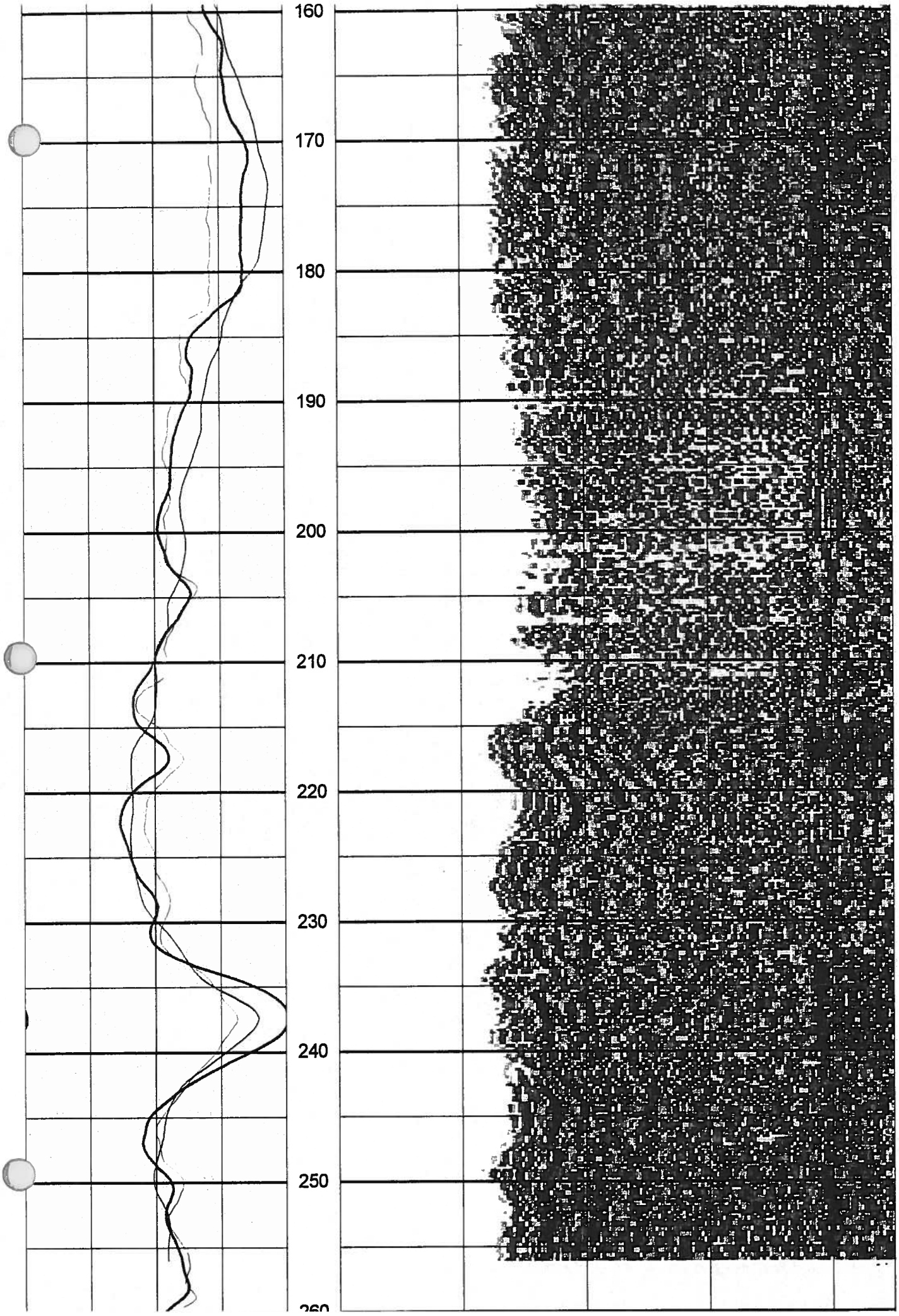
Southwest Geophysical Services, Inc.

COMPANY	QST ENVIRONMENTAL
WELL ID	EW-26
FIELD	
COUNTY	MARICOPA STATE ARIZONA
LOCATION	OTHER SERVICES
CO	
WELL	
FLD	
CTY	
STE	
FILING No	
SEC TWP RGE	
PERMANENT DATUM	ELEVATION K.B.
LOG MEAS. FROM	GROUND LEVEL ABOVE PERM. DATUM D.F.
DRILLING MEAS. FROM	G.L.

DATE	6-1-99	TYPE FLUID IN HOLE	
RUN No	1	SALINITY	
TYPE LOG	E-LOG - SONIC	DENSITY	
DEPTH-DRILLER	262 FT	LEVEL	
DEPTH-LOGGER	261.7 FT	MAX. REC. TEMP.	
BTM LOGGED INTERVAL	261.7 FT		
TOP LOGGED INTERVAL	125 FT		
OPERATING RIG TIME			
RECORDED BY	K. MITCHELL		
WITNESSED BY	J. MIEHER		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	10"	SURFACE	135 FT	10"		SURFACE	135 FT
2	6 1/2"	135 FT	262 FT				




160
170
180
190
200
210
220
230
240
250
260

ENGINEERING
3747 East Grove Street, Phoenix, AZ 85040-3982
Tel (602) 454-0402 Fax (602) 454-0403

July 9, 1999

Mr. John Mieher
QST Environmental –Phoenix
426 North 44th Street, Suite 110
Phoenix, Arizona, 85008

Re: Sky Harbor Airport
Monitor Well Location Survey

Dear Mr. Mieher:

The locations listed below were pointed out to our survey crew on June 14, 1999 to denote monitoring wells EW-22 through EW-26. The coordinates listed are NAD83(1992) state plane ground coordinates. The GAF used is 1.0001480129. The elevations listed are based on the Sky Harbor Airport vertical datum.

DESC.	NORTHING	EASTING	ELEVATION
EW-22	883859.72	675585.26	1122.16
EW-23	883737.83	674961.38	1121.38
EW-24	883283.29	676821.94	1098.72
EW-25	883550.56	678228.84	1106.82
EW-26	882546.92	677889.06	1125.35

If you require any further information, please do not hesitate to contact our office.

Sincerely;

Alan D. Reece, R.L.S.
Survey Manager

Screening-Level Ecological Risk Assessment

Prepared for:
Estes Landfill
Phoenix, Arizona

Prepared by:
QST Environmental Inc.
Phoenix, Arizona

June 1999

QST Project No. 6699-030-0700

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List of Tables (continued)

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1.0 Introduction

This report presents the results of the Screening-Level Ecological Risk Assessment conducted to support the Remedial Investigation (RI) conducted at the Estes Landfill. The objectives of the screening-level ecological risk assessment were to utilize currently available information and data regarding ecological constituents of potential concern (ecoCOPCs), ecotoxicology, and ecology to estimate the potential for undesirable ecological effects and to provide a means of determining if a more detailed ecological risk assessment was required. This screening-level ecological risk assessment was performed to evaluate the potential for adverse effects to the ecological resources at the Estes Landfill due to the constituents present in soil and groundwater. Results of the screening-level ecological risk assessment were used to:

- Determine if specific ecoCOPCs associated with the Estes Landfill pose potential adverse effects to ecological receptors;
- Determine if the potential risks from specific constituents are greater than the acceptable range; and
- Assist in the determination of whether a more thorough assessment is warranted.

The Estes Landfill is located adjacent to and south of the Salt River between 40th and 45th Streets in Phoenix, Arizona (Figure 1). The Estes Landfill study area is shown in Figure 2. The study area includes a network of groundwater monitoring wells that extends beyond the portion of the aquifer which is impacted by the site. The Estes Landfill was privately owned and operated from the early 1950 until 1972, when it was permanently closed to landfill operations.

The screening-level ecological risk assessment for the Estes Landfill consists of three major components:

- Screening-Level Problem Formulation;
- Ecological Effects Evaluation; and
- Screening-Level Exposure Estimate and Risk Characterization.

This screening-level ecological risk assessment was conducted in accordance with the following guidance:

- Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments [U.S. Environmental Protection Agency (USEPA), 1997];
- Guidelines for Ecological Risk Assessment (USEPA, 1998);
- Guide for Screening Level Ecological Assessments (Suter, 1995);
- Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference (USEPA, 1989); and
- Risk Assessment Guidance for Superfund, Volume II: Environmental Evaluation Manual (USEPA, 1989).

2.0 Screening-Level Problem Formulation

The screening-level problem formulation develops a conceptual model for the site that addresses five major issues:

1. Environmental setting and contaminants known or suspected to exist at the site;
2. Contaminant fate and transport mechanisms that are known or suspected to exist at the site;
3. The mechanisms of ecotoxicity associated with the contaminants and likely categories of receptors that could be affected;
4. The complete exposure pathways known or suspected to exist at the site; and
5. Selection of endpoints to screen for ecological risk.

2.1 Environmental Setting and Stressor Characteristics

2.1.1 Site Characterization

The primary objective of the site characterization is to present narrative regarding the existing habitats within the vicinity of the Estes Landfill Site in order to provide supporting information for the screening-level ecological risk assessment. This effort relied on review of existing mapping, past reports, existing literature, field reconnaissance, and agency coordination. Specifically, the purpose of this task was to:

- review existing information regarding the environmental and ecological resources located in the vicinity of the Estes Landfill;
- utilize existing mapping to aid in characterizing the study area;
- identify terrestrial cover types and habitats to provide a general understanding of the ecological structure and quality within the study area;
- identify any special, sensitive, or unique ecological resources including the documented occurrences of listed federal or state threatened and/or endangered species; and
- summarize available information on the nature and extent of any site-originating contaminants.

A walkover of the Estes Landfill, the adjacent Salt River channel, and immediately surrounding areas was conducted by a QST ecologist. Terrestrial habitat characterization was largely based upon overall habitat structure, and the identification of predominant vegetation communities within the areas observed. As this effort involved a qualitative survey, the information regarding vegetative species is not considered a complete representation of all existing species within the areas observed. Plant identification was primarily accomplished in the field. Incidental faunal observations were recorded during field activities.

2.1.2 Area Topography

Previous reports have indicated that the Estes Landfill is located on the eastern edge of the West Salt River Valley, which is characterized by broad, relatively flat alluvial basin that slopes gently west towards the outlet of the basin (Harding Lawson, Associates, 1997). Development practices, urbanization, and flood control measures have altered the pre-settlement topography dramatically. The landfill site lies adjacent to, and above, the Salt River Channel in the uplands. Topographic relief from the lower-lying areas of the Salt River to the surrounding upland areas to the north (Phoenix Airport) and south (Estes Landfill) ranges from approximately 20 - 30(+) feet. The upland areas bordering the Salt River were elevated to reduce flooding hazards with fill material by broadening the river channel.

Within the landfill site boundaries, topography ranges from nearly flat to steep. Overall slope is to the south. As a result of a flood control project, the historic boundaries of the landfill were modified by excavating 30 acres of the site and placing the material onto what is presently the remaining 40 acres. The locating of the 30 acres of material within the 40 acres has resulted in a steeply banked plateau, creating two predominant elevations. The lower-lying areas surrounding the plateau are characterized by a disturbed ground surface, resulting from past land disturbance activities (i.e., excavation, earth moving, materials storage and dumping). As a result of these activities small depressional areas and swales occur within the property. Maximum topographic change across the site (from site proper to the highest point within the plateau area) is approximately 50 feet. Relief is noticeable on the plateau, with gradient sloping westerly; falling approximately 13 feet to the western edge.

2.1.3 Ecological Characterization

Historic land use has greatly influenced the availability, extent, and quality of the existing ecological communities. Historic land development patterns and current land use activities have defined the local landscape matrix as developed/urbanized. The current state of successional change and the stage of vegetative development has clearly been determined by human activities. The landscape surrounding the Estes Landfill reflects commercial-retail use, continuing industrial activity, landfilling, and residential use. The landscape to the south, southeast, southwest, and west of the site is distinguished by office parks, the Waste Management Landfill, industrial businesses, storage yards, and repair shops, and a mix of commercial-retail-residential. The Salt River channel lies immediately to the north of the site, the Phoenix Sky Harbor International Airport is located to the north of the river.

Ecological Cover Types

Four cover types were identified by review of aerial photographs and City of Phoenix maps (approximately 2 miles), and field reconnaissance within the area surrounding the Estes Landfill Site (approximately ½ mile). The landscape within the vicinity is largely characterized by

disturbed/developed, upland terrestrial communities. The ecological cover types observed included developed land, old field, dry river channel, and open water.

As indicated above, local land use practices have determined the nature and extent of cover types found within the vicinity of the site. From a total cover/total area perspective, the predominant cover type is developed land.

Developed Land

The predominant cover type immediately encompassing the Estes Landfill area and parcels to the south, southeast, southwest, and the west is developed land. Zoning within the vicinity of the landfill is heavy industrial and light industrial. This cover type designation is used to define those areas directly associated with active industrial, commercial-retail-residential, and other related uses. The open spaces associated with these land uses are typically actively managed on a regular basis (i.e., mowed lawns and fields), and are therefore maintained in a static, early successional condition. With the exception of the Salt River Channel, development in the vicinity of Estes Landfill is high density with minimal undisturbed, open space, which is actively managed (i.e., mining) and affected parcel use practices (i.e., landfilling, junkyards, auto salvage and repair, etc.). Habitat availability is, therefore, by limited by virtue of the absence of undisturbed, intact habitats and the largely homogeneous structure of the developed land landscape. Exceptions may occur in protected areas such as parks, or may be limited to the occurrence of exotic species planted as ornamentals, or the maintaining of narrow strips of shrubs and trees along edges of property lines, mowed lawns, and fields. Areas providing cover, hunting opportunities, and forage are limited.

The predominant community vegetative assemblage is characterized by herbaceous species, with occasional shrubs and trees. Dominant species include various grasses; palm trees; and occasional desert wildflowers, shrubs, and trees.

Various faunal species are known to occur within developed land habitats. The predominantly herbaceous structure and highly disturbed nature of developed land provides poor to moderate habitat quality. Mammal species may include eastern cottontail, shrew and mole species, mice species, and raccoon. Common bird species associated with developed land may include blue jay, common crow (observed), cardinal, American robin, mourning dove (observed), European starling (observed), and house sparrow.

Old Field

Old field habitats are lands that have been historically cleared, farmed, logged, or disturbed for other development purposes (i.e., industrial, manufacturing). Vegetative cover in these areas typifies that of early successional conditions. Generally, old fields represent areas that have been recently abandoned

and subsequently invaded by volunteer plant species. Vegetative structure is typically predominated by annual and perennial herbs, and scattered shrubs and young trees. The area encompassing Estes Landfill was classified as old field, as well as the area adjacent to, and to the east and northeast of, the site.

The lower-lying area surrounding the plateau consisted primarily of bare ground with a ground surface comprised of rocks, gravel, occasional piles of refuse and fill materials (i.e., asphalt, plastic sheeting, metals, woody debris, and concrete), and coarse sand. Unvegetated ground was prevalent and apparently a result of vehicular traffic and past disturbance activities. Consequently, vegetative cover was sparse and predominated by forbs, small low-to-the-ground herbs and grasses, and scattered trees and shrubs. Small patches and individuals of velvet mesquite, yellow paloverde, and seepweed were observed across the site. Other vegetative species included ironweed, fiddleneck, filaree, smoketree, brittle phacelia, desert groundsel, brown-eyed evening primrose, and grass species. The taller trees and shrubs provided shade and cover for a number of bird species. Some of the species observed utilizing the site trees and shrubs included Gambel's quail, curve-billed thrasher, common flicker, American crow, rock dove, and mourning dove (see Table 1).

Due to local, micro-topographic differences and earth moving activities, a number of small depressions and swales were observed on-site. In many of these areas there was evidence of temporary ponding in the form of cracked silty soils on the uppermost surface. These areas apparently collect stormwater runoff and direct precipitation after storm events. There was little to no vegetative growth in the depressions and swales.

Numerous small mammals and bird species may utilize this habitat type for nesting, foraging and hunting, and cover. Mammals species observed included the black-tailed jackrabbit, eastern cottontail, and the burrows of what appeared to be that of a rock ground squirrel. Other species potentially occurring may include thirteen-lined ground squirrel, Merriam's shrew, desert shrew, house mouse, striped skunk, and fox. Common bird species may include common flicker, horned lark, western bluebird, common yellowthroat, killdeer, red-tailed hawk, American kestrel, and house sparrow. The unidentified skeletal remains of a raptor were observed within the utility transmission line easement area, due south of the plateau landfilled area.

Dry River Channel

The Salt River is the primary surface water feature in the Phoenix area. Surface flow and water permanence within the channel, however, are both infrequent and ephmeral. The stretch of the Salt River in the vicinity of the City of Phoenix and those areas adjacent to the Estes site, are predominantly characterized as dry river channel. Flow into the Salt River is managed upstream by a series of reservoir dams. Releases from these dams and the Granite Reef Diversion dam (located

18 miles upstream) are infrequent, but create high velocity flows and dramatic fluctuations in water depth. Flow velocities have neared 100,000 cubic feet per second; overall measurable flow may continue for days to months (HLA, 1997). High flow events from upstream releases from reservoir dams have occurred 11 times over the past 30 years. Other sources of water for the Salt River include drainage canals and stormwater drains. These sources provide minimal flow to the river in the vicinity of the site; likely occurring only after periods of extended, or heavy, precipitation events.

As a consequence of lack of water permanence and flow, there is no true aquatic habitat in the vicinity of the Estes Landfill site. High quality riparian habitat occurs 3 to 4 miles downstream of the site (Arizona Game and Fish Department (GFD), personal communication). These areas are comprised of cottonwood-willow associations and are well utilized by waterfowl, shore and wading birds, and various mammal and fish species. Field reconnaissance efforts indicated that there are no true riparian habitats in the Salt River channel adjacent and just upstream of the landfill (approximately ⅛ mile), or within ½ mile downstream of the site.

The river channel is broad, ranging from 900 to 1,200 feet across. The channel is comprised of a deeper "normal" flow channel, which gradates in both the north and south directions to a primary and secondary terraces. The normal flow channel is subtly-to-moderately incised, narrow and linear water course that meanders in areas within the river channel proper. Some of the lower lying areas collect and hold water, as were evidenced by darkly stained substrates and dried algal material. Elevational change from the lower positions in the normal flow channel to the higher points at the secondary terraces approach, and exceed in some areas, 10 feet. The occurrence of the terraces within the river channel are likely due to historic flow regimes and characteristics, and due to past flood control and bank stabilization efforts. These areas are relatively broad and are differentiated from one another by rises in elevation and slope, and extent of vegetative cover.

