Airservices Australia

Ayers Rock (Yulara) Airport

Preliminary Site Investigation

October 2017

Sections of this report have been redacted to protect personnel privacy and commercial in confidence information

Executive summary

Airservices Australia (Airservices) engaged GHD Pty Ltd (GHD) to conduct a Preliminary Site Investigation (PSI) at the Ayers Rock (Yulara) Airport (ARA) with particular regard to the potential for contamination from per- and poly-fluorinated alkyl substances (PFAS).

Based on the review of available site history information, site inspection and site interviews, the following potential sources of PFAS have been identified:

- Areas in which Aviation Rescue Fire Fighting (ARFF) operate or have historically operated including:
  - The Fire Station (FS) and surrounding area
  - Fire Training Grounds (FTG) and surrounding area
  - Former interim Fire station and surrounding area
- Other possible sources of contamination were:
  - Bio piling of soils impacted with petroleum hydrocarbons that originated form the ARFF areas
  - Historical disposal of waste impacted by AFFF to Sewage Treatment Plant (STP) with potential for subsequent discharge via effluent

The desktop review identified the following potential sensitive receptors:

- Workers on-site whose activities may result in exposure to contaminated site soils and or surface water
- Terrestrial flora and fauna consuming impacted plant material e.g. grasses and surface water, which may in turn may impact their predators

Based on the data reviewed in this study and the conceptual site model (CSM) the following summary is made:

- The primary source (use of AFFF containing PFASs) no longer exists. Secondary sources include residual soil and sediment contamination
- Soil results reported concentrations of PFASs below the adopted human health and ecological guidelines, indicating that in the areas sampled, soils do not present an unacceptable risk to human health and ecological receptors
- There is a potential, albeit low, risk to groundwater in the area but groundwater is not extracted for any use in the immediate vicinity of the site

This report should be read in accordance with the limitations set out in Section 10.

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1. Introduction

Airservices Australia (Airservices) engaged GHD Pty Ltd (GHD) to conduct a Preliminary Site Investigation (PSI) at the Ayers Rock (Yulara) Airport (ARA) with particular regard to the potential for contamination from per- and poly-fluorinated alkyl substances (PFAS).

1.1 Background

Aqueous film-forming foam (AFFF) has been used for fire-fighting purposes around Australia for decades. On airports, AFFF has been used at fuel depots, hangars and for operational and fire training purposes.

AFFF has not been used in the provision of aviation rescue and fire-fighting services by Airservices since 2010 but continues to be used around fuel depots, hangars etc, at many airports. AFFF products historically used on airport sites contained PFAS. Depending on the type of AFFF used, the principal PFAS constituents could have included perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) or fluorotelomers such as 6:2 fluorotelomer sulfonate (6:2FtS) and 8:2 fluorotelomer sulfonate (8:2FtS).

1.2 Objectives

The objective of this PSI is to identify where there is potential for PFAS contamination to be present at the ARA as a result of previous activities by ARFF and other AFFF users. A preliminary, targeted soil and sediment sampling program was undertaken to further investigate the desktop findings of the PSI.

The report also seeks to identify potential sensitive receptors and stakeholders that may be impacted by possible PFAS contamination originating from the ARA.

1.3 Scope

The scope of work for the PSI included:

- Review of historical aerial photographs to gain an understanding of site development over time and identify potential areas where AFFF may have been used
- Review of current certificates of title and key lessees to identify site activities that may have included the use of AFFF
- Review of published data on geology, hydrology and hydrogeology to gain an understanding of site conditions and identify sensitive receptors
- Search of the groundwater bore database to understand beneficial uses for groundwater in the area
- Review of historical reports provided by Airservices to provide some background to previous investigations and site conditions
- A detailed site inspection to gain an understanding of site condition and inspect areas where there is potential for AFFF to have been used
- Interviews with personnel who have an understanding of current and historical site activities to identify areas where AFFF may have been used
- Preliminary and targeted soil and sediment sampling program
- Development of a Conceptual Site Model (CSM) and potential source, pathway, receptor linkages
- Conclusions

2. Data quality objectives

The Data Quality Objective (DQO) process was applied to the preliminary investigations as described below, to ensure that data collection activities were appropriate and achieved the stated objectives. The DQO steps defined above have been addressed as follows.

Table 1 Data quality objectives

Step		Description
1	**State the problem to be resolved**	Where was AFFF historically used on the Airport site? Do possible source, pathway, receptor linkages present an unacceptable risk?
2	**Identify the decision/s to be made**	To address the problem set out in Step 1, the following decisions are required to achieve the task objective and to identify data gaps and additional information that may be required: • What activities have occurred at the site which may have involved the use of AFFF? • What types of AFFF have been used? • Where was AFFF stored on site? • What is the nature of the contaminant migration pathways, particularly leading off the site? • What sensitive receptors are present at and surrounding the site?
3	**Identify the inputs to the decision**	To inform the decisions and identify key data gaps and needs, the following information is considered necessary: • Review of site conditions • Review of available history information • Interviews with site personnel • Detailed site inspection • Development of a Conceptual Site Model
4	**Define the boundaries of the study**	The study boundary comprises soil and surface water within the on-site areas in the vicinity of the identified potential PFAS sources as shown in Figure 1.
5	**Develop a decision rule**	The key decision rules are: Are there areas of the site, outside the current fire station and FTG, where PFAS may be present and does this present: 1) a potential unacceptable risk; or 2) a risk that contamination may be migrating off-site? • If NO – further investigations can be targeted in these known (source) areas. • If YES – more extensive investigations may be required to target broader areas of the site and understand the potential for off-site contamination.

Step		Description
6	**Specify the tolerable limits on decision errors**	There is potential for anecdotal information to not always be accurate or to be limited in nature, and it is also difficult to assess site activities from historical aerial photographs based on poor resolution. Where possible, any potential sources of PFAS contamination will be cross checked through multiple lines of evidence. The two decision errors that exist include: • False positive – an area identified as potentially containing PFAS does not. • False negative – Areas containing PFAS are not identified. • These can be managed through the implementation of a sampling program to confirm the PSI findings.
7	**Optimise the design for obtaining the data**	The CSM design will be optimised through: • Identification of potential PFAS sources from existing information and investigations conducted by others. • A preliminary and high level review of the likely hydraulic characteristics of the upper aquifer to estimate the groundwater flow direction and seepage velocities at various locations of the site. • A review of the surface water pathways (hydrology) across and leaving the site.

3. Site information

3.1 Site location

The ARA is located approximately six kilometres north of the township of Yulara, and nine kilometres north of the Uluru-Kata Tjuta National Park, Northern Territory, Australia.

The site location is outlined in Figure 1 in Appendix A and location details are provided in Table 2.

