



NRA

*National Rivers Authority
South West Region*

ENVIRONMENTAL PROTECTION

**WATER QUALITY INVESTIGATIONS
AT NANCEKUKE, CORNWALL**

**January 1992
WQP/92/002**

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WATER QUALITY INVESTIGATIONS AT NANCEKUKU, CORNWALL

TECHNICAL REPORT NO. WQP/92/002

SUMMARY

Further to concern by some members of the public and media following the deaths of sea birds and marine mammals in 1989 and 1990, the National Rivers Authority (NRA) gave an undertaking to monitor surface and groundwaters in the vicinity of the former Chemical Defence Establishment (CDE) Nancekuke site, to determine whether any impact from historic uses could be detected in these waters.

Twenty three locations were identified as sampling points. Samples were collected in September and October 1991. The samples were analysed for a range of chemical and physical determinands, which act as general indicators of pollution.

The water quality characteristics of the surface and groundwaters collected in the vicinity of Nancekuke are consistent with levels expected to be found naturally in such waters in West Cornwall.

For certain samples the analytical results show the presence of concentrations of cadmium, zinc, and other metals consistent with waters within the mineral enriched areas of West Cornwall. The volumes discharged from these locations to tidal waters are small and their combined impact on the surrounding marine environment will be minimal.

The analytical results do not indicate any levels of other substances, which could effect identified water uses in the area.

A trace amount of op' TDE, (a breakdown product of the pesticide DDT) was found in a seepage from a rockface in Gooden Heane Cove. It is possible that illegal tipping outside the boundary of the former CDE site is a source of this material. It is not suspected that the pesticide residues result from the uses of the site at Nancekuke. Samples are to be taken to confirm the continuing presence of this substance.

The presence of trace amounts of dieldrin found in a seepage from an adit in Tobban Horse Bay is suspected to be connected with illegal tipping in the associated mine shafts, which are outside the former CDE site boundary. Staff of the NRA have informed the Cornwall Waste Regulation Authority of these disposal sites and are requiring methods of control and prevention.

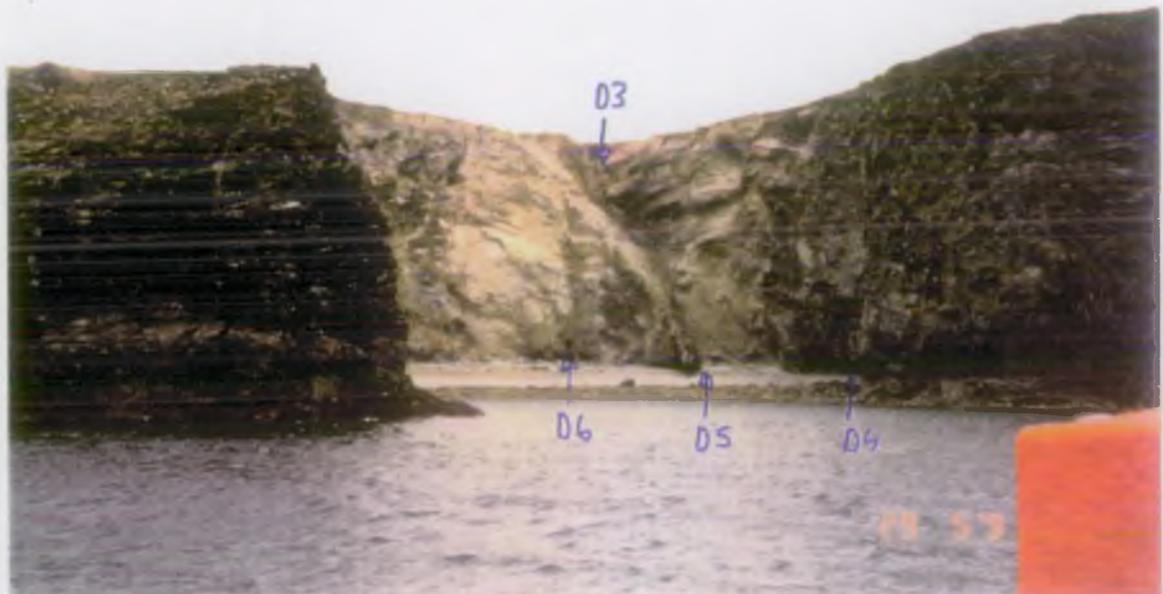
The extremely low flows associated with the releases of pesticides will result in minimal impact on the surrounding marine environment.

B L Milford
Water Quality Planner
January 1992

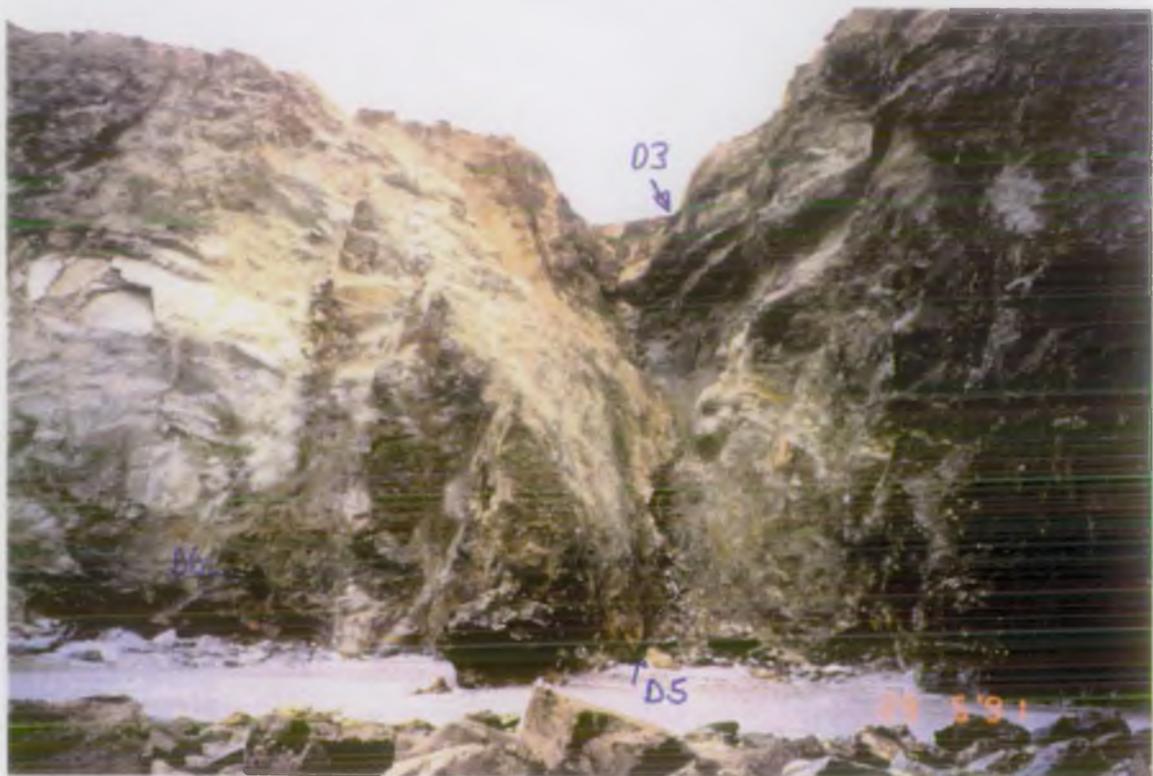
ENVIRONMENT AGENCY



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View of sampling locations D3, D4, D5 and D6 from the sea.





View of location of two adits, D7 and D8, and Sally's Bottom Stream overflowing the cliffs at Sally's Bottom.

WATER QUALITY INVESTIGATIONS AT NANCEKUKU, CORNWALL

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WATER QUALITY INVESTIGATIONS AT NANCEKUKU, CORNWALL

1. INTRODUCTION

During 1989 and 1990, some members of the public and media associated the reported deaths of sea birds, seals and cetaceans such as dolphins and porpoises, around the coast of Cornwall with the previous activities perceived to have taken place at the former Chemical Defence Establishment (CDE) at Nancekuke.

Further to this public concern, the National Rivers Authority (NRA) gave an undertaking to monitor surface and groundwaters in the vicinity of the former CDE Nancekuke site to determine whether any impact from the historic uses could be detected in these waters.

This report identifies the sampling locations and presents the analytical results from the initial survey to characterise water quality in flowing surface waters and groundwater seepages around the site.

2. BACKGROUND

Before the Second World War the site occupied by the former CDE Nancekuke, was used as agricultural land, predominantly as rough pasture and grassland. The land was obtained by compulsory purchase by the War Office. The airfield at Nancekuke, near Portreath was commissioned in 1941 and used by the Royal Air Force and the United States Air Forces. The base was placed on a care and maintenance basis in 1945 and held as a surplus inactive station from 1948 to 1950 when it was transferred to the Ministry of Supply.

Resulting from the UK government's research programme to develop a capability to manufacture chemical defence agents in bulk, work commenced at CDE Nancekuke during 1952 to support this programme commissioned by the Ministry of Defence. Following the 1976 Defence Review, there was a decision to close the Establishment and transfer the remaining work to CDE Porton. All work had ceased by 1977 and following a decommissioning period, the Establishment finally closed in 1980. The Ministry of Defence organised the transfer of the site to the Royal Air Force in 1980 and the site is operated today as RAF Portreath.

3. INVESTIGATIONS

During 1990 and 1991 discussions took place between staff of the NRA and CDE Porton concerning the operation of the site of the former CDE Nancekuke.

Site inspections at Nancekuke were undertaken in early 1991 with the co-operation of the station commander. Watercourses and groundwater seepages were identified from these site inspections. Additional inspections were made from a boat moving parallel to the coastline and confirmed by landings when tide and weather permitted.

Carnon Consultancy was engaged by the NRA to undertake a mine search in respect of old workings and adit systems adjacent to the coastline between Portreath and Porthtowan. The presence of a substantial network of drainage adits and the existence of many shafts have been identified, associated with mineral lodes which have been worked close to the surface. These systems provide ample facilities for groundwater to percolate underground and be carried away to the sea over an area of about 1.5 square kilometres, part of this area being included within the boundaries of the former CDE Nancekuke.

The investigation area covered both the former CDE site and the surrounding land from Gooden Heane Cove at Portreath to Porthtowan Beach. The southern boundary being the Redruth Stream, a tributary of the Portreath Stream. The land surrounding the former CDE site is predominantly agricultural with some woodland, and small areas of historic metalliferous mining.

Twenty three locations were identified as sampling points and these points were assigned a prefix 'D' to indicate that access to the site was difficult or a prefix 'E' if access was easy (see Appendix 1). Plans were developed to undertake sample collection approximately ten to twenty days after a period of sustained rainfall. This time delay would allow groundwater to move through the investigation area to the selected sampling points. The majority of sampling points are located outside the former CDE boundary.

The initial survey was planned to characterise the water quality of flowing surface waters, groundwater seepages and mine adit discharges. Samples would be analysed for a range of chemical and physical determinands, which would act as general chemical pollution indicators.

Samples were collected from locations E1, E3, E4, E5, E7, E8 and E9 (see Appendices 1 and 2) on 26 September 1991. There were insufficient flows to collect samples from locations E2 and E6.

Many of the identified sampling locations only have sufficient flowing water for sample collection purposes after periods of sustained rainfall. Rainfall during August 1991 totalled 36 millimetres and September produced only 56 millimetres as recorded at Mawla (NGR SW 7030 4580). Rainfall on 7 October was 22.8 millimetres and by 10 October 39.6 millimetres had been recorded over four days.

NRA staff and a contractor, Chris Harker of Rope Access Technology, St Day, collected samples from the 'D' locations on 25 and 26 October, fifteen days after the period of substantial rainfall, (see photographs in Appendix 2). An additional 19.1 millimetres of rain had fallen since 10 October. Nevertheless, there was insufficient flow to collect samples from location D14.

Samples were forwarded to the newly opened NRA laboratory at Exeter, where certain analyses were undertaken. Other analyses were undertaken by contracted analytical services. The samples were screened for organochlorine and organophosphorus residues, for metals and for a standard sanitary suite of determinands. Analysis was completed in January 1992. The analytical results for all the above samples have been reviewed and are included in Appendix 3. These results are available to the public through the Water Resources Act register at the NRA's offices at Bodmin and Exeter.

4. CONCLUSIONS

The water quality characteristics of surface and groundwaters collected in the vicinity of the site of the former CDE Nancekuke are consistent with those found naturally in many other waters in West Cornwall.

For certain samples (from locations D3, D4, D6, D7, D8, D9, D10, D11, D12 and D13), the analytical results show the presence of concentrations of cadmium, zinc and other metals consistent with levels expected to be found in waters within the mineral enriched areas of West Cornwall. The volumes discharged (0.2 litres/minute to 180 litres/minute) from these locations to tidal waters are small and their combined impact on the surrounding marine environment will be minimal.

The analytical results do not indicate any levels of other substances which could affect identified water uses in the area.

Two analytical results have indicated the presence of trace amounts of pesticides:

- (a) 21.5 nanograms/litre of op'TDE (a breakdown product of the pesticide DDT) were found in the sample collected from D2, which is from a seepage from the rock face in Gooden Heane Cove.

The origin of the trace amounts of this substance is not known. It is possible that illegal tipping outside the boundary of the former CDE site is a source of this material. It is not suspected that the pesticide residues result from the uses of the site at Nancekuke. The extremely low flows (0.7 litres/minute) from this rock seepage will have minimal impact on the surrounding marine environment.

- (b) 41.3 nanograms/litre of dieldrin were found in the sample collected from D9, which is from a seepage from an adit at the back of a sea cave in Tobban Horse Bay.

The origins of the trace amounts of this pesticide could be associated with the illegal tipping of materials in the mine shafts associated with the Lushington Mine draining through the Wheal Tye section to this adit, (see Appendix 2, photographs 32 to 35). These shafts are outside the boundary of the former CDE site.

The extremely low flows from this adit seepage (approximately 20 litres/day) will have minimal impact on the surrounding marine environment.

A site meeting has taken place between staff of the NRA and Cornwall Waste Regulation Authority with an objective to prevent such illegal tipping taking place in future.

5. RECOMMENDATIONS

Following the initial characterisation survey and before further sampling surveys are undertaken, a review of future sampling points and the required chemical and physical determinands will take place to ensure that resources are targeted appropriately to potential impact assessment.

The next survey will include samples of sea water and selected marine biota from key locations to demonstrate any impact from the freshwater inputs to tidal waters identified between Portreath and Porthtowan.

No detailed investigation of the trace amount of op' TDE found in the groundwater seepage at sampling location D2 should take place until its presence is confirmed in the sample collected from the next survey.

The next water quality survey will be commissioned after the next period of sustained rainfall.

The dieldrin concentrations in the adit seepage from the back of the sea cave in Tobban Horse Bay should be monitored in future surveys.

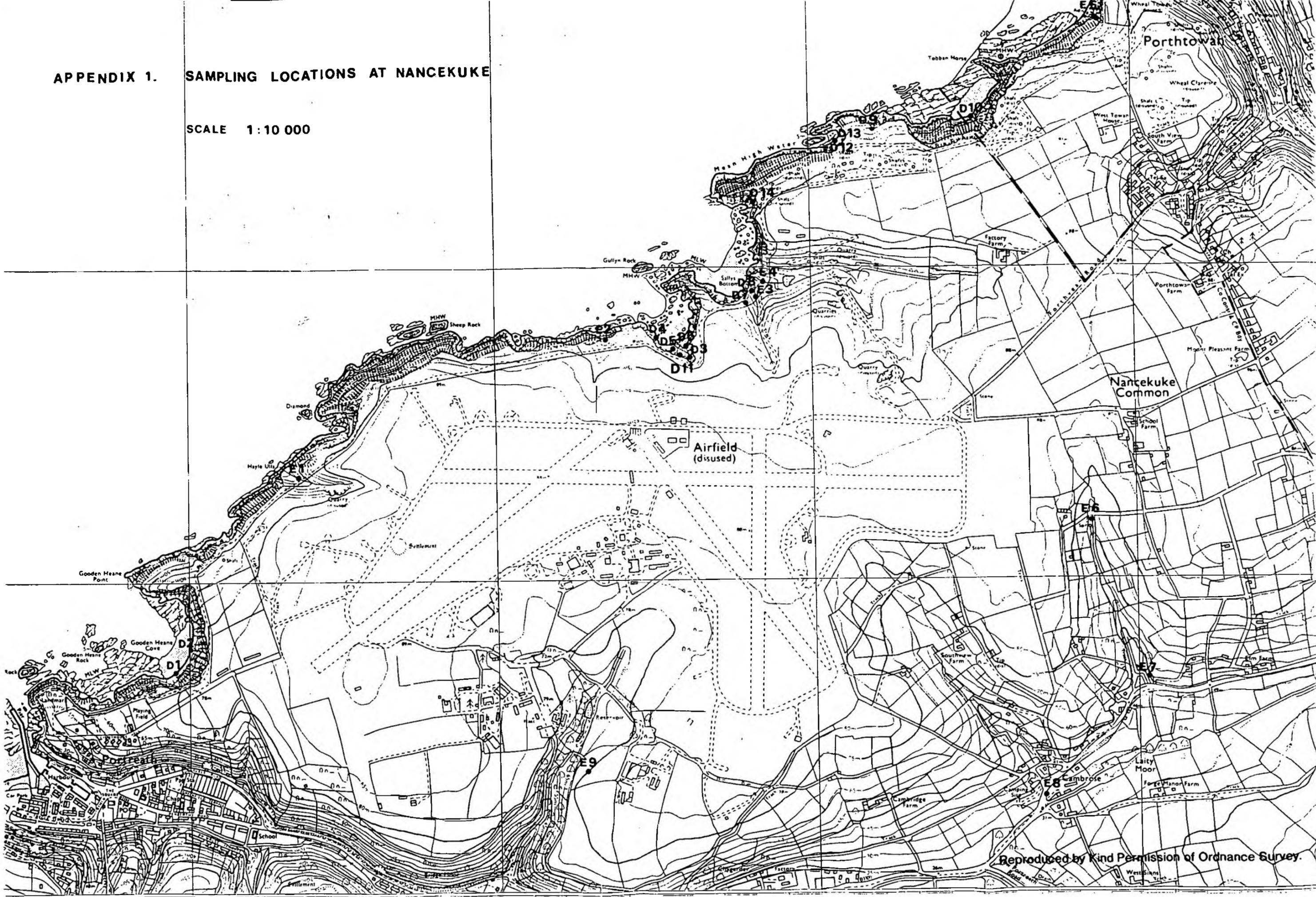
The Cornwall Waste Regulation Authority will be asked to investigate the feasibility of removing this deposited material from the mine shafts without causing environmental damage. If it is possible to remove this material, then following removal, the shafts should be capped.

LIST OF APPENDICES

1. Map of Sampling Locations at Nancekuke
2. Photographs of sampling locations
3. Analytical Results of First Survey

APPENDIX 1. SAMPLING LOCATIONS AT NANCEKUKUKE

SCALE 1:10 000



APPENDIX 2

PHOTOGRAPHS OF SAMPLING LOCATIONS



P1: Sample Point D1.

General view of D1 showing major cross-course exposed in cliff.
Sample point lower right, at top of sand.

P2: Detail D1.

Samples collected lower centre (sample point ringed).

SAMPLE D1

Location (OS grid ref.): SW 6596 4571

Date and Time of Sample: 25 October, 14:30 - 14:55

Estimated Flow Rate: 1 l/min

Sampling Procedure: Standard, water running down slab
collected from gully at base.

Nature of Sampling Point: Water dripping from major quartz filled
cross-course several metres wide (trending 140 deg.m, dipping
60 deg. West). Apparent high Fe content cementing beach sand.



P1: Sample Point D1.

General view of D1 showing major cross-course exposed in cliff.
Sample point lower right, at top of sand.

P2: Detail D1.

Samples collected lower centre (sample point ringed).

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Nature of Sampling Point: Water dripping from major quartz filled
cross-course several metres wide (trending 140 deg.m, dipping
60 deg. West). Apparent high Fe content cementing beach sand.



