MINERAL RESOURCES TASMANIA

Tasmania

DEPARTMENT *of* INFRASTRUCTURE, ENERGY *and* RESOURCES

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Natural Heritage Trust

Helping Communities Helping Australia

The effects of waste disposal on groundwater quality in Tasmania

Scottsdale waste depot

Tasmanian Geological Survey Record 2002/04

Mineral Resources Tasmania
Tasmanian Geological Survey
Record 2002/04

Groundwater quality investigations at the Scottsdale waste depot

A. R. Ezzy

Abstract

The Scottsdale waste depot is an open-gate disposal site for general waste streams (including herbicide, pesticide and weedicide containers). The landfill footprint is located on the Jetsonville aquifer, a groundwater resource of State significance. Some groundwater and surface waters are degraded around the site. Issues such as surface water management, capping of the landfill, leachate management infrastructure, and contaminated surface water and groundwater are priorities to be addressed at this site.

INTRODUCTION

Mineral Resources Tasmania (MRT) initiated a project to investigate the effects of waste disposal on groundwater quality in Tasmania. The project was funded by MRT and the Natural Heritage Trust (NHT) and included a number of sites for detailed study. The waste depot at Scottsdale was one of these sites.

The objectives of the investigations at the Scottsdale waste depot were to:

- Determine the geological nature of the host materials;
- Identify the depth of the water table;
- Examine the quality of the groundwater; and
- Identify if a potential hydraulic connection exists between the waste fill materials and the local hydrological system.

SITE DESCRIPTION

The Scottsdale waste depot is located on Bridport Road six kilometres northwest of Scottsdale (538 800 mE, 5 448 800 mN) (fig. 1).

Site history and waste management

The Scottsdale waste depot has been in operation for approximately forty years and the Department of Primary Industries, Water and Environment (DPIWE) currently license the facility. No engineered fill sequence has been implemented at the site.

Groundwater and leachate monitoring was undertaken by Sinclair Knight Merz Pty Ltd during the preparation of the Scottsdale Waste Depot Environmental Management Plan of October 1997. This document indicated that no serious contamination of the groundwater had occurred due to the operation of the waste depot.

The landfill area consists of an active quarry pit to the north, the main landfill footprint, and active pesticide/herbicide/weedicide trenches to the south fig. 4). Plate 1 shows the pesticide/herbicide/ weedicide collection bin and a Council backhoe

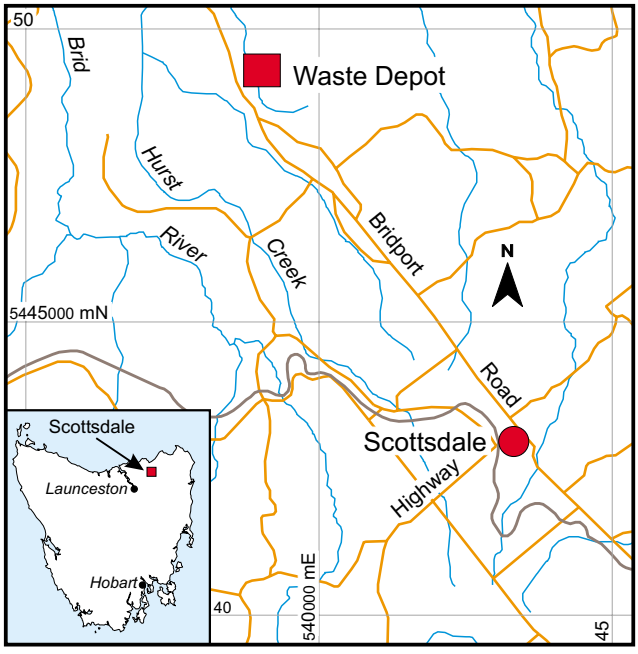

Figure 1
Location of waste depot, Scottsdale.

Plate 1. *The pesticide/herbicide/weedicide collection bin and a Council backhoe burying the containers in the trench area to the south.*

Plate 2. *Cracking and slumping of cover material used on a recent pesticide/herbicide/weedicide container burial trench.*

Plate 3. *Various other waste streams are disposed of at the site, including burnt green waste and tyres, vegetable matter (e.g. onions) and general refuse.*

actively burying the containers in the trench area to the south. Cracking and slumping of cover material used on a recent trench is shown in Plate 2, while Plate 3 shows various other waste streams disposed of at the site, including burnt green waste, tyres, vegetables such as onions and general refuse.

No surface water (perimeter drains) or leachate management infrastructure currently exists at the site, and leachate can be seen discharging from the landfill as springs from the bund walls (Plate 4). Several springs often combine on the northeast corner of the landfill footprint and discharge as a surface water (leachate) flow into the drainage to the north of the site (Plate 5). During rainfall events this area acts as a major transport mechanism for above-ground off-site transportation of leachate emanating from the landfill (Plate 6). The northern active quarry pit is subject to flooding during rainfall events (Plate 7).

Plate 4. *Leachate discharging from the landfill as a spring in a bund wall.*

Plate 5. *Springs combining on the northeast corner of the landfill footprint as a discharge of surface water (leachate) into the drainage to the north of the site.*

Plate 6

The northeast corner of the landfill footprint during a rain event, acting as a major transport mechanism for above-ground off-site transportation of leachate emanating from the landfill.

Plate 7

Flooding of the northern active quarry pit during a rainfall event.

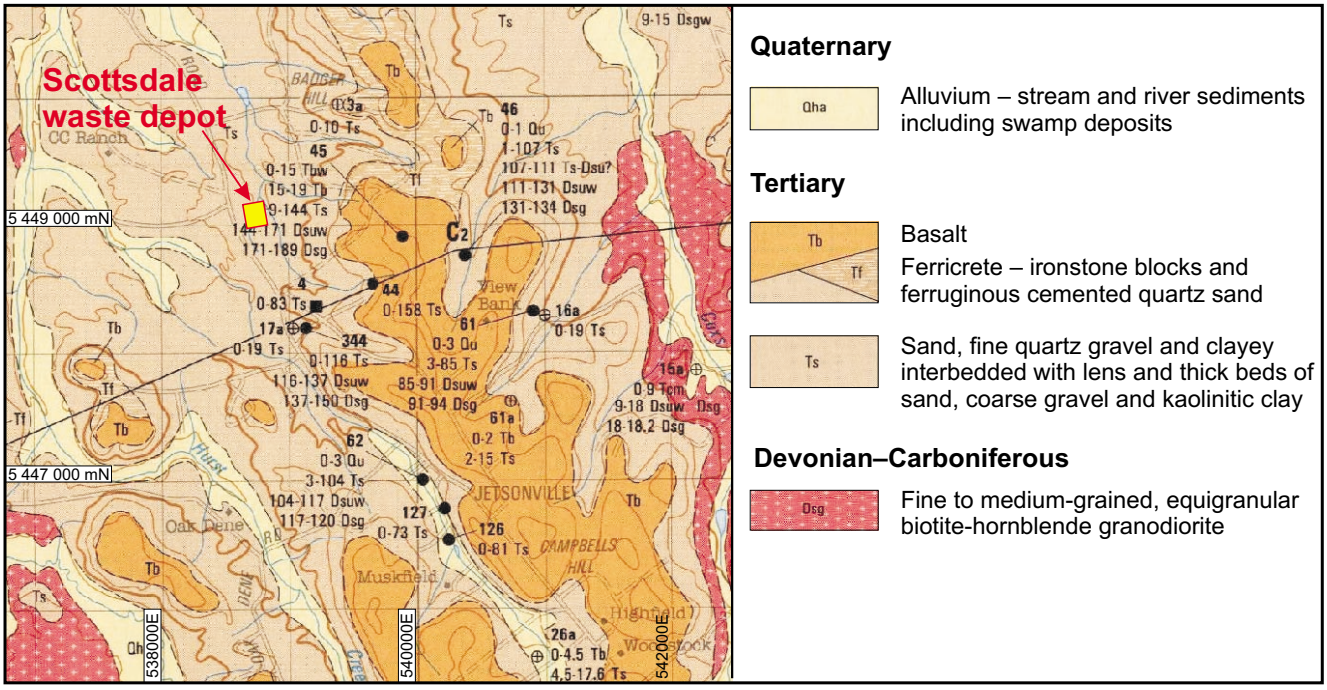

Figure 2

Extract from Scottsdale sedimentary basin (Moore, 1990a) of the local area and related geology.

Geology

The Tasmania Department of Mines 1:60 000 scale geological map of the area (Moore, 1990*a*) indicates that the waste disposal area is underlain by Tertiary sediments. These sediments consist of sand, fine quartz gravel and clayey gravel interbedded with lenses and thick beds of sand, coarse gravel and kaolinitic clay. Figure 2 is a modified extract from the Scottsdale sedimentary basin map (Moore, 1990*a*).

Geological mapping during the present study confirmed that the site is dominated by the Tertiary deposits, with these occurring within 100 metres of the waste disposal site in all directions. All disposal sites are located in heterogenous layers of sand, clay and gravel sediments. Plate 8 shows a cutting on the northern end of the landfill footprint demonstrating the nature of the Tertiary sediments at the site.

Two samples from the northern quarry were selected (based on the highest clay content of observed materials in the quarry) for XRD and Atterberg analyses. The results (Appendix 1) indicate that the clays contain a high quartz content.

Hydrology

The waste disposal site is located in the catchment of Hurst Creek. Hurst Creek discharges into Trent Water at Bridport, approximately eleven kilometres north of the waste depot. Australian Bureau of Meteorology rainfall station 091116 at Scottsdale (Kraft Foods) is the closest rainfall station to the site. The rainfall chart of average monthly recorded rainfall (fig. 3) shows that rainfall is highest in autumn/winter (April to August), with an average annual rainfall of 983.6 mm.

Plate 8

Exposed cutting on the northern end of the landfill footprint demonstrating the nature of the Tertiary sediments at the site.

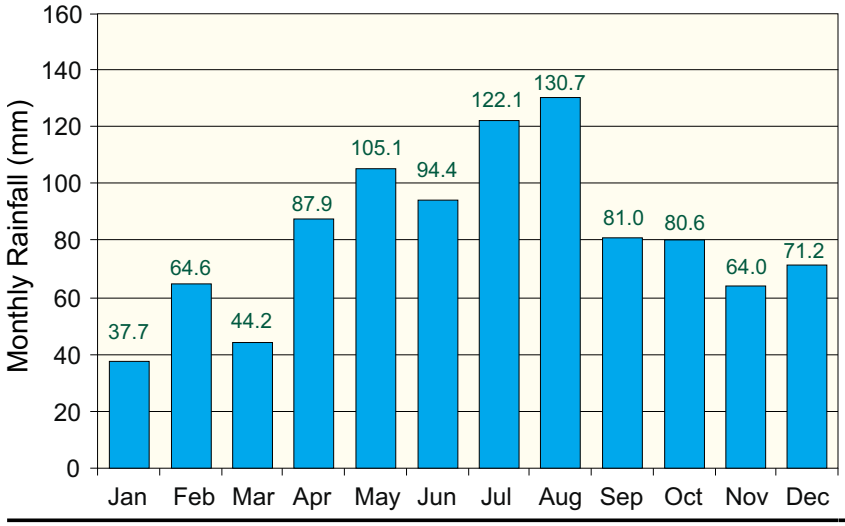

Figure 3

Average monthly rainfall for Australian Bureau of Meteorology rainfall station 091116, Scottsdale (Kraft Foods).

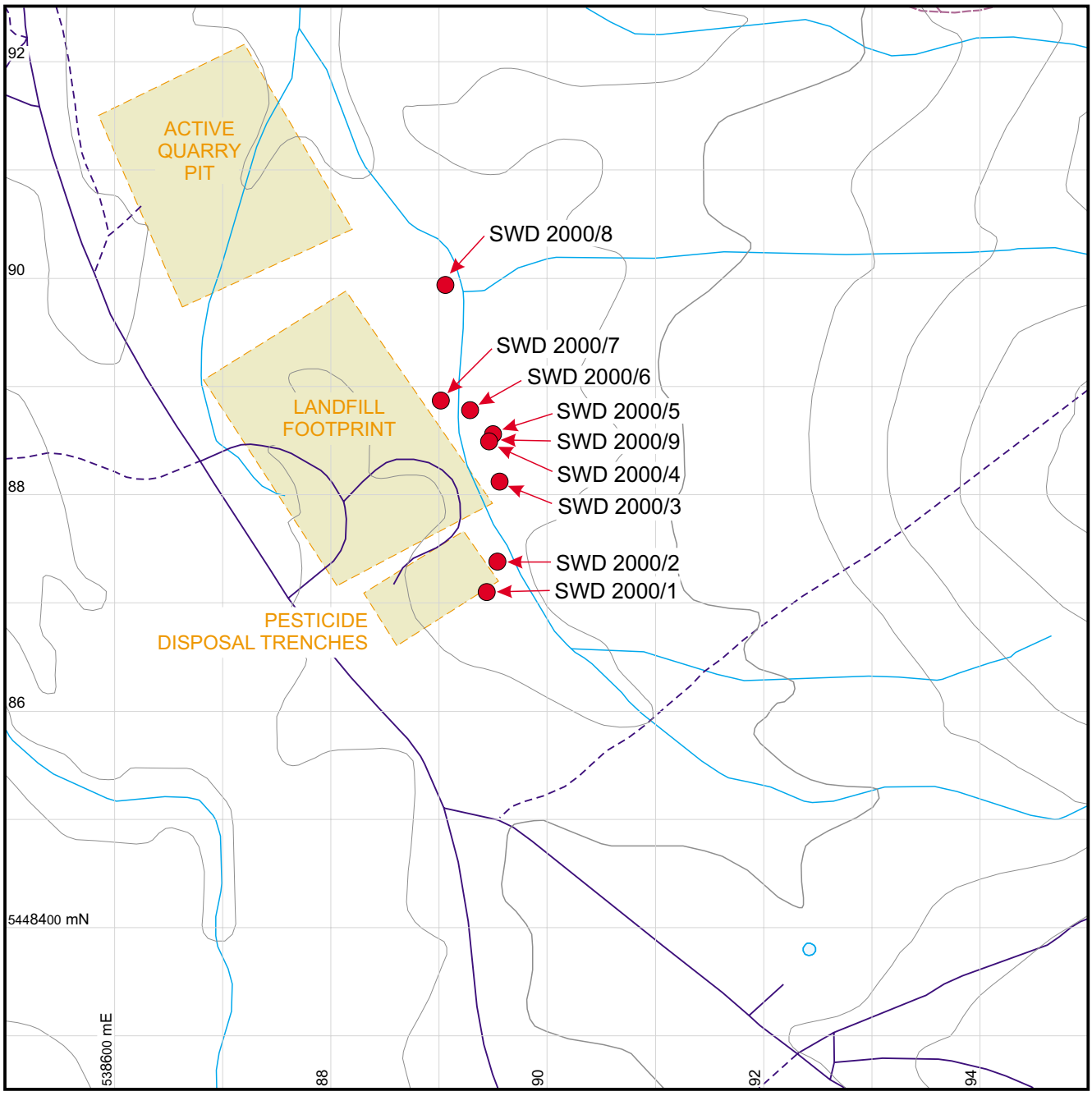

Figure 4

Locations of environmental monitoring bores installed at the Scottsdale waste depot.

INVESTIGATION METHODS

Borehole drilling and installation

Nine 120 mm diameter monitoring bores were auger drilled between 20 and 27 September 2000 for this project (fig. 4). Fifty millimetre PVC casing and slotted screens with bentonite seals were installed in each hole. All bores were logged in accordance with AS 1726-1993; engineering logs are given in Appendix 2.

Groundwater was encountered between 1.0 and 11.6 metres depth below ground level across the site. Flow during drilling indicated that the groundwater in all boreholes was unconfined. Recorded yields of bores ranged between 0.09 and 0.50 l/s. Figure 5 shows a cross-section and related standing water levels on 20 August 2001 for bore holes SWD2000/2, 4, 5, 6, 8 and 9.

The unsaturated zone consists of heterogenous layers of low to high plasticity clay, sand, and gravel. Groundwater was intercepted in layers preceding more dense iron oxide-enriched layers (coffee rock) in the sedimentary profile (boreholes SWD2000/2, SWD2000/3, SWD2000/6, SWD20000/7 and SWD2000/8. These five bores all had yields less than 0.15 l/s. Clustered shallower boreholes SWD2000/4, SWD2000/5 and SWD2000/9 (screened above 3.5 metres) all produced yields between 0.42 and 0.50 litres per second.

Two additional monitoring bores were drilled between 19 and 21 November 2001. Details of these bores are outlined in a supplementary report (Ezzy, 2002*a*). Borehole SWD2001/1 was drilled to 63 m and intercepted seven aquifer levels between 9 and 31 metres. Borehole SWD2001/2 was drilled to 11.5 m to assess if the uppermost level of the aquifer was hydraulically interconnected with the deeper groundwater tables.

In situ permeability testing

One extraction and two repeated injection slug tests were carried out on 17 August 2001 on bores SWD2000/8, SWD2000/4 and SWD2000/5 respectively. Data collected during the slug tests are presented in Appendix 5.

Slug test data were analysed in the software package *AquiferWin32* (Version 2.17, Environmental Simulations Inc.). The Bouwer and Rice (1976 Unconfined Aquifer) solution was used to calculated the hydraulic conductivities depicted in Table 1. This method was selected as the most appropriate available within the software package.

Table 1

Hydraulic conductivity values calculated from analyses of pump test data.

Pump test number	*Borehole*	*Hydraulic conductivity (m/d)*
1	SWD2000/4	10.43
2	SWD2000/4	13.02
3	SWD2000/5	6.22
4	SWD2000/5	6.38
5	SWD2000/8	1.42

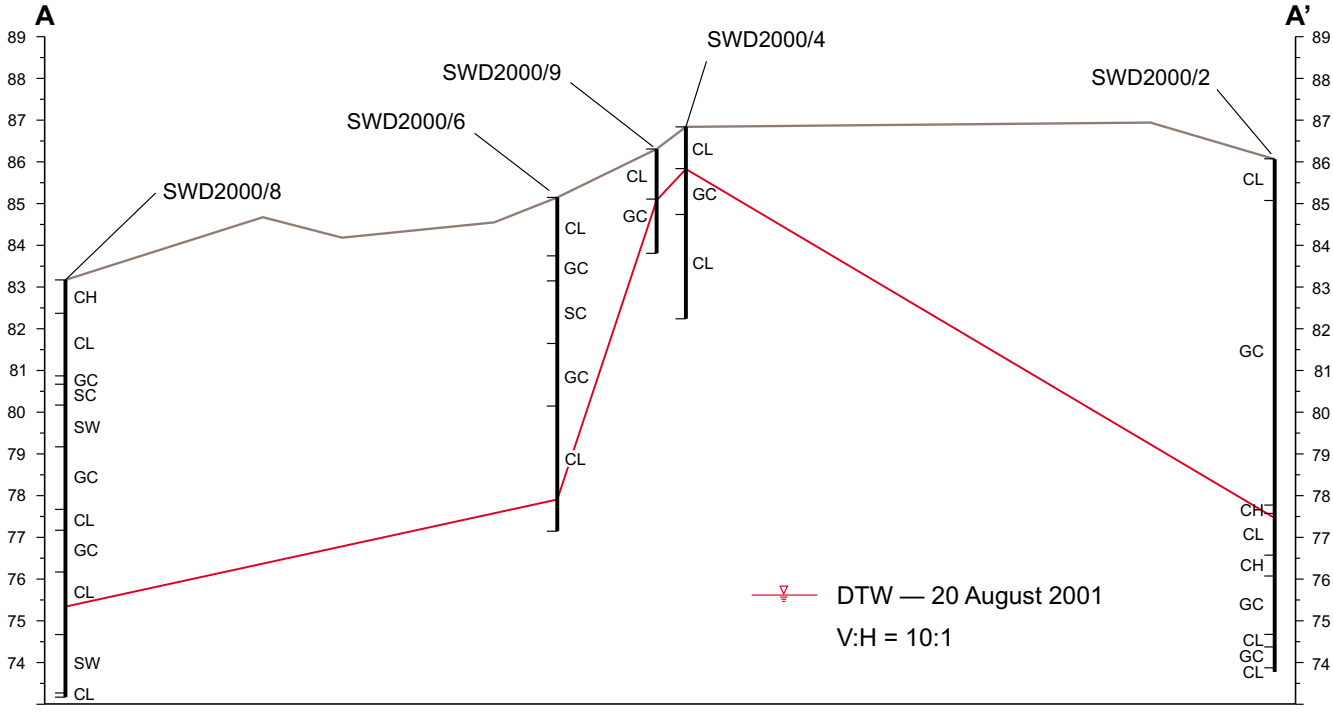

Figure 5

Cross scetions and related standing wtare levels on 20 August 2001 for boreholes SWD2000/2, 4, 5, 6, 8 and 9.

CONCEPTUAL HYDROLOGICAL MODEL

Groundwater investigations undertaken by Sinclair Knight Merz Pty Ltd (during the preparation of the Scottsdale Waste Depot Environmental Management Plan, October 1997) identified two aquifer levels at approximately 10 m depth and between 20 and 30 m depth. The main Jetsonville aquifer was inferred to exist between 50 and 70 m depth. Drilling was not undertaken to prove that the deeper aquifer level existed in the area of the landfill footprint.

The Tasmania Department of Mines 1:60 000 scale hydrogeology map of the area (Moore, 1990*b*) illustrates that the aquifer in the area is hosted by a Tertiary unconsolidated sedimentary basin. The hydrogeological properties of the groundwater resource identified by Moore (1990*b*) are given below.

	Range	*Average*
Bore yield (l/min)	5–681*	199.3
Water quality — TDS (mg/l)	55–3972	283.8

* Maximum available pump capacity
– larger output possible in some bores.