Table 2 Site identification

Street Address	200 Coote Road, Yulara, Northern Territory
Site Area	500 ha
Title Identifiers	Lot 101 S 81/079
Local Government Area	Unincorporated (Yulara)
Current Land Use	Airport and associated commercial enterprises
Land Use Zoning	No zoning

3.2 Lease information review

The current operating lease holder for the ARA is Ayers Rock Resort Company Limited who sublease portions of the site to several other entities. The current properties within ARA and relevant lessees are summarised in Table 3 and current certificates of title are provided in Appendix B. It should be noted that there was a previous lease to Airservices Australia, which expired on 30 June 2008.

The lessees identified are those that are considered to have a major presence on site and/or the potential to undertake activities that could cause contamination. Others are also included on the certificate of title which are not identified here based on their lesser relevance to this investigation.

The airport is operated by Voyages Hotels & Resorts Pty Limited (Voyages).

Table 3 Current certificate of title lessee summary

Owner	Lot/ Plan	Primary Lessee / Date	Sub-lessee / Date
Northern Territory of Australia	Lot 101 S 81/079	Ayers Rock Resort Company Limited. Term: 1 Feb 1997 – 30 June 2007	Perpetual Trustee Company Limited. Term: 1 July 2007 – 30 June 2032
			Voyages Hotels & Resorts Pty Limited. Term: 3 Dec 2002 – 31 Dec 2017

3.3 Site description

A site inspection was completed by GHD (accompanied by Airservices) on 21 and 22 July 2016. A summary of the findings are provided below and site photographs are included in Appendix C.

Key site features are outlined on Figure 2 in Appendix A. They included:

- One runway and taxiway
- Terminal building and car park
- Light aircraft / helicopter parking
- ARFF Fire Station (FS)
- ARFF Fire training ground (FTG)
- Sewage treatment plant (STP)
- Surface water drainage channels

The site is situated in an arid region and consequently surface vegetation is sparse. The site is generally flat but surrounded by dunes.

Runway

The ARA includes one major runway, that runs approximately north-west to south-east. There is a taxiway that leads from the runway to the apron in front of the main terminal building.

Terminal

The terminal is located on the south of the runway. Terminal parking and car hire parking is located immediately south of the terminal. The terminal and car parking areas are characterised by hardstands with some minor areas of tree/shrub planting.

Aircraft hangar

One aircraft hangar is located to the west of the terminal building which is leased by light aircraft and helicopter operators. No hangars are present that house larger jets. Firefighting equipment within the hangars are understood to be limited to handheld fire extinguishers.

The hangar is situated on unsealed ground adjacent to an asphalt light aircraft taxiway.

Fire station (FS)

The current FS is located approximately 500 m to the north-west of the terminal building. The FS includes a two-storey building, fire truck garage, wash-down area, hardstand and AST bunded area for chemical and foam storage.

The fire truck garage is surrounded by hard stand which drains to a surface water collection system. The system includes a collection trench and separator. All water from FS drains into the Airport STP.

The FS is surrounded by grass and open surface water drainage channels directly to the west.

Fire training ground (FTG)

The FTG contains the following:

- A bunded hardstand with large mock up (LMU). The area immediately outside the hardstand area is characterised by exposed soil with some grass
- Unbunded bulk storage tanks labelled “Polluted Water”
- Bunded kerosene tank
- Waste water treatment system consisting of underground interceptors and digester and above ground pumps. It is understood, this system collects waste water from the FTG pad and removes TPH (via the separator) then directs the waste stream to the digester to allow time for the foam to breakdown before it directs the treated wastewater to the airport’s STP.
- A number of car bodies
- An area of soil stockpiling

The FTG is surrounded by sparsely vegetated grassland and shrubs typical of an arid climate.

Surface water drainage channels

There is a series of surface water drainage channels that transect the site and appear to lead to a larger drain near the FS. During the site inspection this channel had some water in it presumably as a result of recent rain.

Sewage treatment plant

The STP is located approximately 100 m to the west of the terminal building. It receives waste from all areas of the airport including the FS and FTG. It consists of underground aeration chambers, a pump shed and a discharge area to the west. Treated water is discharged from the area to the environment.

3.4 Surrounding land uses

Land immediately surrounding the airport is largely vacant with native vegetation, sand dunes and some constructed vehicle tracks. The Uluru-Kata Tjuta National Park occupies 1,326 square kilometres approximately 9 km to the south of ARA.

3.5 Key stakeholders

The following key stakeholders have been identified at the site:

- Voyages Hotels & Resorts Pty Limited
- Site lessees

4. Site conditions

4.1 Topography

The ARA itself is generally flat, but is surrounded by slightly raised sand dunes. The site does not appear to show any evidence of filling.

4.2 Geology

4.2.1 Regional geology

The site is located on a sand plain with associated dune forms. The regional geology is characterised by Quaternary aged alluvium comprised of sand, gravel and mud deposits in stream channels and flood-out plains (Young et al. 2002).

A geological map is included in Appendix D, groundwater bore locations and bore ids are included in Appendix A, Figure 3.

4.2.2 Soil profile

No description of the soil encountered on site was provided in the previous reports. However, the site visit indicated red sandy soil associated with the sandplains.

4.3 Hydrology

The ARA does not contain any natural permanent water bodies. Dry stream beds are present in the region and these are only likely to flow during high rainfall events. A system of large salt lakes (Lake Amadeus) is located approximately 40 km to the north of ARA.

A constructed drainage channel system is located to the west and south of the FS with a minor drain running parallel to and south of the runway. The channels terminate into a small artificial dam to the west of the FS and north of the FTG. During the site visit in July 2016, some water was present in the drain. Site personnel indicated this does not tend to remain for any significant time.

4.4 Hydrogeology

Groundwater is abstracted for drinking water supply at the Uluru-Kata Tjuta National Park which is located approximately 9 km to the south of ARA. There are two aquifers that provide drinking water to the National Park and surrounds, namely the Dune Plains Aquifer and the Southern Aquifer. The aquifers are not hydrologically connected. The Dune Plains Aquifer is the water table aquifer beneath the ARA.

The Dune Plains Aquifer supplies water to the township of Yulara (6 km south of ARA) and the Southern Aquifer supplies water to the Visitor Centre and Park Headquarters, and to Mutitjulu Community. Both are recharged through large rainfall events. The aquifers are not connected to the Great Artesian Basin.

Flora and fauna within the region are not considered dependent on groundwater.

A search of the Department of Land Resource Management 2000, *Hydrological information of the Northern Territory* identified five bores within 1 km of the site (it is important to note that unregistered and private bores may also exist). A figure showing the location of the bores is provided in Figure 3 in Appendix A. A summary of these bores is shown in Table 4.