P3: Sample Point D2.
Samples taken from shallow cave, centre.
P4: Detail D2.

SAMPLE D2

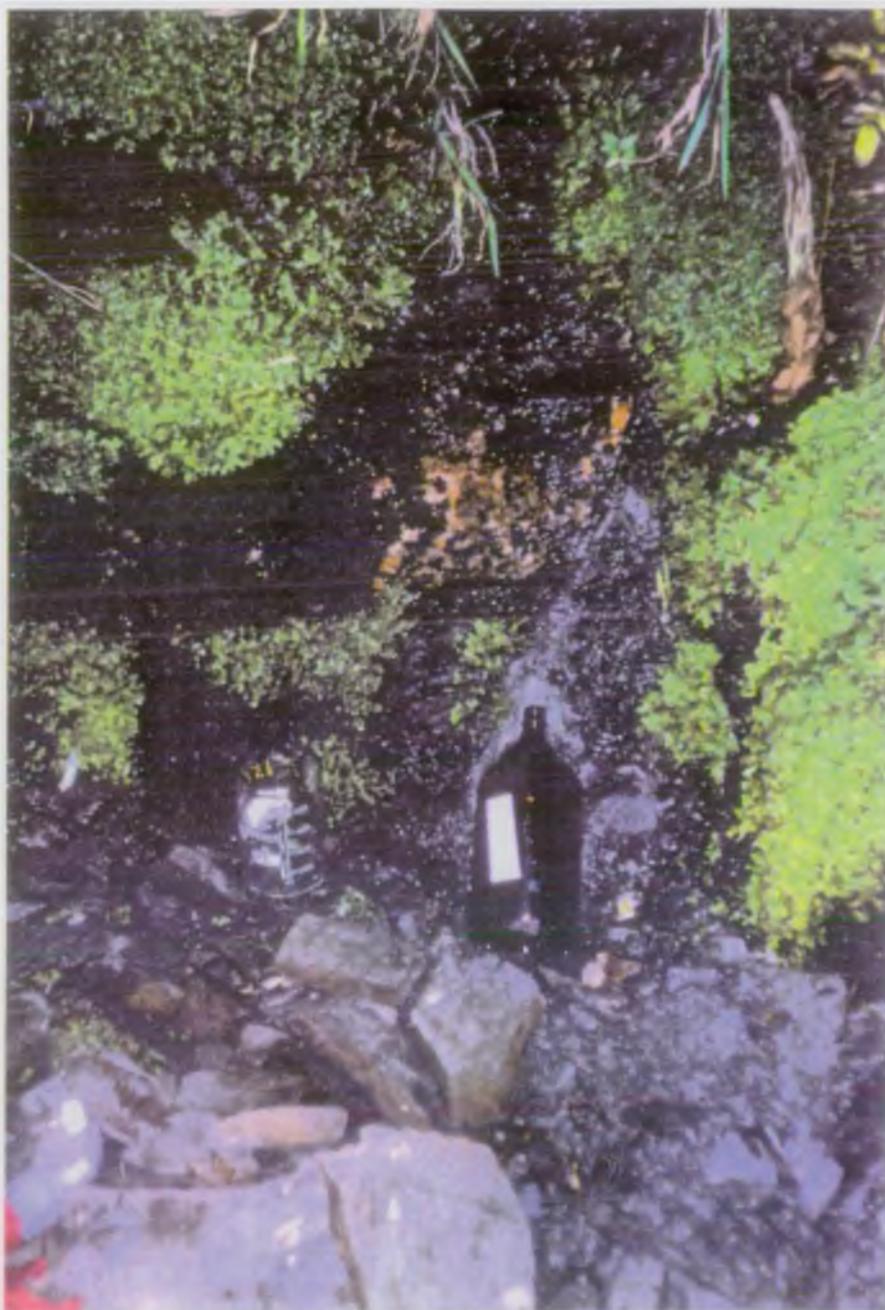
Location (OS grid ref.): SW 6602 4584

Date and Time of Sample: 25 October, 14:30 - 14:55

Estimated Flow Rate: 0.7 l/min

Sampling Procedure: Standard

Nature of Sampling Point: Sample from shallow cave formed by two faults (085 deg.m dipping 80 deg. south and 045 deg.m dipping 60 deg. north). Generally wet with large number of drips and trickles, sample taken from largest, on joint running 070 deg.m dipping 70 deg. north, with some evidence of mineralisation. (NB: Redruth Sewer Tunnel lies about 150m away in this direction, and the geological section indicates similar features)



P3: Sample Point D2.
Samples taken from shallow cave, centre.
P4: Detail D2.

SAMPLE D2

Location (OS grid ref.): SW 6602 4584

Date and Time of Sample: 25 October, 14:30 - 14:55

Estimated Flow Rate: 0.7 l/min

Sampling Procedure: Standard

Nature of Sampling Point: Sample from shallow cave formed by two faults (085 deg.m dipping 80 deg. south and 045 deg.m dipping 60 deg. north). Generally wet with large number of drips and trickles, sample taken from largest, on joint running 070 deg.m dipping 70 deg. north, with some evidence of mineralisation. (NB: Redruth Sewer Tunnel lies about 150m away in this direction, and the geological section indicates similar features)



P5: Sampling D3, 10 metres below top of gully.
P6: Detail D3.

SAMPLE D3

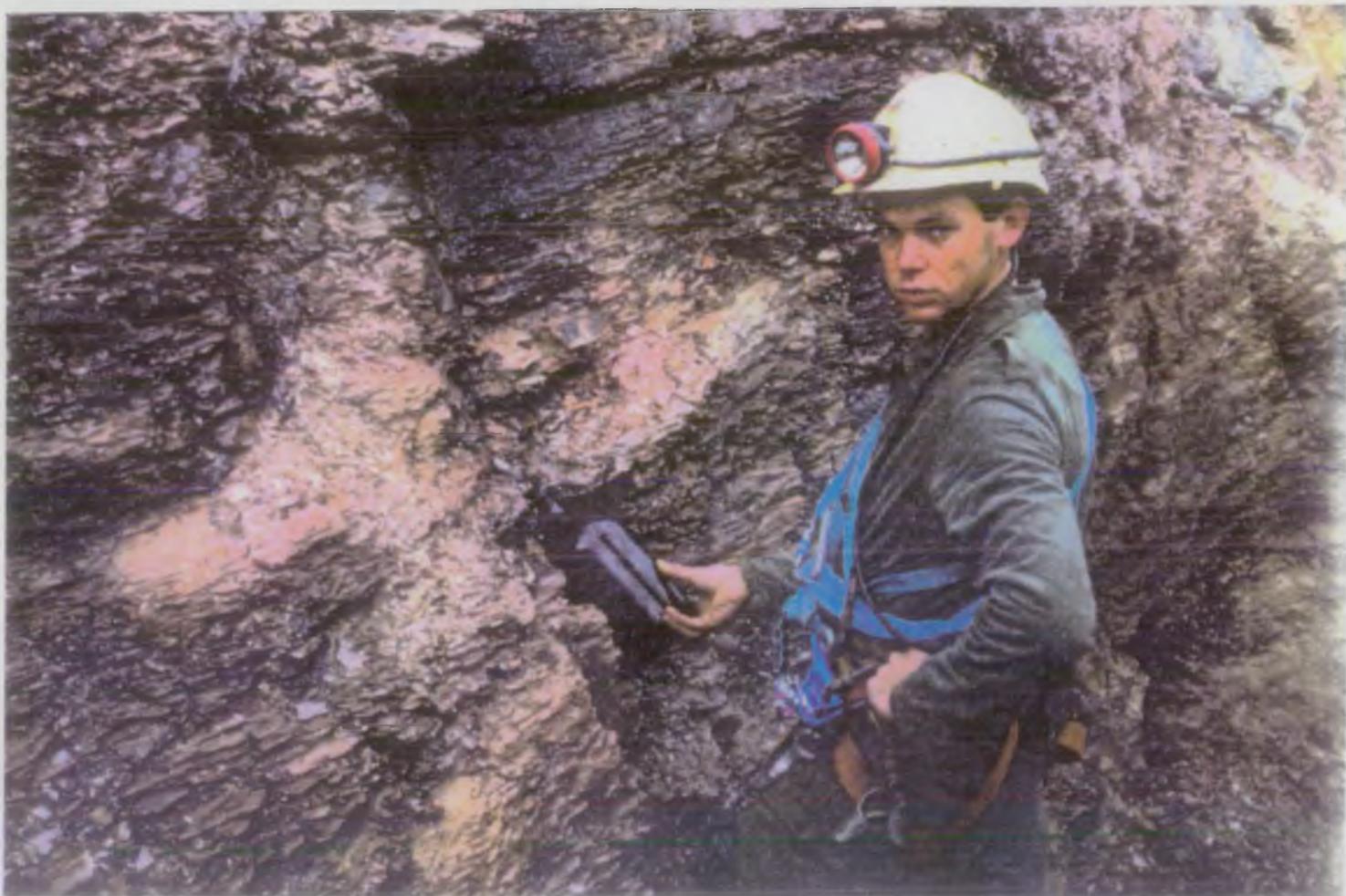
Location (OS grid ref.): SW 6763 4672

Date and Time of Sample: 26 October, 10:05 - 10:30

Estimated Flow Rate: 0.5 l/min

Sampling Procedure: Standard

Nature of Sampling Point: Water issuing from band of harder shale outcropping in gully formed by heavily altered soft shale associated with two parallel cross-courses (trending about 150 deg.m dipping 60 deg. west). In total probably 3 - 4 l/min issues from various fissures but the sample was taken from the largest flow point, about 10m down the gully, an open joint trending due south and dipping 70 deg. east.



P5: Sampling D3, 10 metres below top of gully.

P6: Detail D3.

SAMPLE D3

Location (OS grid ref.): SW 6763 4672

Date and Time of Sample: 26 October, 10:05 - 10:30

Estimated Flow Rate: 0.5 l/min

Sampling Procedure: Standard

Nature of Sampling Point: Water issuing from band of harder shale outcropping in gully formed by heavily altered soft shale associated with two parallel cross-courses (trending about 150 deg.m dipping 60 deg. west). In total probably 3 - 4 l/min issues from various fissures but the sample was taken from the largest flow point, about 10m down the gully, an open joint trending due south and dipping 70 deg. east.



P7: Sampling D4. West end of Gullyn Cove beach.
P8: Detail D4.

SAMPLE D4

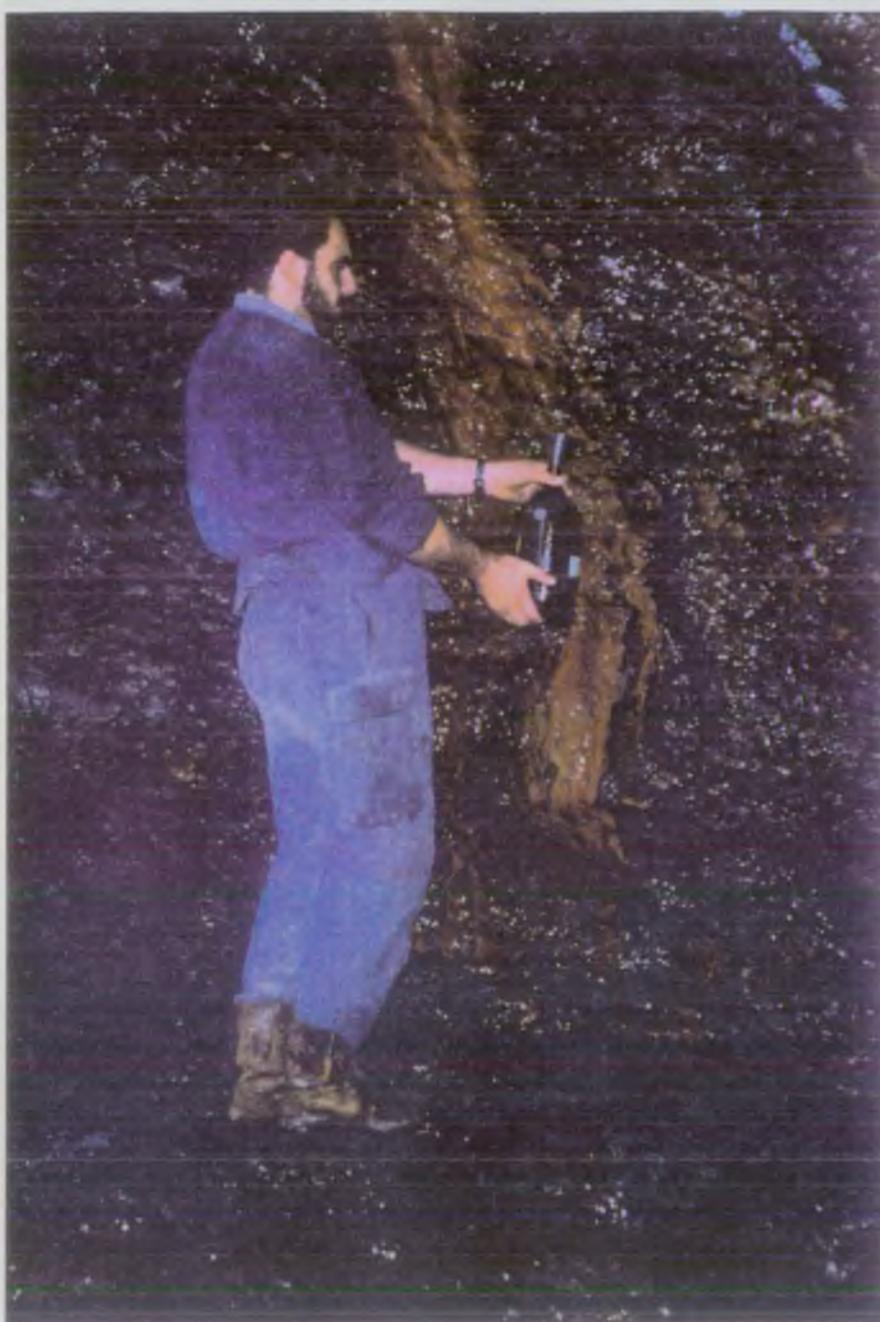
Location (OS grid ref.): SW 6753 4677

Date and Time of Sample: 26 October, 12:30 - 13:30

Estimated Flow Rate: 0.2 l/min

Sampling Procedure: Standard, drips collected in s/s and plastic funnels.

Nature of Sampling Point: Water dripping from vertical fault trending due south, outcropping in cliff at west end of beach. Evidence of mineralisation and considerable Fe staining.



P7: Sampling D4. West end of Gullyn Cove beach.

P8: Detail D4.

SAMPLE D4

Location (OS grid ref.): SW 6753 4677

Date and Time of Sample: 26 October, 12:30 - 13:30

Estimated Flow Rate: 0.2 l/min

Sampling Procedure: Standard, drips collected in s/s and plastic funnels.

Nature of Sampling Point: Water dripping from vertical fault trending due south, outcropping in cliff at west end of beach.

Evidence of mineralisation and considerable Fe staining.



P9: Sample Point D5, near bottom of gully.

Sample point lower centre, ringed. Approximate position of D11 also shown.

P10: Detail D5.

SAMPLE D5

Location (OS grid ref.): SW 6763 4675

Date and Time of Sample: 26 October, 12:45 - 13:05

Estimated Flow Rate: 3 l/min (total in gully about 10 l/min)

Sampling Procedure: Standard, but winchesters filled from 1 litre pyrex bottles.

Nature of Sampling point: Flow at base of same gully as D3 and D11, sampled at convenient point about 5m above beach. Flow much dispersed amongst rocks so difficult to estimate.



P9: Sample Point D5, near bottom of gully.
Sample point lower centre, ringed. Approximate position of D11
also shown.

P10: Detail D5.

SAMPLE D5

Location (OS grid ref.): SW 6763 4675

Date and Time of Sample: 26 October, 12:45 - 13:05

Estimated Flow Rate: 3 l/min (total in gully about 10 l/min)

Sampling Procedure: Standard, but winchesters filled from
1 litre pyrex bottles.

Nature of Sampling point: Flow at base of same gully as D3 and
D11, sampled at convenient point about 5m above beach. Flow much
dispersed amongst rocks so difficult to estimate.



P11: Sampling D6, adit at Gullyn Cove.

SAMPLE D6

Location (OS grid ref.): SW 6760 4678

Date and Time of Sample: 26 October, 12:00 - 12:05

Estimated Flow Rate: 18 l/min

Sampling Procedure: Standard

Nature of Sampling Point: Flow from adit driven on mineralised fault, trending 130 deg.m dipping 45 deg. west.



P12: Sample Points D7 & D8.

Entrance to Sally's Bottom adit top left.

P13: Sample point D7 (ringed), south branch of adit.

P14: Sampling D8, east branch of adit.

P15: Hauling D8 samples back to cliff top, Sally's Bottom.

SAMPLE D7

Location (OS grid ref.): SW 6780 4692

Date and Time of Sample: 24 October, 10:00 - 10:20

Estimated Flow Rate: 20 l/min

Sampling Procedure: Standard, but winchesters filled from 1 litre pyrex bottles.

Nature of Sampling point: Flow from southward branch of Sally's Bottom adit.

SAMPLE D8

Location (OS grid ref.): SW 6780 4692

Date and Time of Sample: 24 October, 10:00 - 10:20

Estimated Flow Rate: 60 l/min (in 2 parts)

Sampling Procedure: Standard, but winchesters filled from 1 litre pyrex bottle with s/s funnel.

Nature of Sampling point: Flow from eastward (main) branch of Sally's Bottom adit.



P12: Sample Points D7 & D8.

Entrance to Sally's Bottom adit top left.

P13: Sample point D7 (ringed), south branch of adit.

P14: Sampling D8, east branch of adit.

P15: Hauling D8 samples back to cliff top, Sally's Bottom.

SAMPLE D7

Location (OS grid ref.): SW 6780 4692

Date and Time of Sample: 24 October, 10:00 - 10:20

Estimated Flow Rate: 20 l/min

Sampling Procedure: Standard, but winchesters filled from 1 litre pyrex bottles.

Nature of Sampling point: Flow from southward branch of Sally's Bottom adit.