Mineral Resources Tasmania has identified the Jetsonville aquifer as a groundwater resource of State significance. Several agricultural-based activities propose using this aquifer as a primary water resource.

The north–south cross-section indicates that a groundwater mound exists on the eastern side of the landfill footprint. Results presented in Ezzy (2002*a*) indicate that the uppermost aquifer level is hydraulically connected to the rest of the aquifer system. Borehole SWD2001/1 showed that the Jetsonville aquifer is located at depths of between approximately 10 and 30 metres in the area of the landfill. The hole also indicated that the hydro-stratigraphy of the aquifer consists of potentially seven levels that all appear to be hydraulically connected. However, the groundwater chemistry results imply that the uppermost water table level (around 10 m) is a heterogenous system with only limited hydraulic connection. Hydraulic connections are expected to increase with depth within the main aquifer zone of 10 to 30 metres.

SURFACE AND GROUNDWATER CHEMISTRY

All bores were sampled on 28 November 2000 in accordance with Australian/New Zealand Standard AS/NZS 5667.11:1998. Bore SWD2000/1 contained no water and therefore was not sampled. Two additional surface water samples were collected from water near the pesticide bin and discharging from the leachate spring. These samples were collected to chemically characterise potential contamination sources. Analytical Services Tasmania (in accordance with relevant Australian and international standards) carried out laboratory testing of the surface and groundwater samples (Appendix 3). Groundwater values for pH ranged between 5.6 to 7.3 with conductivity ranging between 202 and 1070 µS/cm. Analytical results for surface and groundwater samples are presented on site maps in Appendix 4. Figure 6 depicts a Piper plot for the results of the groundwater samples and the leachate spring also

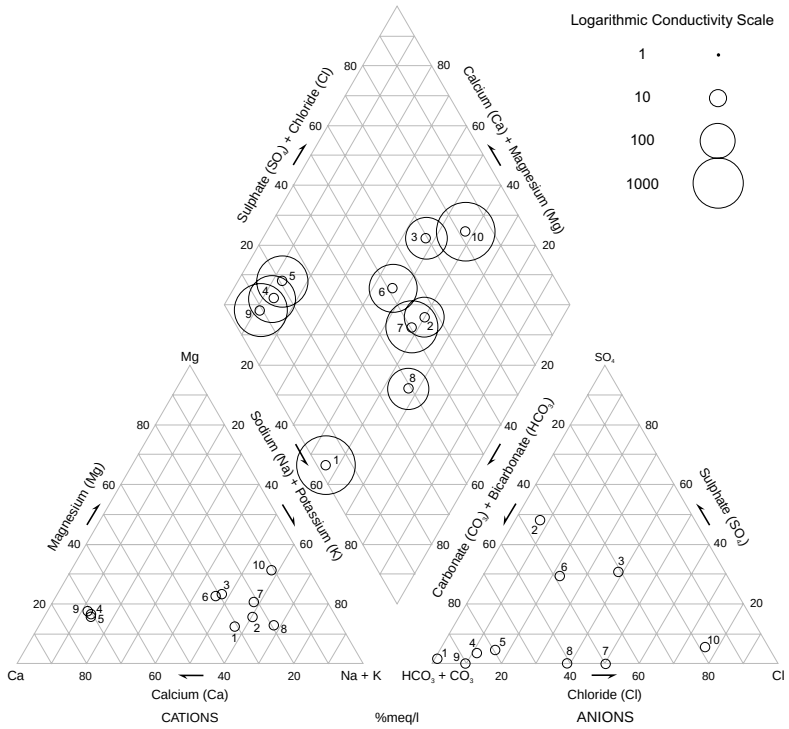

Figure 6

Piper plot for groundwater bores at the Scottsdale waste depot.
1 – leachate spring; 2 – SWD2000/2; 3 – SWD2000/3; 4 – SWD2000/4; 5 – SWD2000/5; 6 – SWD2000/6; 7 – SWD2000/7; 8 – SWD2000/8; 9 – SWD2000/9; 10 – average of all MRT groundwater records for Tertiary sediments.

Table 3. *Comparison of analytical results against water quality standards (guideline value listed when stated by a relevant standard). Highlighted values exceed emission limits.*

Parameter	*PSWD 2000/2*	*PSWD 2000/3*	*PSWD 2000/4*	*PSWD 2000/5*	*PSWD 2000/6*	*PSWD 2000/7*	*PSWD 2000/8*	*PSWD 2000/9*	*Pesticide bin*	*Leachate spring*	*Emission limit*
pH	6.2	6.2	7.3	7.0	6.5	5.9	5.6	7.1	-	6.6	N/A
Conductivity (µS/cm)	202	262	854	855	556	966	251	1070	-	2730	N/A: note average sea water value 36 000 µS/cm
Alkalinity CO_3 (mg/L)	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	N/A
Alkalinity HCO_3 (mg/L)	29	40	396	382	133	94	19	503	-	924	N/A
Bromide (mg/L)	<0.01	0.10	<0.01	<0.01	0.92	2.3	0.21	0.17	-	2.5	N/A
Chloride (mg/L)	38	38	29	27	75	83	56	31	-	230	250* (mg/L)
Fluoride (mg/L)	<0.02	<0.02	0.04	0.22	0.06	0.04	<0.02	<0.02	-	006	1.5* (mg/L)
Sulphate (mg/L)	2.7	29	31	44	35	55	7.1	40	-	2.2	250* (mg/L)
Ammonia (mg/L)	0.011	0.007	0.022	0.243	0.007	0.010	0.021	<0.002	-	**66.200**	0.5* (mg/L) nitrogen (as ammonia)
Nitrate + Nitrite (mg/L)	0.098	0.094	0.153	0.124	0.093	**14.600**	2.320	3.750	-	0.085	10.0* (mg/L) nitrogen (as nitrate or nitrite)
Nitrite (mg-N/L)	<0.002	0.042	<0.002	<0.002	<0.002	**3.040**	<0.002	0.003	-	0.006	10.0* (mg/L) nitrogen (as nitrate or nitrite)
Ortho-P (mg-P/L)	0.003	<0.002	0.011	0.007	0.003	0.006	0.003	0.006	-	0.005	2.0* (mg/L) as phosphorus
Calcium (mg/L)	8.41	14.5	27.4	14.5	12.6	36.1	8.17	164	-	125	N/A
Potassium (mg/L)	2.31	1.54	1.79	0.82	2.76	10.7	0.84	5.20	-	225	N/A
Magnesium (mg/L)	3.42	7.05	3.83	2.13	5.59	21.6	3.39	25.1	-	31.2	N/A
Sodium (mg/L)	22.9	26.1	4.89	2.62	19.8	107	32.1	28.5	-	132	N/A
a - BHC (µg/L)	ND	-	-	-	-	-	-	-	ND	-	NA
Aldrin (µg/L)	ND	-	-	-	-	-	-	-	ND	-	10 (µg/L)*
b - BHC (µg/L)	ND	-	-	-	-	-	-	-	ND	-	N/A
d - BHC (µg/L)	ND								ND		NA
Diazinon (µg/L)	ND	-	-	-	-	-	-	-	**0.2**	-	1.0 (mg/L)*
Dieldrin (µg/L)	ND	-	-	-	-	-	-	-	ND	-	0.02 (mg/L) ***
Dimethoate (µg/L)	ND	-	-	-	-	-	-	-	ND	-	1.0 (mg/L)*
Disulfoton (µg/L)	ND	-	-	-	-	-	-	-	ND	-	NA
Endosulfan I (µg/L)	ND	-	-	-	-	-	-	-	ND	-	1.0 (µg/L)*
Endosulfan II (µg/L)	ND	-	-	-	-	-	-	-	ND	-	NA
Endosulfan sulphate (µg/L)	ND								ND		NA
Endrin (µg/L)	ND	-	-	-	-	-	-	-	ND	-	0.001 (µg/L)***
Endrin aldehyde (µg/L)	ND	-	-	-	-	-	-	-	**0.6**	-	NA
Ethyl parathion (µg/L)	ND	-	-	-	-	-	-	-	ND	-	NA
Famphur (µg/L)	ND	-	-	-	-	-	-	-	**0.2**	-	NA
g – BHC (µg/L)	ND	-	-	-	-	-	-	-	ND	-	NA
Heptachlor (µg/L)	ND	-	-	-	-	-	-	-	ND	-	NA
Heptachlor epoxide (µg/L)	ND								ND		NA
Methyl parathion (µg/L)	ND	-	-	-	-	-	-	-	ND	-	NA
p-p'-DDD (µg/L)	ND	-	-	-	-	-	-	-	ND	-	0.01 Sum of DDT/DDE/DDD (µg/L) ***
p-p'-DDE (µg/L)	ND	-	-	-	-	-	-	-	ND	-	0.01 Sum of DDT/DDE/DDD (µg/L) ***
p-p'-DDT (µg/L)	ND	-	-	-	-	-	-	-	ND	-	-0.1 (mg/L)*- 0.01 Sum DDT/DDE/DDD (µg/L) ***
Phorate (µg/L)	ND	-	-	-	-	-	-	-	ND	-	NA
Sulfotep (µg/L)	ND	-	-	-	-	-	-	-	ND	-	NA
Thionazin (µg/L)	ND								ND		NA

* *Environment Protection (Water Pollution) Regulations* 1974, Emission into inland water ** Australian Water Quality Guidelines for Fresh and Marine Waters, 1992
*** Dutch Inertention Values, May 1994 N/A – no emission limit available ND – not detected

Table 4. *Comparison of analytical results against the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000*

ANALYTE	SCOTTSDALE WASTE DEPOT										ANZECC 2000		
	Pesticide bin	Leachate spring	SWD 2000/2	SWD 2000/3	SWD 2000/4	SWD 2000/5	SWD 2000/6	SWD 2000/7	SWD 2000/8	SWD 2000/9	IRRIGATION		LIVESTOCK DRINKING
											STV (Short-term)	LTV (Long-term)	
Standing Water Level (m)	-	-	8.70	10.48	1.31	1.22	7.54	7.98	7.75	1.30			
pH – field (pH Units)	-	6.9	6.5	6.3	7.2	7.3	7.4	6.2	6.2	7.3	**6.0-8.5		
pH – laboratory (pH Units)	-	6.6	6.2	6.2	7.3	7.0	6.5	5.9	5.6	7.1	**6.0-8.5		
Conductivity – field (µS/cm)	-	2880	165	223	810	915	397	880	213	1035	(1)(Refer Tables 4.2.3 & 4.2.4)		
Conductivity – laboratory (µS/cm)	-	2730	202	262	854	855	556	966	251	1070	(1)(Refer Tables 4.2.3 & 4.2.4)		
Bromide (mg/L)	-	2.5	<0.01	0.10	<0.01	<0.01	0.92	2.3	0.21	0.17			
Chloride (mg/L)	-	230	38	38	29	27	75	83	56	31	(2)MT (Refer Table 4.2.6) MR (Refer Table 4.2.7)		
Fluoride (mg/L)	-	0.06	<0.02	<0.02	0.04	0.22	0.06	0.04	<0.02	<0.02	4	1	
Sulphate (mg/L)	-	2.2	2.7	29	31	44	35	55	7.1	40			
NH_3-N (mg/L)	-	66.2	0.011	0.007	0.022	0.243	0.007	0.01	0.021	<0.02			
(NO_2 + NO_3)-N (mg/L)	-	0.085	0.098	0.094	0.153	0.124	0.093	14.6	2.32	3.75			
NO_2-N (mg/L)	-	0.006	<0.002	0.042	<0.002	<0.002	<0.002	3.04	<0.002	0.003			
PO_4-P (mg/L)	-	0.005	0.003	<0.002	0.011	0.007	0.003	0.006	0.003	0.006			
Calcium (mg/L)	-	125	8.41	14.5	27.4	14.5	12.6	36.1	8.17	164			1000
Potasium (mg/L)	-	225	2.31	1.54	1.79	0.82	2.76	10.7	0.84	5.2			
Magnesium (mg/L)	-	31.2	3.42	7.05	3.83	2.13	5.59	21.6	3.39	25.1			250–2000
Sodium (mg/L)	-	132	22.9	26.1	4.89	2.62	19.8	107	32.1	28.5	(2)MT (Refer Table 4.2.8)		
OP and OC Pestcides (µg/L)													
Diazinon	ND	-	0.2	-	-	-	-	-	-	-			
Endrin aldehyde	ND	-	0.6	-	-	-	-	-	-	-			
Famphur	ND	-	0.2	-	-	-	-	-	-	-			

Shaded areas indicate values above relevant guideline levels

Notes:
** set to limit potential for corrosion and fouling of pumping, irrigation and stock watering systems
*** Chromium (VI)
(1) Suitability depends on salt tolerance of crop & calculation of ECse, the average root zone salinity. ECse depends on soil type & average root zone leaching fraction
(2) ES = Suits extremely sensitive crops
MS = Suits moderately sensitive crops, may affect sensitive crops
MT = Suits moderately tolerant crops
MR = Medium risk of increasing crop cadmium concentrations
MA = may affect crops sensitive to foliar injury through foliar absorbtion
STV — Short term trigger value for contaminant in irrigation water (<20 years) use
LTV — Long term trigger value for contaminant in irrigation water (100 years) use
NST — Not sufficiently toxic

sampled at the site. Tables 3 and 4 compare the analytical results against international standards where a guideline/emission value is stated by the relevant standard.

Groundwater chemistry was only investigated within the uppermost aquifer level. Shallow bores screened above 3.5 m were neutral to slightly alkaline (pH 7.0–7.3) whilst the deeper bores screened below 6.0 m are distinctly acidic (pH 5.6–6.5). The shallow bores were also much higher in alkalinity (HCO_3), generally highest in conductivity, and lower in sodium and chloride content than the deeper bores.

Two locations on the eastern side of the landfill footprint indicate potential recharge to the uppermost level of the aquifer from degraded fill water emanating from the landfill.

Degraded groundwater quality was identified in borehole SWD2000/7, with elevated bromide, nitrate + nitrite, calcium, potassium, magnesium and sodium levels (causing an increase in conductivity). Surface discharges of leachate from the landfill also occur in this area and may be recharging the groundwater via soakage through the soil profile.

The second location relates to the zone of shallow groundwater and is interpreted as a groundwater mound. The Piper plot indicates that the bores in the area of the eastern groundwater mound (SWD2000/4, 5 and 9) have a distinct chemical signature compared to the other bores sampled at the site. Increased concentrations of potassium, magnesium and sodium have also resulted in higher conductivity values in this area. When compared to the chemical signature of the leachate spring, it appears that this area is also potentially recharged by degraded fill water (leachate). The mound could be the result of a hydraulic head held within the fill material connected to the highest level of the Jetsonville aquifer.

Surface water at the site contained several contaminates including, ammonia, Diazinon, Endrin aldehyde and Famphur. As noted above, recharge to groundwater via the soil profile may also degrade groundwater quality.

CONTAMINATION ASSESSMENT

Evidence of leachate contamination of groundwater is demonstrated in bores SWD2000/7 and 9. Higher levels of contamination occur in surface water discharging from the waste fill into the northern drainage line. The non-detection of pesticides in SWD2000/2 could imply that the pesticide trenches are well sealed, although the bore may have failed to intercept a preferred pathway of migration from the trenches in the upper heterogenous sediment layers.

PRINCIPAL CONCLUSIONS

The groundwater quality of the Jetsonville aquifer is vulnerable to degradation from the migration of contaminated waste fill water (leachate) from the Scottsdale waste depot. The Scottsdale waste depot signifies a risk to the on-going management of this State-significant groundwater resource. This site will require substantial engineering works to avoid potential on-going degradation of surface and groundwater quality. Issues include surface water management, appropriate capping of the landfill, alternative suitable disposal of herbicide, pesticide and weedicide containers, leachate management infrastructure, and protection of the public from contaminated surface and groundwater.

FURTHER WORK

Geotechnical investigations have been undertaken at the Dorset Council clay quarry, Jensens Road, North Scottsdale, in order to identify a low permeability clay resource in the local area (Ezzy, 2002*b*). This material may be useful in helping to implement appropriate risk management procedures at the site (including waste encapsulation and leachate management).

Future investigations and remediation options may wish to consider the landfill and pesticide trenches as separate issues. A forward long-term detailed monitoring strategy should help to define any attenuation process occurring at the site. Future drilling should include a suitable background bore some distance from the site and several boreholes installed in the fill material to measure the saturation level of the fill.

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MOORE, W. R. 1990*a*. *North East Tasmania Groundwater Resource Project. Map 1. Geology of the Scottsdale Sedimentary Basin*. Tasmania Department of Mines.

MOORE, W. R. 1990*b*. *North East Tasmania Groundwater Resource Project. Map 2. Hydrogeology of the Scottsdale Sedimentary Basin*. Tasmanian Department of Mines.

[30 May 2002]

Appendix 1

XRD and Atterberg analyses of samples from the northern quarry

Client:	A. Ezzy
Sample Source:	Various
Analyses:	Approximate mineralogy and mechanical properties
Methods:	X-ray diffraction and Atterberg Limits tests
Analyst:	R. N. Woolley, Mineral Resources Tasmania
Date:	6 September 2001

XRD Results (approx wt %)

Sample	*Quartz*	*Kaolinite*	*Smectite*	*Mica*	*Gibbsite*
Jetsonville A	70	25	2	2	?
Jetsonville B	70	25	5	?	?

? = possibly present
Peak overlap may interfere with identifications
Minerals present in trace amounts, or amorphous material, may not be detected

Atterberg Results

Sample	*MC*	*LL*	*PL*	*LS*
Jetsonville A	23	29	15	6
Jetsonville B	29	31	14	7

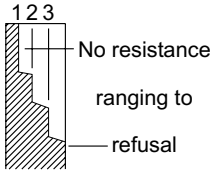
MC = Moisture Content
PL = Plastic Limit
LL = Liquid Limit
LS = Linear Shrinkage

Appendix 2

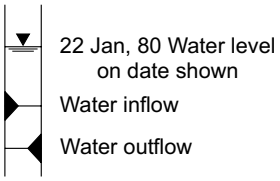
Engineering logs of boreholes

EXPLANATION SHEET FOR ENGINEERING LOGS
Borehole and excavation log

Penetration



Water



Notes — samples and tests

U50	Undisturbed sample 50 mm diameter
D	Disturbed sample
N	Standard penetrometer blow count for 300 mm
N*	SPT + Sample

Material classification

Based on Unified Soil Classification System.

In Graphic Log materials are represented by clear contrasting symbols consistent for each project.

Moisture content

D	Dry, looks and feels dry
M	Moist, no free water on hand when remoulding
W	Wet, free water on hand when remoulding
LL	Liquid limit
PL	Plastic limit
PI	Plasticity index

e.g. M>PL — Moist, moisture content greater than the plastic limit

Consistency

		: hand penetrometer
VS	Very soft	<25 (kPa)
S	Soft	25 – 50
F	Firm	50 – 100
St	Stiff	100 – 200
VSt	Very stiff	200 – 400
H	Hard	>400
Fb	Friable	

Notes: X on log is test result
— is range of results

Density index

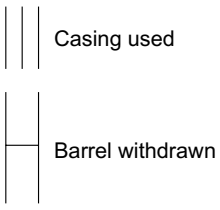
		%
VL	Very loose	0 – 15
L	Loose	15 – 35
MD	Medium dense	35 – 65
D	Dense	65 – 85
VD	Very dense	85 – 100

Fracture description

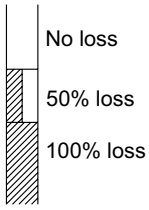
RP	Rough planar
RL	Rough irregular
SP	Smooth planar
SL	Smooth irregular

Cored borehole log

Case - lift



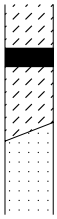
Fluid loss



Lugeons

Lugeon units (uL) are a measure of rock mass permeability. For a 46 to 74 mm diameter borehole 1 Lugeon is defined as a rate of loss of 1 litre per metre per minute. 1 Lugeon is roughly equivalent to a permeability of 1 x 10^{-4} mm / sec.

Graphic log



No core

Rock substances represented by clear, contrasting symbols consistent for each project.

Weathering

Fr	Fresh
SW	Slightly weathered
HW	Highly weathered
EW	Extremely weathered

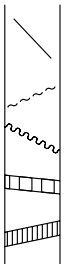
Strength

		point load strength index $I_{s(50)}$ (MPa)
EL	Extremely low	< 0.03
VL	Very low	0.03 – 0.1
L	Low	0.1 – 0.3
M	Medium	0.3 – 1
H	High	1 – 3
VH	Very high	3 – 10
EH	Extremely high	>10

Notes: X on log is test result.