Table 4 Groundwater bores within 1 km of the site

Bore ID	Bore depth (mbgl)	Year drilled	SWL (mbgl)	Direction from site	Purpose
RN012081	93	1979	14.6	South	Farming
RN012163	63	1979	14.2	South	Monitoring
RN012082	53	1979	0	South	Investigation
RN012076	37.5	1979	12.6	South west	Farming
RN012065	37.5	1979	12.3	On site	Monitoring

Groundwater bore 12065 is located on-site to the north of the FS. The bore log from this well indicates that the soils beneath the site are Quaternary sand and gravels up to 3 m depth, confirming the regional geology of Quaternary aged alluvium. Underlying this unit is Tertiary clays with minor sands up to 36 m depth and then Dolomitic Siltstone. Bore 12065 indicates that there are two aquifers beneath the site extending to:

- 18 m depth in Tertiary Sands (Dunes Plains Aquifer)
- 35 m depth at the base of Tertiary Clay that likely extends into the underlying Dolomitic Sandstone

The relatively shallow SWL of the on-site bore RN012065 above water strike suggests the SWL measured represents the potentiometric surface of a confined aquifer.

5. Site history

5.1 Aerial photographs

A review of historical aerial photographs between 1983 and 2015 was completed. A summary of the key findings is outlined in Table 5. A copy of the photographs is provided in Appendix E.

Table 5 Historical aerial photograph summary

Date	Description
1983	This image showed only a small, southern portion of the site. The southern half of the runway was visible in its current location however, shorter in length. One building was visible in the area that now houses the main airport infrastructure. A number of roads and limited car parking was visible surrounding this building. Two large sealed areas were visible to the north east and north west of the building. The remainder of the site appeared to be sparsely vegetated vacant land.
1991	This image showed only a small, southern portion of the site. Evidence of earthworks was visible to the west of the sealed area. An additional sealed lane was visible to the north of the original connecting the runway to the airport building. An area which appeared to be used as a car park was visible to the south east of the airport building as an area of exposed soil. Another area of exposed soil was visible to the east of the sealed area.
1998	The runway appeared to have been extended to the south east to its current configuration. An additional large building was visible to the east of the existing airport building. Additional parking was also visible to the south. The tarmac area to the north of the airport buildings appeared to have been extended to the east. A third sealed lane was visible to the north west of the existing lanes connecting the runway to the airport building. An area of exposed soil, possibly indicating earthworks, was visible to the north west of the Terminal in the area that subsequently was developed as the FTG.
2015	The FTG and current FS are now visible to the north west of the Terminal

5.2 Previous reports

A number of reports were provided by Airservices for review. These are outlined below with a summary of the key points.

Low Ecological Services, 2009

***Report on Soil Sampling at Yulara Airport Fire Station and ARFF Drill Ground,* Low Ecological Services, October 2009**

- Since opening in 2005, the Yulara Airport fire station and firefighting training facility have serviced the Ayers Rock (Yulara) Airport. Training practices included the use of unleaded petroleum and kerosene as accelerants and extinguishment of fires using AFFF, dry chemical powder (DCP) and water.
- The infrastructure of the Fire Training Ground (also referred to as Ayers Rock ARFF Drill Ground Area) includes:
  - 30 x 20 m bunded concrete training ground
  - Large mock up aircraft unit (LMU) attached to underground kerosene distribution pipes

  - 5,000 L AVTUR (kerosene) AST
  - Wastewater storage tank and separator at the training ground
  - Stormwater drainage that diverts rain water off the training slab and east of the training ground
- The infrastructure of the FS includes:
  - AFFF foam storage and refill station with an external wash-down area that drains off site to the east of the FS
  - A mechanical workshop facility (vehicle maintenance) with a wash down area which drains to a station separator, into Wastewater storage tank and then to airport sewer system, separate to the drainage from AFFF foam storage and refill station
- Investigation included sampling and analysis of five targeted surface soil samples from ARA.
- The analytical suite included metals, total petroleum hydrocarbons (TPH) and benzene, toluene, ethylene and xylene (BTEX). PFAS (PFOS and PFOA) were excluded from analysis as Airservices ceased to use 3M Light Water ™ AFFF at fire training facilities in 2003. As the fire station was not opened until October 2005, 3M Light Water ™ AFFF has reportedly never been applied during firefighting training activities at Ayers Rock (Yulara) Airport. The results showed no exceedances of the adopted screening levels for the assessment.
- In 2003 Airservices introduced the product Ansul Ansulite™ AFFF to replace 3M Light Water ™ AFFF. As such, Ansul Ansulite ™ AFFF was in use at Yulara Airport from 2005 until the reporting date (October 2009).
- Malfunction of the water level switch for the storage tank containing untreated water from the training pad has caused spills and low level contamination in the past.
- Waste water drains to the lowest point west of the AFFF foam refill and wash down area.

GHD, 2013

***Airservices Australia, Solberg RF6 use at Ayers Rock Airport Potential to discharge Solberg RF6 at Ayers Rock Airport STP,* GHD, March 2013**

- An options assessment for the disposal of wastewater containing Solberg Rehealing™ RF6 6% Fire Fighting Foam was completed by GHD (2014).
- In January 2010 Airservices adopted a policy of ‘no-foam’ hot firefighting training at local fire training grounds. However, due to a change in Civil Aviation Safety Authority requirements, Airservices was required to resume periodic hot fire foam behaviour training.
- Before adopting the ‘no-foam’ policy, AFFF wastewater was discharged to the Ayers Rock (Yulara) Airport sewage plant.

Low Ecological Services, 2014

Report on Soil Sampling and Analysis at Yulara Airport Fire Station and ARFF Drill Ground, Low Ecological Services, 10 February 2014

- Since October 2009, Low Ecological Services Pty Ltd regularly sampled at the Ayers Rock (Yulara) Airport. Samples were collected and analysed in October 2009, December 2011, December 2012 and February 2014.
- In February 2014, two soil samples were collected at each of five sampling locations. Samples were collected at the surface and at a depth of 0.5 mbgl. Selected sampling locations were consistent with previous investigations and were selected to target areas where possible contaminants may accumulate.
- The analytical suite included metals, TPH, TRH, BTEX, PFOS and PFOA. Results indicated:
  - PFOS and PFOA concentrations were above the laboratory level of reporting (LOR) in all samples analysed, however no exceedances of the adopted screening levels were reported.
  - The reported TPH, TRH and BTEX concentrations were below the LOR.

5.3 Interviews

Site interviews were conducted on the 21 and 22 July 2016 with the following personnel:

- [redacted] – Assistant Airport Manager – Voyages Indigenous Tourism Australia
- [redacted] – General Manager – Voyages Indigenous Tourism Australia
- [redacted] – Fire Station Manager – Airservices Australia
- [redacted] – Airservices Australia

A summary of the key findings from the interviews is contained in Sections 5.3.1 and 5.3.2. A transcript of the interviews is provided in Appendix F.