SAMPLE D8

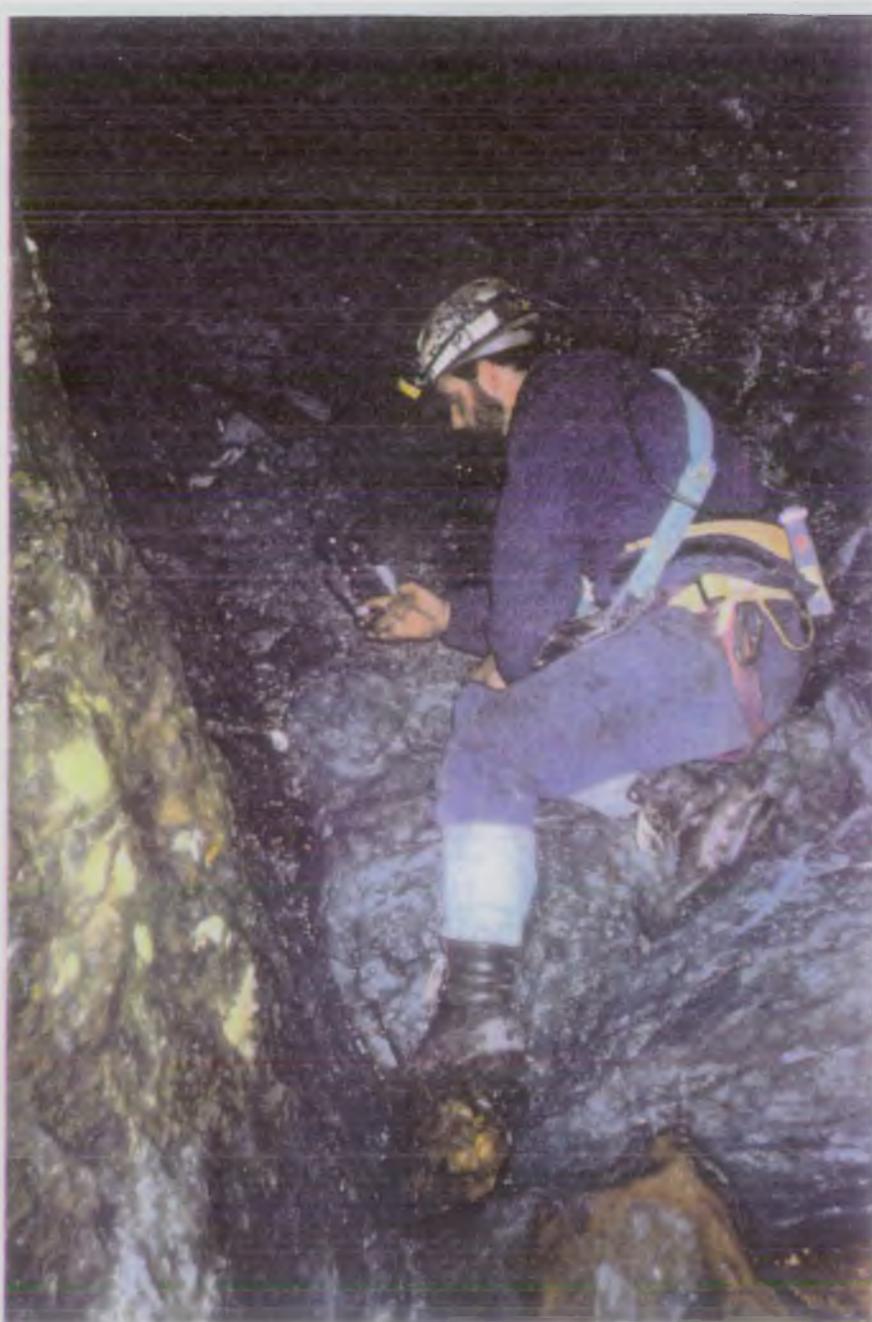
Location (OS grid ref.): SW 6780 4692

Date and Time of Sample: 24 October, 10:00 - 10:20

Estimated Flow Rate: 60 l/min (in 2 parts)

Sampling Procedure: Standard, but winchesters filled from 1 litre pyrex bottle with s/s funnel.

Nature of Sampling point: Flow from eastward (main) branch of Sally's Bottom adit.



P12: Sample Points D7 & D8.

Entrance to Sally's Bottom adit top left.

P13: Sample point D7 (ringed), south branch of adit.

P14: Sampling D8, east branch of adit.

P15: Hauling D8 samples back to cliff top, Sally's Bottom.

SAMPLE D7

Location (OS grid ref.): SW 6780 4692

Date and Time of Sample: 24 October, 10:00 - 10:20

Estimated Flow Rate: 20 l/min

Sampling Procedure: Standard, but winchesters filled from 1 litre pyrex bottles.

Nature of Sampling point: Flow from southward branch of Sally's Bottom adit.

SAMPLE D8

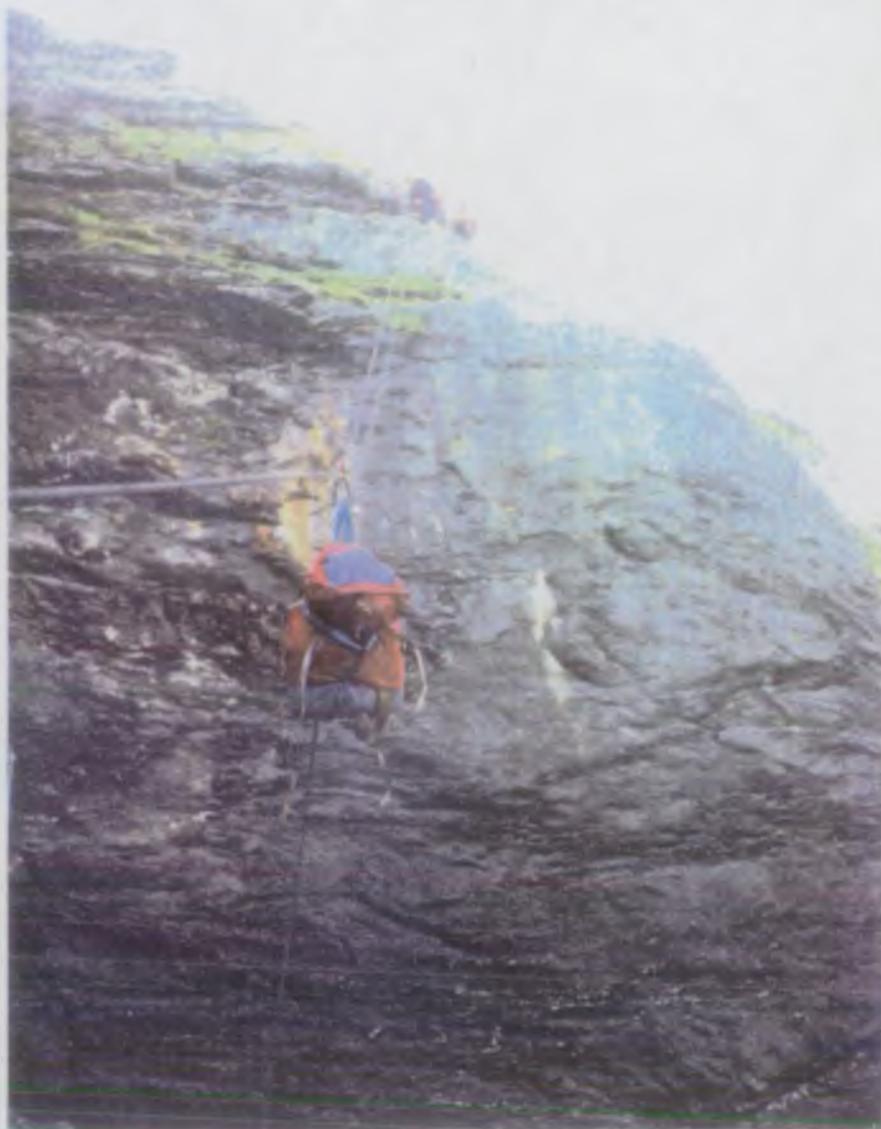
Location (OS grid ref.): SW 6780 4692

Date and Time of Sample: 24 October, 10:00 - 10:20

Estimated Flow Rate: 60 l/min (in 2 parts)

Sampling Procedure: Standard, but winchesters filled from 1 litre pyrex bottle with s/s funnel.

Nature of Sampling point: Flow from eastward (main) branch of Sally's Bottom adit.



P12: Sample Points D7 & D8.

Entrance to Sally's Bottom adit top left.

P13: Sample point D7 (ringed), south branch of adit.

P14: Sampling D8, east branch of adit.

P15: Hauling D8 samples back to cliff top, Sally's Bottom.

SAMPLE D7

Location (OS grid ref.): SW 6780 4692

Date and Time of Sample: 24 October, 10:00 - 10:20

Estimated Flow Rate: 20 l/min

Sampling Procedure: Standard, but winchesters filled from 1 litre pyrex bottles.

Nature of Sampling point: Flow from southward branch of Sally's Bottom adit.

SAMPLE D8

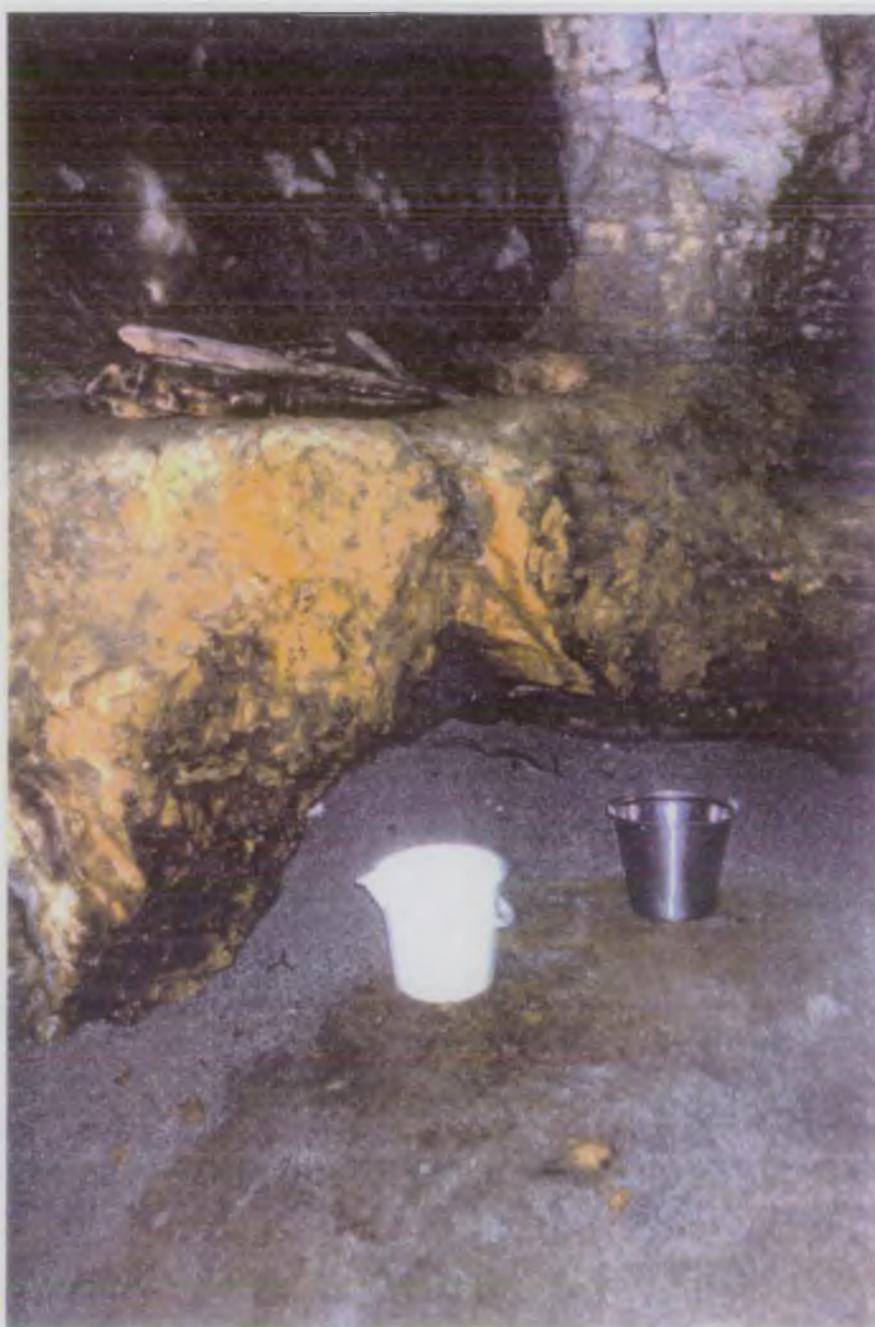
Location (OS grid ref.): SW 6780 4692

Date and Time of Sample: 24 October, 10:00 - 10:20

Estimated Flow Rate: 60 l/min (in 2 parts)

Sampling Procedure: Standard, but winchesters filled from 1 litre pyrex bottle with s/s funnel.

Nature of Sampling point: Flow from eastward (main) branch of Sally's Bottom adit.



P16: Sample Point D9, Wheal Tye adit, back of Seal Hole cave.
Collecting drips in buckets over 24 hour period.

SAMPLE D9

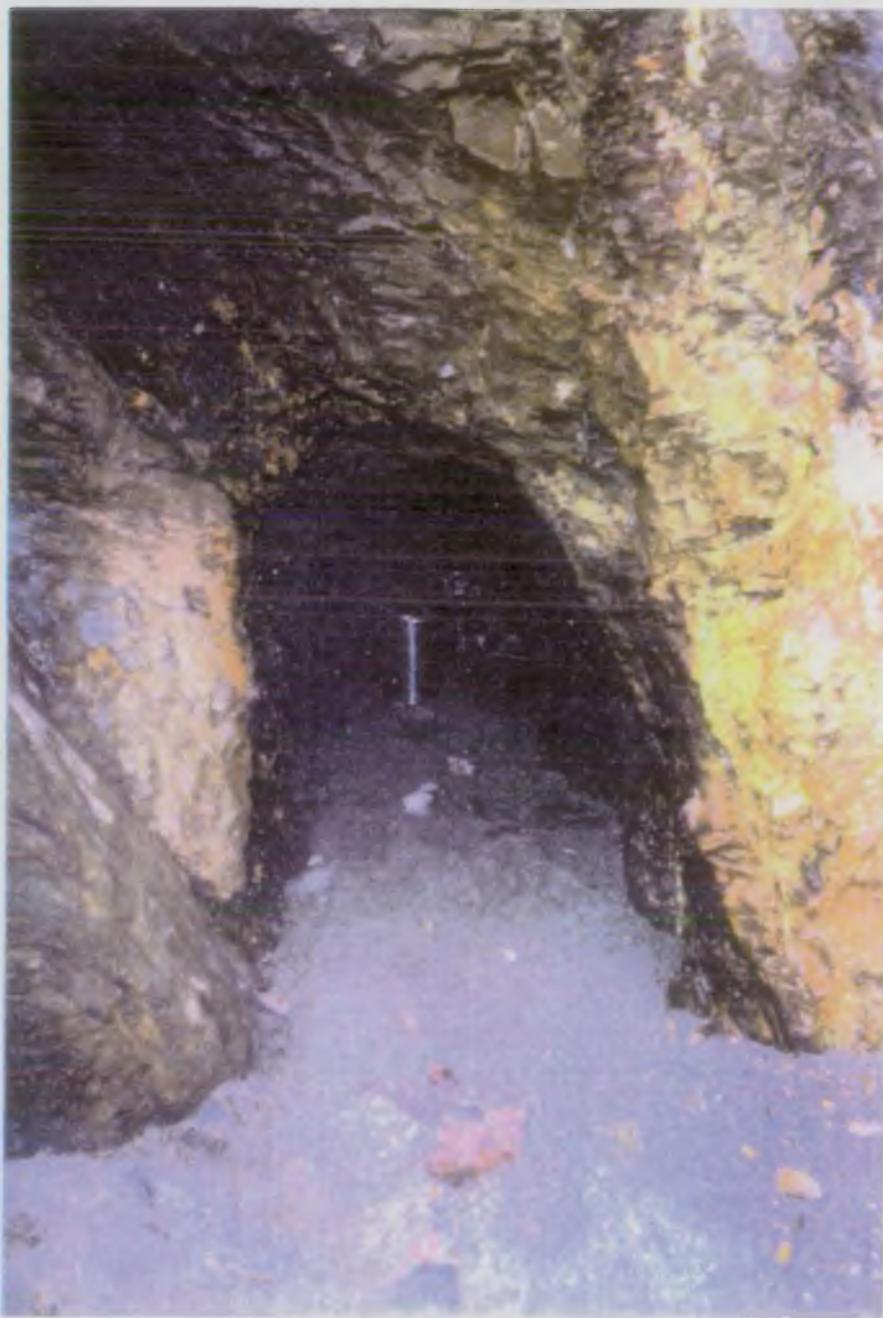
Location (OS grid ref.): SW 6820 4746

Date and Time of Sample: 24 October 13:30 - 25 October 13:30

Estimated Flow Rate: Over 20 litres in 24 hours

Sampling Procedure: Buckets (s/s and plastic) placed under drips for 24 hours. Plastic bucket overflowed but s/s contained only about 5 litres, so winchesters had to be filled from plastic bucket.

Nature of Sampling point: Water dripping from Wheal Tye adit at back of Seal Hole sea cave.



P17: Sample Point D10, old trial workings on cross-course at back of beach. Collecting drips in buckets over 24 hour period.
P18: Detail D10.

SAMPLE D10

Location (OS grid ref.): SW 6850 4748

Date and Time of Sample: 24 October 14:00 - 25 October 14:00

Estimated Flow Rate: 6 litres in 24 hours

Sampling Procedure: Buckets (s/s and plastic) placed under drips for 24 hours. Only 2 litres in pyrex and 4 litres in plastic was collected.

Nature of Sampling Point: Water collected from drips in shallow trial adit at back of beach on junction between major cross-course (trending 160 deg.m dipping 80 deg. west) and mineralised fault (trending 180 deg.m dipping 55 deg. west). The cross-course of blocky quartz is about 2m wide with a 0.4m band of clay infill and probably represents an impermeable lateral barrier, whilst still allowing longitudinal water movement. The water collected comes from the east of this cross-course, and is associated with the mineralised fault, which exhibits rich visible traces of Cu, As, Zn and Pb minerals.



P17: Sample Point D10, old trial workings on cross-course at back of beach. Collecting drips in buckets over 24 hour period.

P18: Detail D10.

SAMPLE D10

Location (OS grid ref.): SW 6850 4748

Date and Time of Sample: 24 October 14:00 - 25 October 14:00

Estimated Flow Rate: 6 litres in 24 hours

Sampling Procedure: Buckets (s/s and plastic) placed under drips for 24 hours. Only 2 litres in pyrex and 4 litres in plastic was collected.

Nature of Sampling Point: Water collected from drips in shallow trial adit at back of beach on junction between major cross-course (trending 160 deg.m dipping 80 deg. west) and mineralised fault (trending 180 deg.m dipping 55 deg. west). The cross-course of blocky quartz is about 2m wide with a 0.4m band of clay infill and probably represents an impermeable lateral barrier, whilst still allowing longitudinal water movement. The water collected comes from the east of this cross-course, and is associated with the mineralised fault, which exhibits rich visible traces of Cu, As, Zn and Pb minerals.



P19: Access to D11, abseiling down gully.

P20: Entrance to D11 adit in side of gully. See photo P9 for approximate position of D11 in relation to D5.

P21 & P22: Bringing samples out from D11.

SAMPLE D11

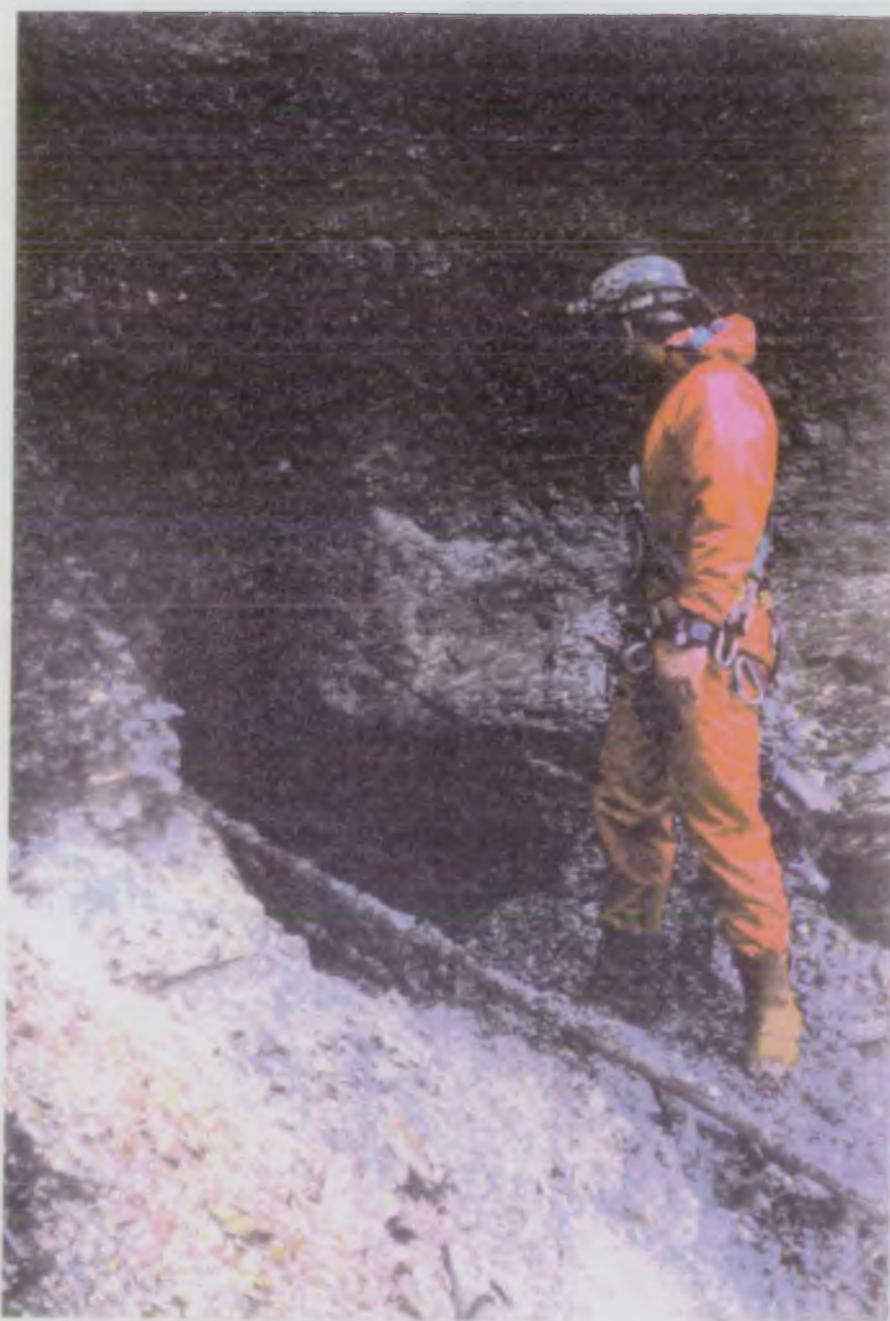
Location (OS grid ref.): SW 6761 4673

Date and Time of Sample: 26 October, 10:55 - 11:15

Estimated Flow Rate: about 0.1 - 0.2 l/min

Sampling Procedure: Bottles filled about 2cm beneath surface of 1m deep pool.