Significant defects

Significant defects shown graphically



MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/1**
Sheet 1 of 2

Project: Scottsdale waste depot
Location: Bridport Road, Scottsdale

Co-ordinates: 55 538944 mE, 5448710 mN
R.L.
Inclination: Vertical
Bearing

Drill type: Auger
Drill method: Rotary
Drill fluid: Nil

Hole commenced: 20 September 2000
Hole completed: 20 September 2000
Drilled by: Mr Shane Heawood
Logged by: Mr Andrew Ezzy
Checked by: Mr Adrian Waite

penetration 1 2 3	support	water	notes: samples, tests	metres: R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
		Cement	D Sample ID 1			CL	CLAY - low plasticity, dark red	M	L	Tertiary sediments
		Bentonite	D Sample ID 2	0.5		SC	SAND - red-brown, clayey	M	L	Tertiary sediments
			D Sample ID 3	1.0						
			D Sample ID 4	1.5						
			D Sample ID 5	2.0		CH	CLAY - medium plasticity, red-brown, sandy	M	F	Tertiary sediments
	No screen	7 mm Gravel	D Sample ID 6	2.5		GC	GRAVEL - red-brown, sandy, clayey	M	L	Tertiary sediments
			D Sample ID 7	3.0						
			D Sample ID 8	3.5						
			D Sample ID 9	4.0		CL	CLAY - low plasticity, mottled red-brown and light grey, sandy	M	St	Tertiary sediments
			D Sample ID 10	4.5		GC	GRAVEL - light red, clayey, sandy	M	L	Tertiary sediments

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/1**
Sheet 2 of 2

Project Scottsdale waste depot — Location Bridport Road, Scottsdale

Co-ordinates 55 538944 mE 5448710 mN
R.L.
Inclination Vertical
Bearing

Drill type Auger
Drill method Rotary
Drill fluid Nil

Hole commenced 20 September 2000
Hole completed 20 September 2000
Drilled by Mr Shane Heawood
Logged by Mr Andrew Ezzy
Checked by Mr Adrian Waite

penetration 1 2 3	support	water	notes samples, tests	metres R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
	No screen		D Sample ID 11							
			D Sample ID 12	5.5						
	1.4 metre Pro slotted screen	7 mm Gravel		6.0						
			D Sample ID 13			SW	SAND - yellow and light red, gravelly, clayey	M	L	Tertiary sediments
			D Sample ID 14	6.5						
			D Sample ID 15							
			D Sample ID 16	7.0						
	Back in fill	Back in fill	D Sample ID 17							
			D Sample ID 18	7.5						
			Sample ID numbers refer to samples stored in MRT core shed				End of hole due to auger refusal at 7.7 m Note: No inflow.			Auger refusal likely due to hard pan layer

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/2**
Sheet 1 of 3

Project	Scottsdale waste depot	Location	Bridport Road, Scottsdale
Co-ordinates	55 538954 mE 5448738 mN	Drill type	Auger
		Drill method	Rotary
		Drill fluid	Nil
R.L.		Hole commenced	21 September 2000
Inclination	vertical	Hole completed	21 September 2000
Bearing		Drilled by	Mr Shane Heawood
		Logged by	Mr Andrew Ezzy
		Checked by	Mr Adrian Waite

penetration 1 2 3	support	water	notes: samples, tests	metres: R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
		Cement	D Sample ID 1			CL	CLAY -medium plasticity, red-brown	M	F	Tertiary sediments
		Bentonite	D Sample ID 2	0.5						
			D Sample ID 3	1.0		GC	GRAVEL - red-brown, clayey, sandy	M	L	Tertiary sediments
	No screen	7 mm Gravel	D Sample ID 4	1.5						
			D Sample ID 5	2.0						
			D Sample ID 6	2.5						
			D Sample ID 7	3.0		GC	GRAVEL - light red-brown, sandy, clayey, 5% weathered granitic pebbles	M	L	Tertiary sediments
			D Sample ID 8	3.5						
			D Sample ID 9	4.0						
			D Sample ID 10	4.5		GC	GRAVEL - light red and brown, clayey, sandy	M	L	Tertiary sediments

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/2**
Sheet 2 of 3

Project Scottsdale waste depot — Location Bridport Road, Scottsdale

Co-ordinates 55 538954 mE 5448738 mN
R.L.
Inclination vertical
Bearing

Drill type Auger
Drill method Rotary
Drill fluid Nil

Hole commenced 21 September 2000
Hole completed 21 September 2000
Drilled by Mr Shane Heawood
Logged by Mr Andrew Ezzy
Checked by Mr Adrian Waite

penetration 1 2 3	support	water	notes: samples, tests	metres: R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
			D Sample ID 11				(As sheet 1)			
			D Sample ID 12	5.5		GC	GRAVEL - yellow and brown, sandy, clayey, 2% pebbles	M	L	Tertiary sediments
			D Sample ID 13	6.0						
			D Sample ID 14	6.5		GC	GRAVEL - light red, sandy, clayey	M	L	Tertiary sediments
			D Sample ID 15	7.0						
	No screen	7 mm Gravel	D Sample ID 16	7.5						
				8.0						
			D Sample ID 17			CH	CLAY - high plasticity, white	M	F	Tertiary sediments
			D Sample ID 18	8.5		CL	CLAY - medium plasticity, mottled white and light red	M	F	Tertiary sediments
			D Sample ID 18	9.0						
			D Sample ID 19	9.5		CH	CLAY - high plasticity, yellow	M	S	Tertiary sediments

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/2**
Sheet 3 of 3

Project	Scottsdale waste depot	Location	Bridport Road, Scottsdale
Co-ordinates	55 538954 mE 5448738 mN	Drill type	Auger
		Drill method	Rotary
		Drill fluid	Nil
R.L.		Hole commenced	21 September 2000
Inclination	vertical	Hole completed	21 September 2000
Bearing		Drilled by	Mr Shane Heawood
		Logged by	Mr Andrew Ezzy
		Checked by	Mr Adrian Waite

penetration 1 2 3	support	water	notes: samples, tests	metres: R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
			D Sample ID 20			GC	GRAVEL - yellow, sandy, clayey	W	VL	Tertiary sediments
			D Sample ID 20	10.5						
			D Sample ID 20	11.0						
	No screen	7 mm Gravel	D Sample ID 21	11.5		CL	CLAY - low plasticity, yellow, gravelly	M	Vst	Tertiary sediments
						SC	SAND- yellow, clayey	W	VS	Tertiary sediments
				12.0						
						CL	CLAY - low plasticity, light red-brown, gravelly	M	Vst	Tertiary sediments
			Sample ID numbers refer to samples stored in MRT core shed				End of hole due to auger refusal at 12.3 m Pumped for 5 minutes. At end of pumping pH 8.4 and conductivity 200 µS/cm.			Auger refusal likely due to hard pan layer

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/3**
Sheet 1 of 3

Project Scottsdale waste depot — Location Bridport Road, Scottsdale

Co-ordinates 55 538956 mE
5448812 mN
R.L.
Inclination vertical
Bearing

Drill type Auger
Drill method Rotary
Drill fluid Nil

Hole commenced 21 September 2000
Hole completed 21 September 2000
Drilled by Mr Shane Heawood
Logged by Mr Andrew Ezzy
Checked by Mr Adrian Waite

penetration 1 2 3	support	water	notes: samples, tests	metres: R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
		Cement	D Sample ID 1			SP	SAND - grey, brown and light red, clayey, 5% pebbles	M	L	Tertiary sediments
		Bentonite	D Sample ID 2	0.5		CL	CLAY - low plasticity, red-brown sandy	M	L	Tertiary sediments
			D Sample ID 3	1.0		CL	CLAY - low plasticity, green-yellow, sandy	M	L	Tertiary sediments
			D Sample ID 4	1.5		CL	CLAY - low plasticity, yellow, sandy, 5% clay mottles light green-grey	M	L	Tertiary sediments
			D Sample ID 5	2.0		GC	GRAVEL - light red, sandy, clayey	M	L	Tertiary sediments
	No screen	7 mm Gravel	D Sample ID 6	2.5		CL	CLAY - low plasticity, white	M	St	Tertiary sediments
			D Sample ID 7	3.0		CL	CLAY - low plasticity, red-white	D	St	Tertiary sediments
			D Sample ID 8	3.5		GC	GRAVEL - light red and red-yellow, sandy, clayey	M	L	Tertiary sediments
			D Sample ID 9	4.0		SC	SAND - white, clayey	M	VL VS	Tertiary sediments
			D Sample ID 10	4.5						

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/3**
Sheet 2 of 3

Project Scottsdale waste depot — Location Bridport Road, Scottsdale

Co-ordinates 55 538956 mE
5448812 mN
R.L.
Inclination vertical
Bearing

Drill type Auger
Drill method Rotary
Drill fluid Nil

Hole commenced 21 September 2000
Hole completed 21 September 2000
Drilled by Mr Shane Heawood
Logged by Mr Andrew Ezzy
Checked by Mr Adrian Waite

penetration 1 2 3	support	water	notes samples, tests	metres R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
	No screen	7 mm Gravel	D Sample ID 11			GC	GRAVEL - yellow, sandy	M	VL	Tertiary Sediments
			D Sample ID 12	5.5						
			D Sample ID 13	6.0		GC	GRAVEL - yellow, clayey, sandy, 5% clay mottles white	M	VL	Tertiary Sediments
			D Sample ID 13	6.5						
			D Sample ID 14			GC	GRAVEL - white, clayey, sandy	M	L	Tertiary Sediments
			D Sample ID 15	7.0		SC	SAND - white, clayey	M	L	Tertiary Sediments
			D Sample ID 16	7.5		GC	GRAVEL - white, clayey, sandy	M	L	Tertiary Sediments
			D Sample ID 17	8.0		GC	GRAVEL - light yellow, clayey, sandy	M	L	Tertiary Sediments
			D Sample ID 18	8.5						
			D Sample ID 19	9.0		GC	GRAVEL - yellow, clayey, sandy	M	L	Tertiary Sediments
			D Sample ID 20	9.5						

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/3**
Sheet 3 of 3

Project	Scottsdale waste depot			Location	Bridport Road, Scottsdale
Co-ordinates	55 538956 mE 5448812 mN	Drill type	Auger	Hole commenced	21 September 2000
		Drill method	Rotary	Hole completed	21 September 2000
R.L.		Drill fluid	Nil	Drilled by	Mr Shane Heawood
Inclination	vertical			Logged by	Mr Andrew Ezzy
Bearing				Checked by	Mr Adrian Waite

penetration 1 2 3	support	water	notes: samples, tests	metres: R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
	No screen	7 mm Gravel	D Sample ID 20							
			D Sample ID 20	10.5						
			D Sample ID 20	11.0						
	1.4 metre Pro slotted screen		D Sample ID 21	11.5		GC	GRAVEL - yellow, clayey	W	VL	Tertiary sediments
				12.0						
				12.5						
	No screen	Back in fill		13.0		CL	CLAY - medium plasticity, white, gravelly	M	Vst	Tertiary sediments
				13.5						
	Back in fill		Sample ID numbers refer to samples stored in MRT core shed	14.0						
				14.5		CL	CLAY - low plasticity, red-brown, gravelly	M	H/D	Tertiary sediments
							End of hole due to auger refusal at 14.6 m Hand bailed for 10 minutes. At end of bailing pH 8.5 and conductivity 160 µS/cm.			Auger refusal likely due to hard pan layer

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/4**
Sheet 1 of 1

Project Scottsdale waste depot — Location Bridport Road, Scottsdale

Co-ordinates 55 538946 mE
5448849 mN
R.L.
Inclination vertical
Bearing

Drill type Auger
Drill method Rotary
Drill fluid Nil

Hole commenced 21 September 2000
Hole completed 21 September 2000
Drilled by Mr Shane Heawood
Logged by Mr Andrew Ezzy
Checked by Mr Adrian Waite

penetration 1 2 3	support	water	notes samples, tests	metres R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
		Cement	D Sample ID 1			CL	CLAY - medium plasticity, light red, gravelly	M	F	Tertiary sediments
		Bentonite	D Sample ID 2	0.5						
	No screen		D Sample ID 3	1.0		GC	GRAVEL - green-grey, clayey	W	L	Tertiary sediments
		7 mm Gravel	D Sample ID 4	1.5		CL	CLAY - medium plasticity, mottled light red and grey	M	St	Tertiary sediments
			D Sample ID 5	2.0		CL	CLAY - medium plasticity, mottled light red and grey	W	S	Tertiary sediments
	1.4 metre Pro slotted screen	Major	D Sample ID 6	2.5		CL	CLAY - medium plasticity, light red, sandy	W	VL	Tertiary sediments
			D Sample ID 6	3.0						
	Back in fill	Back in fill	D Sample ID 6	3.5						
				4.0			End of hole due to high yield at 4.0 m Pumped for 30 minutes at 30 L/m (maximum pumping capacity). At end of pumping pH 7.8 and conductivity 560 µS/cm.			Area of groundwater mound

Sample ID numbers refer to samples stored in MRT core shed

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/5**
Sheet 1 of 1

Project	Scottsdale waste depot	Location	Bridport Road, Scottsdale
Co-ordinates	55 538947 mE 5448849 mN	Drill type	Auger
		Drill method	Rotary
		Drill fluid	Nil
R.L.		Hole commenced	21 September 2000
Inclination	vertical	Hole completed	21 September 2000
Bearing		Drilled by	Mr Shane Heawood
		Logged by	Mr Andrew Ezzy
		Checked by	Mr Adrian Waite

penetration 1 2 3	support	water	notes: samples, tests	metres: R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
	No screen	Cement	D Sample ID 1			CL	CLAY - medium plasticity, light red, gravelly	M	F	Tertiary sediments
	1.4 metre Pro slotted screen	Bentonite	D Sample ID 2	0.5						
		7 mm Gravel	D Sample ID 3	1.0		GC	GRAVEL - green-grey, clayey	W	L	Tertiary sediments
			D Sample ID 4	1.5		CL	CLAY - medium plasticity, mottled light red and grey	M	St	Tertiary sediments
	B.I.F.	B.I.F.		2.0						
			Sample ID numbers refer to samples stored in MRT core shed				End of hole at 2.0 m Pumped for 30 minutes at 24 L/m. At end of pumping pH 8.1 and conductivity 480 µS/cm.			Area of groundwater mound

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/6**
Sheet 1 of 2

Project Scottsdale waste depot — Location Bridport Road, Scottsdale

Co-ordinates 55 538929 mE
5448878 mN

R.L.
Inclination vertical
Bearing

Drill type Auger
Drill method Rotary
Drill fluid Nil

Hole commenced 27 September 2000
Hole completed 27 September 2000
Drilled by Mr Shane Heawood
Logged by Mr Andrew Ezzy
Checked by Mr Adrian Waite

penetration 1 2 3	support	water	notes samples, tests	metres R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
		Cement	D Sample ID 1			CL	CLAY - low plasticity, red-brown, gravelly, sandy	M	L	Tertiary sediments
		Bentonite	D Sample ID 2	0.5						
			D Sample ID 2	1.0						
			D Sample ID 3	1.5		GC	GRAVEL - light yellow, sandy	M	VL	Tertiary sediments
			D Sample ID 4	2.0		SC	SAND - fine, red-white, clay mottled light red	D	L	Tertiary sediments
	No screen	7 mm Gravel	D Sample ID 5	2.5						
			D Sample ID 6	3.0						
			D Sample ID 7	3.5		GC	GRAVEL - light yellow, clayey, sandy	M	L	Tertiary sediments
			D Sample ID 8	4.0						
			D Sample ID 9	4.5						

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/6**
Sheet 2 of 2

Project Scottsdale waste depot — Location Bridport Road, Scottsdale

Co-ordinates 55 538929 mE 5448878 mN
R.L.
Inclination vertical
Bearing

Drill type Auger
Drill method Rotary
Drill fluid Nil

Hole commenced 27 September 2000
Hole completed 27 September 2000
Drilled by Mr Shane Heawood
Logged by Mr Andrew Ezzy
Checked by Mr Adrian Waite

penetration 1 2 3	support	water	notes samples, tests	metres R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
	No screen		D Sample ID 10			CL	CLAY - low plasticity, green-yellow, gravelly	M	L	Tertiary sediments
			D Sample ID 11	5.5						
			D Sample ID 12	6.0						
	2.0 metre slotted screen	7 mm Gravel	D Sample ID 13	6.5		CL	CLAY - medium plasticity, light yellow, sandy, weathered granite fragments up to 17 mm	M	L	Tertiary sediments
			D Sample ID 14	7.0		CL	CLAY - low plasticity, green-yellow, gravelly, sandy	M	F	Tertiary sediments
			D Sample ID 14	7.5						
			D Sample ID 15							
				8.0			GRANITE - dark red- brown weathered			
			Sample ID numbers refer to samples stored in MRT core shed				End of hole due to auger refusal at 8.0 m Note: No inflow.			Auger refusal may be due to weathered granite boulders

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/7**
Sheet 1 of 2

Project Scottsdale waste depot — Location Bridport Road, Scottsdale

Co-ordinates 55 538902 mE
5448887 mN
R.L.
Inclination vertical
Bearing

Drill type Auger
Drill method Rotary
Drill fluid Nil

Hole commenced 27 September 2000
Hole completed 27 September 2000
Drilled by Mr Shane Heawood
Logged by Mr Andrew Ezzy
Checked by Mr Adrian Waite

penetration 1 2 3	support	water	notes: samples, tests	metres: R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
		Cement	D Sample ID 1			CH	CLAY - high plasticity, mottled dark red-brown and red-brown	M	L	Tertiary sediments
		Bentonite	D Sample ID 2	0.5		CL	CLAY - medium plasticity, red-brown, rock fragments up to 14 mm	M	L	Tertiary sediments
			D Sample ID 3	1.0		CL	CLAY - low plasticity, light red-brown, gravelly	M	F	Tertiary sediments
			D Sample ID 4			CL	CLAY - low plasticity, mottled light grey and yellow	M	L	Tertiary sediments
			D Sample ID 5	1.5		CL	CLAY - low plasticity, red- white, gravelly	M	F	Tertiary sediments
			D Sample ID 6	2.0		GC	GRAVEL - light red and yellow, clayey	M	L	Tertiary sediments
	No screen	7 mm Gravel	D Sample ID 7	2.5		GC	GRAVEL - light red, clayey	M	L	Tertiary sediments
			D Sample ID 8	3.0		SW	SAND - coarse, light red	M	L	Tertiary sediments
			D Sample ID 9	3.5		SW	SAND - coarse, red-yellow	M	L	Tertiary sediments
			D Sample ID 10	4.0		SW	SAND - coarse, yellow and brown, gravelly	M	L	Tertiary sediments
			D Sample ID 11	4.5		CL	CLAY - low plasticity, yellow, gravelly	M	L	Tertiary sediments

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. SWD 2000/7
Sheet 2 of 2

Project Scottsdale waste depot — Location Bridport Road, Scottsdale

Co-ordinates 55 538902 mE 5448887 mN
R.L.
Inclination vertical
Bearing

Drill type Auger
Drill method Rotary
Drill fluid Nil

Hole commenced 27 September 2000
Hole completed 27 September 2000
Drilled by Mr Shane Heawood
Logged by Mr Andrew Ezzy
Checked by Mr Adrian Waite

penetration 1 2 3	support	water	notes samples, tests	metres R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
							(As sheet 1)			
			D Sample ID 12	5.5		CL	CLAY - medium plasticity, light yellow	M	L	Tertiary sediments
	No screen	7 mm Gravel	D Sample ID 13			CL	CLAY - medium plasticity, white	M	F	Tertiary sediments
			D Sample ID 14	6.0						
			D Sample ID 15	6.5		CH	CLAY -high plasticity, light yellow	M	F	Tertiary sediments
			D Sample ID 16	7.0						
			D Sample ID 17	7.5		CL	CLAY -low plasticity, yellow, sandy	M	L	Tertiary sediments
	1.5 metre slotted screen		D Sample ID 18	8.0		SC	SAND - yellow, clayey	W	VL	Tertiary sediments
				8.5			GRANITE - weathered dark brown			
			Sample ID numbers refer to samples stored in MRT core shed				End of hole due to auger refusal at 8.8 m			Auger refusal may be due to weathered granite boulders

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/8**
Sheet 1 of 3

Project Scottsdale waste depot — Location Bridport Road, Scottsdale

Co-ordinates 55 538906 mE
5448994 mN
R.L.
Inclination vertical
Bearing

Drill type Auger
Drill method Rotary
Drill fluid Nil

Hole commenced 27 September 2000
Hole completed 27 September 2000
Drilled by Mr Shane Heawood
Logged by Mr Andrew Ezzy
Checked by Mr Adrian Waite

penetration 1 2 3	support	water	notes samples, tests	metres R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
		Cement	D Sample ID 1	0.5		CH	CLAY - high plasticity, brown	M	F	Tertiary sediments
		Bentonite	D Sample ID 2	1.0		CL	CLAY - medium plasticity, mottled white and yellow	M	St	Tertiary sediments
						CL	CLAY - low plasticity, white and red	D	St	Tertiary sediments
			D Sample ID 3	1.5						
				2.0						
			D Sample ID 4			GC	GRAVEL - light red, clayey	M	L	Tertiary sediments
	No screen	7 mm Gravel	D Sample ID 5	2.5		SC	SAND - coarse, light yellow, clayey	M	S L	Tertiary sediments
			D Sample ID 6	3.0		SW	SAND - light red-yellow, gravelly, clayey	M	L	Tertiary sediments
			D Sample ID 7	3.5		SW	SAND - coarse, light red, clayey	M	L	Tertiary sediments
			D Sample ID 8	4.0		GC	GRAVEL - yellow, sandy	M	L	Tertiary sediments
			D Sample ID 9	4.5		GC	GRAVEL - yellow, sandy, 10% white clay mottles	M	L	Tertiary sediments

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/8**
Sheet 2 of 3

Project Scottsdale waste depot — Location Bridport Road, Scottsdale

Co-ordinates 55 538906 mE
5448994 mN
R.L.
Inclination vertical
Bearing

Drill type Auger
Drill method Rotary
Drill fluid Nil

Hole commenced 27 September 2000
Hole completed 27 September 2000
Drilled by Mr Shane Heawood
Logged by Mr Andrew Ezzy
Checked by Mr Adrian Waite

penetration 1 2 3	support	water	notes samples, tests	metres R.L.	metres depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
			D Sample ID 9					(As sheet 1)			
			D Sample ID 10		5.5		CL	CLAY - low plasticity, yellow, gravelly	M	L	Tertiary sediments
	No screen		D Sample ID 11		6.0		GC	GRAVEL - yellow, clayey, weathered brown granitic fragments	M	VL	Tertiary sediments
		7 mm Gravel	D Sample ID 11		6.5						
			D Sample ID 12		7.0		CL	CLAY - medium plasticity, yellow, clayey	M	L	Tertiary sediments
	2.0 metre slotted screen		D Sample ID 12		7.5						
			D Sample ID 12		8.0						
					8.5		SW	SAND - coarse, light yellow, clayey	W	VL	Tertiary sediments
			D Sample ID 13		9.0						
			D Sample ID 13		9.5						
	No screen	Back in fill	D Sample ID 14				CL	CLAY - low plasticity, light red and white, gravelly		Vst	Tertiary sediments

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/8**
Sheet 3 of 3

Project	Scottsdale waste depot	Location	Bridport Road, Scottsdale
Co-ordinates	55 538906 mE 5448994 mN	Drill type	Auger
		Drill method	Rotary
		Drill fluid	Nil
R.L.		Hole commenced	27 September 2000
Inclination	vertical	Hole completed	27 September 2000
Bearing		Drilled by	Mr Shane Heawood
		Logged by	Mr Andrew Ezzy
		Checked by	Mr Adrian Waite

penetration 1 2 3	support	water	notes: samples, tests	metres: R.L.	metres: depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
			Sample ID numbers refer to samples stored in MRT core shed					End of hole due to auger refusal at 10.0 m Hand bailed for 10 minutes.			Auger refusal likely due to hard pan layer

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - BOREHOLE

Borehole no. **SWD 2000/9**
Sheet 1 of 1

Project	Scottsdale waste depot			Location	Bridport Road, Scottsdale
Co-ordinates	55 538950 mE 5448856 mN	Drill type	Auger	Hole commenced	27 September 2000
		Drill method	Rotary	Hole completed	27 September 2000
R.L.		Drill fluid	Nil	Drilled by	Mr Shane Heawood
Inclination	vertical			Logged by	Mr Andrew Ezzy
Bearing				Checked by	Mr Adrian Waite

penetration 1 2 3	support	water	notes samples, tests	metres R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
	No screen	Cement / Bentonite	No samples collected due to poor weather conditions	0.5		CL	CLAY - medium plasticity, red-brown	M	L	Tertiary sediments
	1.0 metre N.R.F.S.* Screen	7 mm Gravel		1.0		GC	GRAVEL - light red, clayey, sandy	W	VL	Tertiary sediments
	No screen			1.5 2.0 2.5			End of hole at 2.5 m Before installation pumped for 30 minutes at 30 L/m (maximum pumping capacity) . After casing installation yield decreased to only 0.5 L/m.			