Substrates within the river channel are characterized by boulder, rubble, cobble, with minor components of rock and pebble. The substrate character is somewhat different with the terraces as they represent depositional areas during high flow events. Substrate composition includes small boulder, rock, pebble, coarse sand, and sand.

Vegetation was scattered throughout the river channel accounting for approximately 30 to 35 percent of total cover. Vegetative growth was primarily comprised of herbaceous and forb species. Shrubs and small trees were also observed. Tree growth was observed primarily within the lower gradient, low flow channel. Observed tree/shrub species included velvet mesquite, willow, cottonwood, fairy duster, smoketree, sweetbush, desert broom, seepweed, and brittlebush. The willows and cottonwoods were found only within small infrequent strips of growth within the low flow channel. Other vegetative species included various grass species [*Digitaria* sp., *Panicum* sp., *Agropyron*,

Elymus sp. (identification of grasses were not verified in the laboratory)], desert verbena, desert lavender, pomegranata, bladderpod, and hierba amarilla.

Overall habitat availability within the river channel is relatively limited by lack of water permanence and flow, and the low density of vegetative cover. The areas of greatest cover were found to occur within the upper terrace areas, where shrub and herbaceous growth are common. There is opportunity and structure for wildlife use given that cover and forage are available. Observed species included black eared jackrabbit, eastern cottontail, burrows of ground squirrel species, and lizard species. Other mammal species occurring within the channel may include fox, mice species, and an occasional coyote. Numerous bird species were observed including killdear, rock dove, black vulture, northern rough-winged swallow, American crow, and common grackle (see Appendix A).

One location within the channel was observed as containing water during field reconnaissance efforts. A stormwater drain, draining portions of the Phoenix airport, occurs nearly directly across from the western property boundary of the Estes Landfill site. At the time of observation, water was flowing from the drain into the river channel. Water flow from this drain appears to be common as is evidenced by a strip of dense growth of willows, cottonwood, cattails, bulrushes, and other species that are typically found in wet environs such as riparian areas and wetlands. Water flows through and around a small ditch-like area and it ultimately directed to the normal flow channel. A small, shallow pool of water was observed within a horseshoe-shaped area that appears to have been made to contain flow from the stormwater drain.

No aquatic life was observed. However, this ponded area is likely important to local birds, insects, and other wildlife as a water source. A smaller pool and some wet areas were observed approximately 60 to 70 feet downstream of the ponded area. Substrate consisted of a fine layer of silt over sand and coarse sand.

Open Water

Open water habitat occurs approximately ½ mile to the west of the Estes Landfill site. The waterbody is referred to as Southbank Lake, and is a manmade, privately owned, lake that was created by excavating to a depth below the water table. Discussions with the GFD indicate that the lake has not been managed or monitored by any state agencies. Reliable data on lake morphometry, fish community assemblage, and water quality are not available. A conversation with a fisherman indicated that the lake ranges from 5 to 30 feet deep with a couple of deeper holes approximately 40 feet in depth. The lake was stocked with fish approximately 15 years ago (1984) with catfish, bluegill, and bass. Fishing in the lake is conducted on fee basis only.

The lake lies due south of the Salt River channel levee, and near a business park complex. The property immediately surrounding the lake is fenced with a locked gate, therefore observations were limited to viewing through binoculars. Due to the depth of the excavation, the surface of water is approximately 30 to 35 feet below the surrounding land surface. The slopes leading to the edges are steep and variably vegetated with shrubs, trees, forbs, herbs, and grasses. Visual observations from a distance suggested that there may not be shallow zones (< 1 to 2 feet) near the lake edge. Emergent vegetative growth was not observed. Wildlife use is expected to be relatively high in this are due to water availability, cover, and the fact that human presence is limited by access. The mammal species listed for developed land, old field, and dry river channel may also occur in the vicinity of the lake. Bird species use is likely greater and includes a greater variety of species, including waterfowl. During field activities, diver ducks were observed near the western end of the lake.

2.1.4 Identification of Sensitive/Special Ecological Resources

The potential occurrence of threatened and endangered species, and the existence of rare natural communities within the proximity of the Estes Landfill was examined as a component of the site characterization process. Correspondence was conducted with the GFD and the U.S. Fish and Wildlife Service (USFWS) to determine the potential presence of protected species (see Appendix B). In addition, a brief literature search was performed for the documentation of sensitive resources in the area.

According to the USFWS, there are 14 endangered species that could potentially occur in the Maricopa County area (see Appendix A). The list of species includes three plant species and two mammals, three fish, and six bird species. Review of the habitat requirements of each suggests that suitable habitat for these species does not occur within the vicinity of the Estes Landfill site. No USFWS listed species were observed during field reconnaissance efforts.

The GFD maintains a Heritage Data Management System that tracks and documents "special status species" throughout the state of Arizona. Those species identified as potentially occurring within the Estes Landfill area included the lowland leopard frog (*Rana yauapaiansis*), Sonoran desert turtle (*Gopterus agussizii*), and roundtail chub (*Gilarobuita*). The status of each of these species within the state is listed as Wildlife of Special Concern (WC) (i.e., a species in jeopardy and/or with documented population declines and habitat losses), and Sensitive (S) (i.e., species classified as sensitive by the Regional Forester when occurring on lands managed by the U.S. Forest Service). None of the state special status species were observed during field activities.

2.1.5 Stessor Characterization

The analysis of samples collected at the Estes Landfill indicate that volatile and semi-volatile organics as well as inorganics are present in soil and groundwater. A detailed discussion of analytical data, data evaluation procedures, and sample identification are presented in Section 6.0 of the RI report.

2.2 Contaminant Fate and Transport

The constituents at the Estes Landfill may remain persistent in the study area or may potentially migrate toward downgradient receptor locations. Constituents such as the semi-volatile organics and inorganics are expected to be relatively immobile and may remain in the soils at the site for long periods of time. Constituents such as the volatile organics are expected to be relatively mobile and may be transported from the soil to other environmental media. These mobile constituents may potentially be transported via the following major migration pathways:

- Soil to groundwater;
- Soil to surface water;
- Soil to sediment; and
- Soil to air.

Once the constituents have migrated from soil to other media, additional transport may potentially occur. For the Estes Landfill, this additional potential transport is expected to be limited to the groundwater to surface water pathway. The groundwater is expected to flow west or southwest depending on seasonal flow in the Salt River. The nearest down gradient surface water to the site is Southbank Lake. This lake is located approximately ½ mile west (and slightly south) of the site and was created by excavating a large pit below the water table. Consequently, groundwater from the site is expected to discharge to Southbank Lake. As groundwater migrates toward Southbank Lake, a significant decrease in constituent concentration is expected and has been observed. This decrease can occur through a combination of advection, adsorption, dispersion, volatilization , dissolution, and biodegradation. Based on available data, impacted groundwater from the site does not currently reach Southbank Lake.

2.3 Ecological Effects and Receptors

The environmental media at the Estes Landfill that contain potential stressor constituents and that may be encountered by ecological receptors includes soil and groundwater. Available screening level ecological effects benchmarks were identified (if available) from the literature for those constituents identified in soil and groundwater. These conservative screening values were used to help develop the ecoCOPCs in Section 3.1. A wide variety of adverse ecological effects have been reported for the constituents detected in soil and groundwater at the Estes Landfill that include, but are not limited to,

effects on survival, growth, metabolism, reproduction, and tumor formation. Potential ecological effects are characterized more fully in Section 3.2.

The Estes Landfill primarily consists of disturbed terrestrial habitat. A general site visit by a trained ecologist indicates that several avian, reptilian and mammalian species may be found at the site. Although this site visit indicates the potential for exposure, it was not designed to identify population effects. Several wildlife species that have been identified as present on the Estes Landfill may be subject to adverse ecological effects from soil constituents. Terrestrial wildlife of interest include, but are not limited to, insects, reptiles (lizards and snakes), birds and small mammals. Terrestrial ecological receptors used in the ecological risk assessment are plants, soil microbes and invertebrates, the black-tailed jackrabbit, the rock ground squirrel, Gambel's quail, the red-tailed hawk, the fence lizard, and the western diamondback rattlesnake, which are representative species of the ecological receptors at the Estes Landfill.

Since groundwater from the site may discharge to Southbank Lake, aquatic receptors are also of interest. Although the site visit did not include aquatic sampling, aquatic receptors of interest are suspected to include amphibians, fish and aquatic invertebrates that may inhabit Southbank Lake.

2.4 Exposure Pathways

The chemical stressors identified in Section 2.1 may cause adverse effects to ecological receptors. However, for adverse effects to be caused, the receptors in the ecosystems must be exposed to these stressors for enough time and in sufficient concentrations to produce the adverse effect. Suitable habitat at the site is limited by development or other anthropogenic activity that has occurred at the Estes Landfill and surrounding area. It is important to consider that, although the exposure at the site is relatively limited, the potential exists for flora and fauna to come in contact with constituents in soils. General potential exposure pathways by which terrestrial wildlife and plant species may come into contact with constituents include:

- Ingestion of or dermal contact with soils by soil invertebrates or wildlife;
- Ingestion of forage or prey; and
- Uptake of constituents or contact with soils by plants.

Although impacted groundwater from the site does not currently reach Southbank Lake, for purposes of this screening analysis it was conservatively assumed that the potential exists for aquatic species of interest to come in contact with constituents in surface water. Generalized potential exposure pathways by which aquatic organisms may come into contact with constituents include:

- Ingestion of or dermal contact with surface water by aquatic invertebrates or wildlife;
- Ingestion of prey; and
- Direct contact with water by plants.

Because some of the stressor constituents bioaccumulate (e.g., some semi-volatiles and inorganics), the extent to which the ingestion of prey may be a significant pathway will be evaluated after selection of ecoCOPCs and evaluation of exposure to soils and surface water.

2.5 Assessment Endpoints

For the screening-level ecological risk assessment, assessment endpoints are any adverse effects on ecological receptors, where receptors are plant and animal populations and communities, habitats, and sensitive environments. Adverse effects on populations can be inferred from measures related to impaired reproduction, growth and survival. Adverse effects on communities can be inferred from changes in community structure or function. Adverse effects on habitats can be inferred from changes in composition, and characteristics that reduce the habitat's ability to support plant and animal populations and communities.

Assessment endpoints selected for this evaluation include:

- Assessment Endpoint 1 - adverse population or community effects on soil dwelling invertebrates due to exposure to ecoCOPCs in soil.
- Assessment Endpoint 2 - adverse population effects on mammals (black-tailed jackrabbit, rock ground squirrel) due to incidental ingestion of ecoCOPCs in soil.
- Assessment Endpoint 3 - adverse population effects on birds (Gambel's quail, red-tailed hawk) due to incidental ingestion of ecoCOPCs in soil.
- Assessment Endpoint 4 - adverse population effects on reptiles (fence lizard, western diamondback rattlesnake) due to incidental ingestion of ecoCOPCs in soil.
- Assessment Endpoint 5 - adverse population effects on plants due to uptake of ecoCOPCs in soil.
- Assessment Endpoint 6 - adverse population effects on amphibians due to direct exposure of egg masses and larval amphibians to ecoCOPCs in surface water.
- Assessment Endpoint 7 - adverse population effects on aquatic invertebrates and fish to direct exposure to ecoCOPCs in surface water.
- Assessment Endpoint 8 - adverse population effects on terrestrial and aquatic species due to bioaccumulation of ecoCOPCs in the food chain.

2.6 Conceptual Model

The conceptual model based upon the ecosystems potentially at risk, the selected endpoints, and the potential exposure to constituent stressors from the Estes Landfill are presented in Figures 3 and 4.

3.0 Screening-Level Ecological Effects Evaluation

3.1 EcoCOPCs

EcoCOPCs are site-related constituents that may pose the most risks to eco-receptors due to toxicity, bioaccumulation, etc. EcoCOPCs are selected for quantitative risk evaluation in the remaining tasks of the screening-level ecological risk assessment. The ecoCOPC selection was conducted according to procedures and guidelines presented in various USEPA guidance. Site-specific ecoCOPCs were selected by:

- Comparing maximum detected concentrations in soil and groundwater to conservative ecotoxicity screening values. Screening criteria were selected from state and national standards, criteria, and screening values (e.g., USEPA) or other relevant sources (toxicological studies reviewed from the literature, or compilations of these). Screening values were acquired, when available from Arizona DEQ, USEPA, and other sources of screening values (i.e., Oak Ridge National Laboratory) (Tables 1 and 2). Screening values must be relevant for the medium evaluated and the endpoint of interest. Special attention must also be given to site-specific chemical conditions for each constituent, such as total organic carbon (TOC) for organic constituents in soil. Professional judgement is exercised to select the most relevant and applicable benchmarks to ensure relevance to the study area and receptors of interest, conservatism, and benchmarks relative to the measure and assessment endpoints of interest. The screening values presented in Tables 1 and 2 represent the most conservative values available for the constituent relative to the measure and assessment endpoints of interest. In most cases, the screening values were based on no observed adverse effect levels (NOAELs). Screening criteria are not available for all constituents. Therefore, consideration was given to similar chemical structure and potential toxicity in determining a surrogate chemical for which a screening criterion was available. If a suitable surrogate could not be determined for a compound, then the compound was selected as a potential ecoCOPC.
- Consideration of detected inorganic concentrations to background concentrations.
- Consideration of the constituent itself in terms of natural occurrence, similarity to other constituents, and essential nutrients. Some professional judgement is used in this evaluation step when considering the potential for natural occurrence of a constituent. Essential nutrients are not retained as potential ecoCOPCs based upon the dietary needs for these constituents by the ecological receptors. Essential nutrients include, but are not limited to calcium, potassium, magnesium, nitrogen, phosphate, iron, and sodium.

EcoCOPCs are selected to limit the number of constituents to be evaluated to those that represent the greatest portion of the potential risk. Screening values are low to help ensure that no constituent is eliminated from consideration without warrant. Soil data used in the ecoCOPC selection process

included both surface and subsurface samples. Maximum soil concentrations were compared to the most stringent soil screening values. The potential impacts of affected groundwater on ecological receptors was considered by comparing maximum groundwater concentrations to the most stringent surface water screening values applicable to the site.

The results of the ecotoxicity screening for soil and groundwater are presented in Tables 3 thru 5. The soil screening results for surface and subsurface soil are presented in Tables 3 and 4. The groundwater screening results are presented in Table 5.

Constituents that exceeded the ecotoxicity screening values were evaluated individually to determine if the constituent was naturally occurring, site-related, or an essential nutrient. Table 6 presents a comparison of maximum detected concentrations of constituents in surface soil to available background data. Constituents detected in surface soil that were eliminated as potential ecoCOPCs based on background include arsenic, barium, beryllium, chromium, nickel and silver. Of the constituents detected in subsurface soils (> 10 feet below the surface), only beryllium was present at concentrations below background. However, because ecological receptors can not be exposed to soils at this depth, the constituents detected in subsurface soils (> 10 feet below the surface) were eliminated from further consideration as ecoCOPCs. Essential nutrients eliminated as potential ecoCOPCs for groundwater include calcium, iron, magnesium, potassium and sodium.

Constituents eliminated as potential ecoCOPCs by the previous steps were considered for retention based upon the potential for bioaccumulation. Constituents eliminated during the screening process include volatile organic compounds (VOCs) semi-volatile organic compounds (semi-VOCs) and inorganics. Of the constituents eliminated, consideration was given to retain aroclor 1254, a polychlorinated biphenyl (PCB), because of the potential for high bioaccumulation. The remaining constituents eliminated during the screening process (VOCs and inorganics) generally have low potential for bioaccumulation and therefore were not retained as ecoCOPCs. Consequently, aroclor 1254 was the only constituent retained as an ecoCOPC based upon potential to bioaccumulate in the environment.

As a final step in determining ecoCOPCs, constituents were evaluated for removal from the preliminary list of ecoCOPCs based on site-specific circumstances, such as low frequency of detection. Constituents that are infrequently detected may be anomalies in the data due to sampling errors or analytical errors and, therefore, may not be site-related. Constituents detected in less than or equal to 5 percent of the groundwater samples analyzed were eliminated from further consideration. The potential ecoCOPCs eliminated in this step include bromodichloromethane, dibromochloromethane, 1,3-dichlorobenzene, antimony, mercury, and selenium. Based on the selection methodology, the ecoCOPCs chosen for soil and groundwater are presented in Table 7.

3.2 Ecotoxicity Benchmark Values

Ecotoxicity benchmark values were used to evaluate the potential for ecological risk for both terrestrial and aquatic receptors of interest. Measures of potential ecological effects that correspond to the assessment endpoints include:

- Measure of Effect 1 - Ecotoxicity benchmark values associated with NOAELs or LOAELs for soil dwelling invertebrates.
- Measure of Effect 2 - Dietary benchmarks for mammals associated with NOAELs or LOAELs adjusted for incidental soil ingestion of ecoCOPCs.
- Measure of Effect 3 - Dietary benchmarks for birds associated with NOAELs or LOAELs adjusted for incidental soil ingestion of ecoCOPCs.
- Measure of Effect 4 - Dietary benchmarks for reptiles associated with NOAELs or LOAELs adjusted for incidental soil ingestion of ecoCOPCs.
- Measure of Effect 5 - Ecotoxicity benchmark values associated with NOAELs or LOAELs for terrestrial plants.
- Measure of Effect 6 - Aquatic ecotoxicity benchmark values for ecoCOPCs for impairment of amphibian reproductive success.
- Measure of Effect 7 - Ecotoxicity benchmark values (established criteria) for aquatic life associated with chronic exposures to surface water.
- Measure of Effect 8 - Dietary benchmarks for mammals, birds, and reptiles associated with NOAELS or LOAELs adjusted for ingestion of forage or prey.

Benchmark values were not available in the literature for all ecoCOPCs. When available, surrogate chemicals were selected based upon similarities in compound structure and relative toxicity.

Numerous variables, which include body weight, food intake, soil intake, home range, etc., are used to determine benchmark values. For purposes of this screening-level ecological risk assessment, conservative assumptions were used to determine benchmark values and to evaluate the potential for ecological risk. Examples of conservative assumptions include:

- Area-use factor - Species are exposed 100 percent of the time;
- Bioavailability - EcoCOPCs are 100 percent bioavailable;
- Life stage - Most sensitive life stage is affected;
- Dietary Composition - Diet is composed entirely of most contaminated food source.

3.2.1 Measure of Effect 1 - Ecotoxicity Benchmark Values Associated with NOAELs or LOAELs for Soil Dwelling Invertebrates

Benchmarks for ecoCOPCs in Estes Landfill soils were used to evaluate the potential for adverse effects to soil-dwelling organisms due to direct exposure to soil. Benchmarks for soil invertebrates are presented in Table 8.