Nature of Sampling Point: Water dripping from roof at end of trial adit (about 10m long) into large pool. Adit driven on mineralised joint trending due south dipping 70 deg. east about 40m down same gully as D3 and D5.



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P21 & P22: Bringing samples out from D11.

SAMPLE D11

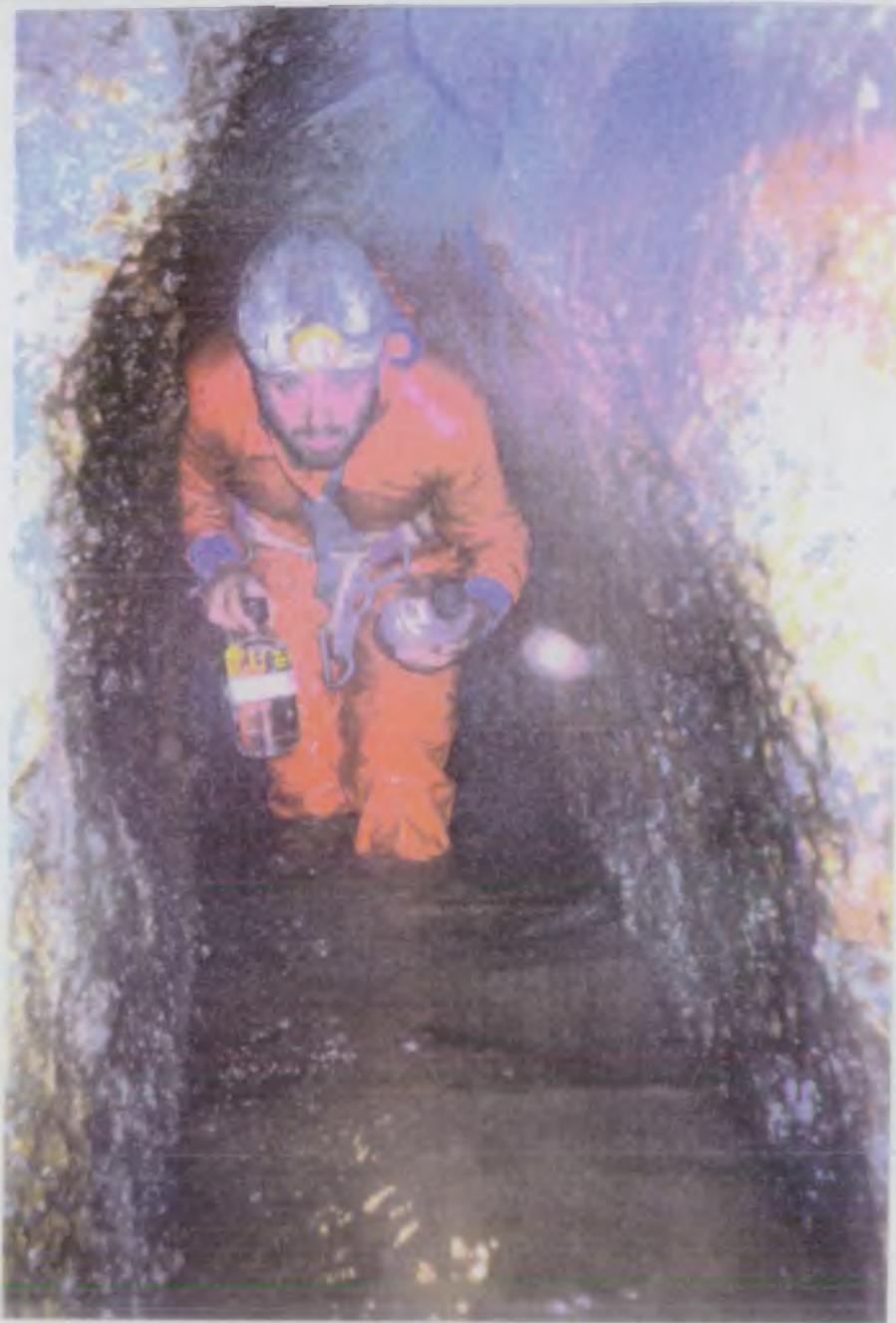
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SAMPLE D11

Location (OS grid ref.): SW 6761 4673

Date and Time of Sample: 26 October, 10:55 - 11:15

Estimated Flow Rate: about 0.1 - 0.2 l/min

Sampling Procedure: Bottles filled about 2cm beneath surface of 1m deep pool.

Nature of Sampling Point: Water dripping from roof at end of trial adit (about 10m long) into large pool. Adit driven on mineralised joint trending due south dipping 70 deg. east about 40m down same gully as D3 and D5.



P23: Showing relative positions of D12 and D13, ringed.
D12 is main adit, lower right, and D13 is older higher adit,
upper left.
P24: Sampling from D12.

SAMPLE D12

Location (OS grid ref.): SW 6805 4738
Date and Time of Sample: 25 October, 10:15 - 10:40
Estimated Flow Rate: 150 - 180 l/min
Sampling Procedure: Standard
Nature of Sampling Point: Flow issuing about 3m above MHWS from
the main adit of Lushington mine (Wheal Sterran section) which
runs over 300m roughly south, encountering several Cu lodes which
are notable for their high sulphide content.

SAMPLE D13

Location (OS grid ref.): SW 6807 4737
Date and Time of Sample: 25 October, 11:05 - 12:15
Estimated Flow Rate: 0.2 l/min
Sampling Procedure: Drips collected by funnel. Only 2
litres in pyrex bottles and 2 litres in plastic bottles
collected.
Nature of Sampling Point: Slight flow issuing from old Wheal
Sterran adit about 25m above MHWS and about 10m east of D12.
Much of this flow appears to come down shaft (exposed in cliff)
from higher level.



P23: Showing relative positions of D12 and D13, ringed.
D12 is main adit, lower right, and D13 is older higher adit,
upper left.

P24: Sampling from D12.

SAMPLE D12

Location (OS grid ref.): SW 6805 4738

Date and Time of Sample: 25 October, 10:15 - 10:40

Estimated Flow Rate: 150 - 180 l/min

Sampling Procedure: Standard

Nature of Sampling Point: Flow issuing about 3m above MHWS from the main adit of Lushington mine (Wheal Sterran section) which runs over 300m roughly south, encountering several Cu lodes which are notable for their high sulphide content.

SAMPLE D13

Location (OS grid ref.): SW 6807 4737

Date and Time of Sample: 25 October, 11:05 - 12:15

Estimated Flow Rate: 0.2 l/min

Sampling Procedure: Drips collected by funnel. Only 2 litres in pyrex bottles and 2 litres in plastic bottles collected.

Nature of Sampling Point: Slight flow issuing from old Wheal Sterran adit about 25m above MHWS and about 10m east of D12. Much of this flow appears to come down shaft (exposed in cliff) from higher level.



P25: General position of D13 (ringed) in relation to other workings.

P26: Access to D13 adit.

P27: Sampling D13.

SAMPLE D13

Location (OS grid ref.): SW 6807 4737

Date and Time of Sample: 25 October, 11:05 - 12:15

Estimated Flow Rate: 0.2 l/min

Sampling Procedure: Drips collected by funnel. Only 2 litres in pyrex bottles and 2 litres in plastic bottles collected.

Nature of Sampling Point: Slight flow issuing from old Wheal Sterran adit about 25m above MHWS and about 10m east of D12. Much of this flow appears to come down shaft (exposed in cliff) from higher level.



P25: General position of D13 (ringed) in relation to other workings.

P26: Access to D13 adit.

P27: Sampling D13.

SAMPLE D13

Location (OS grid ref.): SW 6807 4737

Date and Time of Sample: 25 October, 11:05 - 12:15

Estimated Flow Rate: 0.2 l/min

Sampling Procedure: Drips collected by funnel. Only 2 litres in pyrex bottles and 2 litres in plastic bottles collected.

Nature of Sampling Point: Slight flow issuing from old Wheal Sterran adit about 25m above MHWS and about 10m east of D12. Much of this flow appears to come down shaft (exposed in cliff) from higher level.



P25: General position of D13 (ringed) in relation to other workings.

P26: Access to D13 adit.

P27: Sampling D13.

SAMPLE D13

Location (OS grid ref.): SW 6807 4737

Date and Time of Sample: 25 October, 11:05 - 12:15

Estimated Flow Rate: 0.2 l/min

Sampling Procedure: Drips collected by funnel. Only 2 litres in pyrex bottles and 2 litres in plastic bottles collected.

Nature of Sampling Point: Slight flow issuing from old Wheal Sterran adit about 25m above MHWS and about 10m east of D12. Much of this flow appears to come down shaft (exposed in cliff) from higher level.



P28 & 29: Access to D14 sea cave from old workings.
P30: Detail of D14, adit at back of sea cave, showing insignificant flow.

SAMPLE D14

Location (OS grid ref.): SW 6782 4722
Date and Time of Sample: 24 October, 11:00
Estimated Flow Rate: Insignificant Flow
Sampling Procedure: NO SAMPLES TAKEN
Nature of Sampling point: Wheal West adit is driven about 100m east on a Cu lode and starts at the back of a sea cave about 3m above MHWS. A small trickle was visible from its entrance but it was not possible to obtain any sample (it is known to flow in very wet conditions). Access was from old workings in the roof of the sea cave about 15m above the beach.



P28 & 29: Access to D14 sea cave from old workings.

P30: Detail of D14, adit at back of sea cave, showing insignificant flow.

SAMPLE D14

Location (OS grid ref.): SW 6782 4722

Date and Time of Sample: 24 October, 11:00

Estimated Flow Rate: Insignificant Flow

Sampling Procedure: NO SAMPLES TAKEN

Nature of Sampling point: Wheal West adit is driven about 100m east on a Cu lode and starts at the back of a sea cave about 3m above MHWS. A small trickle was visible from its entrance but it was not possible to obtain any sample (it is known to flow in very wet conditions). Access was from old workings in the roof of the sea cave about 15m above the beach.



P28 & 29: Access to D14 sea cave from old workings.

P30: Detail of D14, adit at back of sea cave, showing insignificant flow.

SAMPLE D14

Location (OS grid ref.): SW 6782 4722

Date and Time of Sample: 24 October, 11:00

Estimated Flow Rate: Insignificant Flow

Sampling Procedure: NO SAMPLES TAKEN

Nature of Sampling point: Wheal West adit is driven about 100m east on a Cu lode and starts at the back of a sea cave about 3m above MHWS. A small trickle was visible from its entrance but it was not possible to obtain any sample (it is known to flow in very wet conditions). Access was from old workings in the roof of the sea cave about 15m above the beach.



P32 - P35: Show very recent and continuing dumping in open shafts of the Wheel Tye section of Lushington Mine. These shafts, at approximately SW 683 473, connect directly to adit D9, and indirectly to adit D12.



P32 - P35: Show very recent and continuing dumping in open shafts of the Wheal Tye section of Lushington Mine. These shafts, at approximately SW 683 473, connect directly to adit D9, and indirectly to adit D12.



P32 - P35: Show very recent and continuing dumping in open shafts of the Wheal Tye section of Lushington Mine. These shafts, at approximately SW 683 473, connect directly to adit D9, and indirectly to adit D12.



P32 - P35: Show very recent and continuing dumping in open shafts of the Wheal Tye section of Lushington Mine. These shafts, at approximately SW 683 473, connect directly to adit D9, and indirectly to adit D12.



El Hayle Ulla Stream discharging to sea.
Sampling location at boundary fence, Nancekuke (SW 6637 4633).





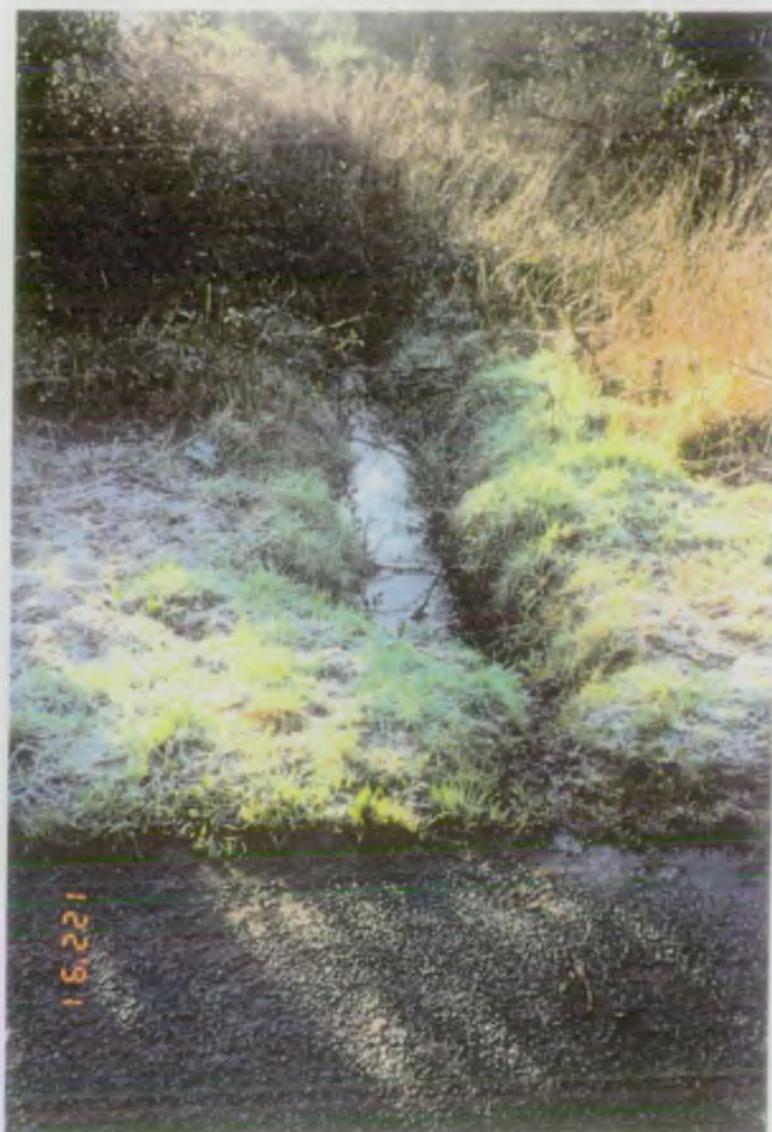
E3 Tributary of Sally's Bottom Stream flowing north at boundary fence,
Nancekuke. Sampling location at SW 6783 4690.



E4 Sally's Bottom Stream flowing west at boundary fence, Nancekuke.
Sampling location at SW 6786 4696.

E5 Adit discharge at Porthtowan (SW 6888 4682).





E6 Tributary of Redruth Stream flowing south from Nancekuke Common.
Sampled at road culvert (SW 6885 4619).



E7 Tributary of Portreath Stream sampled north of the Cambrose/Laity Moor road at SW 6904 4567.



E8 Tributary of Portreath Stream sampled east of the Cambrose/Laity Moor road
at SW 6879 4529.

APPENDIX 3

ANALYTICAL RESULTS OF FIRST SURVEY

Sample Analysis Report

Sampling Point : NANCEKUKU/D1

Date/Time Taken : 25-OCT-91 14:30

GOODEN HEANE COVE IRON STAINED SEEPAGE APPROX 2 METRES ABOVE TOP OF BEACH

Address : GOODEN HEANE COVE
TOP OF BEACH

Laboratory Reference : E21932

Sampler's Comments :

PRESENT WEATHER - DRY, OVERCAST

PRECIPITATION - NIL FLOW - 1 LT/MIN COND 648 pH 7.6

Det. Code	Description	Result
61	pH	8.0000 pH
62	CONDUCTIVITY AT 20C	538.0000 Microsiemens/cm
58	TURBIDITY	< 1.0000 Turbidity FTU
76	TEMPERATURE	11.3000 Celsius
81	OXYGEN DISSOLVED % SATURATION	73.0000 %
82	OXYGEN DISSOLVED	7.9700 mg/l
	BOD ATU	< 1.0000 mg/l
105	MERCURY	< 0.0200 ug/l
106	CADMIUM DISSOLVED	< 0.2000 ug/l
108	CADMIUM	< 0.2000 ug/l
111	AMMONIA EXPRESSED AS NITROGEN	< 0.0200 mg/l N
116	NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	7.9000 mg/l N
118	NITRITE	< 0.0100 mg/l
119	AMMONIA NON-IONISED	0.0004 mg/l
135	SUSPENDED SOLIDS 105C	< 2.0000 mg/l
172	CHLORIDE ION	147.0000 mg/l
180	ORTHO-PHOSPHATE	0.0500 mg/l
182	SILICATE REACTIVE DISSOLVED	2.7000 mg/l
213	COPPER DISSOLVED	No Result
	RESULT = .004	
215	COPPER	0.0030 mg/l
231	BERYLLIUM DISSOLVED	< 0.0010 mg/l
233	BERYLLIUM	< 0.0010 mg/l
243	ZINC DISSOLVED	No Result
	RESULT = .009	
245	ZINC	0.0060 mg/l
255	BARIUM DISSOLVED	No Result
	ACTUAL RESULT = .024	
257	BARIUM	0.0030 mg/l
281	BORON DISSOLVED	No Result
	ACTUAL RESULT = .025	
283	BORON	0.0210 mg/l
285	ALUMINIUM DISSOLVED	< 0.0300 mg/l
287	ALUMINIUM	< 0.0300 mg/l
326	LEAD DISSOLVED	0.0010 mg/l
328	LEAD	0.0010 mg/l
350	VANADIUM DISSOLVED	< 0.0010 mg/l
352	VANADIUM	< 0.0010 mg/l
358	ANTIMONY DISSOLVED	< 0.0010 mg/l
360	ANTIMONY	< 0.0010 mg/l

Contd...