* Nylon Rock Fabric Sock

Appendix 3

Analytical Services Tasmania — Laboratory reports

Tasmania

ANALYTICAL SERVICES TASMANIA
Sandy Bay Laboratory
c|- Chemistry Department University of Tasmania
Sandy Bay Tasmania 7005
Telephone: (03) 6226 7175 Fax: (03) 6226 7825
Email: ast.sandybay@dpiwe.tas.gov.au

NATA Accreditation Number: 5589

Laboratory Report

Report No:	13955	***Please quote this number when making enquiries about this report***
Submitted By:	Andrew Ezzy	
Client:	Mineral Resources Tasmania	
Site Description:	Scottsdale	
Received:	01-Dec-00	**Client Order No:**
Report Date:	30-Jan-01	
Report To:	Andrew Ezzy	
Address:	Gordons Hill Rd Rosny TAS 7018	

Test Method(s) :

1001-Water:	pH in Water by APHA Method 4500-H
1002-Water:	Conductivity by APHA Method 2510
1101-Water:	Alkalinity by APHA Method 2320/4500-CO2
1103-Water:	Anions by Ion Chromatography APHA Method 4110C
1201-Water:	Nutrients by APHA Method 4500
1302-Water:	Major Cations in Water by APHA Method 3030/3120
1501-Water:	Semivolatile Organics in Water by GCMS - OC & OP Pesticides

NATA Accreditation Number: 5589

Mike Johnson
Manager

Tasmania

ANALYTICAL SERVICES TASMANIA

Sandy Bay Laboratory

c|- Chemistry Department University of Tasmania

Sandy Bay Tasmania 7005

NATA Accreditation Number: 5589

Report No: 13955 **Report Date:** 30-Jan-01

		Method:	1001-Water	1002-Water	1101-Water	1101-Water	1103-Water	1103-Water	1103-Water	1103-Water
		Analyte:	pH	Conductivity	Alkalinity CO3	Alkalinity HCO3	Bromide	Chloride	Fluoride	Nitrate
Lab.No.	Sample Id.	Date/Time Sampled		µS/cm	mg/L CaCO3	mg/L CaCO3	mg/L	mg/L	mg/L	mg-N/L
14236	Pesticidebin	28/11/2000 15:45								
14237	LeachatePlume	28/11/2000 14:35	6.6	2730	<1	924	2.5	230	0.06	4.4
14238	Bore 57	28/11/2000 10:00	5.7	112	<1	16	0.06	18	<0.02	0.05
14239	SWD2000/2	28/11/2000 11:10	6.2	202	<1	29	<0.01	38	<0.02	<0.03
14240	SWD2000/3	28/11/2000 12:10	6.2	262	<1	40	0.10	38	<0.02	<0.03
14241	SWD2000/4	28/11/2000 12:40	7.3	854	<1	396	<0.01	29	0.04	0.20
14242	SWD2000/5	28/11/2000 13:10	7.0	855	<1	382	<0.01	27	0.22	<0.03
14243	SWD2000/6	28/11/2000 14:10	6.5	556	<1	133	0.92	75	0.06	0.28
14244	SWD2000/7	28/11/2000 14:30	5.9	966	<1	94	2.3	83	0.04	18
14245	SWD2000/8	28/11/2000 15:30	5.6	251	<1	19	0.21	56	<0.02	2.9
14246	SWD2000/9	28/11/2000 13:45	7.1	1070	<1	503	0.17	31	<0.02	4.0
	Method Detection	Limit								

ND = Not Detected

Tasmania

ANALYTICAL SERVICES TASMANIA

Sandy Bay Laboratory

c|- Chemistry Department University of Tasmania

Sandy Bay Tasmania 7005

NATA Accreditation Number: 5589

Report No: 13955 **Report Date:** 30-Jan-01

		Method:	1103-Water	1103-Water	1103-Water	1201-Water	1201-Water	1201-Water	1201-Water	1302-Water
		Analyte:	Nitrite	Phosphate	Sulphate	Ammonia	Nitrate+Nitrite	Nitrite	Ortho-P	Ca (Dissolved)
Lab.No.	Sample Id.	Date/Time Sampled	mg-N/L	mg-P/L	mg/L	µg-N/L	µg-N/L	µg-N/L	µg-P/L	mg/L
14236	Pesticidebin	28/11/2000 15:45								
14237	LeachatePlume	28/11/2000 14:35	<0.10	<0.10	2.2	66200	85	6	5	125
14238	Bore 57	28/11/2000 10:00	<0.10	<0.10	3.4	14	108	2	32	1.94
14239	SWD2000/2	28/11/2000 11:10	<0.10	<0.10	2.7	11	98	<2	3	8.41
14240	SWD2000/3	28/11/2000 12:10	<0.10	<0.10	29	7	94	42	<2	14.5
14241	SWD2000/4	28/11/2000 12:40	<0.10	<0.10	31	22	153	<2	11	27.4
14242	SWD2000/5	28/11/2000 13:10	<0.10	<0.10	44	243	124	<2	7	14.5
14243	SWD2000/6	28/11/2000 14:10	<0.10	<0.10	35	7	93	<2	3	12.6
14244	SWD2000/7	28/11/2000 14:30	<0.10	<0.10	55	10	14600	3040	6	36.1
14245	SWD2000/8	28/11/2000 15:30	<0.10	<0.10	7.1	21	2320	<2	3	8.17
14246	SWD2000/9	28/11/2000 13:45	<0.10	<0.10	40	<2	3750	3	6	164
	Method Detection	Limit								

ND = Not Detected

Tasmania

ANALYTICAL SERVICES TASMANIA

Sandy Bay Laboratory

c|- Chemistry Department University of Tasmania

Sandy Bay Tasmania 7005

NATA Accreditation Number: 5589

Report No: 13955 **Report Date:** 30-Jan-01

		Method:	1302-Water	1302-Water	1302-Water	1501-Water	1501-Water	1501-Water	1501-Water	1501-Water
		Analyte:	K (Dissolved)	Mg (Dissolved)	Na (Dissolved)	a-BHC	Aldrin	b-BHC	d-BHC	Diazinon
Lab.No.	Sample Id.	Date/Time Sampled	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L
14236	Pesticidebin	28/11/2000 15:45				ND	ND	ND	ND	0.2
14237	LeachatePlume	28/11/2000 14:35	225	31.2	132					
14238	Bore 57	28/11/2000 10:00	2.12	3.87	10.2					
14239	SWD2000/2	28/11/2000 11:10	2.31	3.42	22.9	ND	ND	ND	ND	ND
14240	SWD2000/3	28/11/2000 12:10	1.54	7.05	26.1					
14241	SWD2000/4	28/11/2000 12:40	1.79	3.83	4.89					
14242	SWD2000/5	28/11/2000 13:10	0.82	2.13	2.62					
14243	SWD2000/6	28/11/2000 14:10	2.76	5.59	19.8					
14244	SWD2000/7	28/11/2000 14:30	10.7	21.6	107					
14245	SWD2000/8	28/11/2000 15:30	0.84	3.39	32.1					
14246	SWD2000/9	28/11/2000 13:45	5.20	25.1	28.5					
	Method Detection	Limit				0.1	0.1	0.2	0.2	0.1

ND = Not Detected

Tasmania

ANALYTICAL SERVICES TASMANIA

Sandy Bay Laboratory

c|- Chemistry Department University of Tasmania

Sandy Bay Tasmania 7005

NATA Accreditation Number: 5589

Report No: 13955 **Report Date:** 30-Jan-01

		Method:	1501-Water	1501-Water	1501-Water	1501-Water	1501-Water	1501-Water	1501-Water	1501-Water
		Analyte:	Dieldrin	Dimethoate	Disulfoton	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde
Lab.No.	Sample Id.	Date/Time Sampled	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
14236	Pesticidebin	28/11/2000 15:45	ND	ND	ND	ND	ND	ND	ND	0.6
14237	LeachatePlume	28/11/2000 14:35								
14238	Bore 57	28/11/2000 10:00								
14239	SWD2000/2	28/11/2000 11:10	ND	ND	ND	ND	ND	ND	ND	ND
14240	SWD2000/3	28/11/2000 12:10								
14241	SWD2000/4	28/11/2000 12:40								
14242	SWD2000/5	28/11/2000 13:10								
14243	SWD2000/6	28/11/2000 14:10								
14244	SWD2000/7	28/11/2000 14:30								
14245	SWD2000/8	28/11/2000 15:30								
14246	SWD2000/9	28/11/2000 13:45								
	Method Detection	Limit	0.2	0.1	0.2	0.1	0.4	0.1	0.1	0.1

ND = Not Detected

Tasmania

ANALYTICAL SERVICES TASMANIA

Sandy Bay Laboratory

c|- Chemistry Department University of Tasmania

Sandy Bay Tasmania 7005

NATA Accreditation Number: 5589

Report No: 13955 **Report Date:** 30-Jan-01

		Method:	1501-Water	1501-Water	1501-Water	1501-Water	1501-Water	1501-Water	1501-Water	1501-Water
		Analyte:	Ethyl parathion	Famphur	g-BHC	Heptachlor	Heptachlor epoxide	Methyl parathion	p,p'-DDD	p,p'-DDE
Lab.No.	Sample Id.	Date/Time Sampled	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
14236	Pesticidebin	28/11/2000 15:45	ND	0.2	ND	ND	ND	ND	ND	ND
14237	LeachatePlume	28/11/2000 14:35								
14238	Bore 57	28/11/2000 10:00								
14239	SWD2000/2	28/11/2000 11:10	ND	ND	ND	ND	ND	ND	ND	ND
14240	SWD2000/3	28/11/2000 12:10								
14241	SWD2000/4	28/11/2000 12:40								
14242	SWD2000/5	28/11/2000 13:10								
14243	SWD2000/6	28/11/2000 14:10								
14244	SWD2000/7	28/11/2000 14:30								
14245	SWD2000/8	28/11/2000 15:30								
14246	SWD2000/9	28/11/2000 13:45								
	Method Detection	Limit	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2

ND = Not Detected

Tasmania

ANALYTICAL SERVICES TASMANIA

Sandy Bay Laboratory

c|- Chemistry Department University of Tasmania

Sandy Bay Tasmania 7005

NATA Accreditation Number: 5589

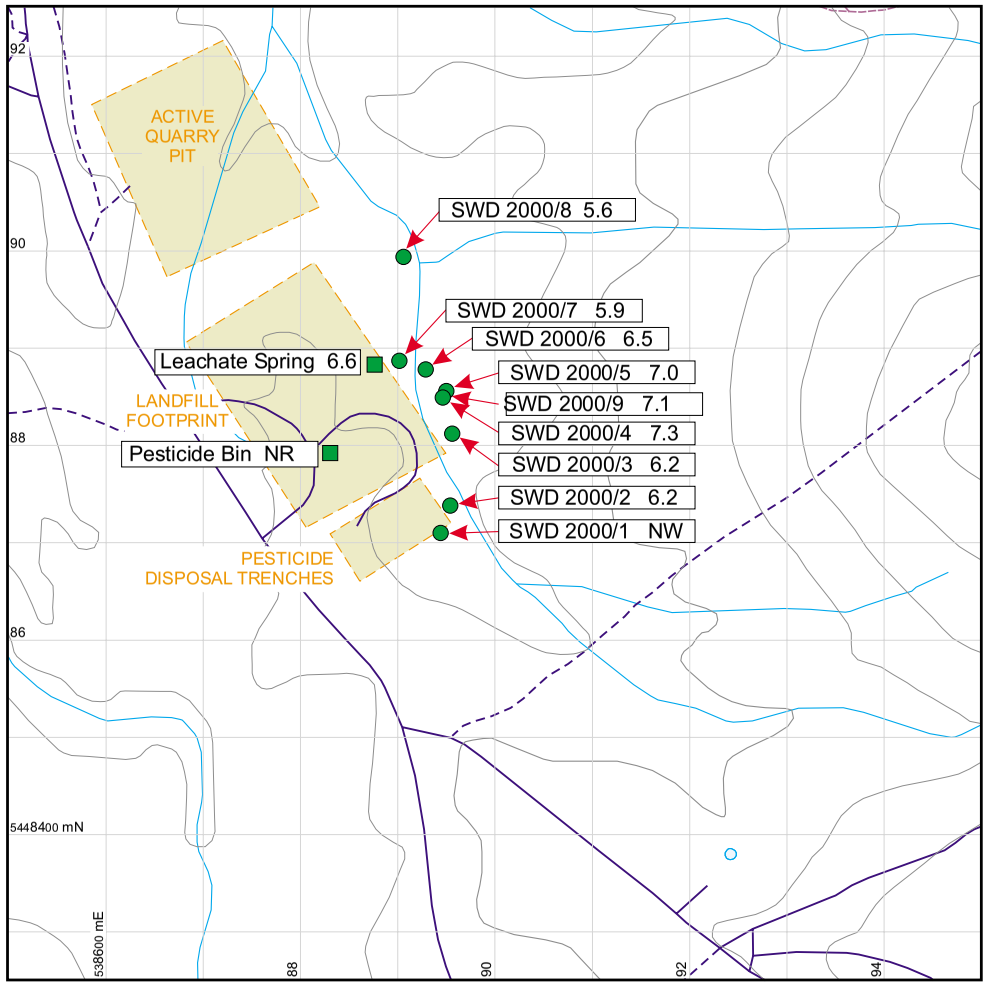
Report No: 13955 **Report Date:** 30-Jan-01

Lab.No.	Sample Id.	Method: / Analyte: / Date/Time Sampled	1501-Water p,p'-DDT µg/L	1501-Water Phorate µg/L	1501-Water Sulfotep µg/L	1501-Water Thionazin µg/L
14236	Pesticidebin	28/11/2000 15:45	ND	ND	ND	ND
14237	LeachatePlume	28/11/2000 14:35				
14238	Bore 57	28/11/2000 10:00				
14239	SWD2000/2	28/11/2000 11:10	ND	ND	ND	ND
14240	SWD2000/3	28/11/2000 12:10				
14241	SWD2000/4	28/11/2000 12:40				
14242	SWD2000/5	28/11/2000 13:10				
14243	SWD2000/6	28/11/2000 14:10				
14244	SWD2000/7	28/11/2000 14:30				
14245	SWD2000/8	28/11/2000 15:30				
14246	SWD2000/9	28/11/2000 13:45				
	Method Detection	Limit	0.1	0.2	0.1	0.2

ND = Not Detected

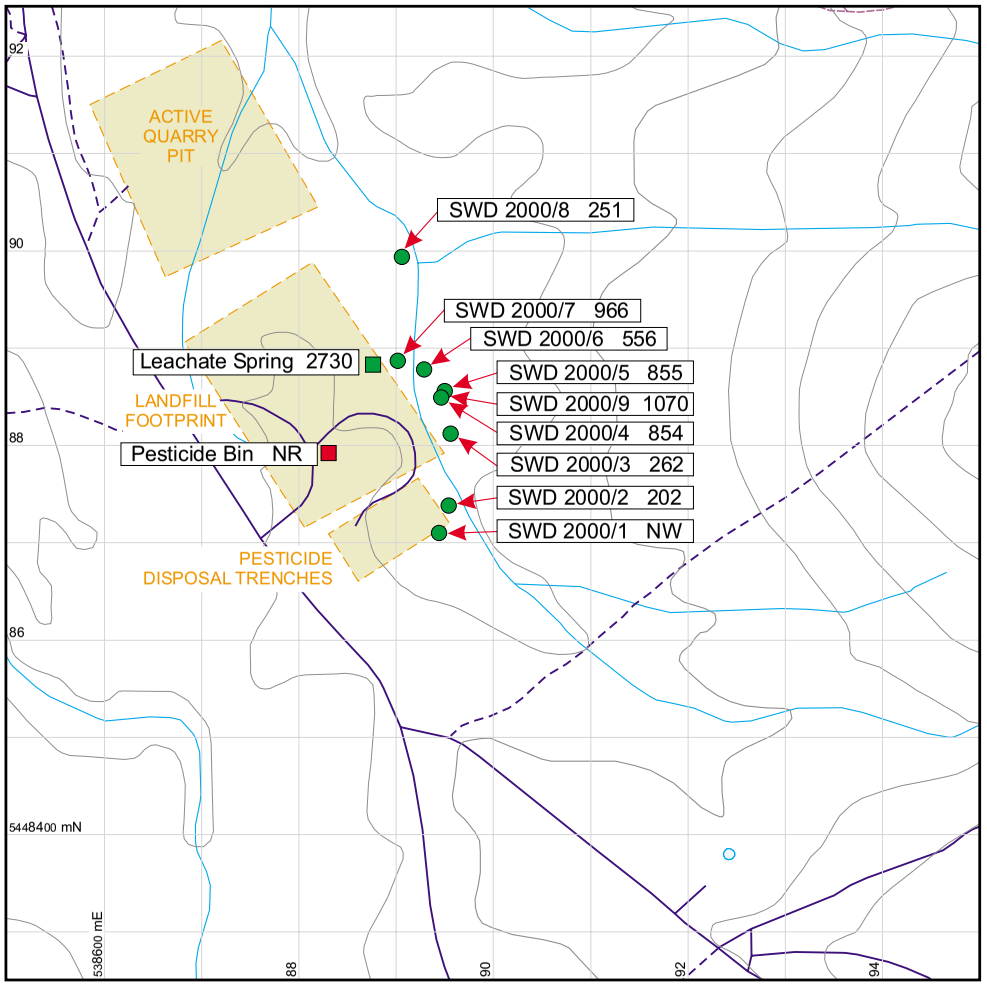
Appendix 4
Analytical results on site maps

Scottsdale Waste Depot
November 2000
pH



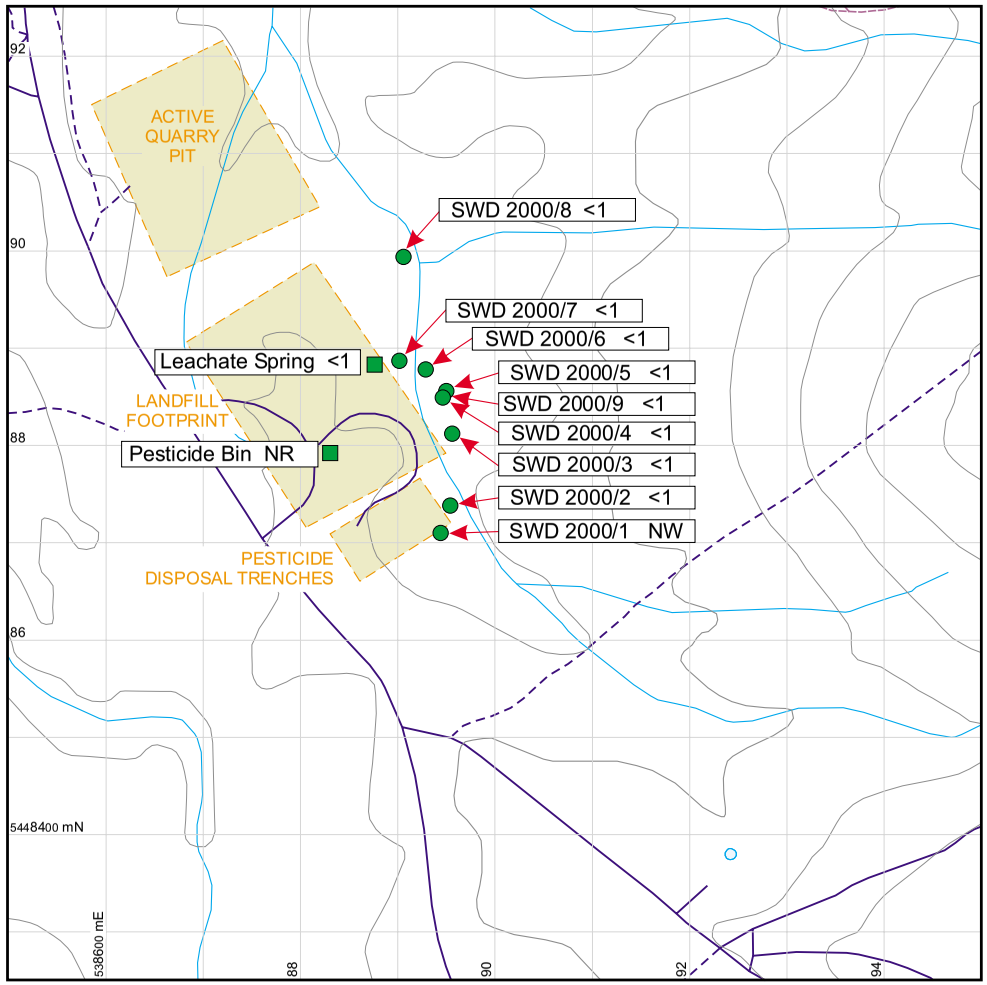
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Conductivity (µS/cm)