3.2.2 Measure of Effects 2, 3, and 4 - Dietary Benchmarks for Mammals, Birds, and Reptiles Associated with NOAELs or LOAELs for Incidental Soil Ingestion

Ecotoxicity benchmarks for soil ecoCOPCs that may be incidentally ingested by small mammals, avian species and reptiles during preening, feeding, and other activities at the Estes Landfill are presented in Tables 9 through 11. In general, representative ecotoxicity benchmark values for ecoCOPCs are identified from the literature and converted to the wildlife species of interest utilizing site-specific exposure assumptions. The chronic endpoint (original endpoint value) used for the ecotoxicity benchmark was a LOAEL or a NOAEL. Extrapolation within classes of organisms, although containing some inherent uncertainty, is a generally accepted practice. On the other hand, extrapolation between phylogenetic classes is more uncertain, and the reliability of such extrapolation is unknown. Extrapolation from mammalian benchmarks to avian or reptilian benchmarks may underestimate toxicity when based solely on body weight. Ecotoxicity benchmark values for some ecoCOPCs were not readily available in the literature for reptilian receptors.

The source for the benchmark calculation is the Toxicological Benchmarks for Wildlife: 1996 Revision (ES/ER/TM-86/R3). The Original Value (mg/kg/day) for the Test Species was converted to an Endpoint Wildlife Value (mg/kg/day) for the species of concern using the following equation:

$$\text{Endpoint Wildlife Value} = \text{Original Value} * (bw_t / bw_w)^{1/4}$$

where: bw_t = Test species body weight (kg), and
bw_w = Endpoint Species (Species of Concern) body weight (kg).

The Endpoint Wildlife Value for the species of concern was then converted to an intake benchmark (mg/kg), representing the concentration of an ecoCOPC in soil that is a dose equivalent of the Endpoint Wildlife Value. Intake benchmarks were calculated using the following equation:

$$\text{Soil Intake Benchmark} = \text{Endpoint Wildlife Value} / f$$

where: f (adjustment factor) = Ir_s / bw_w
Ir_s = soil consumption rate (kg/day) for species

The final benchmarks for ingestion of ecoCOPCs by mammals, birds and reptiles as well as factors used in the above calculation used to determine the benchmarks are presented in Tables 9 through 11.

3.2.3 Measure of Effect 5 - Ecotoxicity Benchmark Values Associated with NOAELs or LOAELs for Terrestrial Plants

Benchmarks for ecoCOPCs that may be taken up by plant species at the Estes Landfill are presented in Table 12. Ecotoxicity benchmark values for some ecoCOPCs (i.e., DDD, DDE, DDT) were not readily available in the literature.

3.2.4 Measure of Effects 6 and 7 - Aquatic Exotoxicity Benchmark Values for ecoCOPCs for Aquatic Life and Impairment or Amphibian Reproductive Success Associated with Chronic Exposures to Surface Water

Amphibians are sensitive bioindicators of environmental stress or change due to their permeable skin and biphasic development. Early life stages are particularly sensitive to environmental conditions. Other aquatic life (i.e., invertebrates and fish) may also be potentially exposed. Specific benchmark values for amphibians were not readily available in the literature. Consequently, available chronic benchmark values for protection of aquatic life as a whole were selected for measurement of these effects.

The Salt River is designated for aquatic and wildlife warmwater (A&Ww) and aquatic and wildlife ephemeral (A&We) uses within the vicinity of the Estes Landfill (ADEQ, 1996). Consequently, the most stringent of the available ADEQ A&Ww and A&We chronic criteria were selected as ecotoxicity benchmarks. If ADEQ criteria were not available, then USEPA Ecotox Thresholds (ETs) or other available ecotoxicity benchmarks were selected. Available chronic aquatic life toxicity values for the ecoCOPCs are presented in Tables 13 and 14.

3.2.5 Measure of Effect 8 - Dietary Benchmarks for Mammals, Birds, and Reptiles Associated with NOAELs or Prey

Benchmarks for ecoCOPCs that may be consumed by mammals, birds and reptiles feeding on forage or prey from the Estes Landfill are presented in Tables 15 through 17. Benchmark values for some ecoCOPCs are not readily available in the literature for some of the animal species evaluated. However, for ecoCOPCs that have benchmark values, a calculated value is presented utilizing test endpoints for other species. The chronic endpoint (original endpoint value) used for the ecotoxicity benchmark was a LOAEL or a NOAEL. Extrapolation within classes of organisms, although containing some inherent uncertainty, is a generally accepted practice. On the other hand, extrapolation between phylogenetic classes is more uncertain, and the reliability of such extrapolation is unknown. Extrapolation from mammalian benchmarks to avian or reptilian benchmarks may

underestimate toxicity when based solely on body weight. Ecotoxicity benchmark values for some ecoCOPCs were not readily available in the literature for reptilian receptors.

The source for the benchmark calculation is the Toxicological Benchmarks for Wildlife: 1996 Revision (ES/ER/TM-86/R3). The Original Value (mg/kg/day) for the Test Species was converted to an Endpoint Wildlife Value (mg/kg/day) for the species of concern using the following equation:

$$\text{Endpoint Wildlife Value} = \text{Original Value} * (bw_t / bw_w)^{1/4}$$

where: bw_t = Test Species body weight (kg), and
bw_w = Endpoint Species (Species of Concern) body weight (kg).

The Endpoint Wildlife Value for the species of concern was then converted to an intake benchmark (mg/kg), representing the concentration of an ecoCOPC in either forage or prey that is a dose equivalent of the Endpoint Wildlife Value. Forage and prey intake benchmarks were calculated using the following equation:

$$\text{Food Intake Benchmark} = \text{Endpoint Wildlife Value} / f$$

where: f (food adjustment factor) = Ir_f / bw_w
Ir_f = food consumption rate (kg/day) for species

The final benchmarks for ingestion of ecoCOPCs in forage and prey by mammals, birds and reptiles are presented in Tables 15 through 17. These tables also present the factors used in the above calculation used to determine the benchmarks.

4.0 Screening-Level Exposure Estimates

Exposure estimates for the screening-level ecological risk calculation were based on the onsite or offsite constituent concentrations and general information regarding the types of biological receptors of concern. Only complete exposure pathways are evaluated. For these, the highest measured or estimated constituent concentrations for each environmental medium was used to estimate exposures.

Numerous variables, which include body weight, food intake, soil intake, home range, etc., are used to evaluate exposure. For purposes of this screening-level ecological risk assessment, conservative assumptions were used to determine the potential for ecological risk. Examples of conservative assumptions include:

- Area-use factor - Species are exposed 100 percent of the time;
- Bioavailability - EcoCOPCs are 100 percent bioavailable;
- Life stage - Most sensitive life stage is affected; and
- Dietary Composition - Diet is composed entirely of most contaminated food source.

4.1 Measure of Effect 1 - Exposure Concentrations for Soil Dwelling Invertebrates

The maximum concentrations of ecoCOPCs detected in soils (< 10 feet below the surface) were selected as a conservative estimate of the concentrations to which soil dwelling invertebrates could be exposed.

4.2 Measure of Effects 2, 3, and 4 - Exposure Concentrations for Mammals, Birds and Reptiles Associated with Incidental Soil Ingestion

The maximum concentrations of ecoCOPCs detected in soils (< 10 feet below the surface) were selected as a conservative estimate of the concentrations to which mammals, birds and reptiles could be exposed through incidental soil ingestion.

4.3 Measure of Effect 5 - Exposure Concentrations for Terrestrial Plants

The maximum concentrations of ecoCOPCs detected in soils (< 10 feet below the surface) were selected as a conservative estimate of the concentrations to which terrestrial plants could be exposed.

4.4 Measure of Effects 6 and 7 - Exposure Concentrations for Aquatic Life and Amphibians Associated with Surface Water

The maximum offsite concentrations of the ecoCOPCs detected in groundwater (down gradient of the site) were selected as a conservative estimate of the concentrations to which aquatic life and amphibians could be exposed. In some cases, 95 percent upper confidence limit (UCL 95) concentrations for offsite groundwater were available as reported in the human health risk assessment. When available, the UCL 95 was used in place of the maximum concentration.

4.5 Measure of Effect 8 - Exposure Concentrations for Mammals, Birds, and Reptiles Associated with Ingestion of Forage or Prey

The exposure concentrations for herbivores were estimated by multiplying the maximum detected concentrations of the ecoCOPCs detected in soils (< 10 feet below the surface) by a conservative plant/soil biotransfer factor.

$$Food_{forage}\ (mg/kg) = C_{soil}\ (mg/kg) \times Br_{forage}$$

where:
- $Food_{forage}$ = Concentration of ecoCOPC in food (mg/kg)
- C_{soil} = Concentration of ecoCOPC in soil (mg/kg)
- Br_{forage} = Biotransfer Factor (mg/kg - plant / mg/kg -Soil)

Exposure concentrations for carnivores were estimated in a two step process. First, the total daily mass of an ecoCOPC ingested by a prey species was determined by adding the contribution from both forage and soil. Then, the daily intake was converted to the concentration in the prey by multiplying the total daily intake of the constituent from plant and soil sources by a conservative biotransfer factor.

$$Food_{prey} = ((Ir_f \times Food_{forage}) + (Ir_s \times C_{soil})) \times Br_{prey}$$

where:
- $Food_{prey}$ = Concentration of ecoCOPC in food (mg/kg)
- Ir_f = Food ingestion rate of prey species (kg/day)
- $Food_{forage}$ = Concentration of ecoCOPC in food consumed by prey (mg/kg)
- Ir_s = Soil ingestion rate of prey species (kg/day)
- C_{soil} = Concentration of ecoCOPC in soil (mg/kg)
- Br_{prey} = Biotransfer factor for prey species (day/kg)

Available biotransfer factors for plants and prey were obtained from USEPA (1998) and Baes *et al.* (1984) and are presented in Table 18.

5.0 Screening-Level Risk Calculation

The environmental media and exposure pathways evaluated for ecological receptors were: (1) ingestion of soils by soil invertebrates, mammals, birds and reptiles; (2) exposure to soil by plant receptors; (3) exposure to surface water by amphibians, fish and aquatic invertebrates; and (4) ingestion of food (forage and prey) potentially affected by bioaccumulation of ecoCOPCs in the food chain. The total exposure to both soil and food by ecological receptors was also examined. Benchmark values corresponding with the appropriate measures of effects were compared with potential exposure concentrations. The estimated exposure concentrations as presented in the previous section were compared to the benchmarks as follows:

$$\text{Ecotoxicity Quotient} = \text{Exposure Concentration} \div \text{Ecotoxicity Benchmark Value}$$

Ecotoxicity quotients (EQs) less than 1 suggest that the benchmark effect is unlikely to occur. Those instances where the individual EQs are greater than 1 require further evaluation. Although the EQ method does not provide an estimate of uncertainty and is not an estimation of potential risk, it is commonly used for screening the potential for ecological effects from exposure to hazardous constituents.

5.1 Measure of Effect 1 - Ecotoxicity Quotients for Soil Dwelling Invertebrates

Exposure concentrations for soil ecoCOPCs were compared with ecotoxicity benchmark values selected for soil invertebrates and other soil dwelling organisms. The resulting EQs are presented in Table 19. EQs exceeding one were calculated for copper and manganese. The EQs indicate that the potential maximum exposure concentrations slightly exceed the benchmark values and, thus, there is a very low potential for adverse effects. The ecotoxicity benchmark used for copper was the NOAEL. If the LOAEL is used as the benchmark and average soil concentrations are used to represent typical exposures, the EQ would be expected to be less than one. Similarly, if average soil concentrations are used to represent typical exposure to manganese, the EQ would be expected to be less than one. Therefore, it can be concluded that no adverse effects are anticipated at the Estes Landfill from this exposure pathway.

5.2 Measure of Effects 2, 3, and 4 - Ecotoxicity Quotients for Mammals, Birds, and Reptiles Associated with Incidental Soil Ingestion

Exposure concentrations for soil ecoCOPCs were compared with ecotoxicity benchmark values selected for mammals, birds and reptiles. The resulting EQs are presented in Tables 20 through 22.

EQs exceeding one were calculated for 4,4-'DDE, 4,4-'DDT, and lead associated with avian receptor exposure to soil. The EQs indicate that the potential maximum exposure concentrations slightly exceed the benchmark values and, thus, there is a very low potential for adverse effects. The ecotoxicity benchmarks used for these constituents were based on the NOAEL. If the benchmark is based on the LOAEL and average soil concentrations are used to represent typical exposures, the EQ would be expected to be less than one. Therefore, it can be concluded that no adverse effects are anticipated at the Estes Landfill from this exposure pathway.

5.3 Measure of Effect 5 - Ecotoxicity Quotients for Terrestrial Plants

Exposure concentrations for soil ecoCOPCs were compared with ecotoxicity benchmark values selected for terrestrial plants. The resulting EQs are presented in Table 23. EQs exceeding one were calculated for copper. The EQ for copper indicates that the potential maximum exposure concentration slightly exceeds the benchmark value and, thus, there is a very low potential for adverse effects. The ecotoxicity benchmark for copper is based on a NOEC. If the benchmark is based on the LOEC and average soil concentrations are used to represent typical exposures, the EQ would be expected to be less than one. An evaluation of the effects for all the soil ecoCOPCs could not be performed due to the limited availability of benchmarks in the literature. However, considering the condition of existing vegetation at the site, it does not appear that concentrations of 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT are causing significant adverse effects. Therefore, it can be concluded that no significant adverse effects to plants are anticipated at the Estes Landfill from soil ecoCOPCs.

5.4 Measure of Effects 6 and 7 - Ecotoxicity Quotients for Aquatic Life and Amphibians Associated with Surface Water

Exposure concentrations for groundwater ecoCOPCs were compared with ecotoxicity benchmark values selected for aquatic life and amphibians. The resulting EQs are presented in Tables 24 and 25. EQs exceeding one were calculated for vinyl chloride, barium, boron, cadmium, lead, manganese and zinc associated with receptor exposure to surface water. The EQs indicate that the potential maximum exposure concentrations slightly exceed the benchmark values and, thus, there is a very low potential for adverse effects. The ecotoxicity benchmarks used for these constituents were based on available surface water quality standards. The exposure concentrations used for these constituents were based were based on either UCL 95 groundwater concentrations or measured maximum offsite groundwater concentrations down gradient of the Estes Landfill. If estimated surface water concentrations in Southbank Lake are used to represent typical exposures, the EQs for this pathway would be expected to be less than one. Therefore, it can be concluded that no adverse effects are anticipated at the Estes Landfill from this exposure pathway.

5.5 Measure of Effect 8 - Ecotoxicity Quotients for Mammals, Birds, and Reptiles Associated with Ingestion of Forage or Prey

The food web bioaccumulation exposure pathway considers the consumption of prey species or forage (plants, seeds, etc.) that have accumulated soil constituents in tissue, by consumers of the food web. Receptors evaluated for this pathway included the black-tailed jackrabbit, the rock ground squirrel, Gambel's quail, red-tailed hawk, fence lizard, and western diamondback rattlesnake. Estimated exposure concentrations for soil ecoCOPCs in forage or prey were compared with ecotoxicity benchmark values selected for mammals, birds and reptiles. The resulting EQs are presented in Tables 26 through 28. EQs were less than one for all receptors except the black-tailed jackrabbit. An EQ exceeding one was calculated for copper associated with the black-tailed jackrabbit's exposure to forage. The EQ for copper indicates that the potential maximum exposure concentration slightly exceeds the benchmark value and, thus, there is a very low potential for adverse effects. The ecotoxicity benchmark used for copper was based on the NOAEL. If the benchmark is based on the LOAEL and average soil concentrations are used to predict typical concentrations in food, the EQ would be expected to be less than one. Therefore, it can be concluded that no adverse effects are anticipated at the Estes Landfill from this exposure pathway.

6.0 Screening-Level Ecological Risk Assessment Conclusions/Recommendations

Based on the results described in Section 5.0, ecoCOPCs in soil and groundwater at the Estes Landfill do not pose a threat to ecological receptors. Area soils do not pose a threat to invertebrates living in the soil, plants growing in the soil, or terrestrial receptors (i.e., birds, mammals, and reptiles) ingesting soil. Risk analysis of food chain bioaccumulation of ecoCOPCs at the Estes Landfill indicate no adverse effects to terrestrial ecological receptors of concern. Groundwater does not pose a threat to amphibians, fish and other aquatic life that may inhabit the surface water of Southbank Lake. Based on this analysis, a more detailed ecological risk assessment is not warranted.

The assessment was conducted using conservative assumptions with respect to the benchmark values and the exposure factors. The derivation of ecological EQs for different constituents and different ecological species was conducted using laboratory toxicity data that were available in the literature. A considerable amount of uncertainty associated with inter- and intra species extrapolation exists when determining benchmark data. The concentrations of ecoCOPCs in terrestrial plants and small mammals used in the exposure models were estimated from site-specific data. Maximum or UCL 95 concentrations based on measured groundwater data down gradient of the site were used as estimates of surface water concentrations in Southbank Lake. To balance such uncertainties, assumptions tend to be conservative, which will overestimate rather than underestimate risks. Considering the conservative nature of the assessment, it is concluded that there is little or no potential that any significant adverse effects will occur at the Estes Landfill with respect to ecological receptors. Based on this analysis, a more thorough assessment is not required.