Sample Analysis ReportSampling Point : NANCEKUKU/D1

Date/Time Taken : 25-OCT-91 14:30

Det.	Code	Description	Result
373		CHROMIUM DISSOLVED	< 0.0010 mg/l
375		CHROMIUM	< 0.0010 mg/l
401		MANGANESE DISSOLVED	0.0020 mg/l
403		MANGANESE	0.0020 mg/l
423		COBALT DISSOLVED	< 0.0010 mg/l
425		COBALT	< 0.0010 mg/l
427		NICKEL DISSOLVED	0.0020 mg/l
429		NICKEL	0.0020 mg/l
3082		HEXACHLORO-BENZENE TOTAL	< 3.5000 ng/l
3083		HEXACHLORO-BUTADIENE TOTAL	< 3.0000 ng/l
3106		ANALYSIS BY MASS-SPEC	Report Filed Misc
3276		ALDRIN	< 3.5000 ng/l
3294		DDE-(PP')	< 3.5000 ng/l
3295		DDE-(OP')	< 8.0000 ng/l
3296		DDT (OP')	< 6.0000 ng/l
37		DDT (PP')	< 3.0000 ng/l
3301		DIELDRIN	< 3.5000 ng/l
3306		ENDRIN	< 4.0000 ng/l
3310		HCH ALPHA	< 4.0000 ng/l
3311		HCH BETA	< 12.0000 ng/l
3312		HCH DELTA	< 4.0000 ng/l
3313		HCH GAMMA	< 3.0000 ng/l
3329		TDE (OP')	< 5.0000 ng/l
3330		TDE (PP')	< 3.0000 ng/l
7354		ARSENIC DISSOLVED ppb	0.4000 ug/l
7356		ARSENIC TOTAL ppb	0.5000 ug/l

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis ReportSampling Point : NANCEKUKU/D2

Date/Time Taken : 25-OCT-91 14:30

GOODEN HEANE COVE FAST FLOWING DISCHARGE FROM FISSURE IN CLIFF APPROX 5 MET
RES ABOVE BEACHAddress : GOODEN HEAVE COVE,
CLIFF FISSURE

Laboratory Reference : E21933

Sampler's Comments :

PRESENT WEATHER - DRY, OVERCAST

PRECIPITATION - NIL FLOW - 0.75 LT/MIN COND 514 pH 6.28

Det.	Code	Description	Result
61		pH	6.9000 pH
62		CONDUCTIVITY AT 20C	506.0000 Microsiemens/cm
68		TURBIDITY	< 1.0000 Turbidity FTU
76		TEMPERATURE	12.3000 Celsius
81		OXYGEN DISSOLVED % SATURATION	70.0000 %
		OXYGEN DISSOLVED	7.4700 mg/l
85		BOD ATU	< 1.0000 mg/l
105		MERCURY	0.0200 ug/l
106		CADMIUM DISSOLVED	0.8000 ug/l
108		CADMIUM	0.9000 ug/l
111		AMMONIA EXPRESSED AS NITROGEN	< 0.0200 mg/l N
116		NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	5.2000 mg/l N
118		NITRITE	0.0100 mg/l
119		AMMONIA NON-IONISED	0.0000 mg/l
135		SUSPENDED SOLIDS 105C	2.3000 mg/l
172		CHLORIDE ION	109.0000 mg/l
180		ORTHO-PHOSPHATE	0.0400 mg/l
182		SILICATE REACTIVE DISSOLVED	5.8000 mg/l
213		COPPER DISSOLVED	0.0100 mg/l
215		COPPER	0.0110 mg/l
231		BERYLLIUM DISSOLVED	0.0010 mg/l
233		BERYLLIUM	< 0.0010 mg/l
243		ZINC DISSOLVED	No Result
		RESULT = .97	
245		ZINC	0.8800 mg/l
255		BARIUM DISSOLVED	No Result
		ACTUAL RESULT = .051	
257		BARIUM	0.0090 mg/l
281		BORON DISSOLVED	No Result
		ACTUAL RESULT = .046	
283		BORON	0.0250 mg/l
285		ALUMINIUM DISSOLVED	< 0.0300 mg/l
7		ALUMINIUM	< 0.0300 mg/l
326		LEAD DISSOLVED	0.0020 mg/l
328		LEAD	0.0060 mg/l
350		VANADIUM DISSOLVED	< 0.0010 mg/l
352		VANADIUM	< 0.0010 mg/l
358		ANTIMONY DISSOLVED	< 0.0010 mg/l
360		ANTIMONY	< 0.0010 mg/l
373		CHROMIUM DISSOLVED	< 0.0010 mg/l

Contd...

Sample Analysis ReportSampling Point : NANCEKUKU/D2

Date/Time Taken : 25-OCT-91 14:30

Det. Code	Description	Result
375	CHROMIUM	< 0.0010 mg/l
401	MANGANESE DISSOLVED	No Result
RESULT = .18		
403	MANGANESE	0.1600 mg/l
423	COBALT DISSOLVED	0.0110 mg/l
425	COBALT	0.0110 mg/l
427	NICKEL DISSOLVED	No Result
RESULT = .017		
429	NICKEL	0.0160 mg/l
3082	HEXACHLORO-BENZENE TOTAL	< 3.5000 ng/l
3083	HEXACHLORO-BUTADIENE TOTAL	< 3.0000 ng/l
3106	ANALYSIS BY MASS-SPEC	Report Filed Misc
3276	ALDRIN	< 3.5000 ng/l
3294	DDE-(PP')	< 3.5000 ng/l
3295	DDE-(OP')	< 8.0000 ng/l
96	DDT (OP')	< 6.0000 ng/l
3297	DDT (PP')	< 3.0000 ng/l
3301	DIELDRIN	< 3.5000 ng/l
3306	ENDRIN	< 4.0000 ng/l
3310	HCH ALPHA	< 4.0000 ng/l
3311	HCH BETA	< 12.0000 ng/l
3312	HCH DELTA	< 4.0000 ng/l
3313	HCH GAMMA	< 3.0000 ng/l
3329	TDE (OP')	21.5000 ng/l
3330	TDE (PP')	< 3.0000 ng/l
7354	ARSENIC DISSOLVED ppb	0.3000 ug/l
7356	ARSENIC TOTAL ppb	0.3000 ug/l

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis Report

Sampling Point : NANCEKUKU/D3

Date/Time Taken : 26-OCT-91 10:00

SEEPAGE APPROX 15 METRES BELOW CLIFF-TOP PATH

Address : GRANDWATER SEEPAGE 3M BELOW
GALLEY

Laboratory Reference : E21984

Sampler's Comments :

COND=353 PH=5.55 COND:US/CM

Det.	Code	Description	Result
61	PH		6.2000 pH
62	CONDUCTIVITY AT 20C		365.0000 Microsiemens/cm
68	TURBIDITY		2.0000 Turbidity FTU
76	TEMPERATURE		11.5000 Celsius
81	OXYGEN DISSOLVED % SATURATION		74.0000 %
82	OXYGEN DISSOLVED		8.0400 mg/l
85	BOD ATU		< 1.0000 mg/l
95	MERCURY		< 0.0200 ug/l
106	CADMIUM DISSOLVED		No Result
RESULT=2.0			
108	CADMIUM		1.8000 ug/l
111	AMMONIA EXPRESSED AS NITROGEN		< 0.0200 mg/l N
116	NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN		3.6400 mg/l N
118	NITRITE		< 0.0100 mg/l
119	AMMONIA NON-IONISED		0.0000 mg/l
135	SUSPENDED SOLIDS 105C		< 2.0000 mg/l
172	CHLORIDE ION		72.8000 mg/l
180	ORTHO-PHOSPHATE		< 0.0100 mg/l
182	SILICATE REACTIVE DISSOLVED		5.0000 mg/l
213	COPPER DISSOLVED		0.0060 mg/l
215	COPPER		0.0060 mg/l
231	BERYLLIUM DISSOLVED		< 0.0010 mg/l
233	BERYLLIUM		< 0.0010 mg/l
243	ZINC DISSOLVED		No Result
RESULT=.100			
245	ZINC		0.0870 mg/l
255	BARIUM DISSOLVED		No Result
RESULT=.016			
257	BARIUM		0.0080 mg/l
281	BORON DISSOLVED		0.0320 mg/l
283	BORON		0.0320 mg/l
285	ALUMINIUM DISSOLVED		< 0.0300 mg/l
297	ALUMINIUM		< 0.0300 mg/l
6	LEAD DISSOLVED		0.0020 mg/l
328	LEAD		0.0030 mg/l
350	VANADIUM DISSOLVED		< 0.0010 mg/l
352	VANADIUM		< 0.0010 mg/l
358	ANTIMONY DISSOLVED		< 0.0010 mg/l
360	ANTIMONY		< 0.0010 mg/l
373	CHROMIUM DISSOLVED		< 0.0010 mg/l

Contd...

3rd Dec 1991

Sample Analysis Report

Sampling Point : NANCEKUKU/D3

Date/Time Taken : 26-OCT-91 10:00

Det.	Code	Description	Result
375	CHROMIUM		< 0.0010 mg/l
401	MANGANESE DISSOLVED		No Result
RESULT = 0.28			
403	MANGANESE		0.2600 mg/l
423	COBALT DISSOLVED		0.0010 mg/l
425	COBALT		0.0010 mg/l
427	NICKEL DISSOLVED		No Result
RESULT=0.007			
429	NICKEL		0.0060 mg/l
3082	HEXACHLORO-BENZENE TOTAL		< 3.5000 ng/l
3083	HEXACHLORO-BUTADIENE TOTAL		< 3.0000 ng/l
3106	ANALYSIS BY MASS-SPEC		Report Filed Misc
3276	ALDRIN		< 3.5000 ng/l
3294	DDE-(PP')		< 3.5000 ng/l
3295	DDE-(OP')		< 8.0000 ng/l
3296	DDT (OP')		< 6.0000 ng/l
3297	DDT (PP')		< 3.0000 ng/l
3301	DIELDRIN		< 3.5000 ng/l
3306	ENDRIN		< 4.0000 ng/l
3310	HCH ALPHA		< 4.0000 ng/l
3311	HCH BETA		< 12.0000 ng/l
3312	HCH DELTA		< 4.0000 ng/l
3313	HCH GAMMA		< 3.0000 ng/l
3329	TDE (OP')		No Result
ANALYTICAL PROBLEM			
3330	TDE (PP')		< 3.0000 ng/l
7354	ARSENIC DISSOLVED ppb		< 0.1000 ug/l
7356	ARSENIC TOTAL ppb		< 0.1000 ug/l

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis ReportSampling Point : NANCEKUKU/D4

Date/Time Taken : 26-OCT-91 13:30

GULLYN ROCK COVE SEEPAGE AT BASE OF CLIFF

Address : GULLYN COVE IVAR SEEPAGE AT
BASE OF CLIFF

Laboratory Reference : E21986

Sampler's Comments :
COND=344 PH= 6.10

Det.	Code	Description	Result
61		pH	6.2000 pH
62		CONDUCTIVITY AT 20C	376.0000 Microsiemens/cm
68		TURBIDITY	2.0000 Turbidity FTU
76		TEMPERATURE	12.1000 Celsius
81		OXYGEN DISSOLVED % SATURATION	74.0000 %
82		OXYGEN DISSOLVED	7.9300 mg/l
85		BOD ATU	< 1.0000 mg/l
85		MERCURY	< 0.0200 ug/l
106		CADMIUM DISSOLVED	< 0.2000 ug/l
108		CADMIUM	< 0.2000 ug/l
111		AMMONIA EXPRESSED AS NITROGEN	< 0.0200 mg/l N
116		NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	< 0.1000 mg/l N
118		NITRITE	< 0.0100 mg/l
119		AMMONIA NON-IONISED	0.0000 mg/l
135		SUSPENDED SOLIDS 105C	3.7000 mg/l
172		CHLORIDE ION	91.8000 mg/l
180		ORTHO-PHOSPHATE	< 0.0100 mg/l
182		SILICATE REACTIVE DISSOLVED	8.1000 mg/l
213		COPPER DISSOLVED	0.0010 mg/l
215		COPPER	0.0010 mg/l
231		BERYLLIUM DISSOLVED	0.0010 mg/l
233		BERYLLIUM	0.0010 mg/l
243		ZINC DISSOLVED	1.2000 mg/l
245		ZINC	1.2000 mg/l
255		BARIUM DISSOLVED	No Result
		RESULT=0.024	
257		BARIUM	0.0190 mg/l
281		BORON DISSOLVED	No Result
		RESULT=0.022	
283		BORON	0.0200 mg/l
285		ALUMINIUM DISSOLVED	< 0.0300 mg/l
287		ALUMINIUM	0.0500 mg/l
286		LEAD DISSOLVED	< 0.0010 mg/l
283		LEAD	< 0.0010 mg/l
350		VANADIUM DISSOLVED	< 0.0010 mg/l
352		VANADIUM	< 0.0010 mg/l
358		ANTIMONY DISSOLVED	< 0.0010 mg/l
360		ANTIMONY	< 0.0010 mg/l
373		CHROMIUM DISSOLVED	< 0.0010 mg/l
375		CHROMIUM	< 0.0010 mg/l

Contd...

Sample Analysis ReportSampling Point : NANCEKUKU/D4

Date/Time Taken : 26-OCT-91 13:30

Det.	Code	Description	Result
401		MANGANESE DISSOLVED	1.0000 mg/l
403		MANGANESE	1.0000 mg/l
423		COBALT DISSOLVED	0.0320 mg/l
425		COBALT	0.0320 mg/l
427		NICKEL DISSOLVED	No Result
RESULT=0.031			
429		NICKEL	0.0270 mg/l
3082		HEXACHLORO-BENZENE TOTAL	< 3.5000 ng/l
3083		HEXACHLORO-BUTADIENE TOTAL	< 3.0000 ng/l
3106		ANALYSIS BY MASS-SPEC	Report Filed Misc
3276		ALDRIN	< 3.5000 ng/l
3294		DDE-(PP')	< 3.5000 ng/l
3295		DDE-(OP')	< 8.0000 ng/l
3296		DDT (OP')	< 6.0000 ng/l
3297		DDT (PP')	< 3.0000 ng/l
301		DIELDRIN	< 3.5000 ng/l
3306		ENDRIN	< 4.0000 ng/l
3310		HCH ALPHA	< 4.0000 ng/l
3311		HCH BETA	< 12.0000 ng/l
3312		HCH DELTA	< 4.0000 ng/l
3313		HCH GAMMA	< 3.0000 ng/l
3329		TDE (OP')	< 5.0000 ng/l
3330		TDE (PP')	< 3.0000 ng/l
7354		ARSENIC DISSOLVED ppb	0.6000 ug/l
7356		ARSENIC TOTAL ppb	0.8000 ug/l

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis Report

Sampling Point : NANCEKUKU/D5

Date/Time Taken : 26-OCT-91 13:00

GULLYN ROCK COVE STREAM AT BASE OF GULLEY

Address : GULLYN COVE - STREAM AT BASE OF GULLEY

Laboratory Reference : E21988

Sampler's Comments :
COND=420 PH=4.44

Det.	Code	Description	Result
61		pH	5.4000 pH
62		CONDUCTIVITY AT 20C	437.0000 Microsiemens/cm
68		TURBIDITY	< 1.0000 Turbidity FTU
76		TEMPERATURE	11.5000 Celsius
81		OXYGEN DISSOLVED & SATURATION	73.0000 %
82		OXYGEN DISSOLVED	7.9300 mg/l
85		BOD ATU	< 1.0000 mg/l
95		MERCURY	0.0200 ug/l
106		CADMIUM DISSOLVED	No Result
RESULT=.7			
108		CADMIUM	0.6000 ug/l
111		AMMONIA EXPRESSED AS NITROGEN	< 0.0200 mg/l N
116		NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	3.7000 mg/l N
118		NITRITE	< 0.0100 mg/l
119		AMMONIA NON-IONISED	0.0000 mg/l
135		SUSPENDED SOLIDS 105C	< 2.0000 mg/l
172		CHLORIDE ION	94.3000 mg/l
180		ORTHO-PHOSPHATE	< 0.0100 mg/l
182		SILICATE REACTIVE DISSOLVED	4.8000 mg/l
213		COPPER DISSOLVED	No Result
RESULT=0.011			
215		COPPER	0.0100 mg/l
231		BERYLLIUM DISSOLVED	< 0.0010 mg/l
233		BERYLLIUM	< 0.0010 mg/l
243		ZINC DISSOLVED	0.2400 mg/l
245		ZINC	0.2400 mg/l
255		BARIUM DISSOLVED	No Result
RESULT=0.009			
257		BARIUM	0.0060 mg/l
281		BORON DISSOLVED	0.0310 mg/l
283		BORON	0.0310 mg/l
285		ALUMINIUM DISSOLVED	0.1500 mg/l
297		ALUMINIUM	0.1500 mg/l
306		LEAD DISSOLVED	< 0.0010 mg/l
328		LEAD	< 0.0010 mg/l
350		VANADIUM DISSOLVED	< 0.0010 mg/l
352		VANADIUM	< 0.0010 mg/l
358		ANTIMONY DISSOLVED	< 0.0010 mg/l
360		ANTIMONY	< 0.0010 mg/l
373		CHROMIUM DISSOLVED	< 0.0010 mg/l

Contd...

Sample Analysis ReportSampling Point : NANCEKUKU/D5

Date/Time Taken : 26-OCT-91 13:00

Det.	Code	Description	Result
375	CHROMIUM		< 0.0010 mg/l
401	MANGANESE DISSOLVED		No Result
RESULT=.033			
403	MANGANESE		0.0320 mg/l
423	COBALT DISSOLVED		< 0.0010 mg/l
425	COBALT		< 0.0010 mg/l
427	NICKEL DISSOLVED		0.0090 mg/l
429	NICKEL		0.0090 mg/l
3082	HEXACHLORO-BENZENE TOTAL		< 3.5000 ng/l
3083	HEXACHLORO-BUTADIENE TOTAL		< 3.0000 ng/l
3106	ANALYSIS BY MASS-SPEC	Report Filed Misc	
3276	ALDRIN		< 3.5000 ng/l
3294	DDE-(PP')		< 3.5000 ng/l
3295	DDE-(OP')		< 8.0000 ng/l
3296	DDT (OP')		< 6.0000 ng/l
3297	DDT (PP')		< 3.0000 ng/l
3301	DIELDRIN		< 3.5000 ng/l
3306	ENDRIN		< 4.0000 ng/l
3310	HCH ALPHA		< 4.0000 ng/l
3311	HCH BETA		< 12.0000 ng/l
3312	HCH DELTA		< 4.0000 ng/l
3313	HCH GAMMA		< 3.0000 ng/l
3329	TDE (OP')		< 5.0000 ng/l
3330	TDE (PP')		< 3.0000 ng/l
7354	ARSENIC DISSOLVED ppb		< 0.1000 ug/l
7356	ARSENIC TOTAL ppb		< 0.1000 ug/l

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis Report

Sampling Point : NANCEKUKU/D6

Date/Time Taken : 26-OCT-91 00:00

GULLYN ROCK COVE SEEPAGE FROM ADIT APPROX 3 METRES ABOVE TOP OF BEACH

Address : GULLYN COVE - ADIT 3M ABOVE
BEACH

Laboratory Reference : E21987

Sampler's Comments :
COND=308 PH=5.46

Det.	Code	Description	Result
61		pH	5.8000 pH
62		CONDUCTIVITY AT 20C	320.0000 Microsiemens/cm
68		TURBIDITY	< 1.0000 Turbidity FTU
76		TEMPERATURE	12.6000 Celsius
81		OXYGEN DISSOLVED & SATURATION	67.0000 %
82		OXYGEN DISSOLVED	7.1000 mg/l
		BOD ATU	< 1.0000 mg/l
5		MERCURY	< 0.0200 ug/l
106		CADMIUM DISSOLVED	No Result
		RESULT=1.2	
108		CADMIUM	1.1000 ug/l
111		AMMONIA EXPRESSED AS NITROGEN	< 0.0200 mg/l N
116		NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	< 0.1000 mg/l N
118		NITRITE	< 0.0100 mg/l
119		AMMONIA NON-IONISED	0.0000 mg/l
135		SUSPENDED SOLIDS 105C	< 2.0000 mg/l
172		CHLORIDE ION	69.1000 mg/l
180		ORTHO-PHOSPHATE	< 0.0100 mg/l
182		SILICATE REACTIVE DISSOLVED	7.1000 mg/l
213		COPPER DISSOLVED	No Result
		RESULT=0.088	
215		COPPER	0.0850 mg/l
231		BERYLLIUM DISSOLVED	< 0.0010 mg/l
233		BERYLLIUM	< 0.0010 mg/l
243		ZINC DISSOLVED	1.1000 mg/l
245		ZINC	1.1000 mg/l
255		BARIUM DISSOLVED	No Result
		RESULT=0.012	
257		BARIUM	0.0080 mg/l
281		BORON DISSOLVED	No Result
		RESULT=0.018	
283		BORON	0.0160 mg/l
295		ALUMINIUM DISSOLVED	0.0500 mg/l
7		ALUMINIUM	0.0600 mg/l
326		LEAD DISSOLVED	0.0020 mg/l
328		LEAD	0.0030 mg/l
350		VANADIUM DISSOLVED	< 0.0010 mg/l
352		VANADIUM	< 0.0010 mg/l
358		ANTIMONY DISSOLVED	< 0.0010 mg/l
360		ANTIMONY	< 0.0010 mg/l
373		CHROMIUM DISSOLVED	< 0.0010 mg/l

Contd...