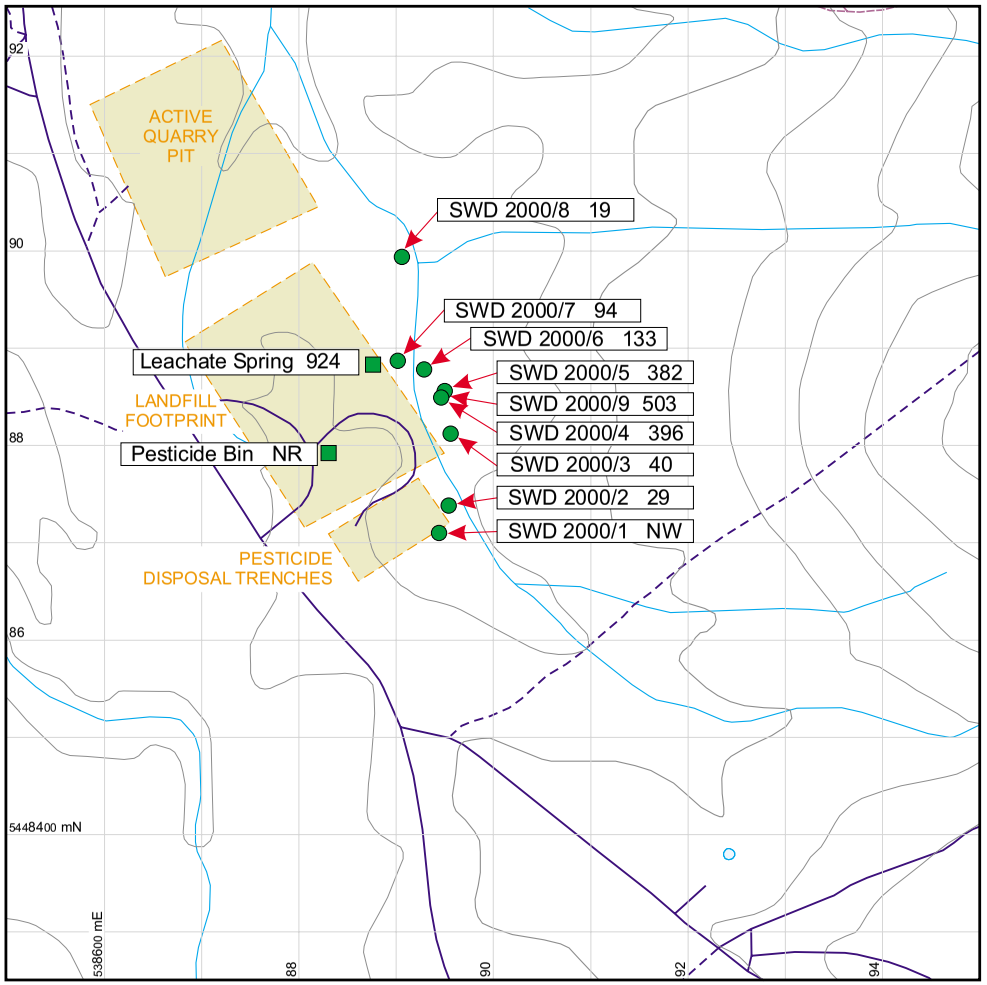
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Alkalinity CO_3 (mg/L $CaCO_3$)



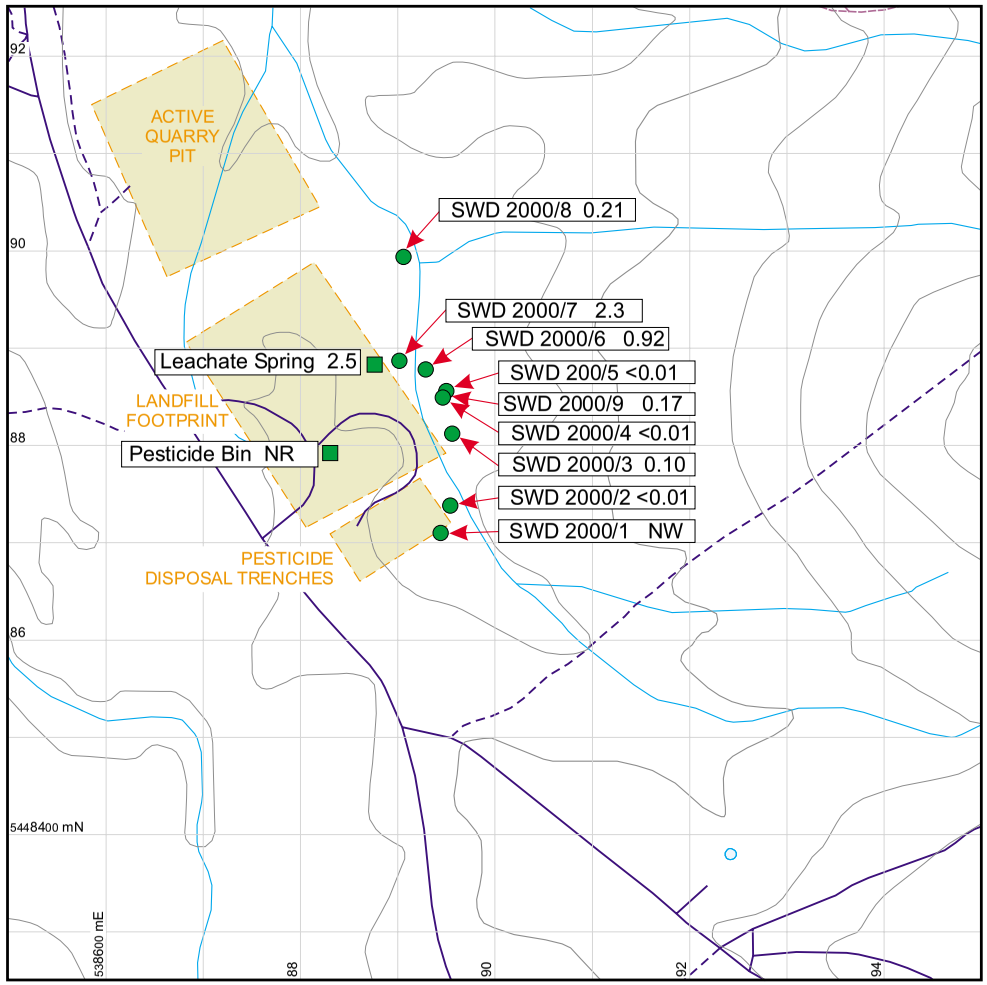
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Alkalinity HCO_3 (mg/L $CaCO_3$)



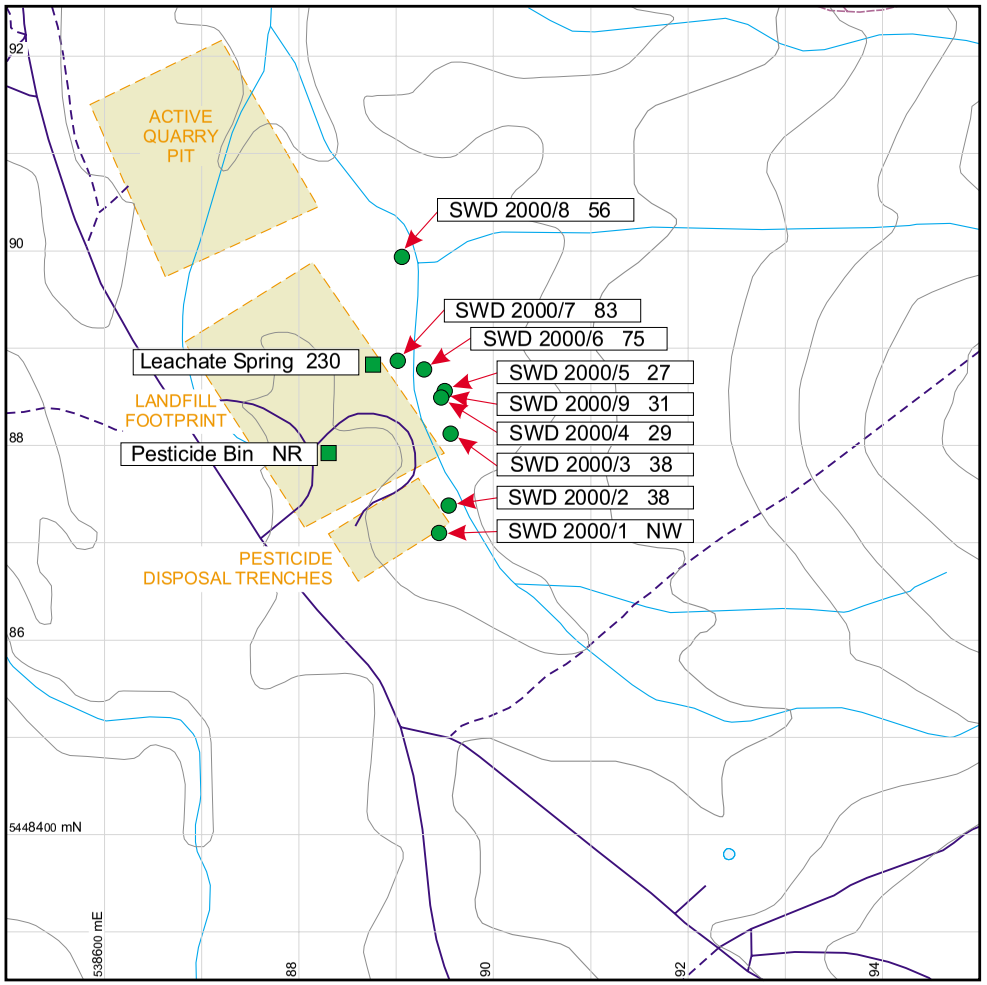
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Bromide (mg/L)



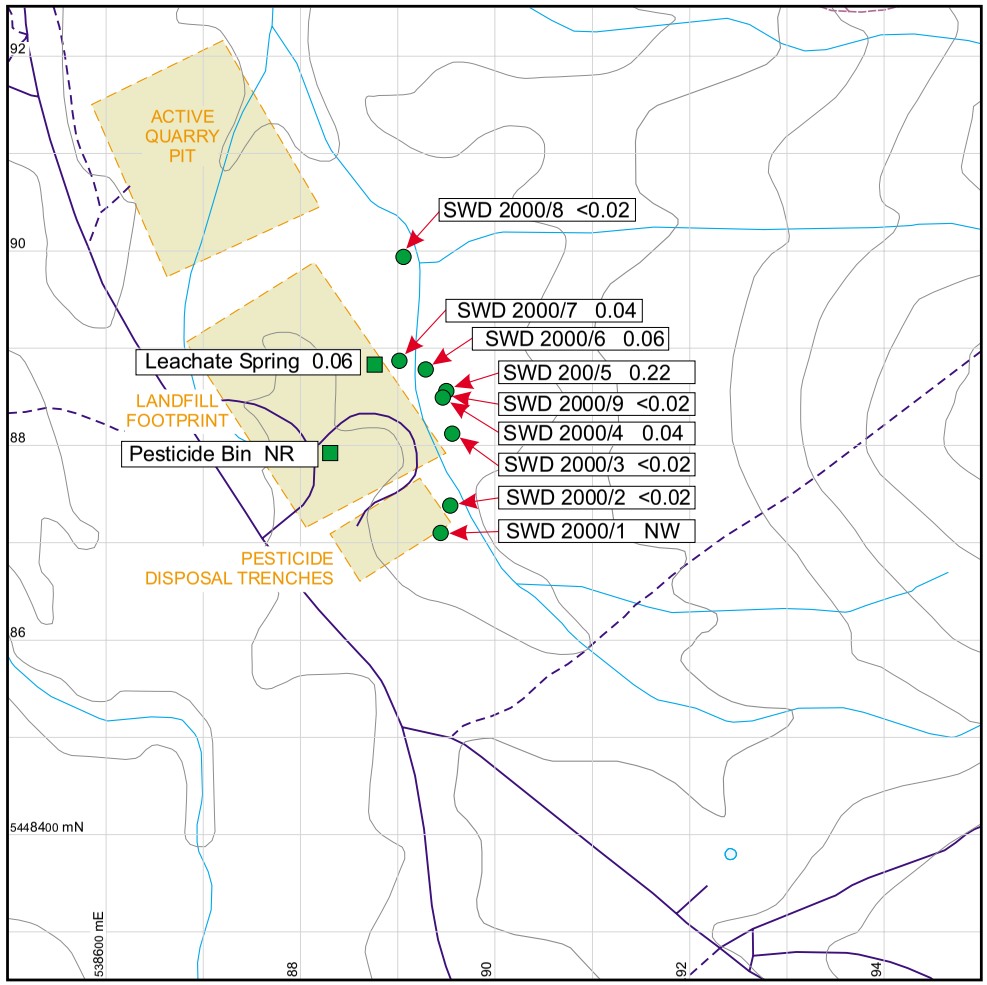
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Chloride (mg/L)



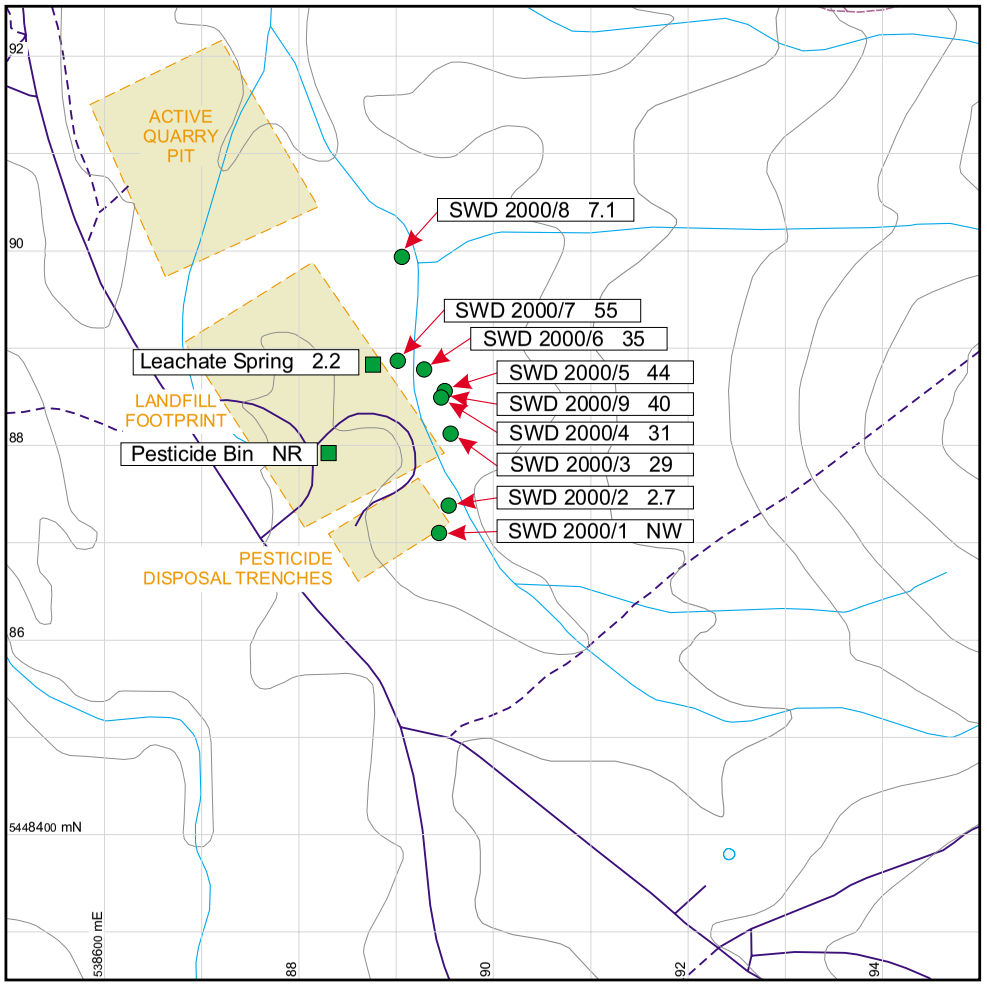
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Fluoride (mg/L)



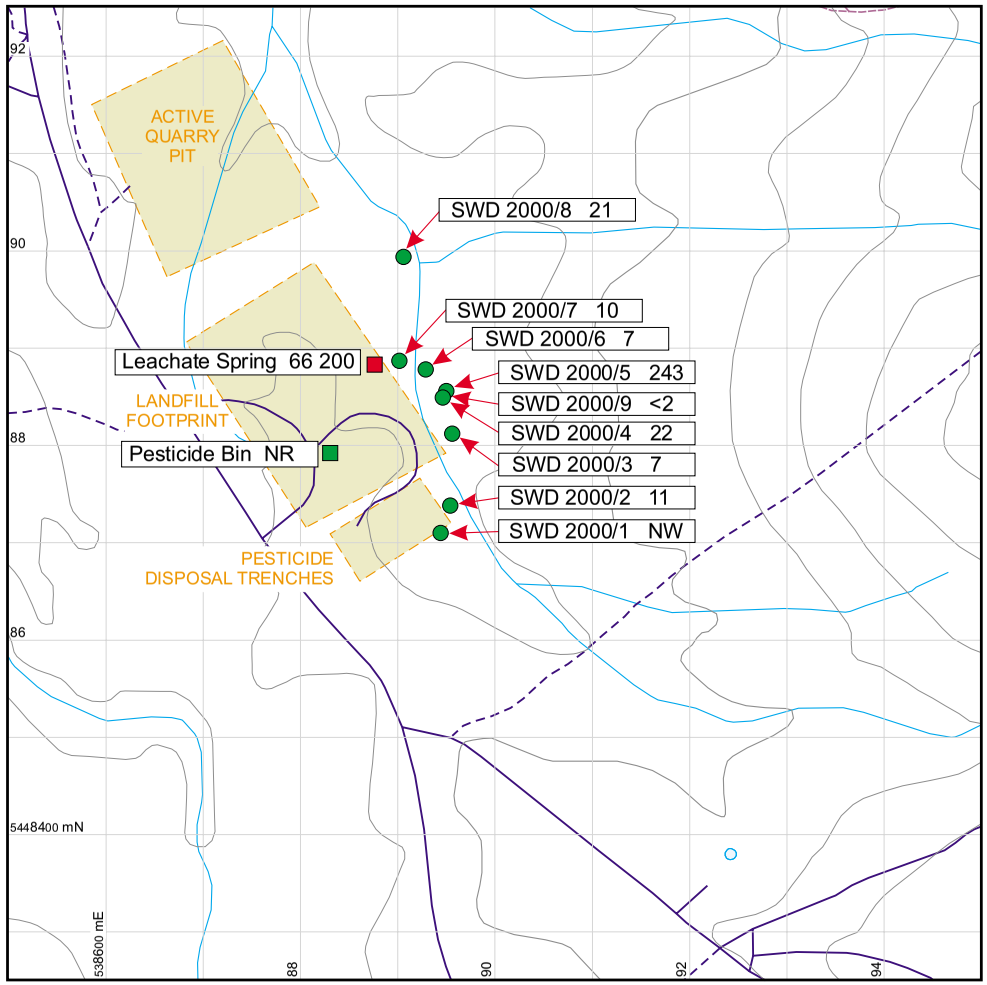
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Sulphate (mg/L)