5.3.1 Ayers Rock (Yulara) Airport Manager

- When Airservices moved towards a new foam, Voyages Hotels & Resorts Pty Limited (Voyages) asked for testing of the new product (Solberg). Solberg was determined to be problematic for the STP as it reduced the oxygen available to the biota that breaks down the sewage.
- Airservices installed a digester which held the stock a bit longer and diluted it before it was sent to the STP. No problems have been encountered since the digester was installed.
- The hangar was not likely to have sprinklers and did not use foam products.
- Voyages did not have a store of AFFF as this was all handled by Airservices.
- Groundwater was not extracted and stormwater was not a significant resource.
- No significant earthworks have occurred on the ARA.
- Voyages operate the STP on site. Treated water from the STP is discharged to ground in an area immediately west of the STP. It also receives waste water from the FTG.
- Voyages are not aware of any landfills on the ARA.

5.3.2 Airservices Australia Fire Station Manager

- Originally the FS was located at a temporary site for approximately 18 months prior to commissioning of the current FS in May 2004. The FTG pad was in use around the same time.
- The FS uses Solberg foam. Prior to Solberg, 3M Ansulite was used in training.
- Fire training with AFFF occurred between 2004 and 2006 approximately once or twice per month with limited volumes of foam. The AFFF was deployed through roof and bumper monitors on the trucks and using hoses. The AFFF was used in training both before and after the hardstand pad at the FTG was built.
- Training schedules were not as structured as they are now. Currently, training with foam (Solberg) might occur annually.
- Wash-down water from the FS and water from the training pad ends up at STP.
- AFFF was stored in 1,000 L totes and 200 L drums until a bulk storage tank was supplied at the FS and also at the temporary FS area. However, this was supplied near the end of the use of AFFF. The tank is still located at the FS awaiting removal and destruction.
- There were no actual fire incidents where foam was used to the knowledge of ARFF staff.
- Some wash down may have occurred at the temporary fire station.
- Bulk earthworks – none near where foam was used.
- An open constructed drain is located at the rear of the FS and may receive overland run-off during storm events.

Clarification on site interview

Subsequent to issuing a draft report, Airservices has provided the following clarifications and alterations via email (7 September 2016) to the interview with the Fire Station Manager:

- ARFF started at ARA in May 2004, occupying a temporary station for approximately 18 months until the current station was built and opened in October 2005.
- It is not known exactly when the bunded pad and LMU were constructed at the FTG, however they were present in aerial photographs from at least from October 2004. Therefore, training without the pad would not have occurred for more than five months.
- Solberg RF6 was introduced at Yulara in December 2010.
- The substance referred to as 3M Ansulite is in fact just Ansulite (manufactured by Tyco).
- Training with foam at Yulara was from 2004 until January 2010 when all of ARFF began to phase out training with foam. Airservices continued to complete some training with the “operational foam” over an 18 month transition period during which Airservices phased in the “foam behavior training” which involves the release of Solberg foam through a branchline (hose) on to the pad to satisfy requirement to train with operational foam.

5.4 Summary of site history

The site historical review indicated that the airport commenced operation in 1982. Airservices arrived in May 2004. The ARFF FS was temporarily located near the light aircraft apron between the terminal and the FTG. This location was used for approximately 18 months before the new FS was built and opened in October 2005. The FTG was also commissioned in May 2004 with the bunded pad and LMU being constructed within five months by October 2004. Measures such as concrete bunds and wastewater collection systems have been in place since the fire station and firefighting training facility opened in 2005.

All fire training activities using AFFF were conducted at the FTG between 2004 and 2010 approximately once or twice per month with limited volumes of foam. AFFF (Ansulite) was used and stored at the FS and may have been stored at the temporary station as well. Solberg RF6 was introduced in December 2010 to replace AFFF, however some remnant AFFF containers remain on-site in bunded areas awaiting disposal. Reportedly, the product 3M Light Water ™ AFFF has not been used on site.

The FTG, current FS and former interim fire station are considered the main potential primary sources of PFAS contamination due to the activities that have occurred here and the storage of AFFF. Potential secondary sources of PFAS contamination include:

- Bio piling of potentially contaminated soil for petroleum hydrocarbon remediation near the FTG.
- Previous discharge of waste impacted by AFFF to the STP. The discharge area of the STP also constitutes a potential secondary source of PFAS contamination.
- Malfunction of the water level switch for the storage tank containing untreated water from the training pad (FTG) has caused spills and low level contamination in the vicinity in the past.

Results of analysis between 2009 and 2014 indicated that reported concentrations of PFOS and PFOA are typically above the LOR, but below the adopted guideline criteria.

6. Preliminary and targeted sampling

6.1 Scope of work

Based on the outcomes of the PSI, a Sample Analysis and Quality Plan (SAQP) was developed for the investigation (GHD, 2016).

The SAQP was prepared so that the field investigations and analyses were undertaken in a way that enabled the collection and reporting of reliable data on which to base any further soil, groundwater and surface water monitoring programs for specific areas of the site.

The scope of work undertaken, methodology adopted and results of the sampling program are provided in a Preliminary Sampling report (GHD, 2017).

6.2 Results summary

The scope of the investigation focused on assessment of potential source areas of most likely impact as determined in the PSI.

The investigations completed as part of this scope of works reported the highest PFAS concentrations in soil samples at the former interim fire station and the treated sewerage discharge area. There were some slightly elevated PFAS concentrations at the FTG and lower concentrations in samples from the current fire station. However, there were no exceedances of the adopted criteria across the site.

In total, there were 34 detectable PFOS concentrations out of a total of 41 primary soil samples. PFOS concentrations were identified in all areas assessed. Areas not assessed were not identified as potential areas of concern and it is considered unlikely that there would be any significant impact outside the main potential sources areas.

Leachate results indicated that PFAS species are leachable although it was generally the shorter chain species that were identified in the leachate. This reflects the generally higher solubility and lower sorption of the shorter species compared to the longer chain species.

Full details of the scope of work undertaken, methodology and results are provided in the Preliminary Sampling report (GHD, 2017).

7. Conceptual site model

Based on our understanding of the contamination issues and site setting a conceptual site model (CSM) has been generated to identify the potential contamination sources, pathways and receptors, and the potential linkages (or pollutant linkages) between these.

A CSM is a critical element of any PSI and forms the basis for the assessment of contamination risk and prioritisation of any further investigations. As it is based only on limited information at the PSI stage, it is regarded as being preliminary only at this point and as the foundation for the development of a more detailed CSM as site investigations progresses.

Different land use scenarios have different contamination risk profiles depending on the sensitivity of receptors and the nature and likelihood of potential exposure mechanisms. This CSM assumes a commercial/industrial land use scenario consistent with the site's current use as an airport. A representation of the CSM using cross sections is provided as Figures 4a and 4b in Appendix A. The CSM pathways are shown on Figure 5 in Appendix A and a representation is also included in Chart 1.