7.0 References

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Table 1 Ecological Screening Benchmarks for Constituents in Soil (mg/kg)
Estes Landfill, Phoenix, Arizona

Constituent	Surrogate	Concentration	Data Type	Comments
Volatiles				
Chlorobenzene		40	Soil Invertebrates	ORNL Benchmark Earthworms
Dibromochloromethane	Chloroform	0.3	Soil Flora	Region 3 BTAG
Dichlorobenzene (total)		20	Soil Invertebrates	ORNL Benchmark Earthworms
Dichlorodifluoromethane		NA		
cis-1,2-Dichloroethene		89.6	Wildlife	ORNL Benchmark Short-tailed Shrew
Methylene Chloride		21.4	Wildlife	ORNL Benchmark Short-tailed Shrew
Semi-Volatiles				
Aroclor 1242		0.329	Wildlife	ORNL Benchmark Short-tailed Shrew
Aroclor 1254		0.111	Wildlife	ORNL Benchmark Short-tailed Shrew
Beta-BHC		1.47	Wildlife	ORNL Benchmark Short-tailed Shrew
Bis(2-ethylhexyl)phthalate		0.91	Wildlife	ORNL Benchmark American Robin
4,4'-DDD	DDT & metabolites	0.002	Wildlife	ORNL Benchmark American Robin
4,4'-DDE	DDT & metabolites	0.002	Wildlife	ORNL Benchmark American Robin
4,4'-DDT	DDT & metabolites	0.002	Wildlife	ORNL Benchmark American Robin
Inorganics				
Arsenic		0.25	Wildlife	ORNL Benchmark Short-tailed Shrew
Barium		17.2	Wildlife	ORNL Benchmark American Robin
Beryllium		0.02	Soil Flora	Region 3 BTAG
Cadmium		1.2	Wildlife	ORNL Benchmark American Robin
Chromium		0.4	Soil Invertebrates	ORNL Benchmark Earthworms
Copper		15	Soil Flora	Region 3 BTAG
Lead		0.94	Wildlife	ORNL Benchmark American Robin
Manganese		100	Soil Invertebrates	ORNL Benchmark Soil Microorganisms
Mercury		0.005	Wildlife	ORNL Benchmark American Robin
Nickel		30	Terrestrial Plants	ORNL Benchmark Phytotoxicity
Silver		2	Terrestrial Plants	ORNL Benchmark Phytotoxicity
Zinc		12	Wildlife	ORNL Benchmark American Robin

ORNL = Oak Ridge National Laboratory
BTAG = Biological Technical Assistance Group

Table 2 Ecological Screening Benchmarks for Constituents in Groundwater (mg/L)
Estes Landfill, Phoenix, Arizona (page 1 of 3)

Constituent	Surrogate	Concentration	Data Type	Comments
Volatiles				
Benzene		0.18	chronic WQS	ADEQ Aquatic & Wildlife WQC
Bromodichloromethane	Chloroform	0.9	chronic WQS	ADEQ Aquatic & Wildlife WQC
Bromomethane		0.36	chronic WQS	ADEQ Aquatic & Wildlife WQC
Carbon Tetrachloride		1.1	chronic WQS	ADEQ Aquatic & Wildlife WQC
Chlorobenzene		0.62	chronic WQS	ADEQ Aquatic & Wildlife WQC
Chloroethane		NA		
2-Chloroethyl Vinyl Ether		9.8	chronic WQS	ADEQ Aquatic & Wildlife WQC
Chloroform		0.9	chronic WQS	ADEQ Aquatic & Wildlife WQC
Chloromethane		15.0	chronic WQS	ADEQ Aquatic & Wildlife WQC
Dibromochloromethane	Chloroform	0.9	chronic WQS	ADEQ Aquatic & Wildlife WQC
1,2-Dichlorobenzene		0.47	chronic WQS	ADEQ Aquatic & Wildlife WQC
1,3-Dichlorobenzene		0.97	chronic WQS	ADEQ Aquatic & Wildlife WQC
1,4-Dichlorobenzene		0.78	chronic WQS	ADEQ Aquatic & Wildlife WQC
Dichlorodifluoromethane		NA		
1,1-Dichloroethane		0.047	Tier II ET	USEPA, 1996
1,2-Dichloroethane		41.0	chronic WQS	ADEQ Aquatic & Wildlife WQC
1,1-Dichloroethene		0.95	chronic WQS	ADEQ Aquatic & Wildlife WQC
cis-1,2-Dichloroethene		0.59	Tier II	ORNL Benchmark Aquatic Biota
trans-1,2-Dichloroethene		3.9	chronic WQS	ADEQ Aquatic & Wildlife WQC
1,2-Dichloropropane		9.2	chronic WQS	ADEQ Aquatic & Wildlife WQC
cis-1,3-Dichloropropene		1.1	chronic WQS	ADEQ Aquatic & Wildlife WQC
trans-1,3-Dichloropropene		1.1	chronic WQS	ADEQ Aquatic & Wildlife WQC
Ethylbenzene		1.4	chronic WQS	ADEQ Aquatic & Wildlife WQC
Methylene Chloride		5.5	chronic WQS	ADEQ Aquatic & Wildlife WQC
1,1,2,2-Tetrachloroethane		3.2	chronic WQS	ADEQ Aquatic & Wildlife WQC
Tetrachloroethene		0.68	chronic WQS	ADEQ Aquatic & Wildlife WQC
Toluene		0.18	chronic WQS	ADEQ Aquatic & Wildlife WQC

Table 2 Ecological Screening Benchmarks for Constituents in Groundwater (mg/L)
Estes Landfill, Phoenix, Arizona (page 2 of 3)

Constituent	Surrogate	Concentration	Data Type	Comments
1,1,1-Trichloroethane		1.6	chronic WQS	ADEQ Aquatic & Wildlife WQC
Trichloroethene		1.3	chronic WQS	ADEQ Aquatic & Wildlife WQC
Trichlorofluoromethane		NA		
Trichlorotrifluoroethane		NA		
1,1,2-Trichloro-1,2,2-Trifluoroethane		NA		
Vinyl Chloride		NA		
Xylenes (total)		0.013	Tier II	ORNL Benchmark Aquatic Biota
Semi-Volatiles				
Bis(2-ethylhexyl)phthalate		0.36	chronic WQS	ADEQ Aquatic & Wildlife WQC
Phenol		1.0	chronic WQS	ADEQ Aquatic & Wildlife WQC
Inorganics				
Antimony		0.03 D	chronic WQS	ADEQ Aquatic & Wildlife WQC
Arsenic		0.19 D	chronic WQS	ADEQ Aquatic & Wildlife WQC
Barium		0.0039	Tier II ET	USEPA, 1996
Beryllium		0.0053 D	chronic WQS	ADEQ Aquatic & Wildlife WQC
Boron		0.0016	Tier II	ORNL Benchmark Aquatic Biota
Cadmium		0.00195 D	chronic WQS	ADEQ Aquatic & Wildlife WQC (based on hardness 200 mg/L CaCO3)
Calcium		116	LCV	ORNL Benchmark Aquatic Biota
Chromium		0.365 D	chronic WQS	ADEQ Aquatic & Wildlife WQC (based on hardness 200 mg/L CaCO3)
Copper		0.0214 D	chronic WQS	ADEQ Aquatic & Wildlife WQC (based on hardness 200 mg/L CaCO3)
Cyanide		0.0097 T	chronic WQS	ADEQ Aquatic & Wildlife WQC
Iron		1.0	AWQC ET	USEPA, 1996

Table 2 Ecological Screening Benchmarks for Constituents in Groundwater (mg/L)
Estes Landfill, Phoenix, Arizona (page 3 of 3)

Constituent	Surrogate	Concentration	Data Type	Comments
Lead		0.00769 D	chronic WQS	ADEQ Aquatic & Wildlife WQC (based on hardness 200 mg/L CaCO3)
Magnesium		82	LCV	ORNL Benchmark Aquatic Biota
Manganese		0.08	Tier II ET	USEPA, 1996
Mercury		0.00001 D	chronic WQS	ADEQ Aquatic & Wildlife WQC
Nickel		0.283 D	chronic WQS	ADEQ Aquatic & Wildlife WQC (based on hardness 200 mg/L CaCO3)
Potassium		53	LCV	ORNL Benchmark Aquatic Biota
Selenium		0.002 T	chronic WQS	ADEQ Aquatic & Wildlife WQC
Sodium		680	LCV	ORNL Benchmark Aquatic Biota
Thallium		0.15 D	chronic WQS	ADEQ Aquatic & Wildlife WQC
Zinc		0.191 D	chronic WQS	ADEQ Aquatic & Wildlife WQC (based on hardness 200 mg/L CaCO3)

WQS = Water Quality Standards
WQC = Water Quality Criteria (Value presented in most stringent of available criteria for protection of Aquatic & Wildlife warmwater or Aquatic and Wildlife ephemeral) based on designated use of Salt River.
ET = Ecotoxicity Threshold
D = Dissolved concentration
T = Total concentration
LCV = Lowest Chronic Value

Table 3 Ecological Risk-Based Screening of Constituents in Surface Soils
Estes Landfill, Phoenix, Arizona

Constituent	Maximum Concentration Detected (mg/kg)	Screening Benchmark (mg/kg)	Does Maximum Detected Concentration Exceed Benchmark Concentration?
Metals			
Arsenic	4.3	0.25	Yes
Barium	126	17.2	Yes
Beryllium	0.38	0.02	Yes
Cadmium	0.8	1.2	No
Chromium	9.7	0.4	Yes
Copper	258	15	Yes
Lead	109	0.94	Yes
Manganese	269	100	Yes
Nickel	18.1	30	No
Silver	0.14	2	No
Semi-Volatiles			
Aroclor 1254	0.08	0.111	No
Beta-BHC	0.038	1.47	No
Bis(2-ethylhexyl)phthalate	0.27	0.91	No
4,4'-DDD	0.06	0.002	Yes
4,4'-DDE	0.7	0.002	Yes
4,4'-DDT	0.6	0.002	Yes

Table 4 Ecological Risk-Based Screening of Constituents in Subsurface Soils (>10 feet)
Estes Landfill, Phoenix, Arizona

Constituent	Maximum Concentration Detected (mg/kg)	Screening Benchmark (mg/kg)	Does Maximum Detected Concentration Exceed Benchmark Concentration?
Metals			
Arsenic	14	0.25	Yes
Barium	397	17.2	Yes
Beryllium	0.4	0.02	Yes
Cadmium	3.9	1.2	Yes
Chromium	47.4	0.4	Yes
Copper	874	15	Yes
Lead	1780	0.94	Yes
Mercury	0.9	0.005	Yes
Nickel	36.5	30	Yes
Silver	2	2	No
Zinc	2210	12	Yes
Semi-Volatiles			
Arochlor 1242	0.03	0.329	No
4,4'-DDD	0.2	0.002	Yes
4,4'-DDE	1.1	0.002	Yes
Volatiles			
Chlorobenzene	0.29	40	No
Dibromochloromethane	0.092	NA	--
Dichlorobenzene (total)	2	20	No
Dichlorodifluoromethane	0.24	NA	--
cis-1,2-Dichloroethene	0.094	89.6	No
Methylene Chloride	0.7	21.4	No

Table 5 Ecological Risk-Based Screening of Constituents in Groundwater
Estes Landfill, Phoenix, Arizona (page 1 of 2)

Constituent	Maximum Concentration Detected (mg/L)	Screening Benchmark (mg/L)	Does Maximum Detected Concentration Exceed Benchmark Concentration?
Benzene	0.093	0.18	No
Bromodichloromethane	0.01	NA	--
Bromomethane	0.0066	0.36	No
Carbon Tetrachloride	0.0091	1.1	No
Chlorobenzene	0.29	0.62	No
Chloroethane	0.014	NA	--
2-Chloroethyl Vinyl Ether	0.0006	9.8	No
Chloroform	0.21	0.9	No
Chloromethane	0.0077	15.0	No
Dibromochloromethane	0.00034	NA	--
1,2-Dichlorobenzene	2.5	0.47	Yes
1,3-Dichlorobenzene	1.9	0.97	Yes
1,4-Dichlorobenzene	1.9	0.78	Yes
Dichlorodifluoromethane	0.083	NA	--
1,1-Dichloroethane	0.017	0.047	No
1,2-Dichloroethane	0.0064	41.0	No
1,1-Dichloroethene	0.018	0.95	No
cis-1,2-Dichloroethene	12	0.59	Yes
trans-1,2-Dichloroethene	0.1	3.9	No
1,2-Dichloropropane	0.00072	9.2	No
cis-1,3-Dichloropropene	0.0005	1.1	No
trans-1,3-Dichloropropene	0.0006	1.1	No
Ethylbenzene	0.33	1.4	No
Methylene Chloride	0.45	5.5	No
1,1,2,2-Tetrachloroethane	0.0044	3.2	No
Tetrachloroethene	0.0067	0.68	No
Toluene	0.065	0.18	No
1,1,1-Trichloroethane	0.05	1.6	No
Trichloroethene	0.12	1.3	No
Trichlorofluoromethane	0.029	NA	--
Trichlorotrifluoroethane	0.006	NA	--
1,1,2-Trichloro-1,2,2-Trifluoroethane	0.014	NA	--
Vinyl Chloride	10	NA	--
Xylenes (total)	1	0.013	Yes
Bis(2-ethylhexyl)phthalate	0.087	0.36	No
Phenol	0.074	1.0	No
Antimony	0.05	0.03 D	Yes
Arsenic	0.14	0.19 D	No
Barium	3.38	0.0039	Yes
Beryllium	0.003	0.0053 D	No
Boron	1.1	0.0016	Yes
Cadmium	0.035	0.00195 D	Yes
Calcium	130	116	Yes
Chromium	0.12	0.365 D	No
Copper	5.1	0.0214 D	Yes
Cyanide	0.04	0.0097 T	Yes
Iron	15.6	1.0	Yes
Lead	0.11	0.00769 D	Yes

Table 5 Ecological Risk-Based Screening of Constituents in Groundwater
Estes Landfill, Phoenix, Arizona (page 2 of 2)

Constituent	Maximum Concentration Detected (mg/L)	Screening Benchmark (mg/L)	Does Maximum Detected Concentration Exceed Benchmark Concentration?
Magnesium	69	82	Yes
Manganese	8.6	0.08	Yes
Mercury	0.0021	0.00001 D	Yes
Nickel	0.48	0.283 D	Yes
Potassium	59	53	Yes
Selenium	0.006	0.002 T	Yes
Sodium	270	680	No
Thallium	0.0024	0.15 D	No
Zinc	4.6	0.191 D	Yes

Table 6 Comparison of Constituents in Surface Soil to Background
Estes Landfill, Phoenix, Arizona

Constituent	Maximum Concentration Detected (mg/kg)	Arizona Background (mg/kg)	Site Background (mg/kg)	Does Maximum Detected Concentration Exceed Background Concentration?
Metals				
Arsenic	4.3	9.4	2.9	No
Barium	126	161	61.9	No
Beryllium	0.38	1.1	0.25	No
Cadmium	0.8	0.4	0.08	Yes
Chromium	9.7	17.5	4.3	No
Copper	258	16.6	9.5	Yes
Lead	109	7.7	5.3	Yes
Manganese	269	NA	162	Yes
Nickel	18.1	18.2	15.4	No
Silver	0.14	0.5	<0.03	No

Table 7 Ecological Constituents of Potential Concern
Estes Landfill, Phoenix, Arizona

Medium	Ecological Constituent of Potential Concern
Soil	Aroclor 1254
	4,4'-DDD
	4,4'-DDE
	4,4'-DDT
	Copper
	Lead
	Manganese
Groundwater	Chloroethane
	1,2-Dichlorobenzene
	1,4-Dichlorobenzene
	Dichlorordifluoromethane
	cis-1,2-Dichloroethene
	Trichlorofluoromethane
	Trichlorotrifluoromethane
	1,1,2-Trichloro-1,2,2-Trifluoroethane
	Vinyl Chloride
	Xylenes (total)
	Barium
	Boron
	Cadmium
	Copper
	Cyanide
	Lead
	Manganese
	Nickel
	Zinc

Table 8 Ecological Screening Benchmarks for Soil Microbes and Invertebrates
Estes Landfill, Phoenix, Arizona

Constituent	Surrogate	Benchmark (mg/kg)	Type	Reference
Aroclor 1254	Pentachlorophenol	6	Derived value from LC50s	*Efroymson et al, 1997*
4,4'-DDD		NA		
4,4'-DDE		NA		
4,4'-DDT		NA		
Copper		50	NOEC	*Khalil et al, 1996*
Lead		500	LOEC	*Bengtsson et al, 1986*
Manganese		100	LOEC	*Premi & Cornfield, 1969*

Table 9 Ecotoxicity Benchmarks for Ingestion of Soil by Mammals
Estes Landfill, Phoenix, Arizona

Constituent/Surrogate	Test Species	Test Species bw (kg)	Original Value (mg/kg/day)	Value Type	Endpoint Species	Endpoint Species bw (kg)	Endpoint Wildlife Value (mg/kg/day)	F (kg/day)	Irsoil (kg/day)	f (l/day)	Soil Intake Benchmark (mg/kg)	Comments
Aroclor 1254	oldfield mouse	0.014	0.068	NOAEL	Black-tailed Jackrabbit	1.2	0.022	0.237	0.0149	0.0124	1.77	*Sample et al, 1996*
	oldfield mouse	0.014	0.068	NOAEL	Rock Ground Squirrel	0.7	0.026	0.068	0.0136	0.0194	1.34	*Sample et al, 1996*
4,4'-DDD	rat	0.35	0.8	NOAEL	Black-tailed Jackrabbit	1.2	0.59	0.237	0.0149	0.0124	47.6	*Sample et al, 1996*
	rat	0.35	0.8	NOAEL	Rock Ground Squirrel	0.7	0.67	0.068	0.0136	0.0194	34.5	*Sample et al, 1996*
4,4'-DDE	rat	0.35	0.8	NOAEL	Black-tailed Jackrabbit	1.2	0.59	0.237	0.0149	0.0124	47.6	*Sample et al, 1996*
	rat	0.35	0.8	NOAEL	Rock Ground Squirrel	0.7	0.67	0.068	0.0136	0.0194	34.5	*Sample et al, 1996*
4,4'-DDT	rat	0.35	0.8	NOAEL	Black-tailed Jackrabbit	1.2	0.59	0.237	0.0149	0.0124	47.6	*Sample et al, 1996*
	rat	0.35	0.8	NOAEL	Rock Ground Squirrel	0.7	0.67	0.068	0.0136	0.0194	34.5	*Sample et al, 1996*
Copper	mink	1.0	11.7	NOAEL	Black-tailed Jackrabbit	1.2	11.2	0.237	0.0149	0.0124	903	*Sample et al, 1996*
	mink	1.0	11.7	NOAEL	Rock Ground Squirrel	0.7	12.8	0.068	0.0136	0.0194	660	*Sample et al, 1996*
Lead	rat	0.35	8	NOAEL	Black-tailed Jackrabbit	1.2	5.88	0.237	0.0149	0.0124	474	*Sample et al, 1996*
	rat	0.35	8	NOAEL	Rock Ground Squirrel	0.7	6.73	0.068	0.0136	0.0194	347	*Sample et al, 1996*
Manganese	rat	0.35	88	NOAEL	Black-tailed Jackrabbit	1.2	65	0.237	0.0149	0.0124	5220	*Sample et al, 1996*
	rat	0.35	88	NOAEL	Rock Ground Squirrel	0.7	74	0.068	0.0136	0.0194	3810	*Sample et al, 1996*

Table 10 Ecotoxicity Benchmarks for Ingestion of Soil by Birds
Estes Landfill, Phoenix, Arizona