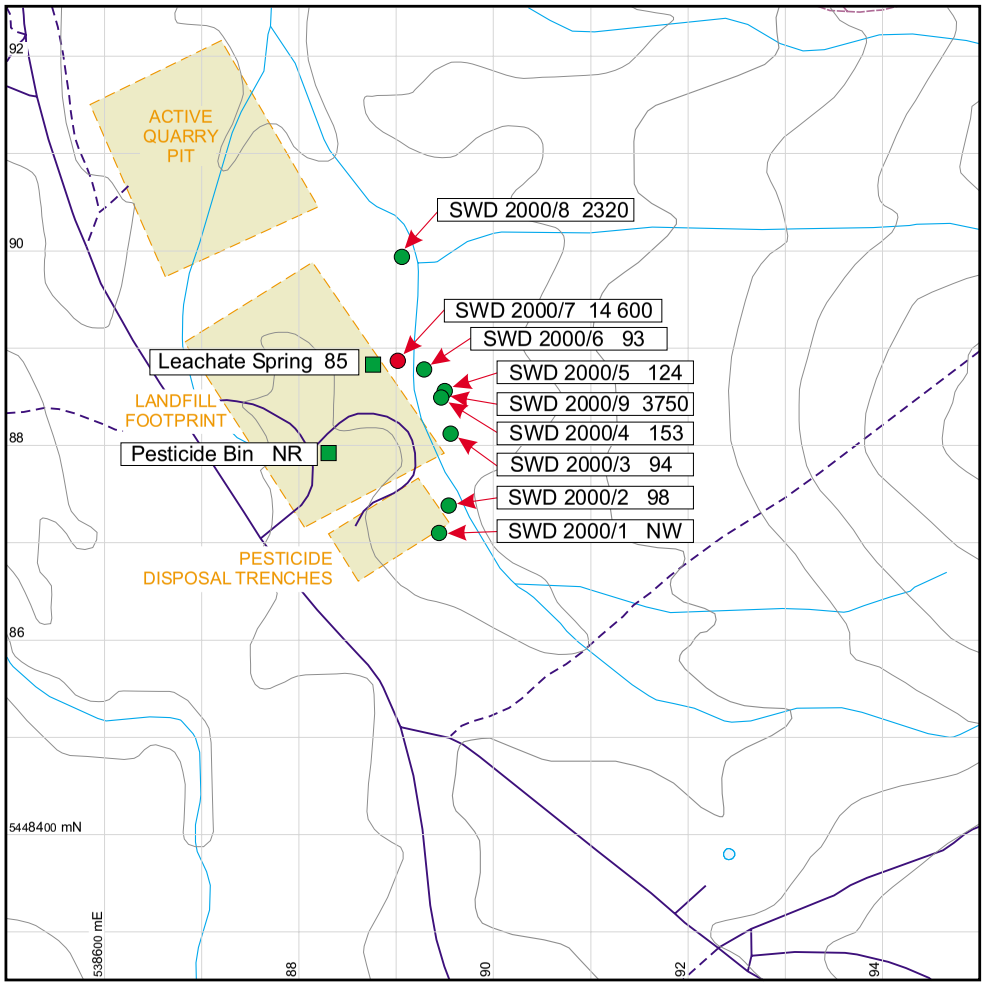
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Ammonia (μg–N/L)



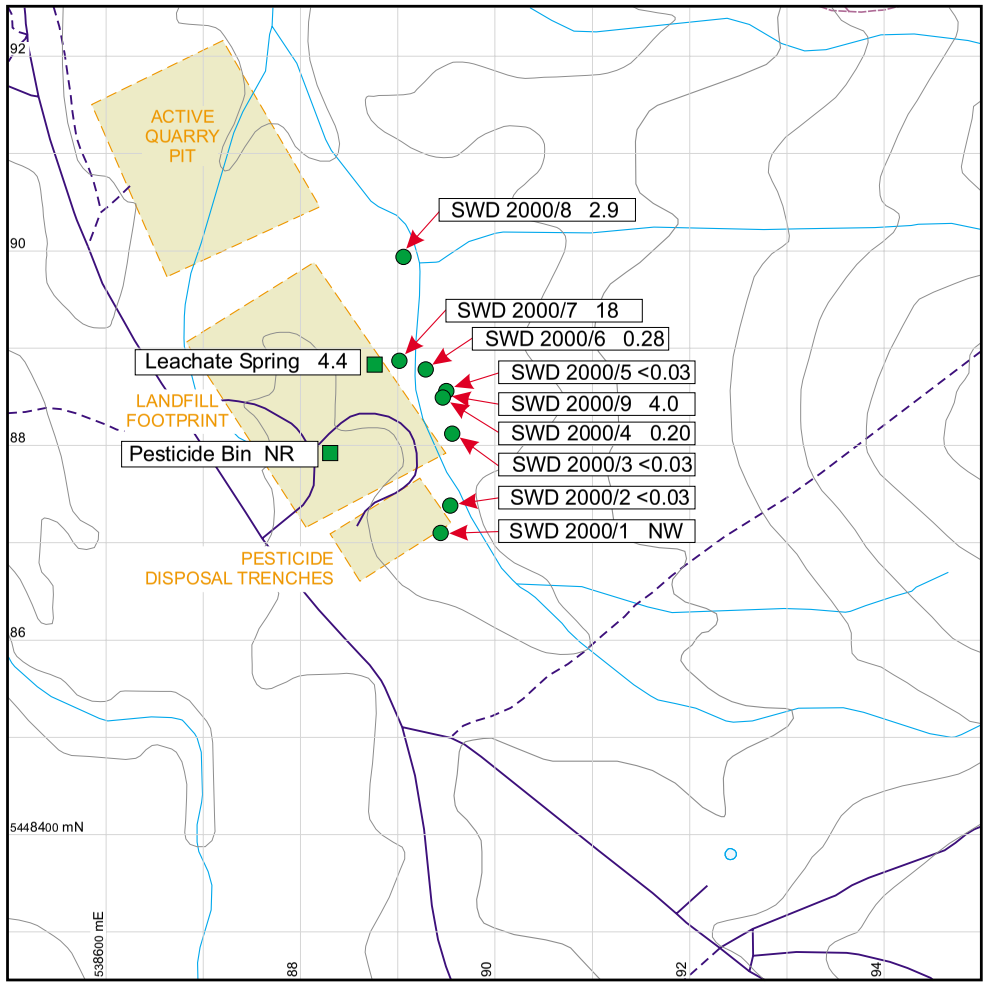
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Nitrtate + Nitrite (μg–N/L)



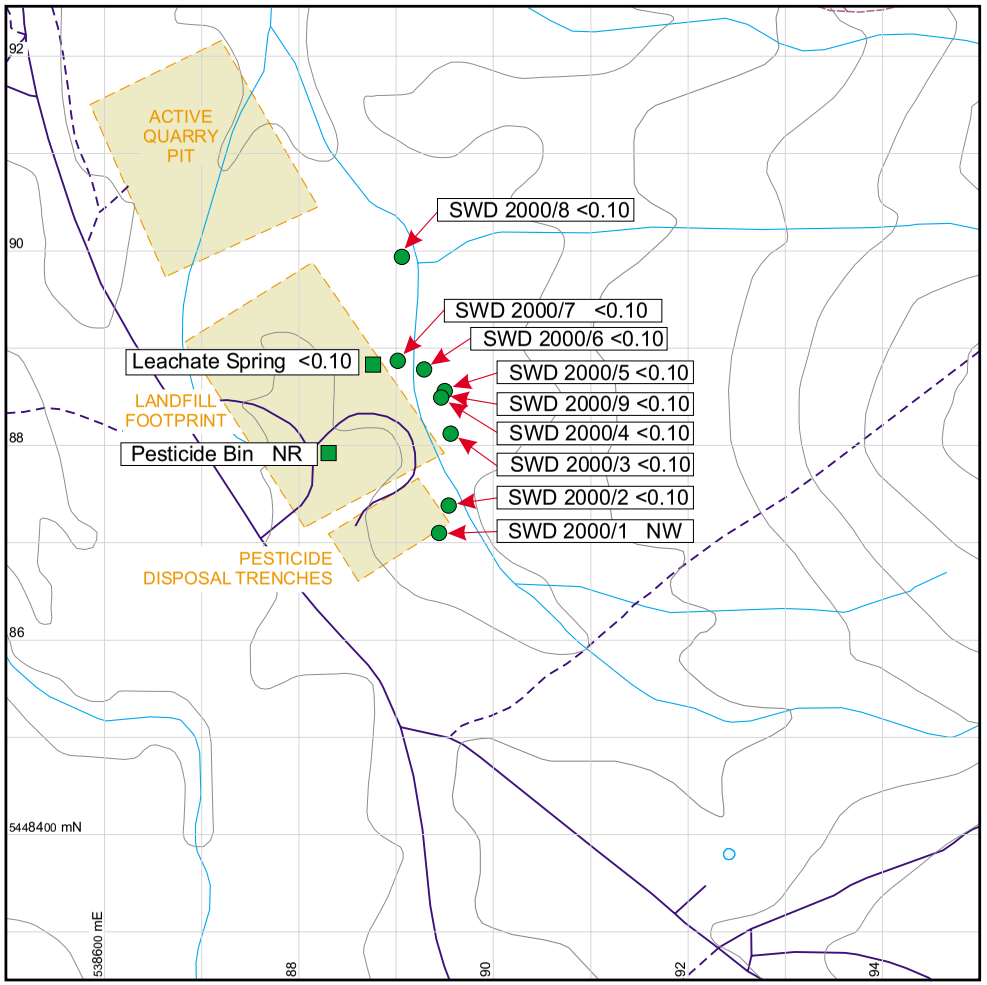
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Nitrate (mg–N/L)



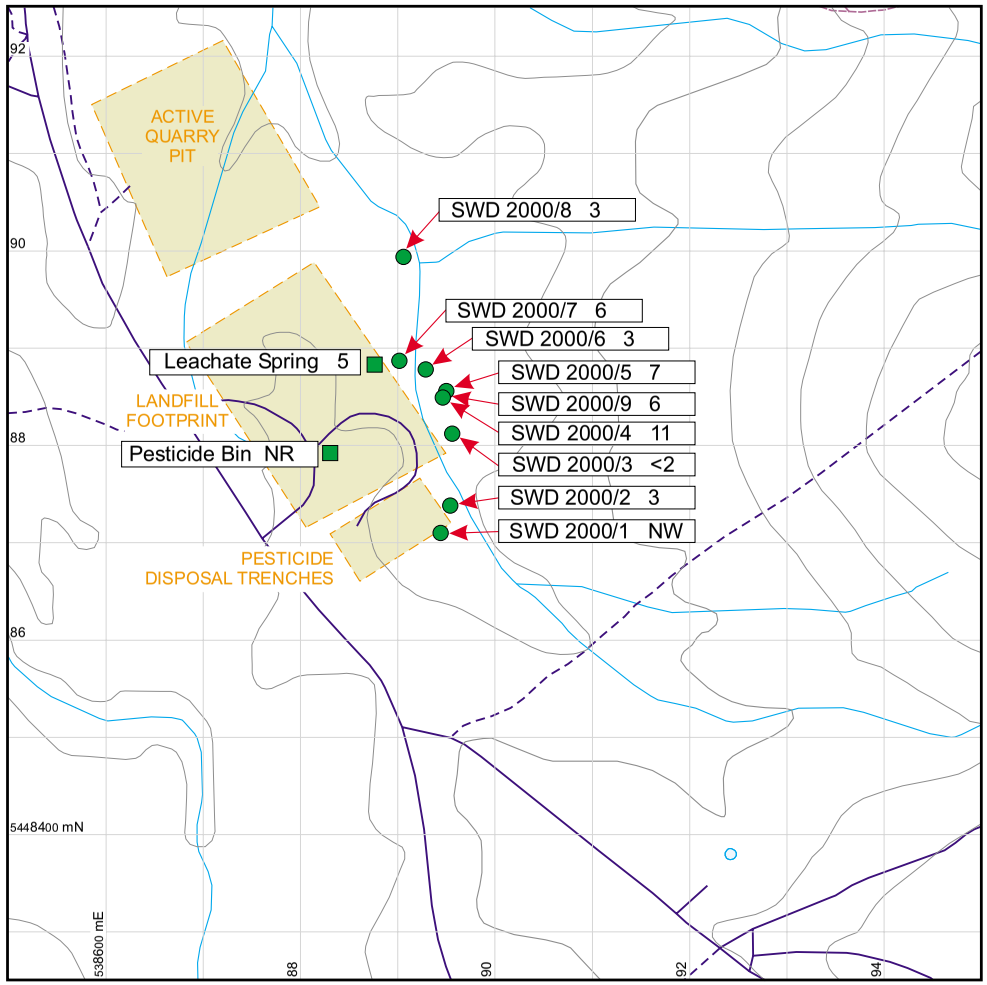
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Nitrite (mg–N/L)



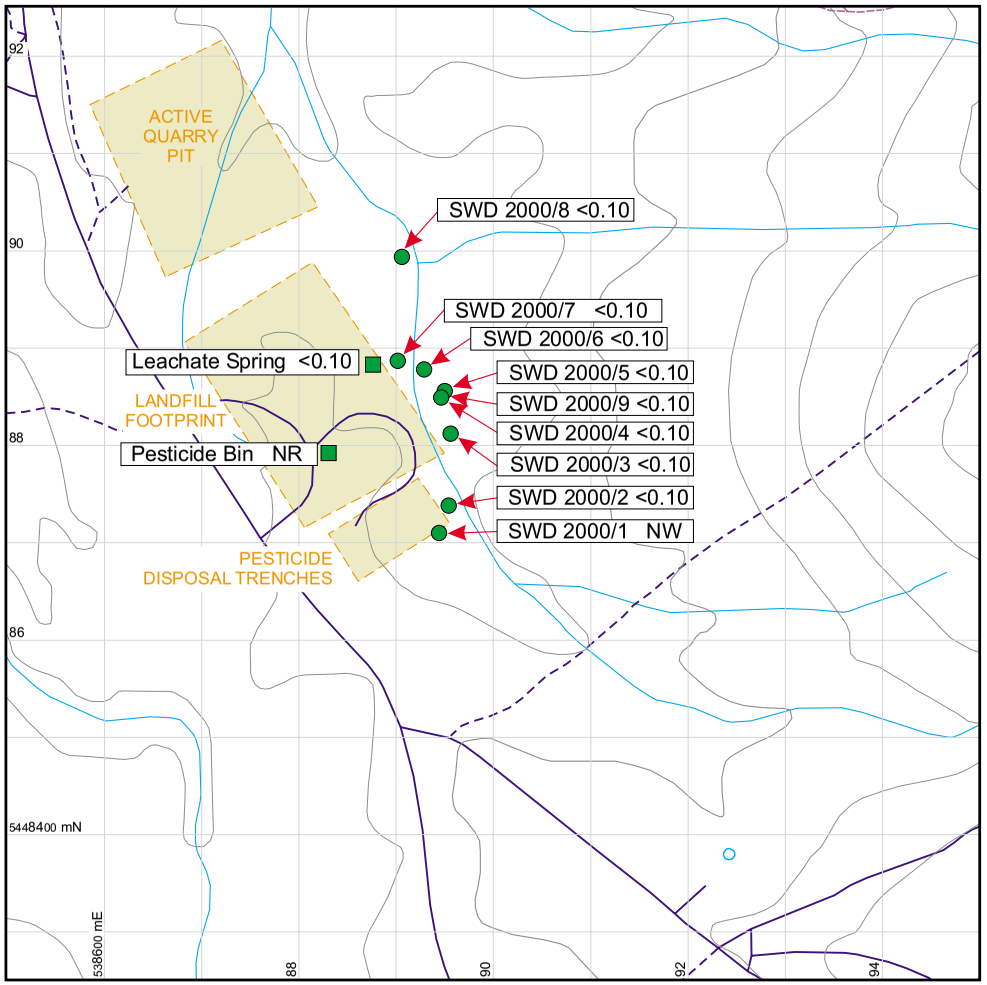
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Ortho-P (μg–N/L)



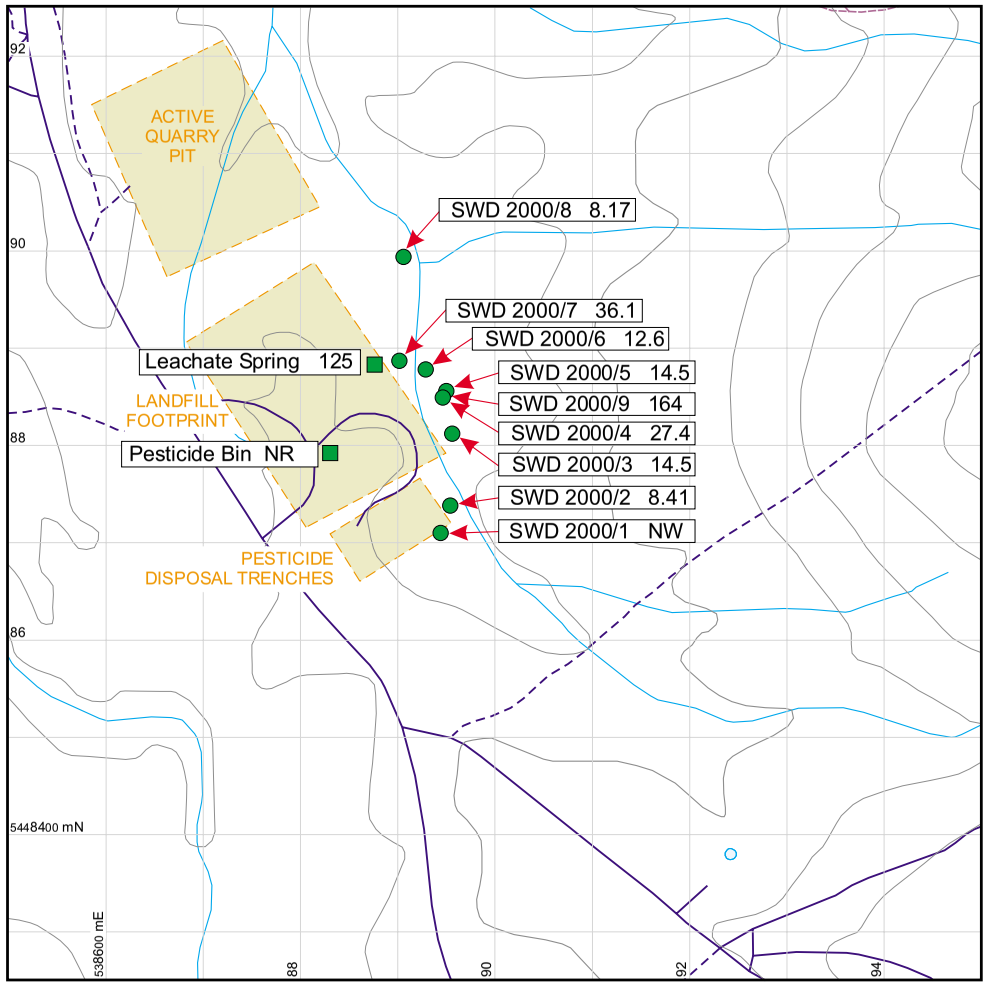
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Phosphate (mg–N/L)



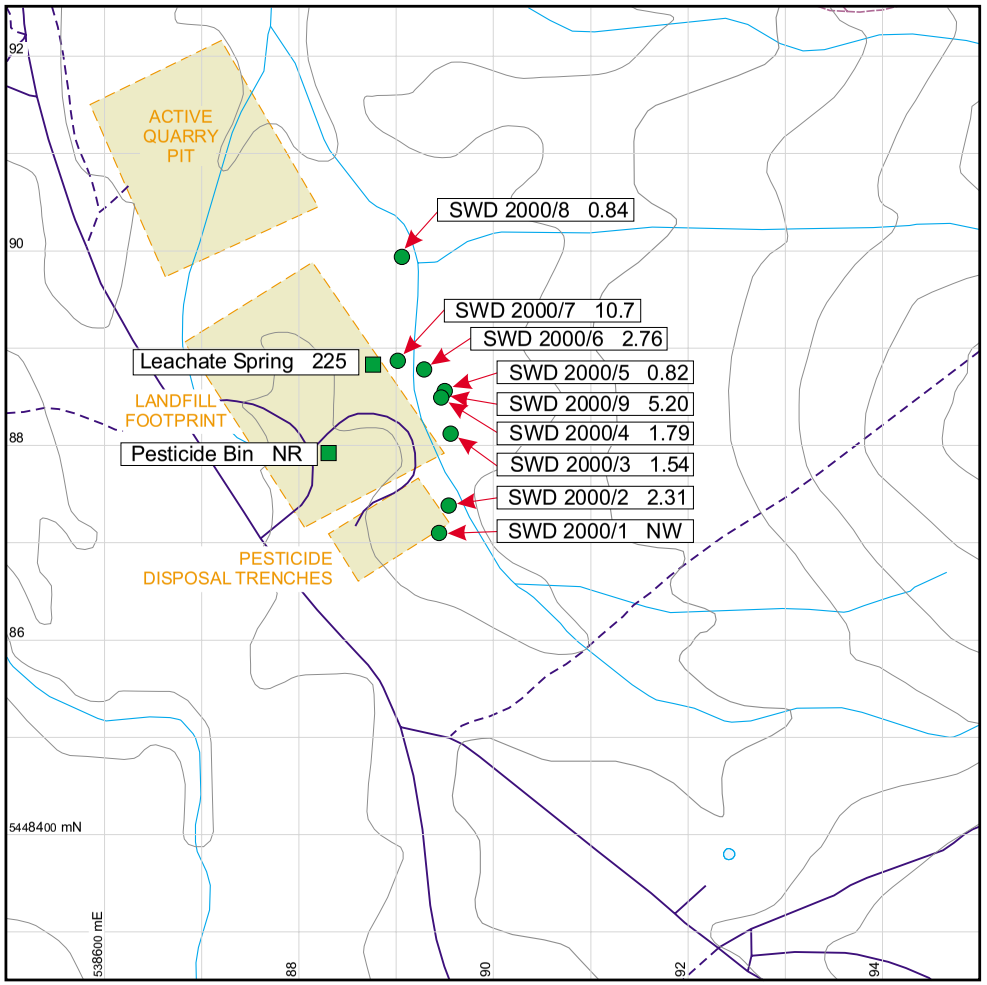
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Ca (mg/L)