7.1 Sources

The focus of this assessment is on the potential sources of PFAS on the ARA. The main potential sources include:

- The FTG – discharge of foam during training events from 2004 to 2010
- The FS and surrounding area – wash down of vehicles and hoses, drainage associated with the bunded areas that contained AFFF
- Former interim FS where AFFF was temporarily stored and some vehicle washdown occurred

Potential minor or secondary sources included:

- Stockpiled soils near the FTG
- Open drain near the FS and drainage low point from AFFF refill station fill point
- Discharge of treated effluent from the FTG at the STP area
- Waste water UST and vehicle wash-down area associated with the FTG

7.2 Pathways

The key mechanisms for contaminant transport at the site have been identified as:

- *Surface water overland flow* – lateral overland flow and migration of contaminants via stormwater during rain events, causing re-deposition of contaminants on other areas of the ARA or off-site. There is little potential for migration of contaminated surface water / storm water from the source in open drainage channels.
- *Groundwater advection/dispersion* - horizontal and vertical migration of contaminants from the ARA soils into the underlying aquifer. The groundwater is not considered likely to discharge to surface and could only be accessed by extraction. Note that there is no extraction of groundwater at the ARA, however groundwater supplies drinking water to the township of Yulara (6 km south of ARA), in the Uluru-Kata Tjuta National Park (9 km to the south of ARA) and to the Mutitjulu Community.
- *Relocation of contaminated soils on site* – stockpiled soils near the FTG have been relocated on the ARA as part of the installation of the digester. The PFAS levels in this soil have not been assessed.

7.3 Receptors

The site is located in a highly modified commercial/industrial site setting. The following are the key potential human health and ecological contamination receptors considered to be relevant in the context of the site's setting:

- Site workers whose activities may result in exposure to site soils and surface water. Note that there is no extraction of groundwater at the ARA.
- Terrestrial flora and fauna consuming impacted plant material e.g. grasses and surface water. This in turn may impact their predators. Note that Flora and fauna within the region are not considered dependent on groundwater.

Based on the identified receptors and the release and fate and transport characteristics of the contaminants of potential concern, contaminant uptake pathways through which receptors may become exposed to contamination include ingestion and dermal absorption.

- *Ingestion exposure pathway* - Ingestion of contaminants by site workers could occur during site works which will involve excavation and handling of site soils or wastewater. This is not considered to be of a concern for indoor site workers.

  Terrestrial fauna may ingest flora and fauna impacted by PFAS and surface water with dissolved PFAS.
- *Dermal exposure pathway* - Exposure may occur via sorption through biological membranes such as skin, based on animal studies. While this has not been confirmed for humans and despite PFOS having a low skin permeability constant, the exposure pathway may be complete.
- *Inhalation exposure pathway* – PFAS are not considered to be volatile so inhalation is not considered to be a viable exposure route other than through dust inhalation during earth works.

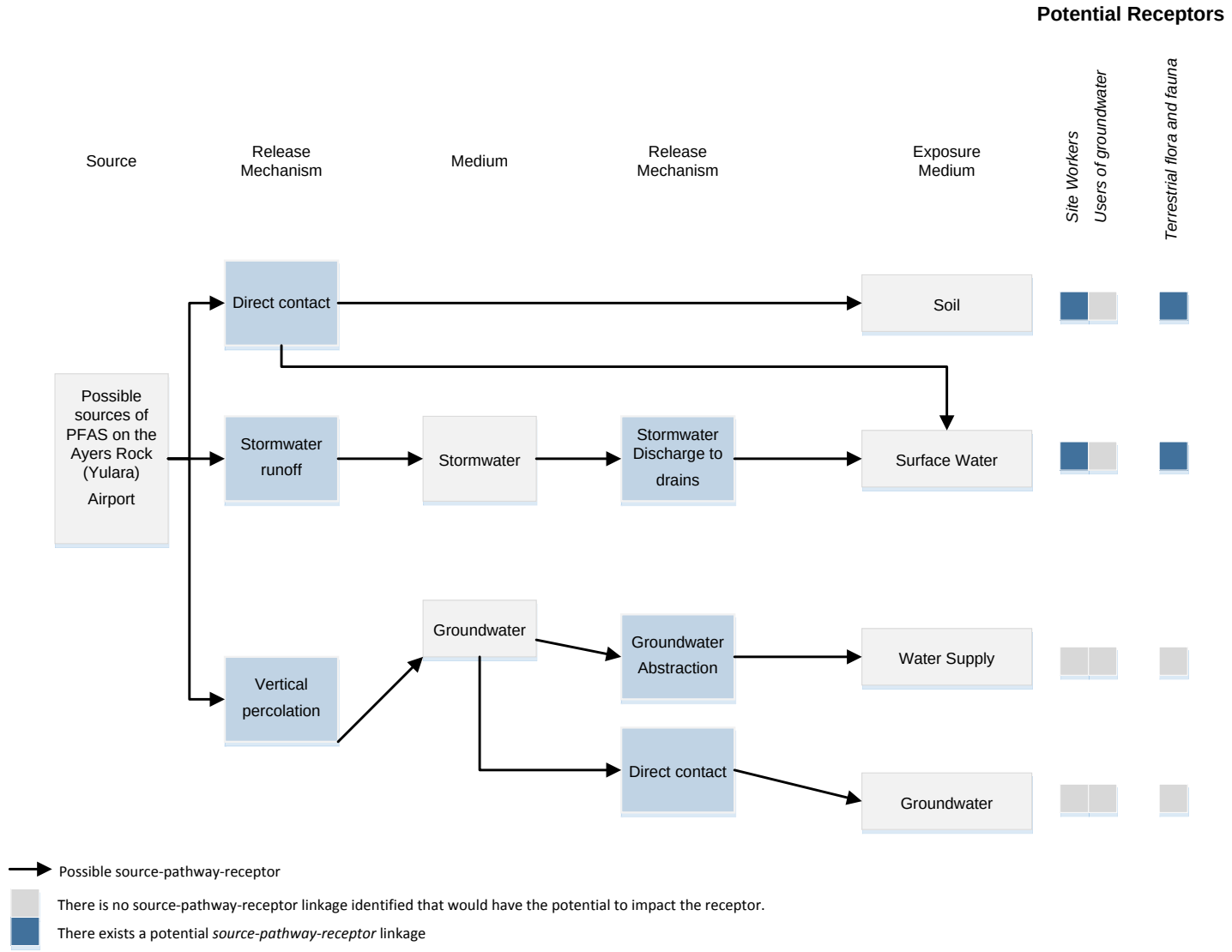
7.4 Potential source-pathway receptor linkages

The CSM has identified a number of potential source-pathway-receptor pollutant linkages which are highlighted in Table 6. These are discussed below in the context of the ARA's setting.