Sample Analysis ReportSampling Point : NANCEKUKU/D6

Date/Time Taken : 26-OCT-91 00:00

Det.	Code	Description	Result
375	CHROMIUM		< 0.0010 mg/l
401	MANGANESE DISSOLVED		0.3700 mg/l
403	MANGANESE		0.3700 mg/l
423	COBALT DISSOLVED		0.0190 mg/l
425	COBALT		0.0190 mg/l
427	NICKEL DISSOLVED		0.0370 mg/l
429	NICKEL		0.0370 mg/l
3082	HEXACHLORO-BENZENE TOTAL		< 3.5000 ng/l
3083	HEXACHLORO-BUTADIENE TOTAL		< 3.0000 ng/l
3106	ANALYSIS BY MASS-SPEC	Report Filed Misc	
3276	ALDRIN		< 3.5000 ng/l
3294	DDE-(PP')		< 3.5000 ng/l
3295	DDE-(OP')		< 8.0000 ng/l
3296	DDT (OP')		< 6.0000 ng/l
3297	DDT (PP')		< 3.0000 ng/l
01	DIELDRIN		< 3.5000 ng/l
3306	ENDRIN		< 4.0000 ng/l
3310	HCH ALPHA		< 4.0000 ng/l
3311	HCH BETA		< 12.0000 ng/l
3312	HCH DELTA		< 4.0000 ng/l
3313	HCH GAMMA		< 3.0000 ng/l
3329	TDE (OP')		No Result
ANALYTICAL PROBLEM			
3330	TDE (PP')		< 3.0000 ng/l
7354	ARSENIC DISSOLVED ppb		0.1000 ug/l
7356	ARSENIC TOTAL ppb		0.2000 ug/l

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

6th Jan 1992

Automatic Sample Analysis Report Production
Date/Time Report Last Run : 02-JAN-92 23:59

Sampling Point : NANCEKUKU/D7

Date/Time Taken : 24-OCT-91 10:20

Sally's Bottom Stream In South Fork Of Adit Discharging Approx 3 Metres Above Top Of Beach

Address : SALLY'S BOTTOM STN IN
 SOUTH FORK OF ADIT

Laboratory Reference : E21564

Sampler's Comments :
 WEATHER DRY/OVERCAST
 FLOW 0.3 L/SEC COND US/CM
 COND 350 pH 6.31

<u>Det.</u>	<u>Code</u>	<u>Description</u>	<u>Result</u>	
61	Ph		6.6	pH
62	Conductivity At 20c		366	Microsiemens
	Turbidity		6	Turbidity FT
70	Temperature		12.2	Celsius
81	Oxygen Dissolved % Saturation		69	%
82	Oxygen Dissolved		7.38	mg/l
85	Bod Atu	<	1	mg/l
105	Mercury	<	0.02	ug/l
106	Cadmium Dissolved	<	0.2	ug/l
108	Cadmium	<	0.2	ug/l
111	Ammonia Expressed As Nitrogen	<	0.02	mg/l N
116	Nitrogen Total Oxidised Express	<	0.1	mg/l N
118	Nitrite		0.01	mg/l
119	Ammonia Non-Ionised		0	mg/l
135	Suspended Solids 105c	<	2	mg/l
172	Chloride Ion		91	mg/l
180	Ortho-Phosphate		0.04	mg/l
182	Silicate Reactive Dissolved		7.4	mg/l
213	Copper Dissolved	<	0.001	mg/l
215	Copper		0.058	mg/l
231	Beryllium Dissolved	<	0.001	mg/l
233	Beryllium	<	0.001	mg/l
237	Zinc Dissolved		1.8	mg/l
245	Zinc		1.9	mg/l
255	Barium Dissolved		0.018	mg/l
257	Barium		0.018	mg/l
281	Boron Dissolved		No Result	
283	Boron		0.018	mg/l
285	Aluminium Dissolved	<	0.03	mg/l
287	Aluminium	<	0.03	mg/l
326	Lead Dissolved	<	0.001	mg/l

Contd...

Automatic Sample Analysis Report Production
Date/Time Report Last Run : 02-JAN-92 23:59Sampling Point : NANCEKUKU/D7Date/Time Taken : 24-OCT-91 10:20

<u>Det.</u>	<u>Code</u>	<u>Description</u>	<u>Result</u>	
328	Lead		0.04	mg/l
350	Vanadium Dissolved	<	0.001	mg/l
352	Vanadium	<	0.001	mg/l
358	Antimony Dissolved	<	0.001	mg/l
360	Antimony	<	0.001	mg/l
373	Chromium Dissolved	<	0.001	mg/l
375	Chromium	<	0.001	mg/l
401	Manganese Dissolved		1.1	mg/l
403	Manganese		1.1	mg/l
423	Cobalt Dissolved		No Result	
425	Cobalt		0.011	mg/l
427	Nickel Dissolved		0.019	mg/l
429	Nickel		0.02	mg/l
32	Hexachloro-Benzene Total	<	3.5	ng/l
3083	Hexachloro-Butadiene Total	<	3	ng/l
3106	Analysis By Mass-Spec		Report Filed	Misc
3276	Aldrin	<	3.5	ng/l
3294	Dde-(Pp')	<	3.5	ng/l
3295	Dde-(Op')	<	8	ng/l
3296	Ddt (Op')	<	6	ng/l
3297	Ddt (Pp')	<	3	ng/l
3301	Dieldrin	<	3.5	ng/l
3306	Endrin	<	4	ng/l
3310	Hch Alpha	<	4	ng/l
3311	Hch Beta	<	12	ng/l
3312	Hch Delta	<	4	ng/l
3313	Hch Gamma	<	3	ng/l
3329	Tde (Op')	<	5	ng/l
3330	Tde (Pp')	<	3	ng/l
7354	Arsenic Dissolved Ppb		0.6	ug/l
7356	Arsenic Total Ppb		0.6	ug/l

* Indicates that Laboratory Determination Method is NAMAS Accredited.

Automatic Sample Analysis Report Production
 Date/Time Report Last Run : 02-JAN-92 23:59

Sampling Point : NANCEKUKU/D8

Date/Time Taken : 24-OCT-91 10:20

Sally's Bottom Stream In North Fork Of Adit Discharging Approx 3 Metres Above Top Of Beach

Address : SALLY'S BOTTOM STMA
 IN NORTH OF ADIT

Laboratory Reference : B21565

Sampler's Comments :
 COND - uS/CM WEATHER DRY/OVERCAST
 FLOW 1 L/SEC COND 402 pH 6.34

Det. Code	Description	Result	
61	Ph	6.8	pH
62	Conductivity At 20c	422	Microsiemens
69	Turbidity	2	Turbidity FT
	Temperature	12.5	Celsius
81	Oxygen Dissolved % Saturation	68	%
82	Oxygen Dissolved	7.22	mg/l
85	Bod Atu	< 1	mg/l
105	Mercury	< 0.02	ug/l
106	Cadmium Dissolved	No Result	
108	Cadmium	2.5	ug/l
111	Ammonia Expressed As Nitrogen	< 0.02	mg/l N
116	Nitrogen Total Oxidised Express	3.8	mg/l N
118	Nitrite	< 0.01	mg/l
119	Ammonia Non-Ionised	0	mg/l
135	Suspended Solids 105c	< 2	mg/l
172	Chloride Ion	83	mg/l
180	Ortho-Phosphate	0.03	mg/l
182	Silicate Reactive Dissolved	5.4	mg/l
213	Copper Dissolved	0.008	mg/l
215	Copper	0.008	mg/l
231	Beryllium Dissolved	< 0.001	mg/l
233	Beryllium	< 0.001	mg/l
233	Zinc Dissolved	1.6	mg/l
235	Zinc	1.7	mg/l
255	Barium Dissolved	0.01	mg/l
257	Barium	0.01	mg/l
281	Boron Dissolved	0.019	mg/l
283	Boron	0.019	mg/l
285	Aluminium Dissolved	< 0.03	mg/l
287	Aluminium	< 0.03	mg/l
326	Lead Dissolved	0.049	mg/l
328	Lead	0.06	mg/l

Contd...

Automatic Sample Analysis Report Production
Date/Time Report Last Run : 02-JAN-92 23:59

Sampling Point : NANCEKUKU/D8

Date/Time Taken : 24-OCT-91 10:20

Det. Code	Description	Result	
350	Vanadium Dissolved	< 0.001	mg/l
352	Vanadium	< 0.001	mg/l
358	Antimony Dissolved	< 0.001	mg/l
360	Antimony	< 0.001	mg/l
373	Chromium Dissolved	< 0.001	mg/l
375	Chromium	< 0.001	mg/l
401	Manganese Dissolved	0.27	mg/l
403	Manganese	0.29	mg/l
423	Cobalt Dissolved	0.009	mg/l
425	Cobalt	0.009	mg/l
427	Nickel Dissolved	No Result	
429	Nickel	0.008	mg/l
3082	Hexachloro-Benzene Total	< 3.5	ng/l
3083	Hexachloro-Butadiene Total	< 3	ng/l
3106	Analysis By Mass-Spec	Report Filed	Misc
3276	Aldrin	< 3.5	ng/l
3294	Dde-(Pp')	< 3.5	ng/l
3295	Dde-(Op')	< 8	ng/l
3296	Ddt (Op')	< 6	ng/l
3297	Ddt (Pp')	< 3	ng/l
3301	Dieldrin	< 3.5	ng/l
3306	Endrin	< 4	ng/l
3310	Hch Alpha	< 4	ng/l
3311	Hch Beta	< 12	ng/l
3312	Hch Delta	< 4	ng/l
3313	Hch Gamma	< 3	ng/l
3329	Tde (Op')	< 5	ng/l
3330	Tde (Pp')	< 3	ng/l
7354	Arsenic Dissolved Ppb	0.1	ug/l
7356	Arsenic Total Ppb	0.4	ug/l

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis Report

Sampling Point : NANCEKUKE/D9

Date/Time Taken : 25-OCT-91 13:00

TOBBAN HORSEBAY SEEPAGE FROM ADIT APPROX 1 METRE ABOVE CAVE BOTTOM APPROX 100 METRES INTO CAVE

Address : TOBBAN HORSES BAY
SEA CAVE ADIT

Laboratory Reference : E21930

Sampler's Comments :
COMPOSITE SAMPLE TAKEN OVER 24HR PERIOD
COND 557 pH 3.73

Met.	Code	Description	Result
61		pH	4.0000 pH
62		CONDUCTIVITY AT 20C	544.0000 Microsiemens/cm
68		TURBIDITY	< 1.0000 Turbidity FTU
76		TEMPERATURE	11.6000 Celsius
81		OXYGEN DISSOLVED % SATURATION	68.0000 %
		OXYGEN DISSOLVED	7.3700 mg/l
85		BOD ATU	< 1.0000 mg/l
105		MERCURY	0.1300 ug/l
106		CADMIUM DISSOLVED	2.8000 ug/l
108		CADMIUM	2.9000 ug/l
111		AMMONIA EXPRESSED AS NITROGEN	< 0.0200 mg/l N
116		NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	< 0.1000 mg/l N
118		NITRITE	< 0.0100 mg/l
119		AMMONIA NON-IONISED	0.0000 mg/l
135		SUSPENDED SOLIDS 105C	< 2.0000 mg/l
172		CHLORIDE ION	142.0000 mg/l
180		ORTHO-PHOSPHATE	0.0200 mg/l
182		SILICATE REACTIVE DISSOLVED	9.3000 mg/l
213		COPPER DISSOLVED	0.2900 mg/l
215		COPPER	0.3000 mg/l
231		BERYLLIUM DISSOLVED	0.0010 mg/l
233		BERYLLIUM	0.0010 mg/l
243		ZINC DISSOLVED	No Result
		RESULT = 3.8	
245		ZINC	3.7000 mg/l
255		BARIUM DISSOLVED	No Result
		ACTUAL RESULT = .031	
257		BARIUM	0.0140 mg/l
281		BORON DISSOLVED	No Result
		ACTUAL RESULT = .031	
283		BORON	0.0260 mg/l
285		ALUMINIUM DISSOLVED	No Result
		ULT = 1.5	
287		ALUMINIUM	1.4000 mg/l
326		LEAD DISSOLVED	0.0340 mg/l
328		LEAD	0.0340 mg/l
350		VANADIUM DISSOLVED	< 0.0010 mg/l
352		VANADIUM	< 0.0010 mg/l
358		ANTIMONY DISSOLVED	< 0.0010 mg/l
360		ANTIMONY	< 0.0010 mg/l

Contd...

3rd Dec 1991

Sample Analysis Report

Sampling Point : NANCEKUKU/D9

Date/Time Taken : 25-OCT-91 13:00

Det.	Code	Description	Result
373		CHROMIUM DISSOLVED	< 0.0010 mg/l
375		CHROMIUM	< 0.0010 mg/l
401		MANGANESE DISSOLVED	No Result
RESULT = .8			
403		MANGANESE	0.7400 mg/l
423		COBALT DISSOLVED	0.0430 mg/l
425		COBALT	0.0450 mg/l
427		NICKEL DISSOLVED	No Result
RESULT = .04			
429		NICKEL	0.0390 mg/l
3082		HEXACHLORO-BENZENE TOTAL	< 3.5000 ng/l
3083		HEXACHLORO-BUTADIENE TOTAL	< 3.0000 ng/l
3106		ANALYSIS BY MASS-SPEC	Report Filed Misc
3276		ALDRIN	< 3.5000 ng/l
3294		DDE-(PP')	< 3.5000 ng/l
3295		DDE-(OP')	< 8.0000 ng/l
3296		DDT (OP')	< 6.0000 ng/l
3297		DDT (PP')	< 3.0000 ng/l
3301		DIELDRIN	1.3000 ng/l
3306		ENDRIN	< 4.0000 ng/l
3310		HCH ALPHA	< 4.0000 ng/l
3311		HCH BETA	< 12.0000 ng/l
3312		HCH DELTA	< 4.0000 ng/l
3313		HCH GAMMA	< 3.0000 ng/l
3329		TDE (OP')	< 5.0000 ng/l
3330		TDE (PP')	< 3.0000 ng/l
7354		ARSENIC DISSOLVED ppb	0.2000 ug/l
7356		ARSENIC TOTAL ppb	0.2000 ug/l

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis Report

Sampling Point : NANCEKUKE/D10

Date/Time Taken : 25-OCT-91 14:00

TOBBAN HORSE BAY SEEPAGE FROM CRUMBLY ROCK IN CROSS COURSE BESIDE SMALL SCALE WORKINGS

Address : TOBBAN HORSE BEACH

Laboratory Reference : E21931

Sampler's Comments :

COMPOSITE SAMPLE COLLECTED OVER 24HR PERIOD
PRESENT WEATHER - DRY, OVERCAST PRECIPITATION - NIL
WIND 1011 pH 3.7

Ret. Code	Description	Result
61	pH	4.0000 pH
62	CONDUCTIVITY AT 20C	1982.0000 Microsiemens/cm
68	TURBIDITY	< 1.0000 Turbidity FTU
76	TEMPERATURE	11.2000 Celsius
81	OXYGEN DISSOLVED % SATURATION	78.0000 %
	OXYGEN DISSOLVED	8.5200 mg/l
85	BOD ATU	1.0000 mg/l
105	MERCURY	0.0600 ug/l
106	CADMIUM DISSOLVED	No Result
	RESULT = 10.9	
108	CADMIUM	19.6000 ug/l
111	AMMONIA EXPRESSED AS NITROGEN	< 0.0200 mg/l N
116	NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	5.7000 mg/l N
118	NITRITE	< 0.0100 mg/l
119	AMMONIA NON-IONISED	0.0000 mg/l
135	SUSPENDED SOLIDS 105C	2.3000 mg/l
172	CHLORIDE ION	1231.0000 mg/l
180	ORTHO-PHOSPHATE	0.0400 mg/l
182	SILICATE REACTIVE DISSOLVED	13.7000 mg/l
213	COPPER DISSOLVED	No Result
	RESULT = .84	
215	COPPER	0.8300 mg/l
231	BERYLLIUM DISSOLVED.	< 0.0010 mg/l
233	BERYLLIUM	< 0.0010 mg/l
243	ZINC DISSOLVED	No Result
	RESULT = 3.6	
245	ZINC	3.5000 mg/l
255	BARIUM DISSOLVED	No Result
	ACTUAL RESULT = .029	
257	BARIUM	0.0170 mg/l
281	BORON DISSOLVED	No Result
	ACTUAL RESULT = .057	
283	BORON	0.0500 mg/l
285	ALUMINIUM DISSOLVED	No Result
	RESULT = 3.8	
287	ALUMINIUM	3.4000 mg/l
326	LEAD DISSOLVED	1.1000 mg/l
328	LEAD	1.1000 mg/l
350	VANADIUM DISSOLVED	< 0.0010 mg/l
352	VANADIUM	< 0.0010 mg/l
358	ANTIMONY DISSOLVED	< 0.0010 mg/l

Contd...