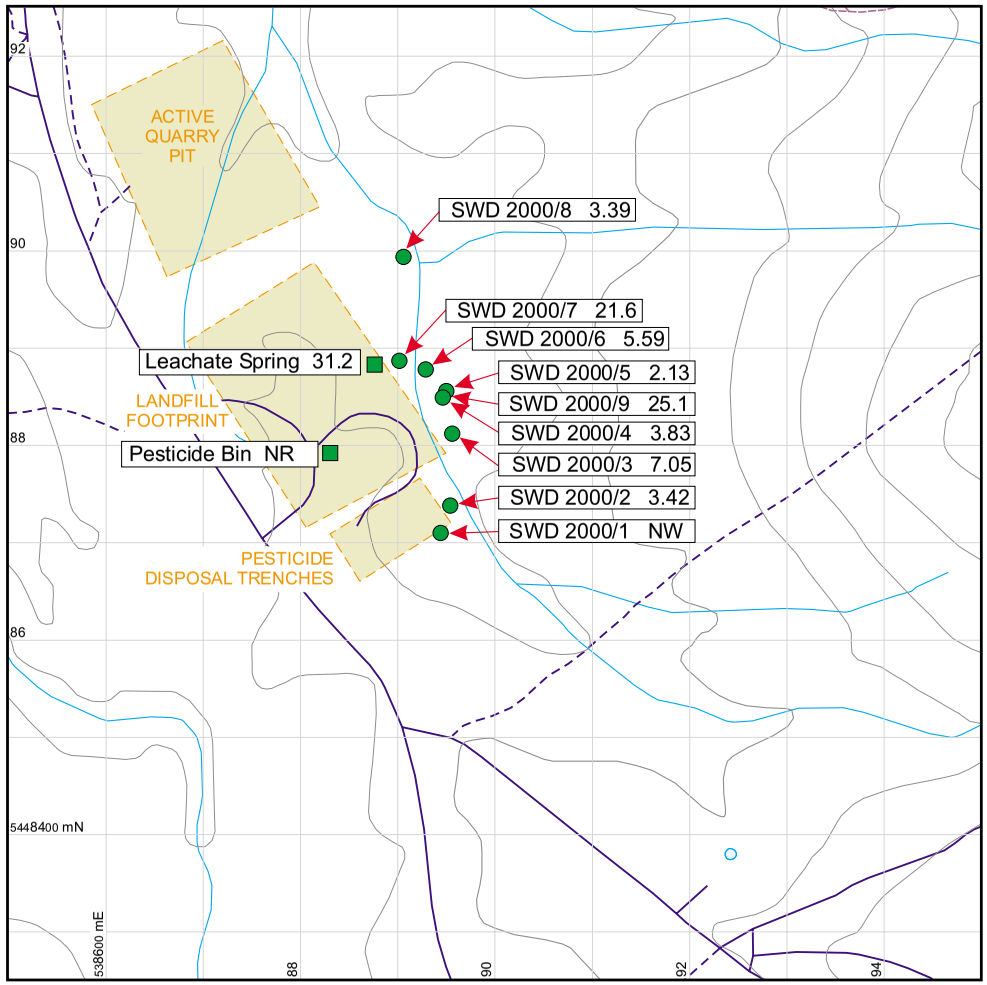
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
K (mg/L)



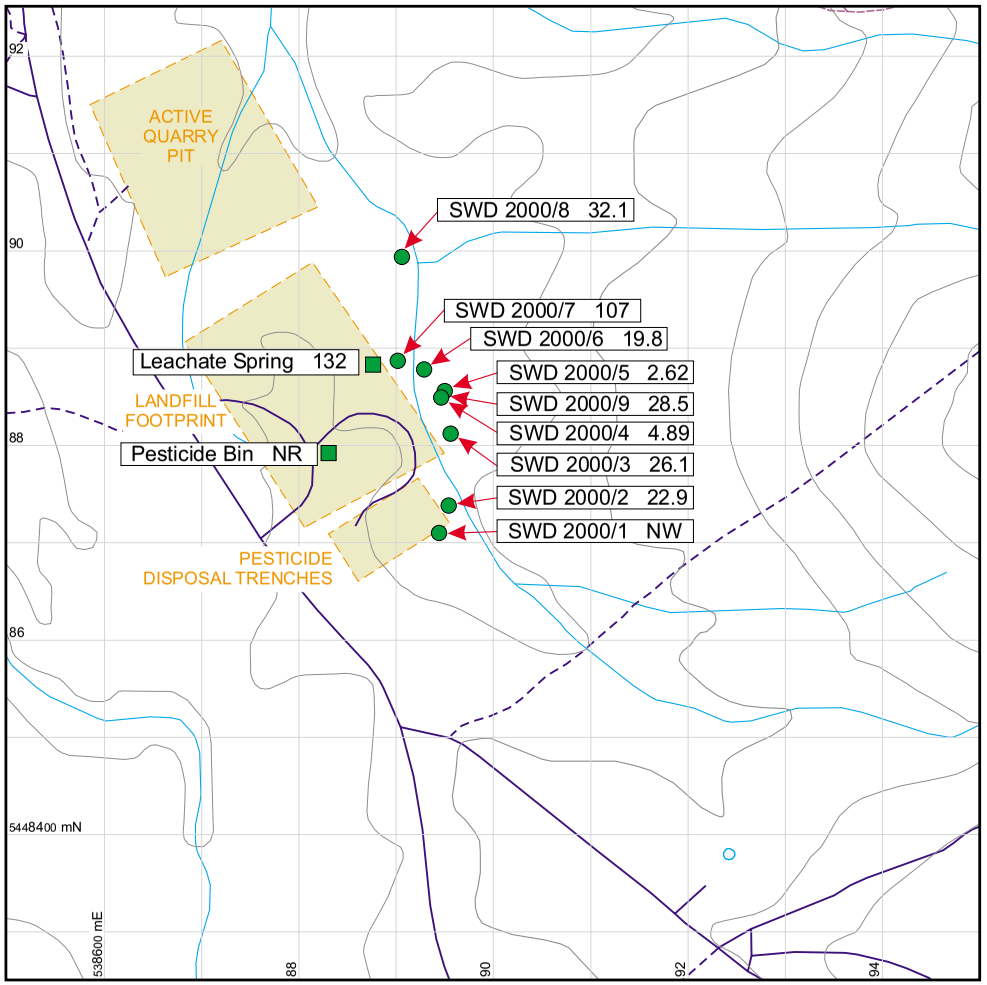
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Mg (mg/L)



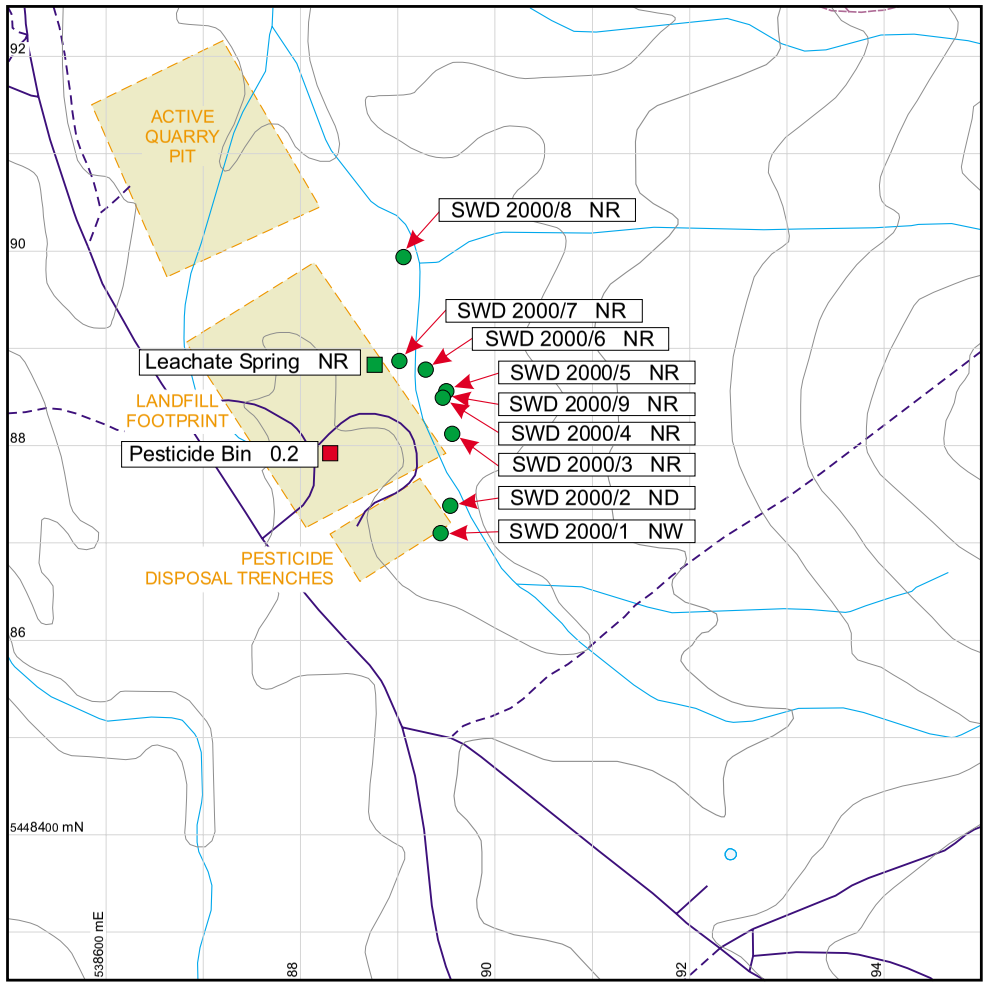
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Na (mg/L)



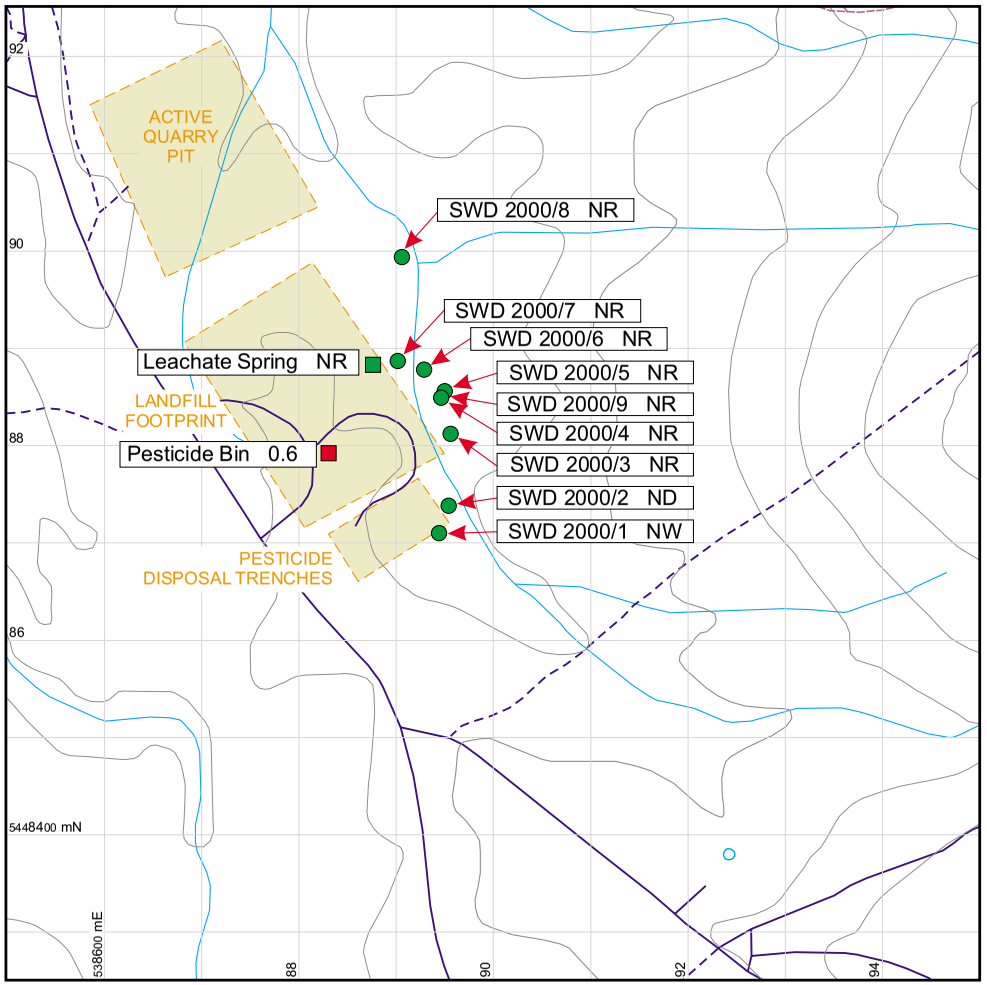
NR = No Result
NW = No Water

Scottsdale Waste Depot
November 2000
Diazinon (µg/L)



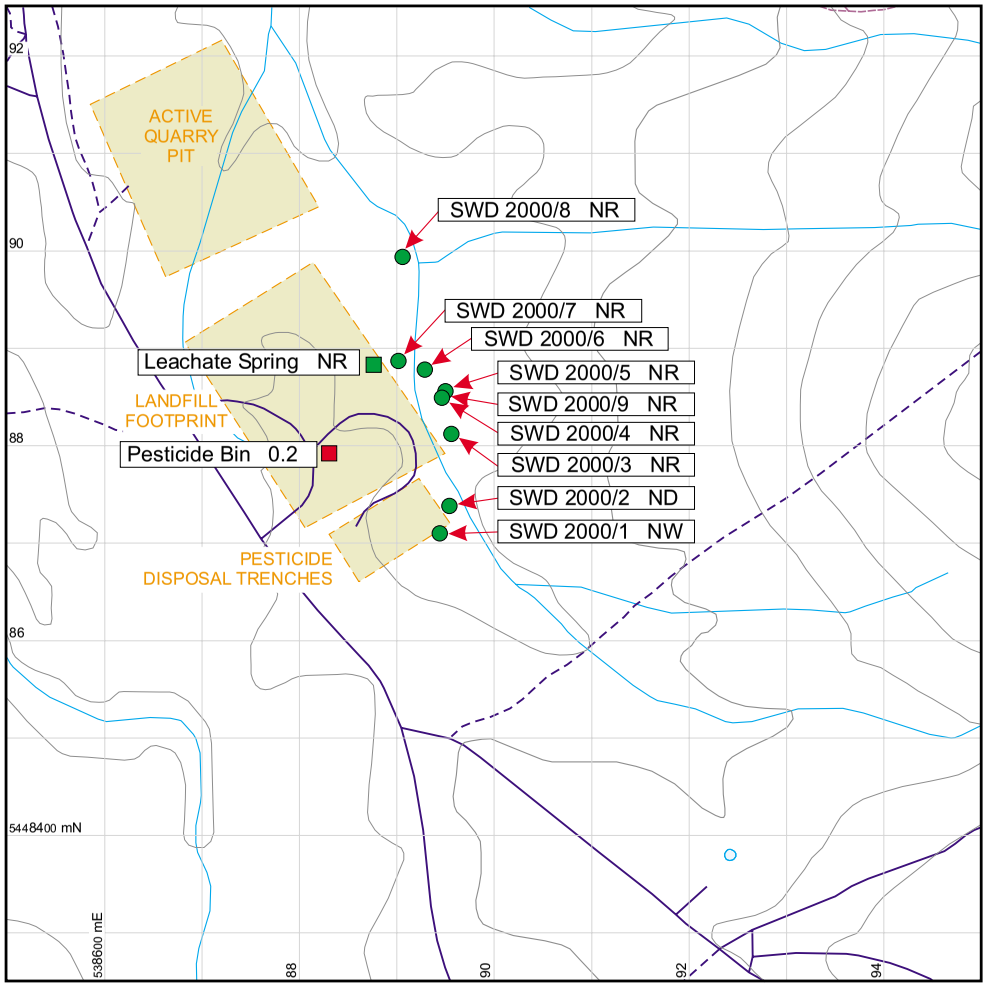
NR = No Result
NW = No Water
ND = Not Detected
Detection Limit 0.1

Scottsdale Waste Depot
November 2000
Endrin aldehyde (µg/L)



NR = No Result
NW = No Water
ND = Not Detected
Detection Limit 0.1

Scottsdale Waste Depot
November 2000
Famphur (µg/L)



NR = No Result
NW = No Water

ND = Not Detected
Detection Limit 0.1

Appendix 5

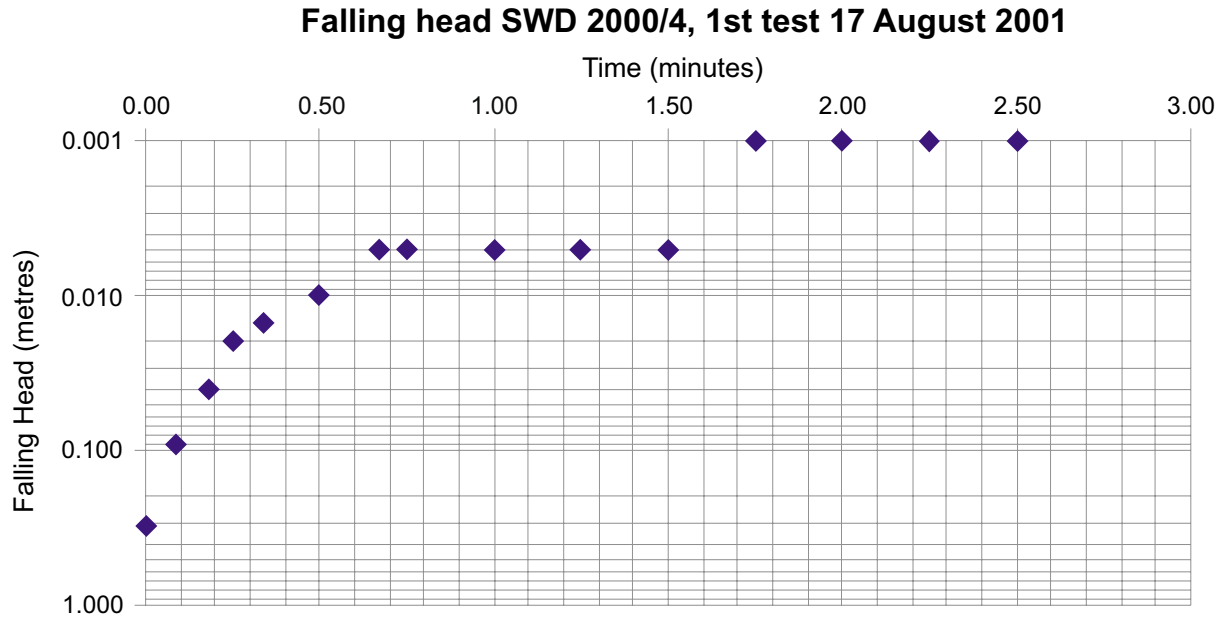
Raw data collected for slug extraction tests

Scottsdale waste depot injection test — slug injection falling head data

Date	17 /08/2001
Bore	SWD 2000/4
TD	4.00 m
SWL	0.31 m

Recovery data

Time	*Residual drawdown*	*Measurement*
0.00	0.310	0.00
0.09	0.090	0.22
0.18	0.040	0.27
0.25	0.020	0.29
0.34	0.015	0.295
0.50	0.010	0.30
0.67	0.005	0.305
0.75	0.005	0.305
1.00	0.005	0.305
1.25	0.005	0.305
1.50	0.005	0.305
1.75	0.001	0.309
2.00	0.001	0.309
2.25	0.001	0.309
2.50	0.001	0.309

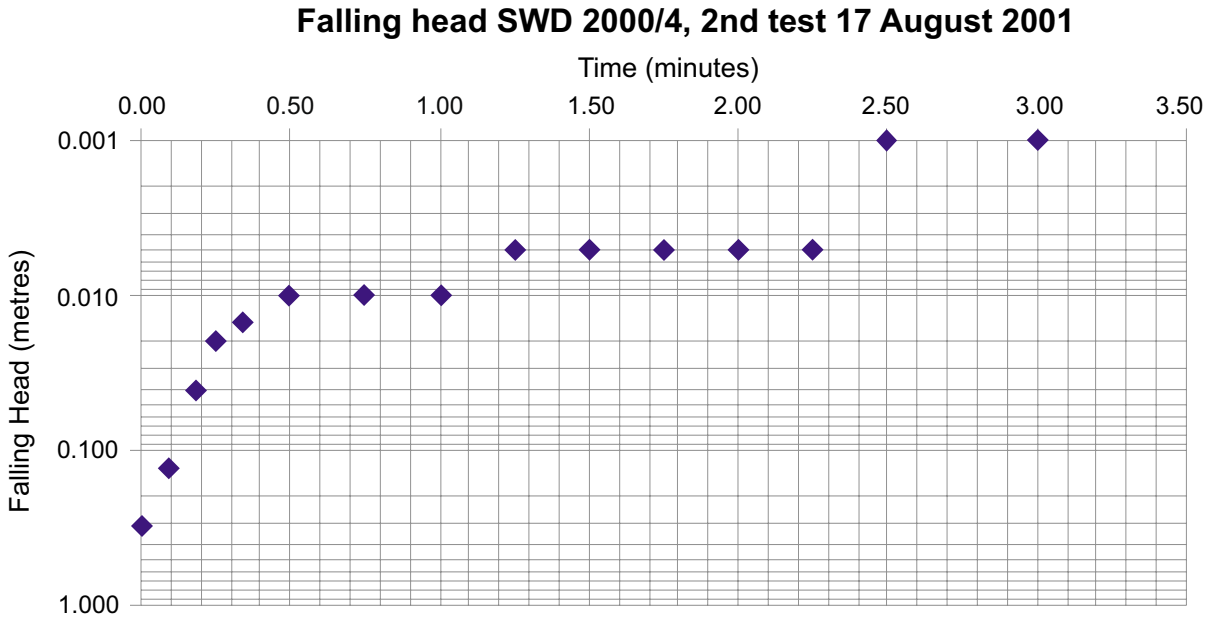


Scottsdale waste depot injection test — slug injection falling head data

Date	17/08/2001
Bore	SWD 2000/4
TD	4.00 m
SWL	0.31 m

Recovery data

Time	*Residual drawdown*	*Measurement*
0.00	0.310	0
0.09	0.130	0.18
0.18	0.040	0.27
0.25	0.020	0.29
0.34	0.015	0.295
0.50	0.010	0.30
0.75	0.010	0.300
1.00	0.010	0.30
1.25	0.005	0.305
1.50	0.005	0.305
1.75	0.005	0.305
2.00	0.005	0.305
2.25	0.005	0.305
2.50	0.001	0.309
3.00	0.001	0.309