Table 6 PFAS contamination – potential pollutant linkages

Potential pollutant linkages	Key exposure routes and risks
Potential human health risks	
Health risks to site workers who may come into contact with contaminated site media	Day to day activities are not likely to expose site personnel to these media. However, it remains a possibility where workers are involved with excavation and handling of contaminated soil or surface water. It is expected that this can be managed through good hygiene practices and task-specific management plans.
Potential ecological risks	
Terrestrial ecology – take up of PFAS in plants and subsequent consumption by fauna plus impact to invertebrates via impacted soil *Potential intake of impacted surface water.*	There is potential for prey species to ingest impacted flora or soil and then be predated by larger animals e.g. eagles, snakes, lizards. Surface water bodies are temporary and may present a low risk to animals.

Chart 1 - Conceptual Site Model



8. Conclusions

8.1 Conclusion

Based on the review of available site history information, site inspection and site interviews, the following potential sources of PFAS have been identified:

- The FTG – discharge of foam during training events from 2004 to 2010
- The FS and surrounding area – wash down of vehicles and hoses, drainage associated with the bunded areas that contained foam
- Former interim FS where AFFF was temporarily stored and some vehicle wash-down occurred

These potential primary sources may have also resulted in minor secondary potential sources:

- Stockpiled soils near the FTG
- Open drain near the FS and drainage low point from AFFF refill station fill point
- Discharge of treated effluent from the FTG at the STP area
- Waste water UST and vehicle wash-down area associated with the FTG

The hydrogeological setting of the site suggests the likelihood of PFAS contamination (should it be present) having migrated to the water table is low, but cannot be ruled out at this stage. The following potential sensitive receptors and contamination exposure mechanism have been identified:

- Workers on-site whose activities may result in exposure to contaminated site soils and or surface water
- Terrestrial flora and fauna consuming impacted plant material e.g. grasses and surface water. This in turn may impact their predators.

8.2 Summary of preliminary sampling program

Based on the data reviewed in this study and the CSM, the following summary is made:

- The primary source (use of AFFF containing PFASs) no longer exists. Secondary sources include residual soil and sediment contamination.
- Soil results reported concentrations of PFASs below the adopted human health and ecological guidelines, indicating that in the areas sampled, soils do not present an unacceptable risk to human health and ecological receptors.
- There is a potential, albeit low, risk to groundwater in the area but groundwater is not extracted for any use in the immediate vicinity of the site.

9. References

Airports Act 1996

Airports (Environment Protection) Regulations 1997

Australian Standard AS 4482.1:2005: Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil

AS/NZS ISO 31000:2009: Risk management - Principles and guidelines

Australian Commonwealth Work Health and Safety Act 2011

Commonwealth Work Health and Safety Regulations 2011

Department of Infrastructure and Regional Development (DoIRD, 2015): GEM 002 - PFC Management Actions Advice

GHD 2013, Solberg RF6 use at Ayers Rock Airport Potential to discharge Solberg RF6 at Ayers Rock Airport STP, March 2013

GHD, 2015, Airservices Interim Contamination Management Strategy and Decision Framework for PFC contamination, June 2015 (the 'Interim Framework')

GHD, 2016: Airservices Australia – Ayers Rock (Yulara) Airport Sampling and Analysis Quality Plan

GHD, 2017: Airservices Australia – Ayers Rock (Yulara) Airport Preliminary Sampling Report

Low Ecological Services 2009, Report on Soil Sampling at Yulara Airport Fire Station and ARFF Drill Ground, October 2009

Low Ecological Services 2014, Report on Soil Sampling at Yulara Airport Fire Station and ARFF Drill Ground, 10 February 2014

NEPC, 2013: National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended 2013 (the ASC NEPM)

Young DN, Duncan N, Camacho A, Ferenczi PA, Madigan TLA 2002, *Ayers Rock SG52-8 1:250 000,* Geological Series, Edition 2, Northern Territory Geological Survey

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The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