Sample Analysis ReportSampling Point : NANCEKUKE/D10

Date/Time Taken : 25-OCT-91 14:00

Det.	Code	Description	Result
360	ANTIMONY		< 0.0010 mg/l
373	CHROMIUM DISSOLVED		< 0.0010 mg/l
375	CHROMIUM		< 0.0010 mg/l
401	MANGANESE DISSOLVED		No Result
RESULT = .5			
403	MANGANESE		0.4700 mg/l
423	COBALT DISSOLVED		0.0980 mg/l
425	COBALT		0.0980 mg/l
427	NICKEL DISSOLVED		No Result
RESULT = .07			
429	NICKEL		0.0680 mg/l
3082	HEXACHLORO-BENZENE TOTAL		< 3.5000 ng/l
3083	HEXACHLORO-BUTADIENE TOTAL		< 3.0000 ng/l
3106	ANALYSIS BY MASS-SPEC		Report Filed
3276	ALDRIN		< 3.5000 ng/l
3294	DDE-(PP')		< 3.5000 ng/l
3295	DDE-(OP')		< 8.0000 ng/l
3296	DDT (OP')		< 6.0000 ng/l
3297	DDT (PP')		< 3.0000 ng/l
3301	DIELDRIN		< 3.5000 ng/l
3306	ENDRIN		< 4.0000 ng/l
3310	HCH ALPHA		< 4.0000 ng/l
3311	HCH BETA		< 12.0000 ng/l
3312	HCH DELTA		< 4.0000 ng/l
3313	HCH GAMMA		< 3.0000 ng/l
3329	TDE (OP')		< 5.0000 ng/l
3330	TDE (PP')		< 3.0000 ng/l
7354	ARSENIC DISSOLVED ppb		0.2000 ug/l
7356	ARSENIC TOTAL ppb		0.2000 ug/l

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis Report

Sampling Point : NANCEKUKU/D11

Date/Time Taken : 26-OCT-91 10:45

ADIT APPROX 10 FEET BELOW SEEPAGE BELOW CLIFF-TOP PATH

Address : ADIT 10M BELOW D3

Laboratory Reference : E21985

Sampler's Comments :

SAMPLE TAKEN FROM POOL IN ADIT DUE TO LACK OF FLOW

Det.	Code	Description	Result
61		pH	6.3000 pH
62		CONDUCTIVITY AT 20C	367.0000 Microsiemens/cm
68		TURBIDITY	3.0000 Turbidity FTU
76		TEMPERATURE	12.0000 Celsius
81		OXYGEN DISSOLVED & SATURATION	65.0000 %
82		OXYGEN DISSOLVED	6.9800 mg/l
85		BOD ATU	< 1.0000 mg/l
105		MERCURY	< 0.0200 ug/l
6		CADMIUM DISSOLVED	No Result
RESULT=6.6			
108		CADMIUM	6.4000 ug/l
111		AMMONIA EXPRESSED AS NITROGEN	< 0.0200 mg/l N
116		NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	3.3600 mg/l N
118		NITRITE	< 0.0100 mg/l
119		AMMONIA NON-IONISED	0.0000 mg/l
135		SUSPENDED SOLIDS 105C	36.0000 mg/l
172		CHLORIDE ION	76.6000 mg/l
180		ORTHO-PHOSPHATE	< 0.0100 mg/l
182		SILICATE REACTIVE DISSOLVED	5.5000 mg/l
213		COPPER DISSOLVED	0.0520 mg/l
215		COPPER	0.0680 mg/l
231		BERYLLIUM DISSOLVED	< 0.0010 mg/l
233		BERYLLIUM	< 0.0010 mg/l
243		ZINC DISSOLVED	2.7000 mg/l
245		ZINC	2.7000 mg/l
255		BARIUM DISSOLVED	No Result
RESULT=0.062			
257		BARIUM	0.0130 mg/l
281		BORON DISSOLVED	No Result
RESULT=0.037			
283		BORON	0.0330 mg/l
285		ALUMINIUM DISSOLVED	< 0.0300 mg/l
287		ALUMINIUM	0.4100 mg/l
276		LEAD DISSOLVED	0.0080 mg/l
8		LEAD	0.1000 mg/l
350		VANADIUM DISSOLVED	< 0.0010 mg/l
352		VANADIUM	0.0030 mg/l
358		ANTIMONY DISSOLVED	< 0.0010 mg/l
360		ANTIMONY	< 0.0010 mg/l
373		CHROMIUM DISSOLVED	< 0.0010 mg/l
375		CHROMIUM	0.0010 mg/l

Contd...

Sample Analysis ReportSampling Point : NANCEKUKU/D11

Date/Time Taken : 26-OCT-91 10:45

Det.	Code	Description	Result
401		MANGANESE DISSOLVED	0.2400 mg/l
403		MANGANESE	0.2700 mg/l
423		COBALT DISSOLVED	0.0090 mg/l
425		COBALT	0.0110 mg/l
427		NICKEL DISSOLVED	0.0150 mg/l
429		NICKEL	0.0150 mg/l
3082		HEXACHLORO-BENZENE TOTAL	< 3.5000 ng/l
3083		HEXACHLORO-BUTADIENE TOTAL	< 3.0000 ng/l
3106		ANALYSIS BY MASS-SPEC	Report Filed Misc
3276		ALDRIN	< 3.5000 ng/l
3294		DDE-(PP')	< 3.5000 ng/l
3295		DDE-(OP')	< 8.0000 ng/l
3296		DDT (OP')	< 6.0000 ng/l
3297		DDT (PP')	< 3.0000 ng/l
3301		DIELDRIN	< 3.5000 ng/l
3306		ENDRIN	< 4.0000 ng/l
3310		HCH ALPHA	< 4.0000 ng/l
3311		HCH BETA	< 12.0000 ng/l
3312		HCH DELTA	< 4.0000 ng/l
3313		HCH GAMMA	< 3.0000 ng/l
3329		TDE (OP')	< 5.0000 ng/l
3330		TDE (PP')	< 3.0000 ng/l
7354		ARSENIC DISSOLVED ppb	0.2000 ug/l
7356		ARSENIC TOTAL ppb	0.2000 ug/l

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis ReportSampling Point : NANCEKUKE/D12

Date/Time Taken : 25-OCT-91 10:00

ADIT 5 METRES ABOVE HIGH WATER MARK

Address : ADIT 5M ABOVE HW MARK

Laboratory Reference : E21928

Sampler's Comments :

COND uS/CM PRESENT WEATHER - DRY, OVERCAST
PRECIPITATION - NIL COND 829 pH 3.39

Det.	Code	Description	Result
61		pH	3.4000 pH
62		CONDUCTIVITY AT 20C	334.0000 Microsiemens/cm
68		TURBIDITY	58.0000 Turbidity FTU
76		TEMPERATURE	11.2000 Celsius
81		OXYGEN DISSOLVED % SATURATION	77.0000 %
82		OXYGEN DISSOLVED	8.4200 mg/l
85		BOD ATU	1.9000 mg/l
5		MERCURY	0.0200 ug/l
106		CADMIUM DISSOLVED	No Result
RESULT = 15.2			
108		CADMIUM	14.0000 ug/l
111		AMMONIA EXPRESSED AS NITROGEN	0.1000 mg/l N
116		NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	< 0.1000 mg/l N
118		NITRITE	0.0300 mg/l
119		AMMONIA NON-IONISED	0.0000 mg/l
135		SUSPENDED SOLIDS 105C	15.0000 mg/l
172		CHLORIDE ION	124.0000 mg/l
180		ORTHO-PHOSPHATE	0.0200 mg/l
182		SILICATE REACTIVE DISSOLVED	19.2000 mg/l
213		COPPER DISSOLVED	No Result
RESULT = 0.82			
215		COPPER	0.7800 mg/l
231		BERYLLIUM DISSOLVED	0.0020 mg/l
233		BERYLLIUM	0.0020 mg/l
243		ZINC DISSOLVED	No Result
RESULT = 7.2			
245		ZINC	6.5000 mg/l
255		BARIUM DISSOLVED	No Result
ACTUAL RESULT = .024			
257		BARIUM	0.0130 mg/l
281		BORON DISSOLVED	No Result
ACTUAL RESULT = .030			
283		BORON	0.0270 mg/l
5		ALUMINIUM DISSOLVED	10.1000 mg/l
287		ALUMINIUM	17.0000 mg/l
326		LEAD DISSOLVED	No Result
RESULT = .39			
328		LEAD	0.0360 mg/l
350		VANADIUM DISSOLVED	< 0.0010 mg/l
352		VANADIUM	< 0.0010 mg/l
358		ANTIMONY DISSOLVED	< 0.0010 mg/l
360		ANTIMONY	< 0.0010 mg/l

Contd...

Sample Analysis Report

Sampling Point : NANCEKUKU/D12

Date/Time Taken : 25-OCT-91 10:00

Det.	Code	Description	Result
	373	CHROMIUM DISSOLVED	No Result
RESULT = .002			
	375	CHROMIUM	0.0010 mg/l
	401	MANGANESE DISSOLVED	2.4000 mg/l
	403	MANGANESE	2.4000 mg/l
	423	COBALT DISSOLVED	0.1110 mg/l
	425	COBALT	0.1110 mg/l
	427	NICKEL DISSOLVED	No Result
RESULT = .072			
	429	NICKEL	0.0670 mg/l
	3082	HEXACHLORO-BENZENE TOTAL	< 3.5000 ng/l
	3083	HEXACHLORO-BUTADIENE TOTAL	< 3.0000 ng/l
	3106	ANALYSIS BY MASS-SPEC	Report Filed Misc
	3276	ALDRIN	< 3.5000 ng/l
	3294	DDE-(PP')	< 3.5000 ng/l
	95	DDE-(OP')	< 8.0000 ng/l
	3296	DDT (OP')	< 6.0000 ng/l
	3297	DDT (PP')	< 3.0000 ng/l
	3301	DIELDRIN	< 3.5000 ng/l
	3306	ENDRIN	< 4.0000 ng/l
	3310	HCH ALPHA	< 4.0000 ng/l
	3311	HCH BETA	< 12.0000 ng/l
	3312	HCH DELTA	< 4.0000 ng/l
	3313	HCH GAMMA	< 3.0000 ng/l
	3329	TDE (OP')	< 5.0000 ng/l
	3330	TDE (PP')	< 3.0000 ng/l
	7354	ARSENIC DISSOLVED ppb	1.3000 ug/l
	7356	ARSENIC TOTAL ppb	1.6000 ug/l

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis Report

Sampling Point : NANCEKUKE/D13

Date/Time Taken : 25-OCT-91 11:15

SMALL ADIT TO EAST OF D12 APPROX 15 METRES ABOVE HIGH WATER MARK

Address : SMALL ADIT EAST OF D12

Laboratory Reference : E21929

Sampler's Comments :

LIMITED VOL FROM FLOW PRECIPITATION - NIL

Det. Code	Description	Result
61	pH	4.4000 pH
62	CONDUCTIVITY AT 20C	34.0000 Microsiemens/cm
68	TURBIDITY	3.0000 Turbidity FTU
76	TEMPERATURE	No Result
81	OXYGEN DISSOLVED & SATURATION	No Result
82	OXYGEN DISSOLVED	No Result
85	BOD ATU	< 1.0000 mg/l
105	MERCURY	
	CADMIUM DISSOLVED	No Result
RESULT = 23.5		
108	CADMIUM	22.3000 ug/l
111	AMMONIA EXPRESSED AS NITROGEN	0.0300 mg/l N
116	NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	1.6000 mg/l N
118	NITRITE	< 0.0100 mg/l
119	AMMONIA NON-IONISED	No Result
135	SUSPENDED SOLIDS 105C	
172	CHLORIDE ION	249.0000 mg/l
180	ORTHO-PHOSPHATE	< 0.0100 mg/l
182	SILICATE REACTIVE DISSOLVED	9.9000 mg/l
213	COPPER DISSOLVED	No Result
RESULT = .68		
215	COPPER	0.6500 mg/l
231	BERYLLIUM DISSOLVED	< 0.0010 mg/l
233	BERYLLIUM	< 0.0010 mg/l
243	ZINC DISSOLVED	No Result
RESULT = 6.0		
245	ZINC	5.7000 mg/l
255	BARIIUM DISSOLVED	No Result
ACTUAL RESULT = .049		
257	BARIIUM	0.0100 mg/l
281	BORON DISSOLVED	No Result
ACTUAL RESULT = .063		
283	BORON	0.0510 mg/l
285	ALUMINIUM DISSOLVED	5.5000 mg/l
7	ALUMINIUM	7.0000 mg/l
326	LEAD DISSOLVED	No Result
RESULT = .09		
328	LEAD	0.0860 mg/l
350	VANADIUM DISSOLVED	< 0.0010 mg/l
352	VANADIUM	< 0.0010 mg/l
358	ANTIMONY DISSOLVED	< 0.0010 mg/l
360	ANTIMONY	< 0.0010 mg/l
373	CHROMIUM DISSOLVED	< 0.0010 mg/l

Contd...

Sample Analysis ReportSampling Point : NANCEKUKU/D13

Date/Time Taken : 25-OCT-91 11:15

Det.	Code	Description	Result
375	CHROMIUM		< 0.0010 mg/l
401	MANGANESE DISSOLVED		1.8000 mg/l
403	MANGANESE		1.8000 mg/l
423	COBALT DISSOLVED		0.0610 mg/l
425	COBALT		0.0620 mg/l
427	NICKEL DISSOLVED		No Result
RESULT = .046			
429	NICKEL		0.0450 mg/l
3082	HEXACHLORO-BENZENE TOTAL		< 3.5000 ng/l
3083	HEXACHLORO-BUTADIENE TOTAL		< 3.0000 ng/l
3106	ANALYSIS BY MASS-SPEC		Report Filed
3276	ALDRIN		< 3.5000 ng/l
3294	DDE-(PP')		< 3.5000 ng/l
3295	DDE-(OP')		< 8.0000 ng/l
3296	DDT (OP')		< 6.0000 ng/l
37	DDT (PP')		< 3.0000 ng/l
3301	DIELDRIN		< 3.5000 ng/l
3306	ENDRIN		< 4.0000 ng/l
3310	HCH ALPHA		< 4.0000 ng/l
3311	HCH BETA		< 12.0000 ng/l
3312	HCH DELTA		< 4.0000 ng/l
3313	HCH GAMMA		< 3.0000 ng/l
3329	TDE (OP')		No Result
ANALYTICAL PROBLEM			
3330	TDE (PP')		< 3.0000 ng/l
7354	ARSENIC DISSOLVED	ppb	
7356	ARSENIC TOTAL	ppb	

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis Report

Sampling Point : NANCEKUKE/E1

Date/Time Taken : 26-SEP-91 11:00

NANCEKUKE E1

Address :

Laboratory Reference : E16134

Det.	Code	Description	Result
61		pH	7.4300 pH
62		CONDUCTIVITY AT 20C	566.8000 Microsiemens/cm
68		TURBIDITY	1.4300 Turbidity FTU
76		TEMPERATURE	12.9000 Celsius
81		OXYGEN DISSOLVED & SATURATION	81.7000 %
82		OXYGEN DISSOLVED	8.6000 mg/l
85		BOD ATU	< 1.0000 mg/l
105		MERCURY	< 0.0200 ug/l
106		CADMIUM DISSOLVED	0.9000 ug/l
108		CADMIUM	0.8000 ug/l
111		AMMONIA EXPRESSED AS NITROGEN	0.0060 mg/l N
113		NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	5.1020 mg/l N
118		NITRITE	0.0030 mg/l
119		AMMONIA NON-IONISED	0.0000 mg/l
135		SUSPENDED SOLIDS 105C	4.2000 mg/l
172		CHLORIDE ION	130.8520 mg/l
180		ORTHO-PHOSPHATE	< 0.0100 mg/l
182		SILICATE REACTIVE DISSOLVED	6.4830 mg/l
213		COPPER DISSOLVED	0.0020 mg/l
215		COPPER	0.0020 mg/l
231		BERYLLIUM DISSOLVED	No Result
LEAKING POT, INSUFFICIENT SAMPLE FOR FULL ANALYSIS			
233		BERYLLIUM	0.0010 mg/l
243		ZINC DISSOLVED	
245		ZINC	0.1440 mg/l
255		BARIUM DISSOLVED	No Result
LEAKING POT, INSUFFICIENT SAMPLE FOR FULL ANALYSIS			
257		BARIUM	0.0110 mg/l
281		BORON DISSOLVED	No Result
LEAKING POT, INSUFFICIENT SAMPLE FOR FULL ANALYSIS			
283		BORON	0.0350 mg/l
285		ALUMINIUM DISSOLVED	< 0.0300 mg/l
287		ALUMINIUM	0.0300 mg/l
286		LEAD DISSOLVED	< 0.0010 mg/l
288		LEAD	< 0.0010 mg/l
350		VANADIUM DISSOLVED	No Result
LEAKING POT, INSUFFICIENT SAMPLE FOR FULL ANALYSIS			
352		VANADIUM	< 0.0010 mg/l
358		ANTIMONY DISSOLVED	No Result
LEAKING POT, INSUFFICIENT SAMPLE FOR FULL ANALYSIS			
360		ANTIMONY	< 0.0010 mg/l
373		CHROMIUM DISSOLVED	0.0010 mg/l
375		CHROMIUM	0.0020 mg/l

Contd...

Sample Analysis Report

Sampling Point : NANCEKUKE/E1

Date/Time Taken : 26-SEP-91 11:00

Det.	Code	Description	Result
401	MANGANESE	DISSOLVED	< 0.0010 mg/l
403	MANGANESE		0.0070 mg/l
423	COBALT	DISSOLVED	No Result
LEAKING POT, INSUFFICIENT SAMPLE FOR FULL ANALYSIS			
425	COBALT		< 0.0010 mg/l
427	NICKEL	DISSOLVED	0.0020 mg/l
429	NICKEL		0.0030 mg/l
559	TDE	(PP')	< 0.0030 ug/l
573	TDE	(OP')	< 0.0050 ug/l
3082	HEXACHLORO-BENZENE	TOTAL	< 3.5000 ng/l
3083	HEXACHLORO-BUTADIENE	TOTAL	< 3.0000 ng/l
3276	ALDRIN		< 3.5000 ng/l
3294	DDE	(PP')	< 3.5000 ng/l
3295	DDE	(OP')	< 8.0000 ng/l
3296	DDT	(OP')	< 6.0000 ng/l
3297	DDT	(PP')	< 3.0000 ng/l
3301	DIELDRIN		< 3.5000 ng/l
3306	ENDRIN		< 4.0000 ng/l
3310	HCH	ALPHA	< 4.0000 ng/l
3311	HCH	BETA	< 12.0000 ng/l
3312	HCH	DELTA	< 4.0000 ng/l
3313	HCH	GAMMA	< 3.0000 ng/l

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis ReportSampling Point : NANCEKUKE/E3

Date/Time Taken : 26-SEP-91 12:30

NANCEKUKE E3

Address :

Laboratory Reference : E16136

Det.	Code	Description	Result
61		pH	7.2300 pH
62		CONDUCTIVITY AT 20C	382.2000 Microsiemens/cm
68		TURBIDITY	1.4300 Turbidity FTU
76		TEMPERATURE	12.4000 Celsius
81		OXYGEN DISSOLVED % SATURATION	84.5000 %
82		OXYGEN DISSOLVED	9.0000 mg/l
85		BOD ATU	< 1.0000 mg/l
105		MERCURY	< 0.0200 ug/l
106		CADMIUM DISSOLVED	0.5000 ug/l
108		CADMIUM	0.4000 ug/l
111		AMMONIA EXPRESSED AS NITROGEN	0.0010 mg/l N
116		NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	4.4360 mg/l N
118		NITRITE	< 0.0100 mg/l
119		AMMONIA NON-IONISED	0.0000 mg/l
135		SUSPENDED SOLIDS 105C	13.0000 mg/l
172		CHLORIDE ION	69.0860 mg/l
180		ORTHO-PHOSPHATE	< 0.0100 mg/l
182		SILICATE REACTIVE DISSOLVED	4.4430 mg/l
213		COPPER DISSOLVED	0.0020 mg/l
215		COPPER	0.0030 mg/l
231		BERYLLIUM DISSOLVED	< 0.0010 mg/l
233		BERYLLIUM	< 0.0010 mg/l
243		ZINC DISSOLVED	0.0690 mg/l
245		ZINC	0.0660 mg/l
255		BARIUM DISSOLVED	
257		BARIUM	0.0080 mg/l
281		BORON DISSOLVED	
283		BORON	0.0240 mg/l
285		ALUMINIUM DISSOLVED	< 0.0300 mg/l
287		ALUMINIUM	0.0300 mg/l
326		LEAD DISSOLVED	< 0.0010 mg/l
328		LEAD	< 0.0010 mg/l
350		VANADIUM DISSOLVED	< 0.0010 mg/l
352		VANADIUM	< 0.0010 mg/l
358		ANTIMONY DISSOLVED	< 0.0010 mg/l
360		ANTIMONY	< 0.0010 mg/l
373		CHROMIUM DISSOLVED	< 0.0010 mg/l
375		CHROMIUM	0.0010 mg/l
401		MANGANESE DISSOLVED	0.0020 mg/l
403		MANGANESE	0.0070 mg/l

Contd...