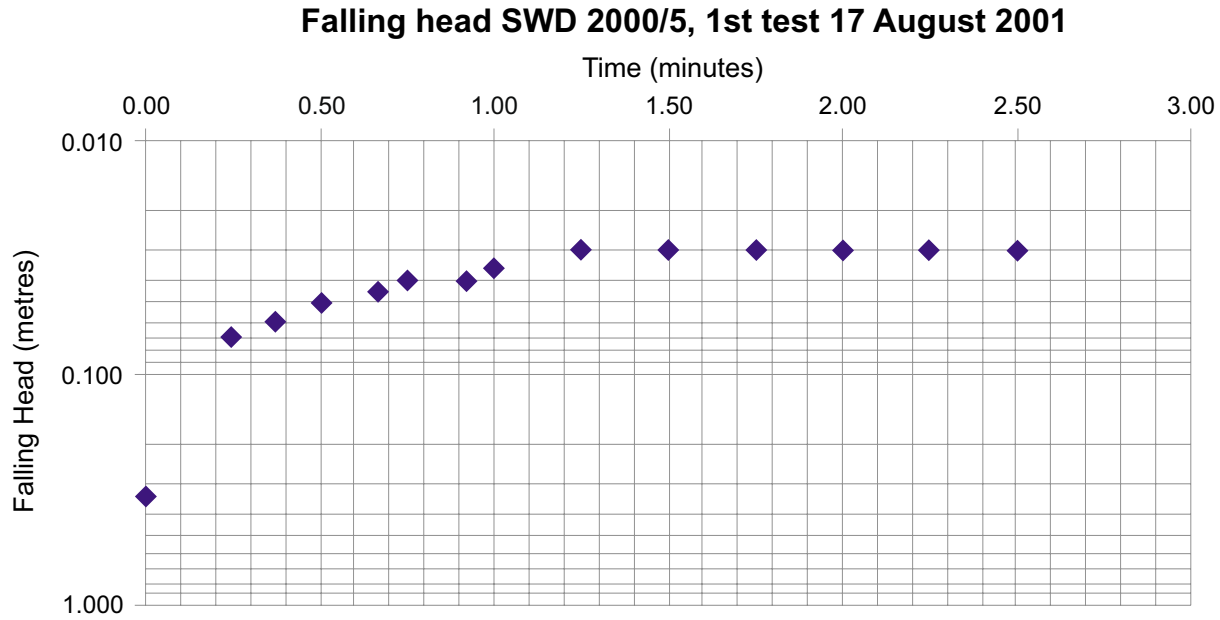


Scottsdale waste depot injection test — slug injection falling head data

Date	17/08/2001
Bore	SWD 2000/5
TD	2.00 m
SWL	0.34 m

Recovery data

Time	*Residual drawdown*	*Measurement*
0.01	0.34	0.00
0.25	0.07	0.27
0.37	0.06	0.28
0.50	0.05	0.29
0.67	0.05	0.295
0.75	0.04	0.30
0.92	0.04	0.30
1.00	0.04	0.305
1.25	0.03	0.31
1.50	0.03	0.31
1.75	0.03	0.31
2.00	0.03	0.31
2.25	0.03	0.31
2.50	0.03	0.31

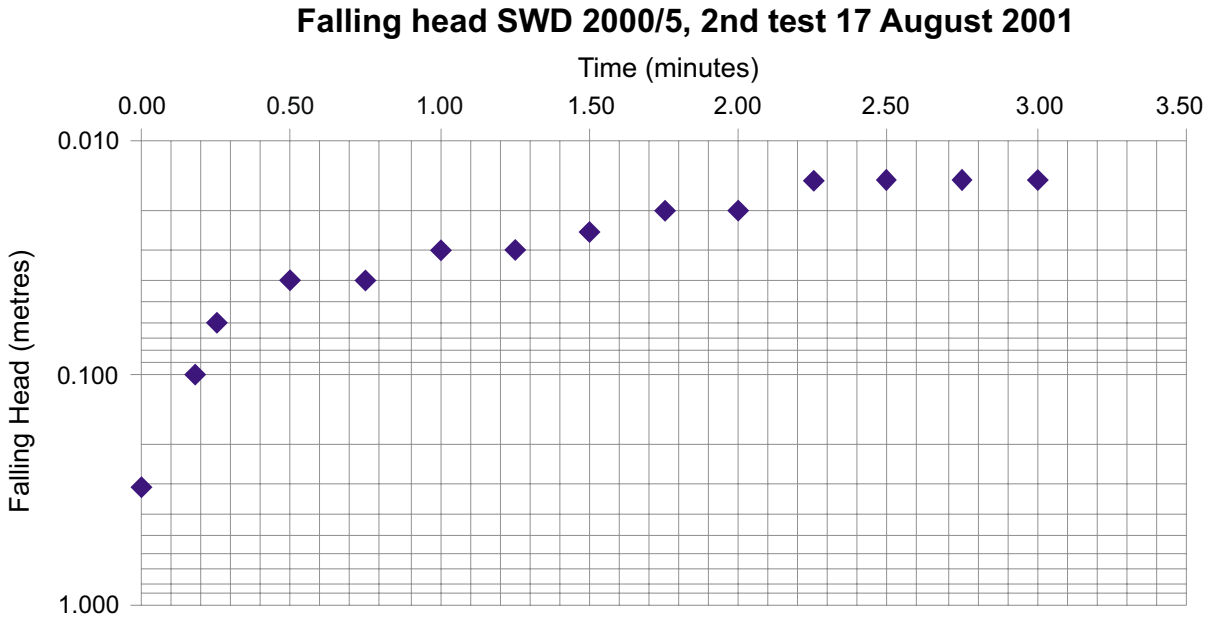


Scottsdale waste depot injection test — slug injection falling head data

Date	17/08/2001
Bore	SWD 2000/5
TD	2.00 m
SWL	0.31 m

Recovery data

Time	*Residual drawdown*	*Measurement*
0.01	0.31	0.00
0.18	0.10	0.21
0.25	0.06	0.25
0.50	0.04	0.27
0.75	0.04	0.27
1.00	0.03	0.28
1.25	0.03	0.280
1.50	0.03	0.285
1.75	0.02	0.29
2.00	0.02	0.29
2.25	0.02	0.295
2.50	0.02	0.295
2.75	0.02	0.295
3.00	0.02	0.295

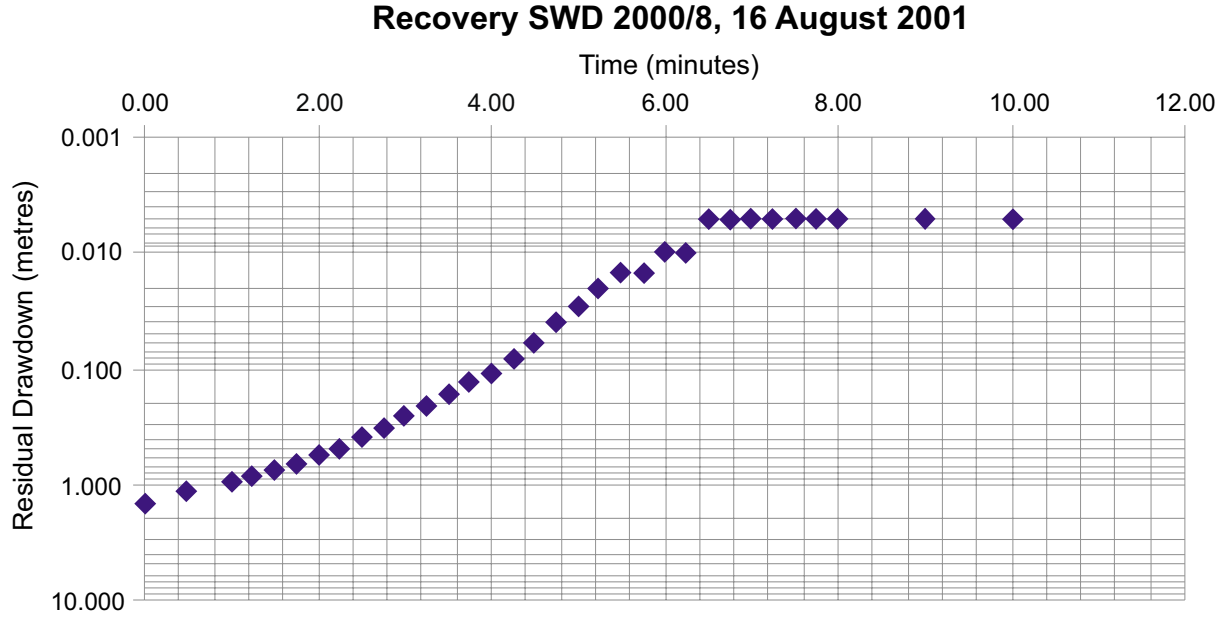


Scottsdale waste depot recovery test — slug extraction recovery data

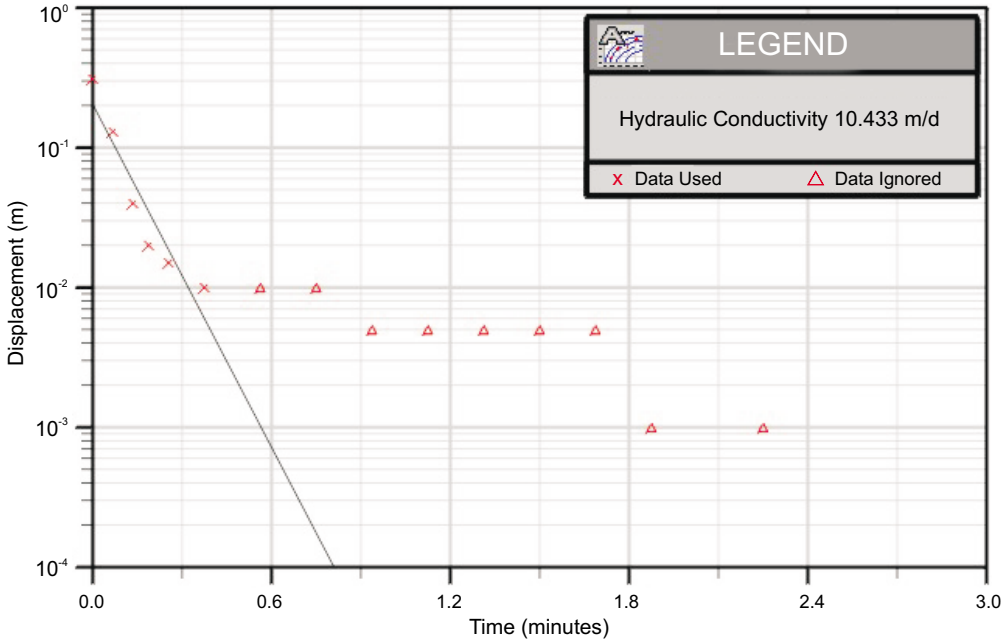
Date	16/08/2001
Bore	SWD 2000/8
TD	10.00 m
SWL	8.23 m
Flow	0.06 L/s

Recovery data

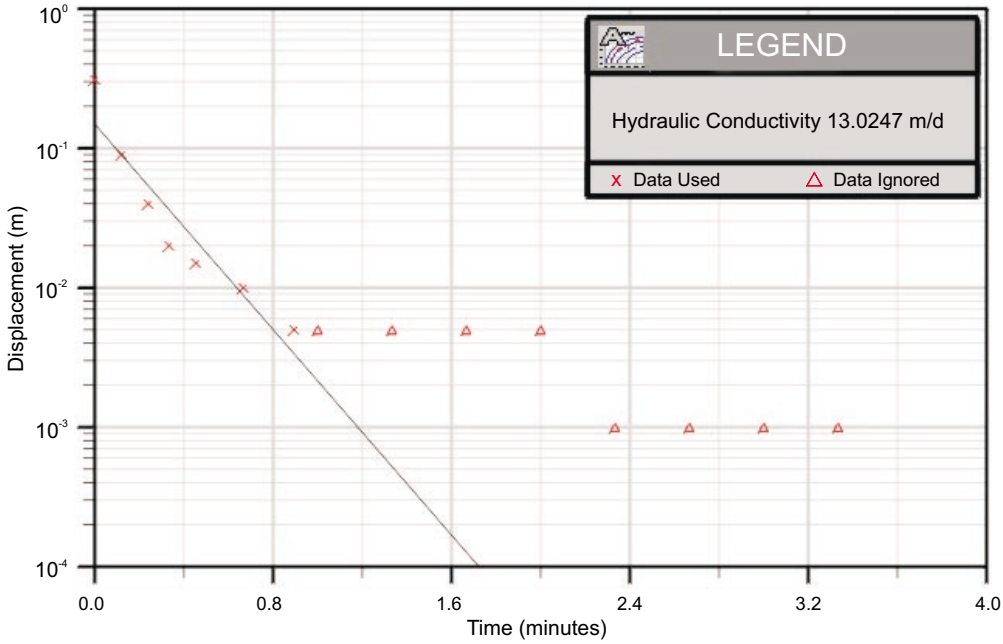
Time	*Residual drawdown*	*Measurement*
0.00	1.470	9.70
0.50	1.170	9.40
1.00	0.960	9.19
1.25	0.850	9.08
1.50	0.760	8.99
1.75	0.670	8.90
2.00	0.570	8.80
2.25	0.480	8.71
2.50	0.380	8.61
2.75	0.320	8.55
3.00	0.260	8.49
3.25	0.210	8.44
3.50	0.170	8.40
3.75	0.130	8.36
4.00	0.110	8.34
4.25	0.080	8.31
4.50	0.060	8.29
4.75	0.040	8.27
5.00	0.030	8.26
5.25	0.020	8.25
5.50	0.015	8.245
5.75	0.015	8.245
6.00	0.010	8.24
6.25	0.010	8.24
6.50	0.005	8.235
6.75	0.005	8.235
7.00	0.005	8.235
7.25	0.005	8.235
7.50	0.005	8.235
7.75	0.005	8.235
8.00	0.005	8.235
9.00	0.005	8.235
10.00	0.005	8.235



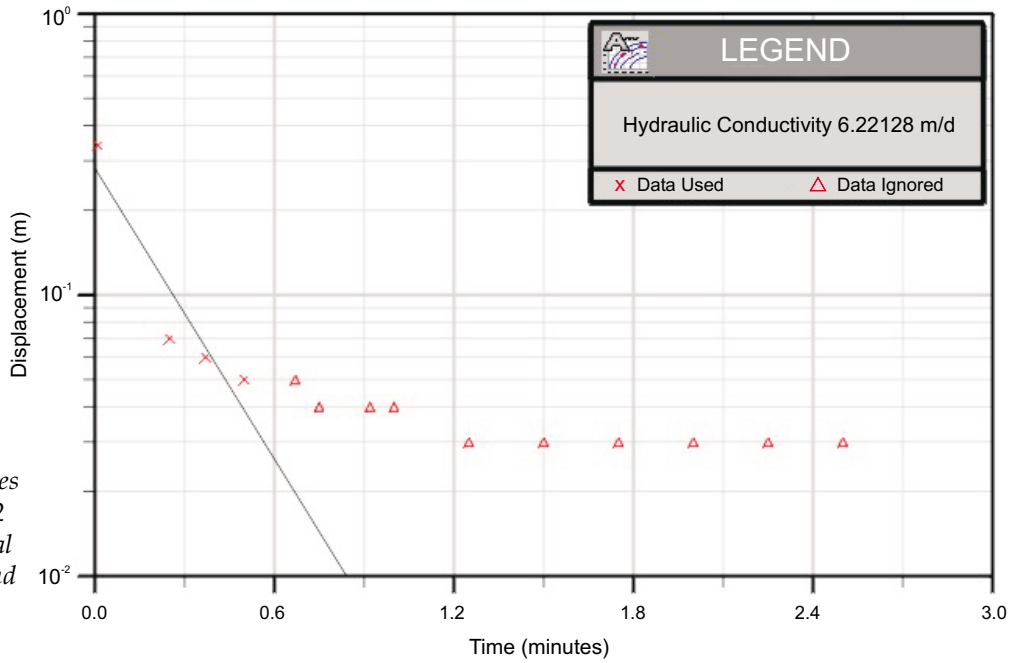
(a) SWD2000/4, first test
(K = 10.43 m/d
= 1.21 x 10^{-4} m/sec)



(b) SWD2000/4 second test
(K = 13.02 m/d
= 1.51 x 10^{-4} m/sec)

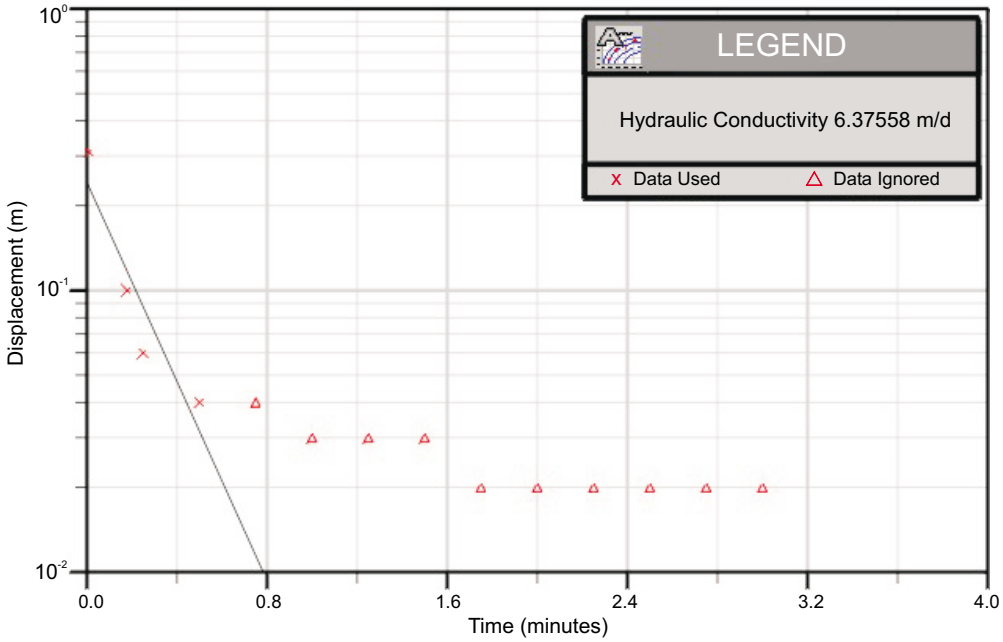


(c) SWD2000/5 first test
(K = 6.22 m/d
= 7.20 x 10^{-5} m/sec)

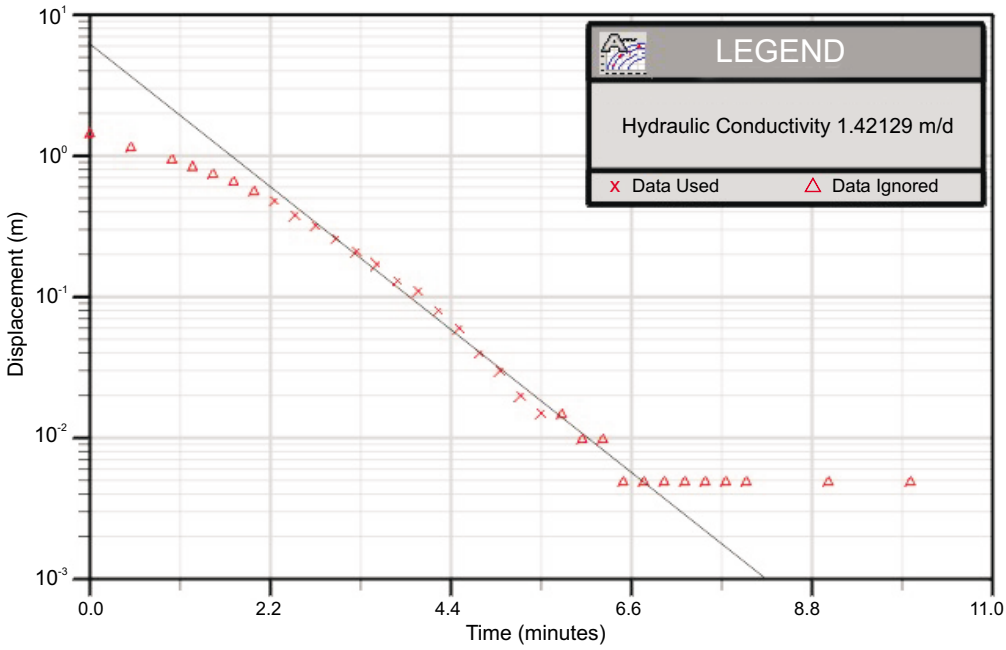


Hydraulic conductivity values calculated in AquiferWin32 Version 2.17, Environmental Simulations Inc., Bouwer and Rice (1976, Unconfined Aquifer) solution

(d) SWD2000/5, second test
(K = 6.38 m/d
= 7.40 x 10^{-5} m/sec)



(e) SWD2000/8
(K = 1.42 m/d
= 1.65 x 10^{-5} m/sec)



Hydraulic conductivity values calculated in AquiferWin32 Version 2.17, Environmental Simulations Inc., Bouwer and Rice (1976, Unconfined Aquifer) solution