Constituent/Surrogate	Test Species	Test Species bw (kg)	Original Value (mg/kg/day)	Value Type	Endpoint Species	Endpoint Species bw (kg)	Endpoint Wildlife Value (mg/kg/day)	F (kg/day)	Irsoil (kg/day)	f (l/day)	Soil Intake Benchmark (mg/kg)	Comments
Aroclor 1254	Ring-necked Pheasant	1.0	0.18	NOAEL	Gambel's Quail	0.2	0.269	0.02	0.004	0.02	13.5	*Sample et al, 1996*
	Ring-necked Pheasant	1.0	0.18	NOAEL	Red-Tailed Hawk	1.0	0.18	0.0582	0.0116	0.0116	15.5	*Sample et al, 1996*
4,4'-DDD	Brown Pelican	3.5	0.0028	NOAEL	Gambel's Quail	0.2	0.0057	0.02	0.004	0.02	0.285	*Sample et al, 1996*
	Brown Pelican	3.5	0.0028	NOAEL	Red-Tailed Hawk	1.0	0.00383	0.0582	0.0116	0.0116	0.33	*Sample et al, 1996*
4,4'-DDE	Brown Pelican	3.5	0.0028	NOAEL	Gambel's Quail	0.2	0.0057	0.02	0.004	0.02	0.285	*Sample et al, 1996*
	Brown Pelican	3.5	0.0028	NOAEL	Red-Tailed Hawk	1.0	0.00383	0.0582	0.0116	0.0116	0.33	*Sample et al, 1996*
4,4'-DDT	Brown Pelican	3.5	0.0028	NOAEL	Gambel's Quail	0.2	0.0057	0.02	0.004	0.02	0.285	*Sample et al, 1996*
	Brown Pelican	3.5	0.0028	NOAEL	Red-Tailed Hawk	1.0	0.00383	0.0582	0.0116	0.0116	0.33	*Sample et al, 1996*
Copper	1 day old chicks	0.534	47	NOAEL	Gambel's Quail	0.2	60	0.02	0.004	0.02	3000	*Sample et al, 1996*
	1 day old chicks	0.534	47	NOAEL	Red-Tailed Hawk	1.0	40	0.0582	0.0116	0.0116	3450	*Sample et al, 1996*
Lead	Japanese Quail	0.15	1.13	NOAEL	Gambel's Quail	0.2	1.1	0.02	0.004	0.02	50	*Sample et al, 1996*
	Japanese Quail	0.15	1.13	NOAEL	Red-Tailed Hawk	1.0	0.7	0.0582	0.0116	0.0116	60	*Sample et al, 1996*
Manganese	Japanese Quail	0.15	997	NOAEL	Gambel's Quail	0.2	928	0.02	0.004	0.02	46400	*Sample et al, 1996*
	Japanese Quail	0.15	997	NOAEL	Red-Tailed Hawk	1.0	620	0.0582	0.0116	0.0116	53400	*Sample et al, 1996*

Table 11 Ecotoxicity Benchmarks for Ingestion of Soil by Reptiles
Estes Landfill, Phoenix, Arizona

Constituent/Surrogate	Test Species	Test Species bw (kg)	Original Value (mg/kg/day)	Value Type	Endpoint Species	Endpoint Species bw (kg)	Endpoint Wildlife Value (mg/kg/day)	F (kg/day)	Irsoil (kg/day)	f (l/day)	Soil Intake Benchmark (mg/kg)	Comments
Aroclor	oldfield mouse	0.014	0.068	NOAEL	Fence Lizard	0.07	0.0045	0.00035	0.00007	0.001	4.5	*Sample et al, 1996*
	oldfield mouse	0.014	0.068	NOAEL	Western Diamondback Rattlesnake	1.0	0.0023	0.0027	0.00054	0.00054	4.26	*Sample et al, 1996*
4,4'-DDD	rat	0.35	0.8	NOAEL	Fence Lizard	0.07	0.12	0.00035	0.00007	0.001	120	*Sample et al, 1996*
	rat	0.35	0.8	NOAEL	Western Diamondback Rattlesnake	1.0	0.062	0.0027	0.00054	0.00054	115	*Sample et al, 1996*
4,4'-DDE	rat	0.35	0.8	NOAEL	Fence Lizard	0.07	0.12	0.00035	0.00007	0.001	120	*Sample et al, 1996*
	rat	0.35	0.8	NOAEL	Western Diamondback Rattlesnake	1.0	0.062	0.0027	0.00054	0.00054	115	*Sample et al, 1996*
4,4'-DDT	rat	0.35	0.8	NOAEL	Fence Lizard	0.07	0.12	0.00035	0.00007	0.001	120	*Sample et al, 1996*
	rat	0.35	0.8	NOAEL	Western Diamondback Rattlesnake	1.0	0.062	0.0027	0.00054	0.00054	115	*Sample et al, 1996*
Copper	mink	1.0	11.7	NOAEL	Fence Lizard	0.07	2.27	0.00035	0.00007	0.001	2270	*Sample et al, 1996*
	mink	1.0	11.7	NOAEL	Western Diamondback Rattlesnake	1.0	1.17	0.0027	0.00054	0.00054	2170	*Sample et al, 1996*
Lead	rat	0.35	8	NOAEL	Fence Lizard	0.07	1.2	0.00035	0.00007	0.001	1200	*Sample et al, 1996*
	rat	0.35	8	NOAEL	Western Diamondback Rattlesnake	1.0	0.62	0.0027	0.00054	0.00054	1150	*Sample et al, 1996*
Manganese	rat	0.35	88	NOAEL	Fence Lizard	0.07	13	0.00035	0.00007	0.001	13000	*Sample et al, 1996*
	rat	0.35	88	NOAEL	Western Diamondback Rattlesnake	1.0	6.8	0.0027	0.00054	0.00054	12600	*Sample et al, 1996*

Table 12 Ecotoxicity Benchmarks for Plant Species
Estes Landfill, Phoenix, Arizona

Constituent	Benchmark Value (mg/kg)	Benchmark Type	Plant Species Tested	Test Medium	Reference
Aroclor 1254	40	NOEC	pigweed	sand	*Efroymson et al, 1997*
4,4'-DDD	NA				
4,4'-DDE	NA				
4,4'-DDT	NA				
Copper	100	NOEC	bush beans	silt loam	*Efroymson et al, 1997*
Lead	500	NOEC	wheat	brown earth	*Efroymson et al, 1997*
Manganese	500	LOEC	bush beans	silt loam	*Efroymson et al, 1997*

Table 13 Ecotoxicity Benchmarks for Direct Exposure of Amphibians in Surface Water
Estes Landfill, Phoenix, Arizona

Constituent	Benchmark (mg/L)	Type	Species	Comments
Chloroethane *	0.028	Chronic Tier II	Various	Suter II and Tsao, 1996
1,2-Dichlorobenzene	0.47	Chronic WQS	Unknown	ADEQ, 1996
1,4-Dichlorobenzene	0.78	Chronic WQS	Unknown	ADEQ, 1996
Dichlorordifluoromethane *	0.028	Chronic Tier II	Various	Suter II and Tsao, 1996
cis-1,2-Dichloroethene	0.59	Chronic	Daphnids Bluegill	Suter II and Tsao, 1996
Trichlorofluoromethane *	0.028	Chronic Tier II	Various	Suter II and Tsao, 1996
Trichlorotrifluoromethane *	0.028	Chronic Tier II	Various	Suter II and Tsao, 1996
1,1,2-Trichloro-1,2,2-Trifluoroethane *	0.028	Chronic Tier II	Various	Suter II and Tsao, 1996
Vinyl Chloride *	0.028	Chronic Tier II	Various	Suter II and Tsao, 1996
Xylenes (total)	0.013	Chronic	Bluegill Fathead Minnow	Suter II and Tsao, 1996
Barium	0.0039	Chronic ET	Unknown	USEPA, 1996
Boron	0.0016	Chronic	Various	Suter II and Tsao, 1996
Cadmium	0.00195	Chronic WQS	Unknown	ADEQ, 1996
Copper	0.0214	Chronic WQS	Unknown	ADEQ, 1996
Cyanide	0.0097	Chronic WQS	Unknown	ADEQ, 1996
Lead	0.00769	Chronic WQS	Unknown	ADEQ, 1996
Manganese	0.08	Chronic ET	Unknown	USEPA, 1996
Nickel	0.283	Chronic WQS	Unknown	ADEQ, 1996
Zinc	0.191	Chronic WQS	Unknown	ADEQ, 1996

* Value selected based on surrogate constituent (chloroform).

Table 14 Ecotoxicity Benchmarks for Aquatic Invertebrates and Fish Exposed to Surface Water
Estes Landfill, Phoenix, Arizona

Constituent	Benchmark (mg/L)	Type	Species	Comments
Chloroethane *	0.028	Chronic Tier II	Various	Suter II and Tsao, 1996
1,2-Dichlorobenzene	0.47	Chronic WQS	Unknown	ADEQ, 1996
1,4-Dichlorobenzene	0.78	Chronic WQS	Unknown	ADEQ, 1996
Dichlorordifluoromethane *	0.028	Chronic Tier II	Various	Suter II and Tsao, 1996
cis-1,2-Dichloroethene	0.59	Chronic	Daphnids Bluegill	Suter II and Tsao, 1996
Trichlorofluoromethane *	0.028	Chronic Tier II	Various	Suter II and Tsao, 1996
Trichlorotrifluoromethane *	0.028	Chronic Tier II	Various	Suter II and Tsao, 1996
1,1,2-Trichloro-1,2,2-Trifluoroethane *	0.028	Chronic Tier II	Various	Suter II and Tsao, 1996
Vinyl Chloride *	0.028	Chronic Tier II	Various	Suter II and Tsao, 1996
Xylenes (total)	0.013	Chronic	Bluegill Fathead Minnow	Suter II and Tsao, 1996
Barium	0.0039	Chronic ET	Unknown	USEPA, 1996
Boron	0.0016	Chronic	Various	Suter II and Tsao, 1996
Cadmium	0.00195	Chronic WQS	Unknown	ADEQ, 1996
Copper	0.0214	Chronic WQS	Unknown	ADEQ, 1996
Cyanide	0.0097	Chronic WQS	Unknown	ADEQ, 1996
Lead	0.00769	Chronic WQS	Unknown	ADEQ, 1996
Manganese	0.08	Chronic ET	Unknown	USEPA, 1996
Nickel	0.283	Chronic WQS	Unknown	ADEQ, 1996
Zinc	0.191	Chronic WQS	Unknown	ADEQ, 1996

* Value selected based on surrogate constituent (chloroform).

Table 15 Ecotoxicity Benchmarks for Ingestion of EcoCOPCs in Food by Mammals
Estes Landfill, Phoenix, Arizona

Constituent/Surrogate	Test Species	Test Species bw (kg)	Original Value (mg/kg/day)	Value Type	Endpoint Species	Endpoint Species bw (kg)	Endpoint Wildlife Value (mg/kg/day)	Irfood (kg/day)	f (l/day)	Food Intake Benchmark (mg/kg)	Comments
Aroclor 1254	oldfield mouse	0.014	0.068	NOAEL	Black-tailed Jackrabbit	1.2	0.022	0.237	0.1975	0.111	*Sample et al, 1996*
	oldfield mouse	0.014	0.068	NOAEL	Rock Ground Squirrel	0.7	0.026	0.068	0.0971	0.268	*Sample et al, 1996*
4,4'-DDD	rat	0.35	0.8	NOAEL	Black-tailed Jackrabbit	1.2	0.59	0.237	0.1975	2.99	*Sample et al, 1996*
	rat	0.35	0.8	NOAEL	Rock Ground Squirrel	0.7	0.67	0.068	0.0971	6.9	*Sample et al, 1996*
4,4'-DDE	rat	0.35	0.8	NOAEL	Black-tailed Jackrabbit	1.2	0.59	0.237	0.1975	2.99	*Sample et al, 1996*
	rat	0.35	0.8	NOAEL	Rock Ground Squirrel	0.7	0.67	0.068	0.0971	6.9	*Sample et al, 1996*
4,4'-DDT	rat	0.35	0.8	NOAEL	Black-tailed Jackrabbit	1.2	0.59	0.237	0.1975	2.99	*Sample et al, 1996*
	rat	0.35	0.8	NOAEL	Rock Ground Squirrel	0.7	0.67	0.068	0.0971	6.9	*Sample et al, 1996*
Copper	mink	1.0	11.7	NOAEL	Black-tailed Jackrabbit	1.2	11.2	0.237	0.1975	56.7	*Sample et al, 1996*
	mink	1.0	11.7	NOAEL	Rock Ground Squirrel	0.7	12.8	0.068	0.0971	132	*Sample et al, 1996*
Lead	rat	0.35	8	NOAEL	Black-tailed Jackrabbit	1.2	5.88	0.237	0.1975	29.8	*Sample et al, 1996*
	rat	0.35	8	NOAEL	Rock Ground Squirrel	0.7	6.73	0.068	0.0971	69.3	*Sample et al, 1996*
Manganese	rat	0.35	88	NOAEL	Black-tailed Jackrabbit	1.2	65	0.237	0.1975	329	*Sample et al, 1996*
	rat	0.35	88	NOAEL	Rock Ground Squirrel	0.7	74	0.068	0.0971	762	*Sample et al, 1996*

Table 16 Ecotoxicity Benchmarks for Ingestion of EcoCOPCs in Food by Birds
Estes Landfill, Phoenix, Arizona

Constituent	Test Species	Test Species bw (kg)	Original Value (mg/kg/day)	Value Type	Endpoint Species	Endpoint Species bw (kg)	Endpoint Wildlife Value (mg/kg/day)	Irfood (kg/day)	f (l/day)	Food Intake Benchmark (mg/kg)	Comments
Aroclor 1254	Ring-necked Pheasant	1.0	0.18	NOAEL	Gambel's Quail	0.2	0.269	0.02	0.1	2.69	*Sample et al, 1996*
	Ring-necked Pheasant	1.0	0.18	NOAEL	Red-Tailed Hawk	1.0	0.18	0.0582	0.0582	3.09	*Sample et al, 1996*
4,4'-DDD	Brown Pelican	3.5	0.0028	NOAEL	Gambel's Quail	0.2	0.0057	0.02	0.1	0.057	*Sample et al, 1996*
	Brown Pelican	3.5	0.0028	NOAEL	Red-Tailed Hawk	1.0	0.00383	0.0582	0.0582	0.066	*Sample et al, 1996*
4,4'-DDE	Brown Pelican	3.5	0.0028	NOAEL	Gambel's Quail	0.2	0.0057	0.02	0.1	0.057	*Sample et al, 1996*
	Brown Pelican	3.5	0.0028	NOAEL	Red-Tailed Hawk	1.0	0.00383	0.0582	0.0582	0.066	*Sample et al, 1996*
4,4'-DDT	Brown Pelican	3.5	0.0028	NOAEL	Gambel's Quail	0.2	0.0057	0.02	0.1	0.057	*Sample et al, 1996*
	Brown Pelican	3.5	0.0028	NOAEL	Red-Tailed Hawk	1.0	0.00383	0.0582	0.0582	0.066	*Sample et al, 1996*
Copper	1 day old chicks	0.534	47	NOAEL	Gambel's Quail	0.2	60	0.02	0.1	600	*Sample et al, 1996*
	1 day old chicks	0.534	47	NOAEL	Red-Tailed Hawk	1.0	40	0.0582	0.0582	687	*Sample et al, 1996*
Lead	Japanese Quail	0.15	1.13	NOAEL	Gambel's Quail	0.2	1.1	0.02	0.1	11	*Sample et al, 1996*
	Japanese Quail	0.15	1.13	NOAEL	Red-Tailed Hawk	1.0	0.7	0.0582	0.0582	12	*Sample et al, 1996*
Manganese	Japanese Quail	0.15	997	NOAEL	Gambel's Quail	0.2	928	0.02	0.1	9280	*Sample et al, 1996*
	Japanese Quail	0.15	997	NOAEL	Red-Tailed Hawk	1.0	620	0.0582	0.0582	10700	*Sample et al, 1996*

Table 17 Ecotoxicity Benchmarks for Ingestion of EcoCOPCs in Food by Reptiles
Estes Landfill, Phoenix, Arizona

Constituent/Surrogate	Test Species	Test Species bw (kg)	Original Value (mg/kg/day)	Value Type	Endpoint Species	Endpoint Species bw (kg)	Endpoint Wildlife Value mg/kg/day	Irfood (kg/day)	f (l/day)	Food Intake Benchmark (mg/kg)	Comments
Aroclor	oldfield mous	0.014	0.068	NOAEL	Fence Lizard	0.07	0.0045	0.00035	0.005	0.9	*Sample et al, 1996*
	oldfield mous	0.014	0.068	NOAEL	Western Diamondback Rattlesnake	1.0	0.0023	0.0027	0.0027	0.85	*Sample et al, 1996*
4,4'-DDD	rat	0.35	0.8	NOAEL	Fence Lizard	0.07	0.12	0.00035	0.005	24	*Sample et al, 1996*
	rat	0.35	0.8	NOAEL	Western Diamondback Rattlesnake	1.0	0.062	0.0027	0.0027	23	*Sample et al, 1996*
4,4'-DDE	rat	0.35	0.8	NOAEL	Fence Lizard	0.07	0.12	0.00035	0.005	24	*Sample et al, 1996*
	rat	0.35	0.8	NOAEL	Western Diamondback Rattlesnake	1.0	0.062	0.0027	0.0027	23	*Sample et al, 1996*
4,4'-DDT	rat	0.35	0.8	NOAEL	Fence Lizard	0.07	0.12	0.00035	0.005	24	*Sample et al, 1996*
	rat	0.35	0.8	NOAEL	Western Diamondback Rattlesnake	1.0	0.062	0.0027	0.0027	23	*Sample et al, 1996*
Copper	mink	1.0	11.7	NOAEL	Fence Lizard	0.07	2.27	0.00035	0.005	454	*Sample et al, 1996*
	mink	1.0	11.7	NOAEL	Western Diamondback Rattlesnake	1.0	1.17	0.0027	0.0027	433	*Sample et al, 1996*
Lead	rat	0.35	8	NOAEL	Fence Lizard	0.07	1.2	0.00035	0.005	240	*Sample et al, 1996*
	rat	0.35	8	NOAEL	Western Diamondback Rattlesnake	1.0	0.62	0.0027	0.0027	230	*Sample et al, 1996*
Manganese	rat	0.35	88	NOAEL	Fence Lizard	0.07	13	0.00035	0.005	2600	*Sample et al, 1996*
	rat	0.35	88	NOAEL	Western Diamondback Rattlesnake	1.0	6.8	0.0027	0.0027	2520	*Sample et al, 1996*