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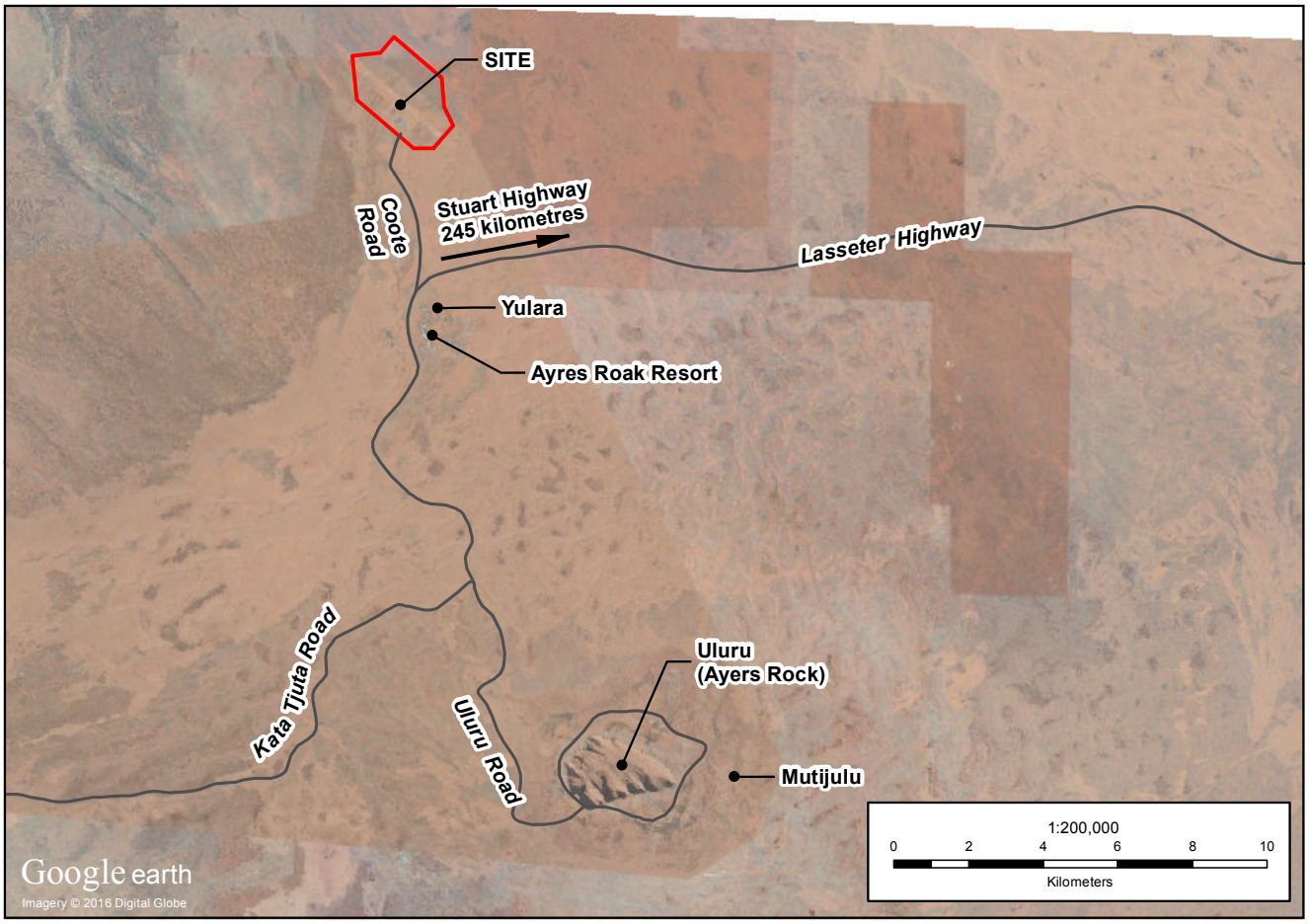
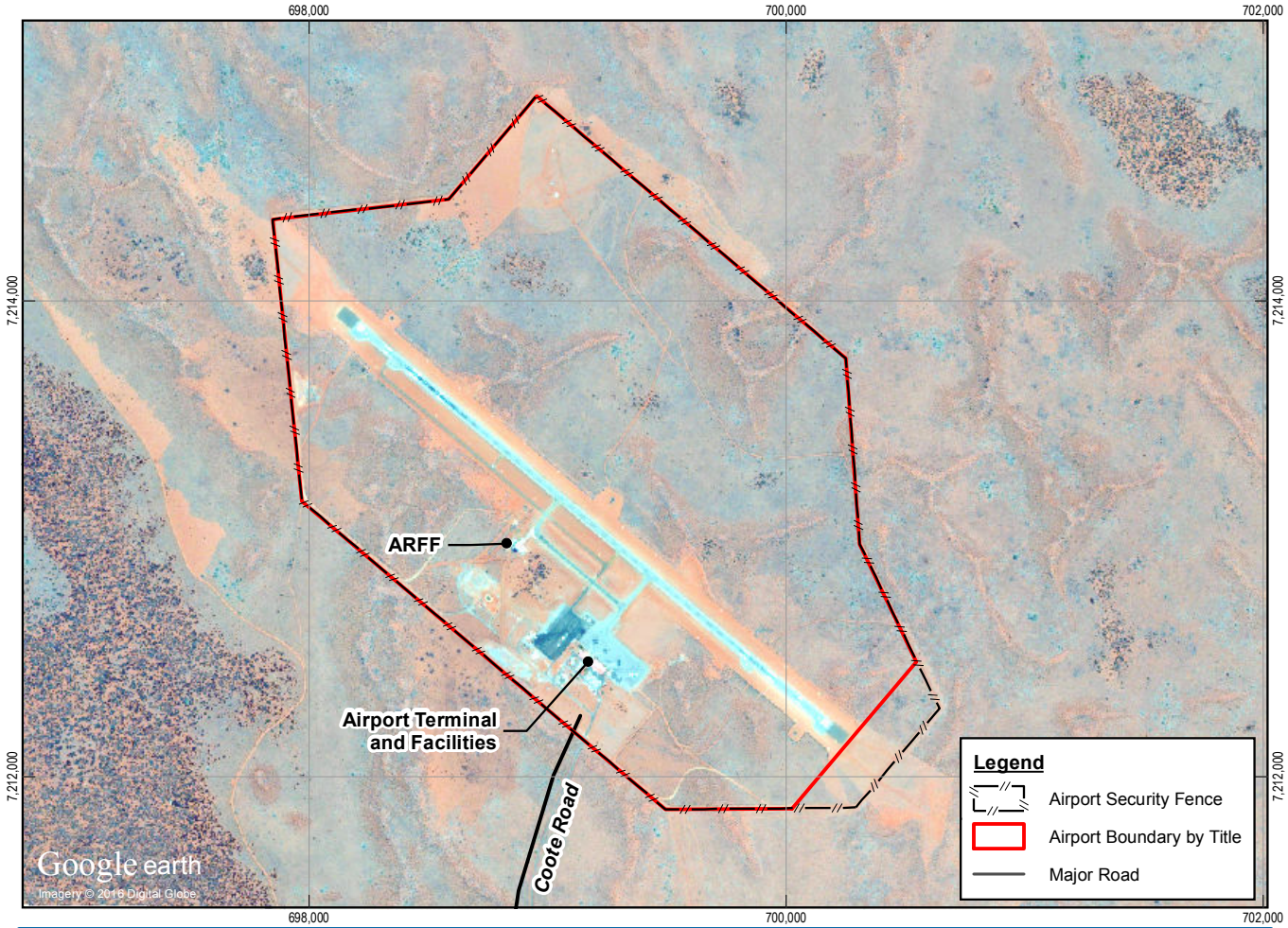
Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

Appendices

Appendix A – Figures





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0 200 400 600 800 1,000 1,200
Metres
Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 52