Sample Analysis Report

Sampling Point : NANCEKUKU/E3

Date/Time Taken : 26-SEP-91 12:30

Det.	Code	Description	Result
423	COBALT	DISSOLVED	< 0.0010 mg/l
425	COBALT		< 0.0010 mg/l
427	NICKEL	DISSOLVED	0.0010 mg/l
429	NICKEL		0.0010 mg/l
559	TDE	(PP')	< 0.0030 ug/l
573	TDE	(OP')	< 0.0050 ug/l
3082	HEXACHLORO-BENZENE	TOTAL	< 3.5000 ng/l
3083	HEXACHLORO-BUTADIENE	TOTAL	< 3.0000 ng/l
3276	ALDRIN		< 3.5000 ng/l
3294	DDE	(PP')	< 3.5000 ng/l
3295	DDE	(OP')	< 8.0000 ng/l
3296	DDT	(OP')	< 6.0000 ng/l
3297	DDT	(PP')	< 3.0000 ng/l
3301	DIELDRIN		< 3.5000 ng/l
3306	ENDRIN		< 4.0000 ng/l
3310	HCH	ALPHA	< 4.0000 ng/l
3311	HCH	BETA	< 12.0000 ng/l
3312	HCH	DELTA	< 4.0000 ng/l
3313	HCH	GAMMA	< 3.0000 ng/l

** Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis ReportSampling Point : NANCEKUKU/E4

Date/Time Taken : 26-SEP-91 00:02

NANCEKUKU E4

Address :

Laboratory Reference : E16137

Det.	Code	Description	Result
61		pH	7.6500 pH
62		CONDUCTIVITY AT 20C	417.6000 Microsiemens/cm
68		TURBIDITY	25.0000 Turbidity FTU
76		TEMPERATURE	12.3000 Celsius
81		OXYGEN DISSOLVED % SATURATION	91.8000 %
82		OXYGEN DISSOLVED	9.8000 mg/l
85		BOD ATU	< 1.0000 mg/l
105		MERCURY	< 0.0200 ug/l
106		CADMIUM DISSOLVED	0.3000 ug/l
108		CADMIUM	0.4000 ug/l
111		AMMONIA EXPRESSED AS NITROGEN	< 0.0200 mg/l N
		NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	6.3080 mg/l N
118		NITRITE	< 0.0100 mg/l
119		AMMONIA NON-IONISED	0.0002 mg/l
135		SUSPENDED SOLIDS 105C	2.9000 mg/l
172		CHLORIDE ION	70.4890 mg/l
180		ORTHO-PHOSPHATE	< 0.0100 mg/l
182		SILICATE REACTIVE DISSOLVED	5.5580 mg/l
213		COPPER DISSOLVED	0.0010 mg/l
215		COPPER	0.0010 mg/l
231		BERYLLIUM DISSOLVED	< 0.0010 mg/l
233		BERYLLIUM	< 0.0010 mg/l
243		ZINC DISSOLVED	
245		ZINC	0.0440 mg/l
255		BARIUM DISSOLVED	
257		BARIUM	0.0070 mg/l
281		BORON DISSOLVED	
283		BORON	0.0210 mg/l
285		ALUMINIUM DISSOLVED	< 0.0300 mg/l
287		ALUMINIUM	< 0.0300 mg/l
326		LEAD DISSOLVED	< 0.0010 mg/l
328		LEAD	< 0.0010 mg/l
350		VANADIUM DISSOLVED	< 0.0010 mg/l
352		VANADIUM	< 0.0010 mg/l
8		ANTIMONY DISSOLVED	< 0.0010 mg/l
360		ANTIMONY	< 0.0010 mg/l
373		CHROMIUM DISSOLVED	< 0.0010 mg/l
375		CHROMIUM	0.0010 mg/l
401		MANGANESE DISSOLVED	0.0140 mg/l
403		MANGANESE	0.0190 mg/l

Contd...

Sample Analysis ReportSampling Point : NANCEKUKU/E4

Date/Time Taken : 26-SEP-91 00:02

Det.	Code	Description	Result
423	COBALT DISSOLVED		< 0.0010 mg/l
425	COBALT		< 0.0010 mg/l
427	NICKEL DISSOLVED		0.0010 mg/l
429	NICKEL		0.0020 mg/l
559	TDE (PP')		< 0.0030 ug/l
573	TDE (OP')		< 0.0050 ug/l
3082	HEXACHLORO-BENZENE TOTAL		< 3.5000 ng/l
3083	HEXACHLORO-BUTADIENE TOTAL		< 3.0000 ng/l
3276	ALDRIN		< 3.5000 ng/l
3294	DDE-(PP')		< 3.5000 ng/l
3295	DDE-(OP')		< 8.0000 ng/l
3296	DDT (OP')		< 6.0000 ng/l
3297	DDT (PP')		< 3.0000 ng/l
3301	DIELDRIN		< 3.5000 ng/l
3306	ENDRIN		< 4.0000 ng/l
10	HCH ALPHA		< 4.0000 ng/l
3311	HCH BETA		< 12.0000 ng/l
3312	HCH DELTA		< 4.0000 ng/l
3313	HCH GAMMA		< 3.0000 ng/l

** Indicates that Laboratory Determination Method is NAMAS Accredited.

NRA Exeter Regional Laboratory

6th Jan 1992

Automatic Sample Analysis Report ProductionDate/Time Report Last Run : 02-JAN-92 23:59Sampling Point : NANCEKUKU/E5Date/Time Taken : 24-OCT-91 13:45

Nancekuke E5

Address : ADIT - PORTHTOWAN BEACH

Laboratory Reference : E21566

Sampler's Comments :

WEATHER DRY/OVERCAST FLOW 1 L/MIN

COND 492 pH 6.59 COND uS/CM

<u>Det. Code</u>	<u>Description</u>	<u>Result</u>	
61	Ph	6.9	pH
62	Conductivity At 20c	519	Microsiemens
68	Turbidity	2	Turbidity FT
76	Temperature	13.4	Celsius
	Oxygen Dissolved % Saturation	85	%
82	Oxygen Dissolved	8.85	mg/l
85	Bod Atu	< 1	mg/l
105	Mercury	< 0.02	ug/l
106	Cadmium Dissolved	7.1	ug/l
108	Cadmium	17.6	ug/l
111	Ammonia Expressed As Nitrogen	< 0.02	mg/l N
116	Nitrogen Total Oxidised Expres	3.8	mg/l N
118	Nitrite	< 0.01	mg/l
119	Ammonia Non-Ionised	0	mg/l
135	Suspended Solids 105c	7.4	mg/l
172	Chloride Ion	96	mg/l
180	Ortho-Phosphate	0.03	mg/l
182	Silicate Reactive Dissolved	7	mg/l
213	Copper Dissolved	0.62	mg/l
215	Copper	0.66	mg/l
231	Beryllium Dissolved	< 0.001	mg/l
233	Beryllium	0.001	mg/l
243	Zinc Dissolved	2.3	mg/l
245	Zinc	2.3	mg/l
5	Barium Dissolved	No Result	
257	Barium	0.019	mg/l
281	Boron Dissolved	No Result	
283	Boron	0.024	mg/l
285	Aluminium Dissolved	< 0.03	mg/l
287	Aluminium	0.18	mg/l
326	Lead Dissolved	0.19	mg/l
328	Lead	0.244	mg/l
350	Vanadium Dissolved	< 0.001	mg/l
352	Vanadium	< 0.001	mg/l

Contd...

6th Jan 1992

Automatic Sample Analysis Report Production
Date/Time Report Last Run : 02-JAN-92 23:59

Sampling Point : NANCEKUKU/E5

Date/Time Taken : 24-OCT-91 13:45

<u>Det.</u>	<u>Code</u>	<u>Description</u>	<u>Result</u>	
358		Antimony Dissolved	<	0.001 mg/l
360		Antimony	<	0.001 mg/l
373		Chromium Dissolved	<	0.001 mg/l
375		Chromium	<	0.001 mg/l
401		Manganese Dissolved		0.24 mg/l
403		Manganese		0.24 mg/l
423		Cobalt Dissolved		0.046 mg/l
425		Cobalt		0.047 mg/l
427		Nickel Dissolved	No Result	
429		Nickel		0.064 mg/l
3082		Hexachloro-Benzene Total	<	3.5 ng/l
3083		Hexachloro-Butadiene Total	<	3 ng/l
3106		Analysis By Mass-Spec	Report Filed	Misc
6		Aldrin	<	3.5 ng/l
3294		Dde-(Pp')	<	3.5 ng/l
3295		Dde-(Op')	<	8 ng/l
3296		Ddt (Op')	<	6 ng/l
3297		Ddt (Pp')	<	3 ng/l
3301		Dieldrin	<	3.5 ng/l
3306		Endrin	<	4 ng/l
3310		Hch Alpha	<	4 ng/l
3311		Hch Beta	<	12 ng/l
3312		Hch Delta	<	4 ng/l
3313		Hch Gamma	<	3 ng/l
3329		Tde (Op')	<	5 ng/l
3330		Tde (Pp')	<	3 ng/l
7354		Arsenic Dissolved Ppb	<	0.1 ug/l
7356		Arsenic Total Ppb	No Result	

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis Report

Sampling Point : NANCEKUKE/E7

Date/Time Taken : 26-SEP-91 10:00

NANCEKUKE E7

Address :

Laboratory Reference : E16140

Det.	Code	Description	Result
51		pH	7.6700 pH
52		CONDUCTIVITY AT 20C	10.0000 Microsiemens/cm
68		TURBIDITY	36.0000 Turbidity FTU
76		TEMPERATURE	11.3000 Celsius
81		OXYGEN DISSOLVED & SATURATION	89.7000 %
82		OXYGEN DISSOLVED	9.8000 mg/l
85		BOD ATU	3.3000 mg/l
105		MERCURY	< 0.0200 ug/l
106		CADMIUM DISSOLVED	0.8000 ug/l
108		CADMIUM	0.9000 ug/l
111		AMMONIA EXPRESSED AS NITROGEN	0.0050 mg/l N
116		NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	11.5060 mg/l N
118		NITRITE	< 0.0100 mg/l
119		AMMONIA NON-IONISED	0.0000 mg/l
135		SUSPENDED SOLIDS 105C	138.0000 mg/l
172		CHLORIDE ION	66.3840 mg/l
180		ORTHO-PHOSPHATE	0.0060 mg/l
182		SILICATE REACTIVE DISSOLVED	4.8840 mg/l
213		COPPER DISSOLVED	0.0020 mg/l
215		COPPER	0.0030 mg/l
231		BERYLLIUM DISSOLVED	< 0.0010 mg/l
233		BERYLLIUM	< 0.0010 mg/l
243		ZINC DISSOLVED	0.2300 mg/l
245		ZINC	0.2430 mg/l
255		BARIUM DISSOLVED	
257		BARIUM	0.0070 mg/l
281		BORON DISSOLVED	
283		BORON	0.0200 mg/l
285		ALUMINIUM DISSOLVED	< 0.0300 mg/l
287		ALUMINIUM	0.0600 mg/l
326		LEAD DISSOLVED	< 0.0010 mg/l
328		LEAD	0.0140 mg/l
350		VANADIUM DISSOLVED	< 0.0010 mg/l
352		VANADIUM	< 0.0010 mg/l
358		ANTIMONY DISSOLVED	< 0.0010 mg/l
360		ANTIMONY	< 0.0010 mg/l
373		CHROMIUM DISSOLVED	< 0.0010 mg/l
375		CHROMIUM	0.0020 mg/l
401		MANGANESE DISSOLVED	0.0110 mg/l
403		MANGANESE	0.0390 mg/l

Contd...

Sample Analysis ReportSampling Point : NANCEKUKU/E7

Date/Time Taken : 26-SEP-91 10:00

Det.	Code	Description	Result
423	COBALT	DISSOLVED	< 0.0010 mg/l
425	COBALT		< 0.0010 mg/l
427	NICKEL	DISSOLVED	0.0040 mg/l
429	NICKEL		0.0050 mg/l
559	TDE	(PP')	< 0.0030 ug/l
573	TDE	(OP')	< 0.0050 ug/l
3082	HEXACHLORO-BENZENE	TOTAL	< 3.5000 ng/l
3083	HEXACHLORO-BUTADIENE	TOTAL	< 3.0000 ng/l
3276	ALDRIN		< 3.5000 ng/l
3294	DDE-	(PP')	< 3.5000 ng/l
3295	DDE-	(OP')	< 8.0000 ng/l
3296	DDT	(OP')	< 6.0000 ng/l
3297	DDT	(PP')	< 3.0000 ng/l
3301	DIELDRIN		< 3.5000 ng/l
3306	ENDRIN		< 4.0000 ng/l
110	HCH	ALPHA	< 4.0000 ng/l
3311	HCH	BETA	< 12.0000 ng/l
3312	HCH	DELTA	< 4.0000 ng/l
3313	HCH	GAMMA	< 3.0000 ng/l

*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis Report

Sampling Point : NANCEKUKE/E8

Date/Time Taken : 26-SEP-91 09:20

NANCEKUKE E8

Address :

Laboratory Reference : E16141

Det.	Code	Description	Result
61		pH	6.9000 pH
62		CONDUCTIVITY AT 20C	344.6000 Microsiemens/cm
68		TURBIDITY	0.9600 Turbidity FTU
76		TEMPERATURE	12.3000 Celsius
81		OXYGEN DISSOLVED & SATURATION	86.2000 %
82		OXYGEN DISSOLVED	9.2000 mg/l
85		BOD ATU	< 1.0000 mg/l
105		MERCURY	< 0.0200 ug/l
106		CADMIUM DISSOLVED	2.2000 ug/l
108		CADMIUM	2.2000 ug/l
111		AMMONIA EXPRESSED AS NITROGEN	0.1870 mg/l N
116		NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	4.2770 mg/l N
118		NITRITE	< 0.0100 mg/l
119		AMMONIA NON-IONISED	0.0003 mg/l
135		SUSPENDED SOLIDS 105C	< 2.0000 mg/l
172		CHLORIDE ION	54.0890 mg/l
180		ORTHO-PHOSPHATE	0.0430 mg/l
182		SILICATE REACTIVE DISSOLVED	6.2300 mg/l
213		COPPER DISSOLVED	0.0050 mg/l
215		COPPER	0.0080 mg/l
231		BERYLLIUM DISSOLVED	< 0.0010 mg/l
233		BERYLLIUM	< 0.0010 mg/l
243		ZINC DISSOLVED	
245		ZINC	1.1600 mg/l
255		BARIUM DISSOLVED	
257		BARIUM	0.0080 mg/l
281		BORON DISSOLVED	
283		BORON	0.0320 mg/l
285		ALUMINIUM DISSOLVED	< 0.0300 mg/l
287		ALUMINIUM	0.0400 mg/l
326		LEAD DISSOLVED	0.0030 mg/l
328		LEAD	0.0130 mg/l
350		VANADIUM DISSOLVED	< 0.0010 mg/l
352		VANADIUM	< 0.0010 mg/l
358		ANTIMONY DISSOLVED	< 0.0010 mg/l
360		ANTIMONY	< 0.0010 mg/l
373		CHROMIUM DISSOLVED	< 0.0010 mg/l
375		CHROMIUM	< 0.0010 mg/l
401		MANGANESE DISSOLVED	0.0620 mg/l
403		MANGANESE	0.0680 mg/l

Contd...

NRA Exeter Regional Laboratory

3rd Dec 1991

Sample Analysis Report

Sampling Point : NANCEKUKU/E8

Date/Time Taken : 26-SEP-91 09:20

Det.	Code	Description	Result
423	COBALT DISSOLVED		0.0030 mg/l
425	COBALT		0.0030 mg/l
427	NICKEL DISSOLVED		0.0130 mg/l
429	NICKEL		0.0140 mg/l
559	TDE (PP')		< 0.0030 ug/l
573	TDE (OP')		< 0.0050 ug/l
3082	HEXACHLORO-BENZENE TOTAL		< 3.5000 ng/l
3083	HEXACHLORO-BUTADIENE TOTAL		< 3.0000 ng/l
3276	ALDRIN		< 3.5000 ng/l
3294	DDE-(PP')		< 3.5000 ng/l
3295	DDE-(OP')		< 8.0000 ng/l
3296	DDT (OP')		< 6.0000 ng/l
3297	DDT (PP')		< 3.0000 ng/l
3301	DIELDRIN		< 3.5000 ng/l
3306	ENDRIN		< 4.0000 ng/l
3310	HCH ALPHA		< 4.0000 ng/l
3311	HCH BETA		< 12.0000 ng/l
3312	HCH DELTA		< 4.0000 ng/l
3313	HCH GAMMA		< 3.0000 ng/l

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.

Sample Analysis Report

Sampling Point : NANCEKUKU/E9

Date/Time Taken : 26-SEP-91 13:45

NANCEKUKU E9

Address :

Laboratory Reference : E16142

Ret. Code	Description	Result
61	pH	7.4100 pH
62	CONDUCTIVITY AT 20C	544.8000 Microsiemens/cm
68	TURBIDITY	0.6600 Turbidity FTU
76	TEMPERATURE	14.4000 Celsius
81	OXYGEN DISSOLVED % SATURATION	78.6000 %
82	OXYGEN DISSOLVED	8.0000 mg/l
85	BOD ATU	< 1.0000 mg/l
105	MERCURY	< 0.0200 ug/l
106	CADMIUM DISSOLVED	< 0.2000 ug/l
108	CADMIUM	< 0.2000 ug/l
111	AMMONIA EXPRESSED AS NITROGEN	0.0040 mg/l N
6	NITROGEN TOTAL OXIDISED EXPRESSED AS NITROGEN	6.6820 mg/l N
118	NITRITE	< 0.0100 mg/l
119	AMMONIA NON-IONISED	0.0000 mg/l
135	SUSPENDED SOLIDS 105C	< 2.0000 mg/l
172	CHLORIDE ION	82.6830 mg/l
180	ORTHO-PHOSPHATE	< 0.0100 mg/l
182	SILICATE REACTIVE DISSOLVED	4.8380 mg/l
213	COPPER DISSOLVED	0.0020 mg/l
215	COPPER	0.0040 mg/l
231	BERYLLIUM DISSOLVED	< 0.0010 mg/l
233	BERYLLIUM	< 0.0010 mg/l
243	ZINC DISSOLVED	0.0100 mg/l
245	ZINC	0.0120 mg/l
255	BARIUM DISSOLVED	
257	BARIUM	0.0070 mg/l
281	BORON DISSOLVED	
283	BORON	0.0350 mg/l
285	ALUMINIUM DISSOLVED	< 0.0300 mg/l
287	ALUMINIUM	0.0800 mg/l
326	LEAD DISSOLVED	< 0.0010 mg/l
328	LEAD	0.0010 mg/l
350	VANADIUM DISSOLVED	< 0.0010 mg/l
352	VANADIUM	< 0.0010 mg/l
3	ANTIMONY DISSOLVED	< 0.0010 mg/l
300	ANTIMONY	< 0.0010 mg/l
373	CHROMIUM DISSOLVED	0.0010 mg/l
375	CHROMIUM	0.0020 mg/l
401	MANGANESE DISSOLVED	0.0190 mg/l
403	MANGANESE	0.0330 mg/l

Contd...

Sample Analysis Report

Sampling Point : NANCEKUKU/E9

Date/Time Taken : 26-SEP-91 13:45

Det.	Code	Description	Result
423	COBALT DISSOLVED		< 0.0010 mg/l
425	COBALT		< 0.0010 mg/l
427	NICKEL DISSOLVED		< 0.0010 mg/l
429	NICKEL		< 0.0010 mg/l
559	TDE (PP')		< 0.0030 ug/l
573	TDE (OP')		< 0.0050 ug/l
3082	HEXACHLORO-BENZENE TOTAL		< 3.5000 ng/l
3083	HEXACHLORO-BUTADIENE TOTAL		< 3.0000 ng/l
3276	ALDRIN		< 3.5000 ng/l
3294	DDE-(PP')		< 3.5000 ng/l
3295	DDE-(OP')		< 8.0000 ng/l
3296	DDT (OP')		< 6.0000 ng/l
3297	DDT (PP')		< 3.0000 ng/l
3301	DIELDRIN		< 3.5000 ng/l
3306	ENDRIN		< 4.0000 ng/l
3310	HCH ALPHA		< 4.0000 ng/l
3311	HCH BETA		< 12.0000 ng/l
3312	HCH DELTA		< 4.0000 ng/l
3313	HCH GAMMA		< 3.0000 ng/l

'*' Indicates that Laboratory Determination Method is NAMAS Accredited.