Table 18 Biotransfer Factors for EcoCOPCs in Soil
Estes Landfill, Phoenix, Arizona

EcoCOPC	Br_{forage} (unitless)	Br_{prey} (day/kg)
Aroclor 1254	1.00E-02	4.05E-02
4,4'-DDD	1.12E-02	3.31E-02
4,4'-DDE	9.37E-03	4.53E-02
4,4'-DDT	1.20E-02	2.95E-02
Copper	4.00E-01	1.00E-02
Lead	4.50E-02	3.00E-04
Manganese	2.50E-01	4.00E-04

Table 19 Ecotoxicity Quotients for Soil Invertebrates Exposure to Soil EcoCOPCs
Estes Landfill, Phoenix, Arizona

EcoCOPC	Exposure Concentration (mg/kg)	Ecotoxicity Benchmark (mg/kg)	Ecotoxicity Quotient (unitless)	Does Exposure Concentration Exceed Benchmark?
Aroclor 1254	0.08	6	1.33E-02	No
4,4'-DDD	0.06	NA	NE	NE
4,4'-DDE	0.7	NA	NE	NE
4,4'-DDT	0.6	NA	NE	NE
Copper	258	50	5.16E+00	Yes
Lead	109	500	2.18E-01	No
Manganese	269	100	2.69E+00	Yes

Table 20 Ecotoxicity Quotients for Mammalian Receptors Exposure to Soil EcoCOPCs
Estes Landfill, Phoenix, Arizona

EcoCOPC	Endpoint Species	Exposure Concentration (mg/kg)	Ecotoxicity Benchmark (mg/kg)	Ecotoxicity Quotient (unitless)	Does Exposure Concentration Exceed Benchmark?
Aroclor 1254	Black-tailed Jackrabbit	0.08	1.77	4.52E-02	No
	Rock Ground Squirrel	0.08	1.34	5.97E-02	No
4,4'-DDD	Black-tailed Jackrabbit	0.06	47.6	1.26E-03	No
	Rock Ground Squirrel	0.06	34.5	1.74E-03	No
4,4'-DDE	Black-tailed Jackrabbit	0.7	47.6	1.47E-02	No
	Rock Ground Squirrel	0.7	34.5	2.03E-02	No
4,4'-DDT	Black-tailed Jackrabbit	0.6	47.6	1.26E-02	No
	Rock Ground Squirrel	0.6	34.5	1.74E-02	No
Copper	Black-tailed Jackrabbit	258	903	2.86E-01	No
	Rock Ground Squirrel	258	660	3.91E-01	No
Lead	Black-tailed Jackrabbit	109	474	2.30E-01	No
	Rock Ground Squirrel	109	347	3.14E-01	No
Manganese	Black-tailed Jackrabbit	269	5220	5.15E-02	No
	Rock Ground Squirrel	269	3810	7.06E-02	No

Table 21 Ecotoxicity Quotients for Avian Receptors Exposure to Soil EcoCOPCs
Estes Landfill, Phoenix, Arizona

EcoCOPC	Endpoint Species	Exposure Concentration (mg/kg)	Ecotoxicity Benchmark (mg/kg)	Ecotoxicity Quotient (unitless)	Does Exposure Concentration Exceed Benchmark?
Aroclor 1254	Gambels Quail	0.08	13.5	5.93E-03	No
	Red-Tailed Hawk	0.08	15.5	5.16E-03	No
4,4'-DDD	Gambels Quail	0.06	0.285	2.11E-01	No
	Red-Tailed Hawk	0.06	0.33	1.82E-01	No
4,4'-DDE	Gambels Quail	0.7	0.285	2.46E+00	Yes
	Red-Tailed Hawk	0.7	0.33	2.12E+00	Yes
4,4'-DDT	Gambels Quail	0.6	0.285	2.11E+00	Yes
	Red-Tailed Hawk	0.6	0.33	1.82E+00	Yes
Copper	Gambels Quail	258	3000	8.60E-02	No
	Red-Tailed Hawk	258	3450	7.48E-02	No
Lead	Gambels Quail	109	50	2.18E+00	Yes
	Red-Tailed Hawk	109	60	1.82E+00	Yes
Manganese	Gambels Quail	269	46400	5.80E-03	No
	Red-Tailed Hawk	269	53400	5.04E-03	No

Table 22 Ecotoxicity Quotients for Reptilian Receptors Exposure to Soil EcoCOPCs
Estes Landfill, Phoenix, Arizona

EcoCOPC	Endpoint Species	Exposure Concentration (mg/kg)	Ecotoxicity Benchmark (mg/kg)	Ecotoxicity Quotient (unitless)	Does Exposure Concentration Exceed Benchmark?
Aroclor 1254	Fence Lizard	0.08	4.5	1.78E-02	No
	Western Diamondback Rattlesnake	0.08	4.26	1.88E-02	No
4,4'-DDD	Fence Lizard	0.06	120	5.00E-04	No
	Western Diamondback Rattlesnake	0.06	115	5.22E-04	No
4,4'-DDE	Fence Lizard	0.7	120	5.83E-03	No
	Western Diamondback Rattlesnake	0.7	115	6.09E-03	No
4,4'-DDT	Fence Lizard	0.6	120	5.00E-03	No
	Western Diamondback Rattlesnake	0.6	115	5.22E-03	No
Copper	Fence Lizard	258	2270	1.14E-01	No
	Western Diamondback Rattlesnake	258	2170	1.19E-01	No
Lead	Fence Lizard	109	1200	9.08E-02	No
	Western Diamondback Rattlesnake	109	1150	9.48E-02	No
Manganese	Fence Lizard	269	13000	2.07E-02	No
	Western Diamondback Rattlesnake	269	12600	2.13E-02	No

Table 23 Ecotoxicity Quotients for Terrestrial Plants Exposure to Soil EcoCOPCs
Estes Landfill, Phoenix, Arizona

EcoCOPC	Exposure Concentration (mg/kg)	Ecotoxicity Benchmark (mg/kg)	Ecotoxicity Quotient (unitless)	Does Exposure Concentration Exceed Benchmark?
Aroclor 1254	0.08	40	2.00E-03	No
4,4'-DDD	0.06	NA	NE	NE
4,4'-DDE	0.7	NA	NE	NE
4,4'-DDT	0.6	NA	NE	NE
Copper	258	100	2.58E+00	Yes
Lead	109	500	2.18E-01	No
Manganese	269	500	5.38E-01	No

Table 24 Ecotoxicity Quotients for Amphibians Exposure to Surface Water EcoCOPCs
Estes Landfill, Phoenix, Arizona

EcoCOPC	Exposure Concentration (mg/L)	Ecotoxicity Benchmark (mg/L)	Ecotoxicity Quotient (unitless)	Does Exposure Concentration Exceed Benchmark?
Chloroethane *	0.014	0.028	5.00E-01	No
1,2-Dichlorobenzene **	0.00376	0.47	8.00E-03	No
1,4-Dichlorobenzene **	0.00106	0.78	1.36E-03	No
Dichlorordifluoromethane **	0.0008	0.028	2.86E-02	No
cis-1,2-Dichloroethene **	0.0169	0.59	2.86E-02	No
Trichlorofluoromethane **	0.00067	0.028	2.39E-02	No
Trichlorotrifluoroethane *	0.006	0.028	2.14E-01	No
1,1,2-Trichloro-1,2,2-Trifluoroethane *	0.0014	0.028	5.00E-02	No
Vinyl Chloride **	0.0312	0.028	1.11E+00	Yes
Xylenes (total) *	0.008	0.013	6.15E-01	No
Barium *	0.123	0.0039	3.15E+01	Yes
Boron *	0.7	0.0016	4.38E+02	Yes
Cadmium *	0.013	0.00195	6.67E+00	Yes
Copper *	0.012	0.0214	5.61E-01	No
Cyanide *	ND	0.0097	0.00E+00	No
Lead *	0.021	0.00769	2.73E+00	Yes
Manganese *	1.82	0.08	2.28E+01	Yes
Nickel *	0.025	0.283	8.83E-02	No
Zinc *	0.57	0.191	2.98E+00	Yes

* Maximum offsite groundwater concentration downgradient of Estes Landfill
** UCL 95 groundwater concentration downgradient of Estes Landfill

Table 25 Ecotoxicity Quotients for Aquatic Receptors Exposure to Surface Water EcoCOPCs
Estes Landfill, Phoenix, Arizona

EcoCOPC	Exposure Concentration (mg/L)	Ecotoxicity Benchmark (mg/L)	Ecotoxicity Quotient (unitless)	Does Exposure Concentration Exceed Benchmark?
Chloroethane *	0.014	0.028	5.00E-01	No
1,2-Dichlorobenzene **	0.00376	0.47	8.00E-03	No
1,4-Dichlorobenzene **	0.00106	0.78	1.36E-03	No
Dichlorordifluoromethane **	0.0008	0.028	2.86E-02	No
cis-1,2-Dichloroethene **	0.0169	0.59	2.86E-02	No
Trichlorofluoromethane **	0.00067	0.028	2.39E-02	No
Trichlorotrifluoroethane *	0.006	0.028	2.14E-01	No
1,1,2-Trichloro-1,2,2-Trifluoroethane *	0.0014	0.028	5.00E-02	No
Vinyl Chloride **	0.0312	0.028	1.11E+00	Yes
Xylenes (total) *	0.008	0.013	6.15E-01	No
Barium *	0.123	0.0039	3.15E+01	Yes
Boron *	0.7	0.0016	4.38E+02	Yes
Cadmium *	0.013	0.00195	6.67E+00	Yes
Copper *	0.012	0.0214	5.61E-01	No
Cyanide *	ND	0.0097	#VALUE!	No
Lead *	0.021	0.00769	2.73E+00	Yes
Manganese *	1.82	0.08	2.28E+01	Yes
Nickel *	0.025	0.283	8.83E-02	No
Zinc *	0.57	0.191	2.98E+00	Yes

* Maximum offsite groundwater concentration downgradient of Estes Landfill
** UCL 95 groundwater concentration downgradient of Estes Landfill

Table 26 Ecotoxicity Quotients for Mammalian Receptors Exposure to Food EcoCOPCs
Estes Landfill, Phoenix, Arizona

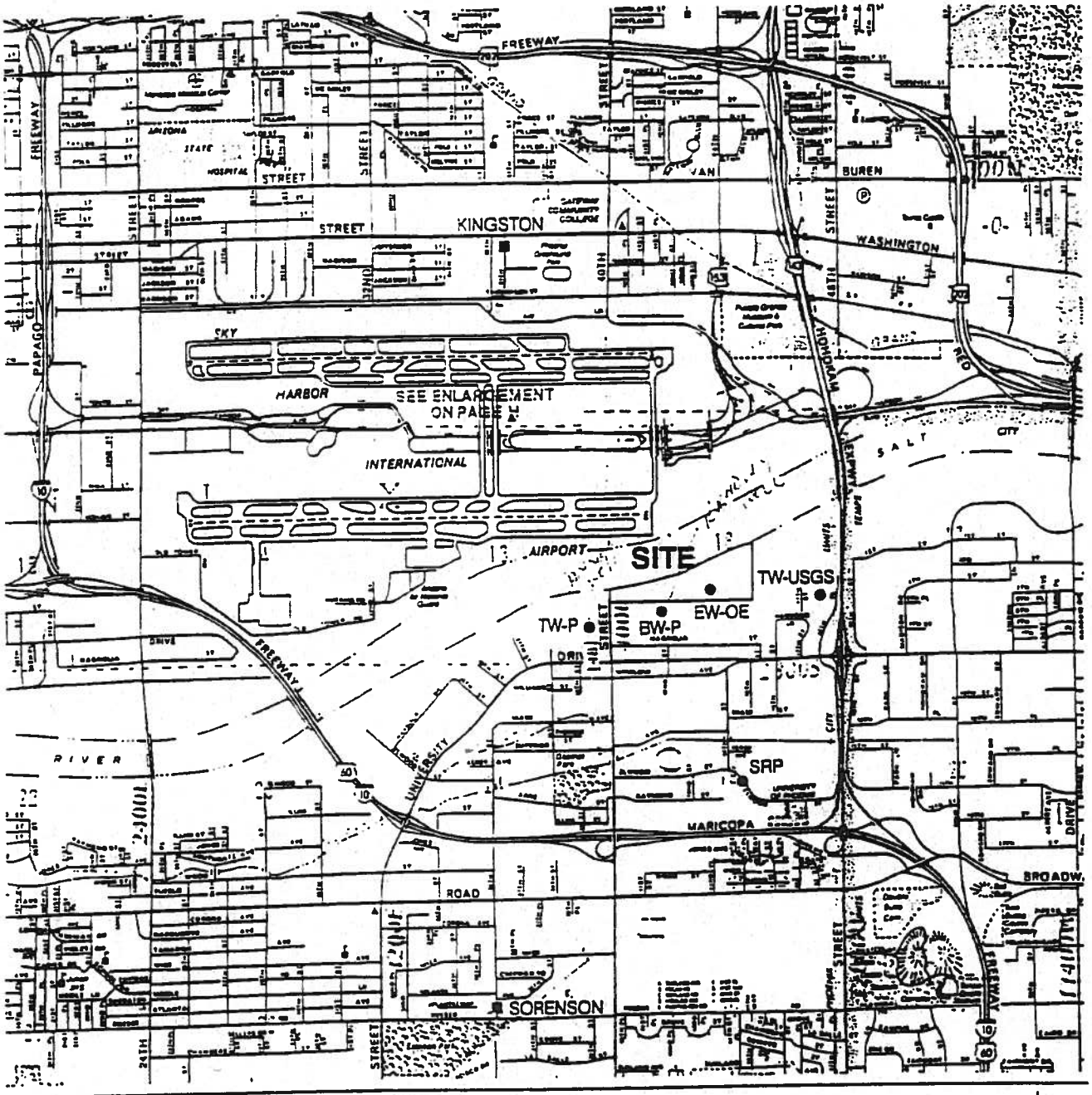
EcoCOPC	Endpoint Species	Exposure Concentration (mg/kg)	Ecotoxicity Benchmark (mg/kg)	Ecotoxicity Quotient (unitless)	Does Exposure Concentration Exceed Benchmark?
Aroclor 1254	Black-tailed Jackrabbit	0.0008	0.111	7.21E-03	No
	Rock Ground Squirrel	0.0008	0.268	2.99E-03	No
4,4'-DDD	Black-tailed Jackrabbit	0.000672	2.99	2.25E-04	No
	Rock Ground Squirrel	0.000672	6.9	9.74E-05	No
4,4'-DDE	Black-tailed Jackrabbit	0.00656	2.99	2.19E-03	No
	Rock Ground Squirrel	0.00656	6.9	9.51E-04	No
4,4'-DDT	Black-tailed Jackrabbit	0.0072	2.99	2.41E-03	No
	Rock Ground Squirrel	0.0072	6.9	1.04E-03	No
Copper	Black-tailed Jackrabbit	103	56.7	1.82E+00	Yes
	Rock Ground Squirrel	103	132	7.80E-01	No
Lead	Black-tailed Jackrabbit	4.91	29.8	1.65E-01	No
	Rock Ground Squirrel	4.91	69.3	7.09E-02	No
Manganese	Black-tailed Jackrabbit	67.3	329	2.05E-01	No
	Rock Ground Squirrel	67.3	762	8.83E-02	No

Table 27 Ecotoxicity Quotients for Avian Receptors Exposure to Food EcoCOPCs
Estes Landfill, Phoenix, Arizona

EcoCOPC	Endpoint Species	Exposure Concentration (mg/kg)	Ecotoxicity Benchmark (mg/kg)	Ecotoxicity Quotient (unitless)	Does Exposure Concentration Exceed Benchmark?
Aroclor 1254	Gambel's Quail	8.00E-04	2.69	2.97E-04	No
	Red-Tailed Hawk	5.60E-05	3.09	1.81E-05	No
4,4'-DDD	Gambel's Quail	6.72E-04	0.057	1.18E-02	No
	Red-Tailed Hawk	3.49E-05	0.066	5.29E-04	No
4,4'-DDE	Gambel's Quail	6.56E-03	0.057	1.15E-01	No
	Red-Tailed Hawk	5.43E-04	0.066	8.23E-03	No
4,4'-DDT	Gambel's Quail	7.20E-03	0.057	1.26E-01	No
	Red-Tailed Hawk	3.14E-04	0.066	4.76E-03	No
Copper	Gambel's Quail	1.03E+02	600	1.72E-01	No
	Red-Tailed Hawk	2.83E-01	687	4.12E-04	No
Lead	Gambel's Quail	4.91E+00	11	4.46E-01	No
	Red-Tailed Hawk	8.36E-04	12	6.97E-05	No
Manganese	Gambel's Quail	6.73E+01	9280	7.25E-03	No
	Red-Tailed Hawk	7.98E-03	10700	7.46E-07	No

Table 28 Ecotoxicity Quotients for Reptilian Receptors Exposure to Food EcoCOPCs
Estes Landfill, Phoenix, Arizona

EcoCOPC	Endpoint Species	Exposure Concentration (mg/kg)	Ecotoxicity Benchmark (mg/kg)	Ecotoxicity Quotient (unitless)	Does Exposure Concentration Exceed Benchmark?
Aroclor 1254	Fence Lizard	8.00E-02	0.9	8.89E-02	No
	Western Diamondback Rattlesnake	5.60E-05	0.85	6.59E-05	No
4,4'-DDD	Fence Lizard	6.00E-02	24	2.50E-03	No
	Western Diamondback Rattlesnake	3.49E-05	23	1.52E-06	No
4,4'-DDE	Fence Lizard	7.00E-01	24	2.92E-02	No
	Western Diamondback Rattlesnake	5.43E-04	23	2.36E-05	No
4,4'-DDT	Fence Lizard	6.00E-01	24	2.50E-02	No
	Western Diamondback Rattlesnake	3.14E-04	23	1.37E-05	No
Copper	Fence Lizard	2.58E+02	454	5.68E-01	No
	Western Diamondback Rattlesnake	2.83E-01	433	6.54E-04	No
Lead	Fence Lizard	1.09E+02	240	4.54E-01	No
	Western Diamondback Rattlesnake	8.36E-04	230	3.63E-06	No
Manganese	Fence Lizard	2.69E+02	2600	1.03E-01	No
	Western Diamondback Rattlesnake	7.98E-03	2520	3.17E-06	No



REFERENCE: METROPOLITAN PHOENIX STREET ATLAS, 1995 EDITION

- ■ Domestic Supply Well Location
- ● Production Well Location

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SCALE IN MILES

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Figure 1
SITE LOCATION MAP
ECOLOGICAL RISK ASSESSMENT
ESTES LANDFILL

QST ENVIRONMENTAL

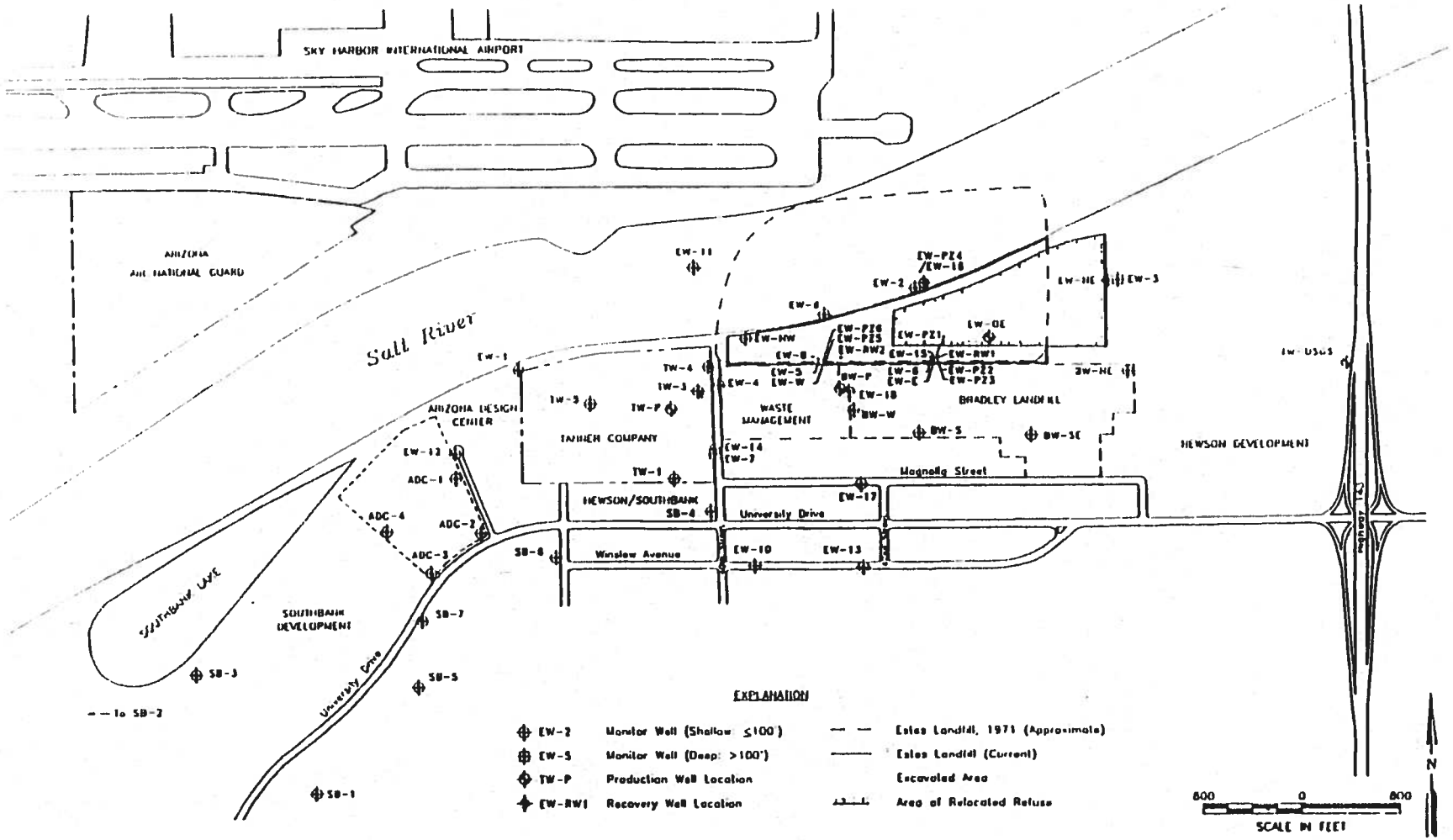

Figure 2
SITE PLAN
ECOLOGICAL RISK ASSESSMENT
ESTES LANDFILL

QST ENVIRONMENTAL

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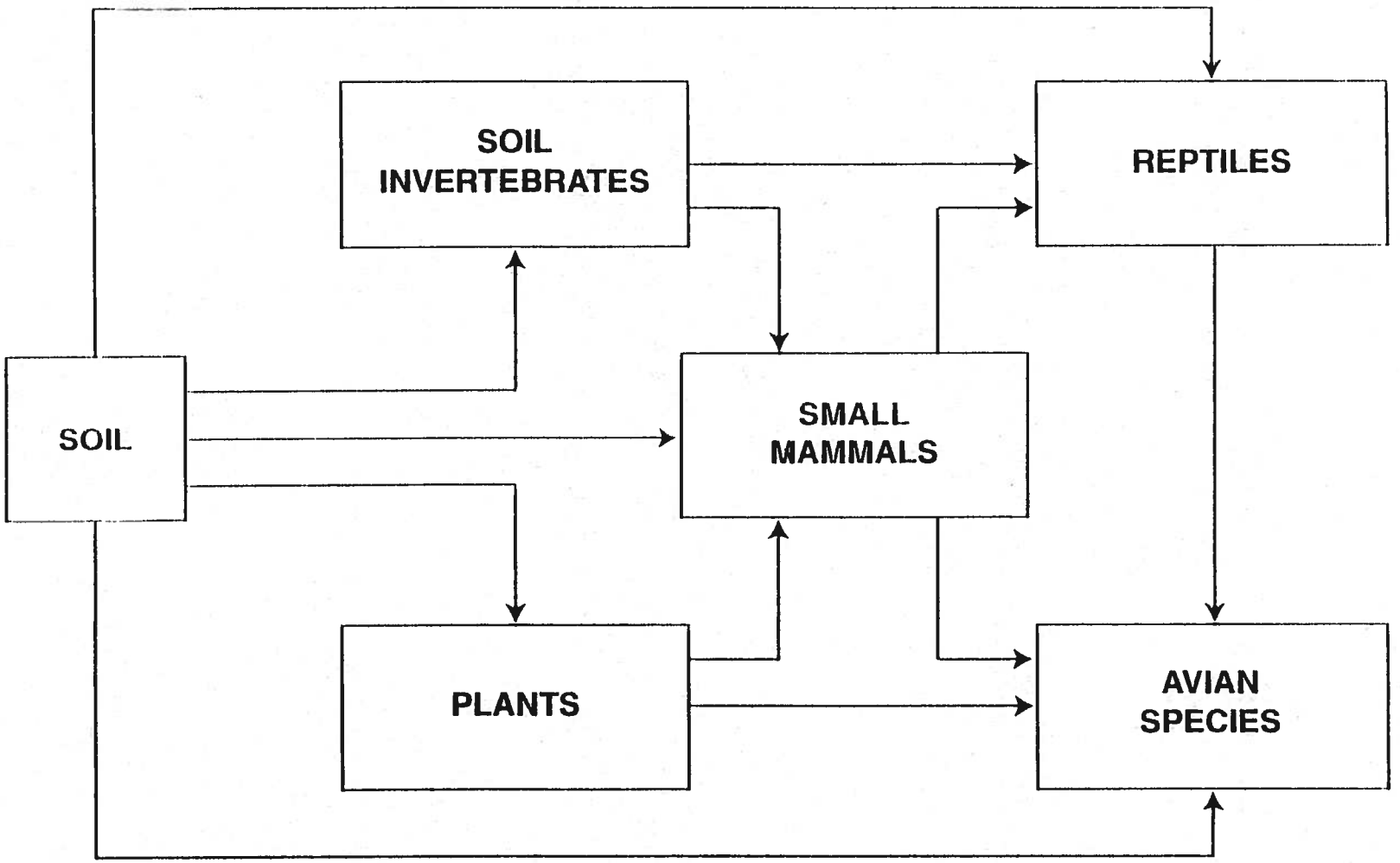

Figure 3
TERRESTRIAL ECOSYSTEM EXPOSURE MODEL
ECOLOGICAL RISK ASSESSMENT
ESTES LANDFILL

QST ENVIRONMENTAL

N:/DATA/PROJ/6699030/DP/ADOBE/FIG2.ai

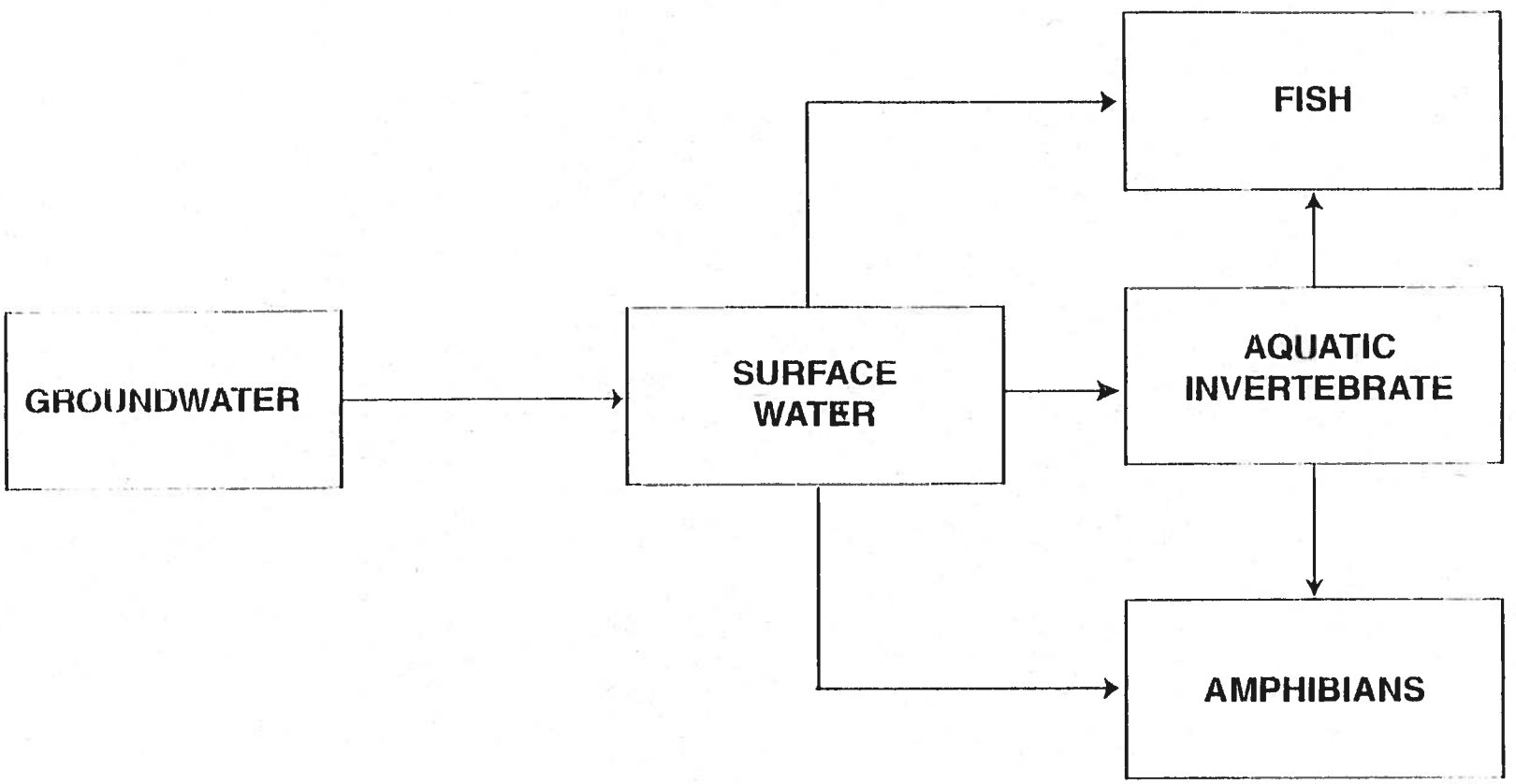

Figure 4
AQUATIC ECOSYSTEM EXPOSURE MODEL
ECOLOGICAL RISK ASSESSMENT
ESTES LANDFILL

QST ENVIRONMENTAL

Appendix A

Incidental Faunal Observations and USFWS Listed Species for Maricopa County, Arizona

Table A-1. Incidental Faunal Observations Within, and in Areas Adjacent, to the Estes Landfill, Phoenix, Arizona

Common Name	Scientific Name	Observed Within Estes Landfill Site	Observed Within the Vicinity of Salt River Channel
Birds			
Black vulture	*Coragyps atratus*		*
Gambel's quail	*Callipepla gambelii*	✔	
Killdeer	*Charadrium vociferus*		✔
Rock dove	*Columba livia*	✔	✔
Mourning dove	*Zenaida macroura*	✔	
Common Flicker (Northern)	*Colaptes auratus*	✔	
Western kingbird	*Tyrannus verticalis*	✔	
Northern rough-winged swallow	*Stelgidopteryx serripennis*		✔
American crow	*Corvus brachyrhynchos*		✔
Curve-billed thrasher	*Toxostoma curvirostre*	✔	
European starling	*Sturnus vulgaris*	✔	
Common grackle	*Quiscalus quiscula*		✔
Mammals			
Black-tailed jackrabbit	*Lepus californicus*	✔	✔
Eastern cottontail	*Sylvilagus floridanus*	✔	✔
Rock ground squirrel	*Spermophilus variegatus*	*	*
Herpetofauna			
(Northern) Fence lizard	*Sceloporus undulatus hyacinthinus*	*	*

* Direct observation allowing absolute identification did not occur during field efforts. Species were qualitatively identified based upon flight pattern, color, and size (black vulture); burrow size and habitat type (rock ground squirrel); and color and size (fence lizard).

Source: QST, 1999.

Table A-2. Listed, Proposed, and Candidate Species Documented by the U.S. Fish and Wildlife Service as Potentially Occurring in Maricopa County, Phoenix, Arizona

Common Name	Scientific Name	Federal Status
Arizona agave	*Agave arizonica*	Endangered
Arizona cliffrose	*Purshia subintegra*	Endangered
Arizona hedgehog cactus	*Echinocereus triglochidiatus arizonicus*	Endangered
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	Endangered
Sonoran pronghorn	*Antilocapra americana sonoriensis*	Endangered
Desert pupfish	*Cyprinodon macularius*	Endangered
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	Endangered
Razorback sucker	*Xyrauchen texanus*	Endangered
American peregrine falcon	*Falco peregrinus anatum*	Endangered
Bald eagle	*Haliaeetus leucocephalus*	Threatened
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	Endangered
Mexican spotted owl	*Strix occidentalis lucida*	Threatened
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered
Yuma clapper rail	*Rallus longirostris yumanensis*	Endangered

Source: USFWS, 1999.

Appendix B

Agency Correspondence

THE STATE OF ARIZONA

GAME & FISH DEPARTMENT

2221 West Greenway Road, Phoenix, Arizona 85023-4399 (602) 942-3000
www.gf.state.az.us

May 21, 1999

Mr. Kris Erickson
QST Environmental
11665 Lilburn Park Road
St. Louis, Missouri 63146-3535

Re: Special Status Species: Estes Landfill - Township 1 North, Range 4 East, Section 18

Dear Mr. Erickson:

The Arizona Game and Fish Department (Department) has reviewed your letter, faxed April 22, 1999, regarding special status species in the above-referenced area, and the following information is provided.

The Department's Heritage Data Management System has been accessed and current records show that the special status species listed below have been documented as occurring in the project vicinity.

COMMON NAME	SCIENTIFIC NAME	STATUS
lowland leopard frog	*Rana yavapaiensis*	**WC,S**
roundtail chub	*Gila robusta*	**WC,S**
Sonoran desert tortoise	*Gopherus agassizii*	**WC,S**

STATUS DEFINITIONS

WC - Wildlife of Special Concern in Arizona. Species whose occurrence in Arizona is or may be in jeopardy, or with known or perceived threats or population declines, as described by the Department's listing of **Wildlife of Special Concern in Arizona** (WSCA, in prep.). Species included in WSCA are currently the same as those in **Threatened Native Wildlife in Arizona** (1988).

S - Sensitive. Species classified as "**sensitive**" by the Regional Forester when occurring on lands managed by the U.S.D.A. Forest Service.

At this time, the Department's comments are limited to the special status species information provided above. This correspondence does not represent the Department's evaluation of impacts to wildlife or wildlife habitat associated with activities occurring in the subject area.

If the Department has specific comments or concerns regarding this project, they will be provided to you by May 24, 1999. If you have any questions regarding this letter, please contact me at (602) 789-3606.

Sincerely,

Nancy Olson

Nancy Olson
Project Evaluation Specialist
Habitat Branch

NLO:no

cc: Russ Haughey, Habitat Program Manager, Region VI, Mesa

AGFD# 4-22-99(01)

United States Department of the Interior
U.S. Fish and Wildlife Service
2321 W. Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
(602)640-2720 FAX (602)640-2730

In Reply Refer To:
AESO/SE
2-21-99-I-204

April 27, 1999

Ms. Kris Erickson
Ecological Assessment Task Manager
QST Environmental
11665 Lilburn Park Road
St. Louis, Missouri 63146-3535

RE: Ecological Risk Assessment for Estes Landfill Remedial Investigation, Phoenix, AZ

Dear Ms. Erickson:

This letter responds to your April 22, 1999, request for an inventory of threatened or endangered species, or those that are proposed to be listed as such under the Endangered Species Act of 1973, as amended (Act), which may potentially occur in your project area (Maricopa County). The enclosed list may include candidate species as well. We hope the enclosed county list of species will be helpful. In future communications regarding this project, please refer to consultation number 2-21-99-I-204.

The enclosed list of the endangered, threatened, proposed, and candidate species includes all those potentially occurring anywhere in the county, or counties, where your project occurs. Please note that your project area may not necessarily include all or any of these species. The information provided includes general descriptions, habitat requirements, and other information for each species on the list. Also on the enclosed list is the Code of Federal Regulations (CFR) citation for each list and is available at most public libraries. This information should assist you in determining which species may or may not occur within your project area. Site-specific surveys could also be helpful and may be needed to verify the presence or absence of a species or its habitat as required for the evaluation of proposed project-related impacts.

Endangered and threatened species are protected by Federal law and must be considered prior to project development. If the action agency determines that listed species or critical habitat may be adversely affected by a federally funded, permitted, or authorized activity, the action agency must request formal consultation with the Service. If the action agency determines that the planned action may jeopardize a proposed species or destroy or adversely modify proposed critical habitat, the action agency must enter into a section 7 conference with the Service. Candidate species are those which are being considered for addition to the list of threatened or endangered species. Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the

Act, we recommend that they be considered in the planning process in the event that they become listed or proposed for listing prior to project completion.

If any proposed action occurs in or near areas with trees and shrubs growing along watercourses, known as riparian habitat, the Service recommends the protection of these areas. Riparian areas are critical to biological community diversity and provide linear corridors important to migratory species. In addition, if the project will result in the deposition of dredged or fill materials into waterways or excavation in waterways, we recommend you contact the Army Corps of Engineers which regulates these activities under Section 404 of the Clean Water Act.

The State of Arizona protects some plant and animal species not protected by Federal law. We recommend you contact the Arizona Game and Fish Department and the Arizona Department of Agriculture for State-listed or sensitive species in your project area.

The Service appreciates your efforts to identify and avoid impacts to listed and sensitive species in your project area. If we may be of further assistance, please feel free to contact Tom Gatz.

Sincerely,

David L. Harlow
Field Supervisor

Enclosure

cc: Director, Arizona Game and Fish Department, Phoenix, AZ

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: **MARICOPA**

03/25/1999

1) LISTED

TOTAL= 14

NAME: ARIZONA AGAVE *AGAVE ARIZONICA*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: No CFR: 49 FR 21055, 05-18-1984

DESCRIPTION: HAS ATTRACTIVE ROSETTES OF BRIGHT GREEN LEAVES WITH DARK MAHOGANY MARGINS. FLOWER: BORNE ON SUB-UMBELLATE INFLORESCENCES.

ELEVATION RANGE: 3000-6000 FT.

COUNTIES: GILA, YAVAPAI, MARICOPA

HABITAT: TRANSITION ZONE BETWEEN OAK-JUNIPER WOODLAND & MOUNTAIN MAHOGANY-OAK SCRUB

SCATTERED CLONES IN NEW RIVER MOUNTAINS AND SIERRA ANCHA. USUALLY FOUND ON STEEP, ROCKY SLOPES. POSSIBLY MAZATAL MOUNTAINS. SHOULD BE LOOKED FOR WHEREVER THE RANGES OF Agave toumeyana var. bella AND Agave chrystantha OVERLAP.

NAME: ARIZONA CLIFFROSE *PURSHIA SUBINTEGRA*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 49 FR 22326 5-29-84

DESCRIPTION: EVERGREEN SHRUB OF THE ROSE FAMILY (ROSEACEAE). BARK PALE SHREDDY. YOUNG TWIGS WITH DENSE HAIRS. LEAVES 1-5 LOBES AND EDGES CURL DOWNWARD (REVOLUTE). FLOWERS: 5 WHITE OR YELLOW PETALS <0.5 INCH LONG.

ELEVATION RANGE: <4000 FT.

COUNTIES: GRAHAM YAVAPAI MARICOPA MOHAVE

HABITAT: CHARACTERISTIC WHITE SOILS OF TERTIARY LIMESTONE LAKEBED DEPOSITS.

WHITE SOILS OF TERITIARY LIMESTONE LAKEBED DEPOSITS CAN BE SEEN FROM A DISTANCE.

NAME: ARIZONA HEDGEHOG CACTUS *ECHINOCEREUS TRIGLOCHIDIATUS ARIZONICUS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: No CFR: 44 FR 61556,10-15-1979

DESCRIPTION: DARK GREEN CYLINDROID 2.5-12 INCHES TALL, 2-10 INCHES IN DIAMETER, SINGLE OR IN CLUSTERS. 1-3 GRAY OR PINKISH CENTRAL SPINES LARGEST DEFLEXED AND 5-11 SHORTER RADIAL SPINES. FLOWER: BRILLIANT RED, SIDE OF STEM IN APRIL- MAY

ELEVATION RANGE: 3700-5200 FT.

COUNTIES: MARICOPA, GILA, PINAL

HABITAT: ECOTONE BETWEEN INTERIOR CHAPPARAL AND MADREAN EVERGREEN WOODLAND

OPEN SLOPES, IN NARROW CRACKS BETWEEN BOULDERS, AND IN UNDERSTORY OF SHRUBS. THIS VARIETY IS BELIEVED TO INTERGRADE AT THE EDGES OF ITS DISTRIBUTION WITH VARIETIES MELANCANTHUS AND NEOMEXICANUS CAUSING SOME CONFUSION IN IDENTIFICATION.

NAME: **LESSER LONG-NOSED BAT** *LEPTONYCTERIS CURASOAE YERBABUENAE*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 53 FR 38456, 09-30-88

DESCRIPTION: ELONGATED MUZZLE, SMALL LEAF NOSE, AND LONG TONGUE. YELLOWISH BROWN OR GRAY ABOVE AND CINNAMON BROWN BELOW. TAIL MINUTE AND APPEARS TO BE LACKING. EASILY DISTURBED.

ELEVATION RANGE: <6000 FT.

COUNTIES: COCHISE, PIMA, SANTA CRUZ, GRAHAM, PINAL, MARICOPA

HABITAT: DESERT SCRUB HABITAT WITH AGAVE AND COLUMNAR CACTI PRESENT AS FOOD PLANTS

DAY ROOSTS IN CAVES AND ABANDONED TUNNELS. FORAGES AT NIGHT ON NECTAR, POLLEN, AND FRUIT OF PANICULATE AGAVES AND COLUMNAR CACTI. THIS SPECIES IS MIGRATORY AND IS PRESENT IN ARIZONA USUALLY FROM APRIL TO SEPTMBER AND SOUTH OF THE BORDER THE REMAINDER OF THE YEAR.

NAME: **SONORAN PRONGHORN** *ANTILOCAPRA AMERICANA SONORIENSIS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-67

DESCRIPTION: BUFF ON BACK AND WHITE BELOW, HOOFED WITH SLIGHTLY CURVED BLACK HORNS HAVING A SINGLE PRONG. SMALLEST AND PALEST OF THE PRONGHORN SUBSPECIES.

ELEVATION RANGE: 2000-4000 FT.

COUNTIES: PIMA, YUMA, MARICOPA

HABITAT: BROAD, INTERMOUNTAIN ALLUVIAL VALLEYS WITH CREOSOTE-BURSAGE & PALO VERDE-MIXED CACTI ASSOCIATIONS

TYPICALLY, BAJADAS ARE USED AS FAWNING AREAS AND SANDY DUNE AREAS PROVIDE FOOD SEASONALLY. HISTORIC RANGE WAS PROBABLY LARGER THAN EXISTS TODAY. THIS SUBSPECIES ALSO OCCURS IN MEXICO.

NAME: **DESERT PUPFISH** *CYPRINODON MACULARIUS*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 51 FR 10842, 03-31-1986

DESCRIPTION: SMALL (2 INCHES) SMOOTHLY ROUNDED BODY SHAPE WITH NARROW VERTICAL BARS ON THE SIDES. BREEDING MALES BLUE ON HEAD AND SIDES WITH YELLOW ON TAIL. FEMALES & JUVENILES TAN TO OLIVE COLORED BACK AND SILVERY SIDES.

ELEVATION RANGE: <5000 FT.

COUNTIES: LA PAZ, PIMA, GRAHAM, MARICOPA, PINAL, YAVAPAI, SANTA CRUZ

HABITAT: SHALLOW SPRINGS, SMALL STREAMS, AND MARSHES. TOLERATES SALINE & WARM WATER

CRITICAL HABITAT INCLUDES QUITOBAQUITO SPRING, PIMA COUNTY, PORTIONS OF SAN FELIPE CREEK, CARRIZO WASH, AND FISH CREEK WASH, IMPERIAL COUNTY, CALIFORNIA. TWO SUBSPECIES ARE RECOGNIZED: DESERT PUPFISH (C. m. maculans) AND QUITOBAQUITO PUPFISH (C. m. eremus).

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: **MARICOPA**

03/25/1999

NAME: **GILA TOPMINNOW** *POECILIOPSIS OCCIDENTALIS OCCIDENTALIS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-1967

DESCRIPTION: SMALL (2 INCHES), GUPPY-LIKE, LIVE BEARING, LACKS DARK SPOTS ON ITS FINS. BREEDING MALES ARE JET BLACK WITH YELLOW FINS.

ELEVATION RANGE: <4500 FT.

COUNTIES: GILA, PINAL, GRAHAM, YAVAPAI, SANTA CRUZ, PIMA, MARICOPA, LA PAZ

HABITAT: SMALL STREAMS, SPRINGS, AND CIENEGAS VEGETATED SHALLOWS

SPECIES HISTORICALLY OCCURRED IN BACKWATERS OF LARGE RIVERS BUT IS CURRENTLY ISOLATED TO SMALL STREAMS AND SPRINGS

NAME: **RAZORBACK SUCKER** *XYRAUCHEN TEXANUS*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 55 FR 21154, 05-22-1990; 59 FR 13374, 03-21-1994

DESCRIPTION: LARGE (UP TO 3 FEET AND UP TO 16 POUNDS) LONG, HIGH SHARP-EDGED KEEL-LIKE HUMP BEHIND THE HEAD. HEAD FLATTENED ON TOP. OLIVE-BROWN ABOVE TO YELLOWISH BELOW.

ELEVATION RANGE: <6000 FT.

COUNTIES: GREENLEE, MOHAVE, PINAL, YAVAPAI, YUMA, LA PAZ, MARICOPA (REFUGIA), GILA, COCONINO, GRAHAM

HABITAT: RIVERINE & LACUSTRINE AREAS, GENERALLY NOT IN FAST MOVING WATER AND MAY USE BACKWATERS

SPECIES IS ALSO FOUND IN HORSESHOE RESERVOIR (MARICOPA COUNTY).CRITICAL HABITAT INCLUDES THE 100-YEAR FLOODPLAIN OF THE RIVER THROUGH GRAND CANYON FROM CONFLUENCE WITH PARIA RIVER TO HOOVER DAM; HOOVER DAM TO DAVIS DAM; PARKER DAM TO IMPERIAL DAM. ALSO GILA RIVER FROM AZ/NM BORDER TO COOLIDGE DAM; AND SALT RIVER FROM HWY 60/SR 77 BRIDGE TO ROOSEVELT DAM; VERDE RIVER FROM FS BOUNDARY TO HORSESHOE LAKE.

NAME: **AMERICAN PEREGRINE FALCON** *FALCO PEREGRINUS ANATUM*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 35 FR 16047, 10-13-70; 35 FR 8495, 06-02-70

DESCRIPTION: A RECLUSIVE, CROW-SIZED FALCON SLATY BLUE ABOVE WHITISH BELOW WITH FINE DARK BARRING. THE HEAD IS BLACK AND APPEARS TO BE MASKED OR HELMETED. WINGS LONG AND POINTED. LOUD WAILING CALLS ARE GIVEN DURING BREEDING PERIOD.

ELEVATION RANGE: 3500-9000 FT.

COUNTIES: MOHAVE COCONINO NAVAJO APACHE SANTA CRUZ MARICOPA COCHISE YAVAPAI GILA PINAL PIMA GREENLEE GRAHAM YUMA

HABITAT: CLIFFS AND STEEP TERRAIN USUALLY NEAR WATER OR WOODLANDS WITH ABUNDANT PREY

THIS IS A WIDE-RANGING MIGRATORY BIRD THAT USES A VARIETY OF HABITATS. BREEDING BIRDS ARE YEAR-ROUND RESIDENTS. OTHER BIRDS WINTER AND MIGRATE THROUGH ARIZONA. SPECIES IS ENDANGERED FROM REPRODUCTIVE FAILURE FROM PESTICIDES. SPECIES HAS BEEN PROPOSED FOR DELISTING (63 FR 45446) BUT STILL RECEIVES FULL PROTECTION UNDER ESA

NAME: **BALD EAGLE** *HALIAEETUS LEUCOCEPHALUS*

STATUS: THREATENED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 60 FR 35999, 07-12-95

DESCRIPTION: LARGE, ADULTS HAVE WHITE HEAD AND TAIL. HEIGHT 28 - 38"; WINGSPAN 66 - 96". 1-4 YRS DARK WITH VARYING DEGREES OF MOTTLED BROWN PLUMAGE. FEET BARE OF FEATHERS.

ELEVATION RANGE: VARIES FT.

COUNTIES: YUMA, LA PAZ, MOHAVE, YAVAPAI, MARICOPA, PINAL, COCONINO, NAVAJO, APACHE, SANTA CRUZ, PIMA, GILA, GRAHAM, COCHISE

HABITAT: LARGE TREES OR CLIFFS NEAR WATER (RESERVOIRS, RIVERS AND STREAMS) WITH ABUNDANT PREY

SOME BIRDS ARE NESTING RESIDENTS WHILE A LARGER NUMBER WINTERS ALONG RIVERS AND RESERVOIRS. AN ESTIMATED 200 TO 300 BIRDS WINTER IN ARIZONA. ONCE ENDANGERED (32 FR 4001, 03-11-1967; 43 FR 6233, 02-14-78) BECAUSE OF REPRODUCTIVE FAILURES FROM PESTICIDE POISONING AND LOSS OF HABITAT, THIS SPECIES WAS DOWN LISTED TO THREATENED ON AUGUST 11, 1995. ILLEGAL SHOOTING, DISTURBANCE, LOSS OF HABITAT CONTINUES TO BE A PROBLEM.

NAME: **CACTUS FERRUGINOUS PYGMY-OWL** *GLAUCIDIUM BRASILIANUM CACTORUM*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: No CFR: 62 FR 10730, 3-10-97

DESCRIPTION: SMALL (APPROX. 7"), DIURNAL OWL REDDISH BROWN OVERALL WITH CREAM-COLORED BELLY STREAKED WITH REDDISH BROWN. SOME INDIVIDUALS ARE GRAYISH BROWN

ELEVATION RANGE: <4000 FT.

COUNTIES: MARICOPA, YUMA, SANTA CRUZ, GRAHAM, GREENLEE, PIMA, PINAL, GILA, COCHISE

HABITAT: MATURE COTTONWOOD/WILLOW, MESQUITE BOSQUES, AND SONORAN DESERTSCRUB

RANGE LIMIT IN ARIZONA IS FROM NEW RIVER (NORTH) TO GILA BOX (EAST) TO CABEZA PRIETA MOUNTAINS (WEST). ONLY A FEW DOCUMENTED SITES WHERE THIS SPECIES PERSISTS ARE KNOWN, ADDITIONAL SURVEYS ARE NEEDED. LISTING EFFECTIVE APRIL 9, 1997. PROPOSED CRITICAL HABITAT IN PIMA, COCHISE, PINAL, AND MARICOPA COUNTIES (64 FR 71821).

NAME: **MEXICAN SPOTTED OWL** *STRIX OCCIDENTALIS LUCIDA*

STATUS: THREATENED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 56 FR 14678, 04-11-91

DESCRIPTION: MEDIUM SIZED WITH DARK EYES AND NO EAR TUFTS. BROWNISH AND HEAVILY SPOTTED WITH WHITE OR BEIGE.

ELEVATION RANGE: 4100-9000 FT.

COUNTIES: MOHAVE, COCONINO, NAVAJO, APACHE, YAVAPAI, GRAHAM, GREENLEE, COCHISE, SANTA CRUZ, PIMA, PINAL, GILA, MARICOPA

HABITAT: NESTS IN CANYONS AND DENSE FORESTS WITH MULTI-LAYERED FOLIAGE STRUCTURE

GENERALLY NESTS IN OLDER FORESTS OF MIXED CONIFER OR PONDERSA PINE/GAMBEL OAK TYPE, IN CANYONS, AND USE VARIETY OF HABITATS FOR FORAGING. SITES WITH COOL MICROCLIMATES APPEAR TO BE OF IMPORTANCE OR ARE PREFERED.

NAME: SOUTHWESTERN WILLOW FLYCATCHER *EMPIDONAX TRAILLII EXTIMUS*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: No CFR: 60 FR 10694, 02-27-95

DESCRIPTION: SMALL PASSERINE (ABOUT 6") GRAYISH-GREEN BACK AND WINGS, WHITISH THROAT, LIGHT OLIVE-GRAY BREAST AND PALE YELLOWISH BELLY. TWO WINGBARS VISIBLE. EYE-RING FAINT OR ABSENT.

ELEVATION RANGE: <8500 FT.

COUNTIES: YAVAPAI, GILA, MARICOPA, MOHAVE, COCONINO, NAVAJO, APACHE, PINAL, LA PAZ, GREENLEE, GRAHAM, YUMA, PIMA, COCHISE, SANTA CRUZ

HABITAT: COTTONWOOD/WILLOW & TAMARISK VEGETATION COMMUNITIES ALONG RIVERS & STREAMS

MIGRATORY RIPARIAN OBLIGATE SPECIES THAT OCCUPIES BREEDING HABITAT FROM LATE APRIL TO SEPTEMBER. DISTRIBUTION WITHIN ITS RANGE IS RESTRICTED TO RIPARIAN CORRIDORS. DIFFICULT TO DISTINGUISH FROM OTHER MEMBERS OF THE EMPIDONAX COMPLEX BY SIGHT ALONE. TRAINING SEMINAR REQUIRED FOR THOSE CONDUCTING FLYCATCHER SURVEYS. CRITICAL HABITAT ON PORTIONS OF THE 100-YEAR FLOODPLAIN ON SAN PEDRO AND VERDE RIVERS; WET BEAVER AND WEST CLEAR CREEKS, INCLUDING TAVASCI MARSH AND ISTER FLAT; THE COLORADO RIVER, THE LITTLE COLORADO RIVER, AND THE WEST, EAST, AND SOUTH FORKS OF THE LITTLE COLORADO RIVER, REFERENCE 60 CFR:62 FR 39129, 7/22/97.

NAME: YUMA CLAPPER RAIL *RALLUS LONGIROSTRIS YUMANENSIS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-67; 48 FR 34182, 07-27-83

DESCRIPTION: WATER BIRD WITH LONG LEGS AND SHORT TAIL. LONG SLENDER DECURVED BILL. MOTTLED BROWN ON GRAY ON ITS RUMP. FLANKS AND UNDERSIDES ARE DARK GRAY WITH NARROW VERTICAL STRIPES PRODUCING A BARRING EFFECT.

ELEVATION RANGE: <4500 FT.

COUNTIES: YUMA, LA PAZ, MARICOPA, PINAL, MOHAVE

HABITAT: FRESH WATER AND BRACKISH MARSHES

SPECIES IS ASSOCIATED WITH DENSE EMERGENT RIPARIAN VEGETATION. REQUIRES WET SUBSTRATE (MUDFLAT, SANDBAR) WITH DENSE HERBACEOUS OR WOODY VEGETATION FOR NESTING AND FORAGING. CHANNELIZATION AND MARSH DEVELOPMENT ARE PRIMARY SOURCES OF HABITAT LOSS.