N

GHD airservices

Airservices Australia
Ayers Rock (Yulara) Airport
Preliminary Site Investigation

Job Number 31-34249
Revision A
Date 17 Aug 2016

Site Locality

Figure 1

H:\Projects\31\34249\GIS_bne_jvc\maps\MXD\31-34249-611_ayersRkLocality_revA.mxd

145 Ann Street Brisbane QLD 4000 T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com.au W www.ghd.com

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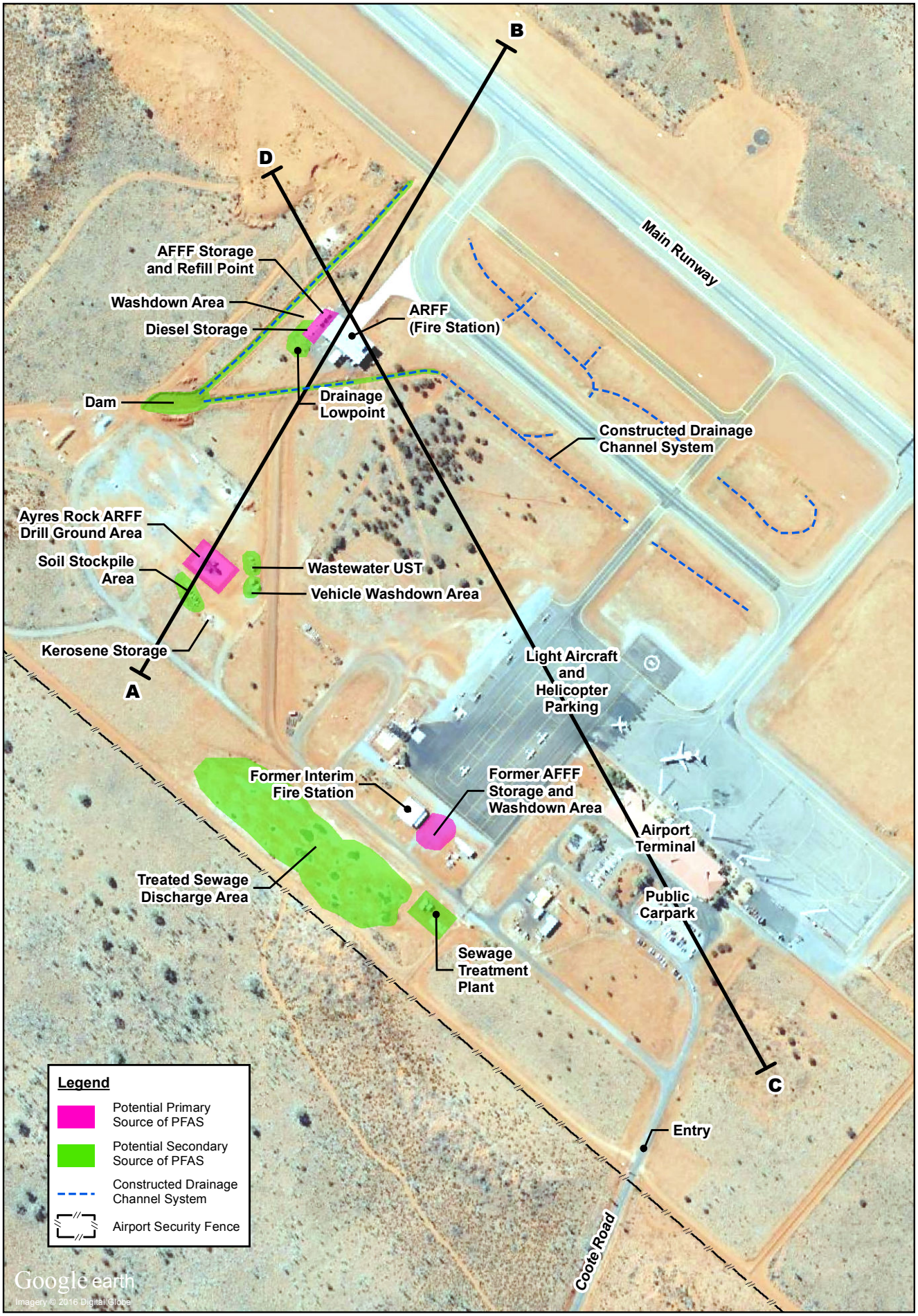
Data Source: DMRM: cadastre (2016); Google Earth: imagery (May 2015, extracted Jul 2016). Created : jvc



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Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 52

N

Airservices Australia
Ayers Rock (Yulara) Airport
Preliminary Site Investigation

Job Number 31-34249
Revision A
Date 12 Oct 2016

Site Details

Figure 2

H:\Projects\31\34249\GIS_bne_jvc\maps\MXD\31-34249-613_ayersRkDetails_revA.mxd

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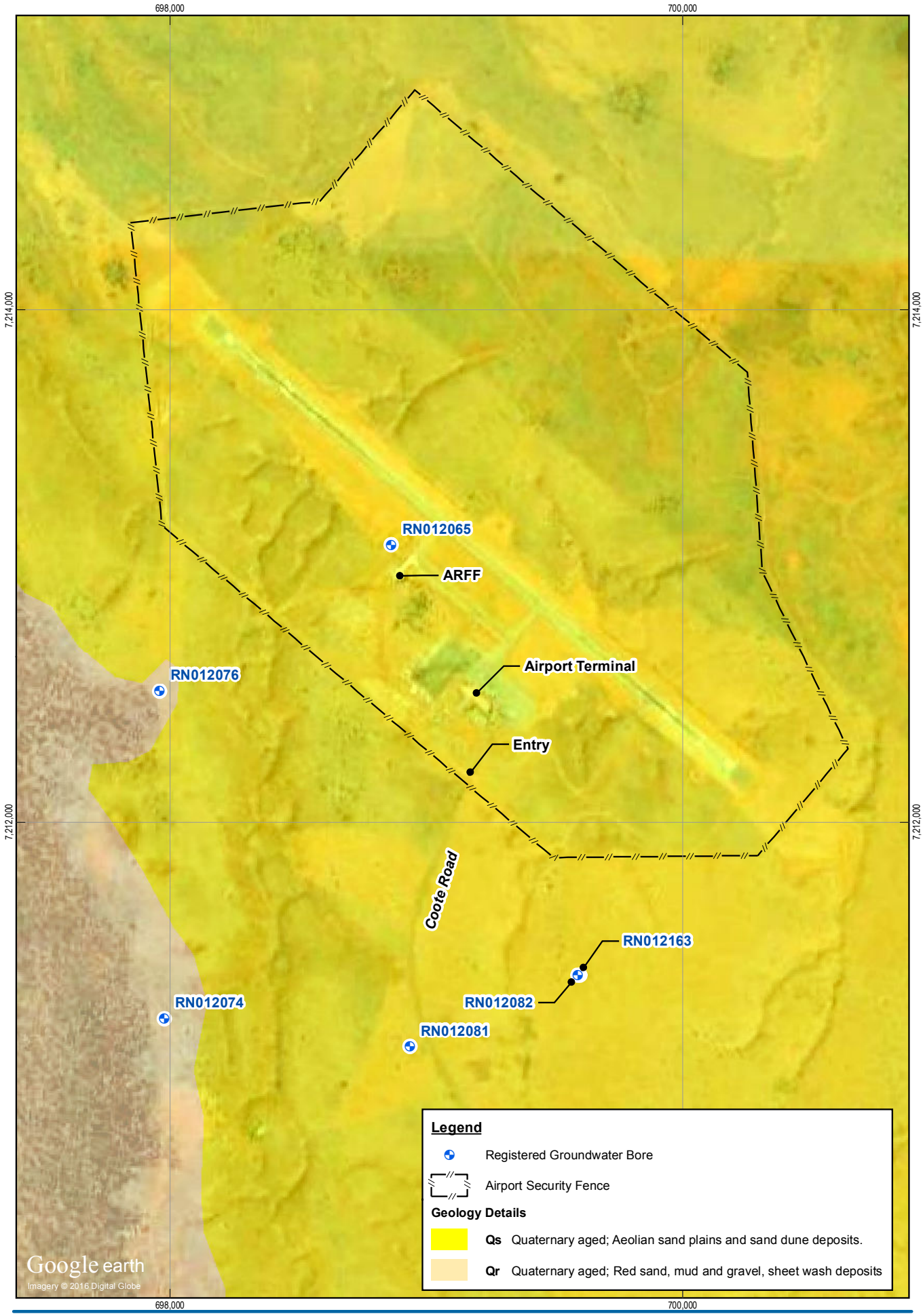
Data Source: DMRM: cadastre (2016); Google Earth: imagery (May 2015, extracted Jul 2016). Created : jvc



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Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 52

N

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airservices

Airservices Australia
Ayers Rock (Yulara) Airport
Preliminary Site Investigation

Job Number	31-34249
Revision	A
Date	17 Aug 2016

Geology and Hydrogeology

Figure 3

H:\Projects\31\34249\GIS_bne_jvc\maps\MXD\31-34249-612_ayersRkGeology_revA.mxd

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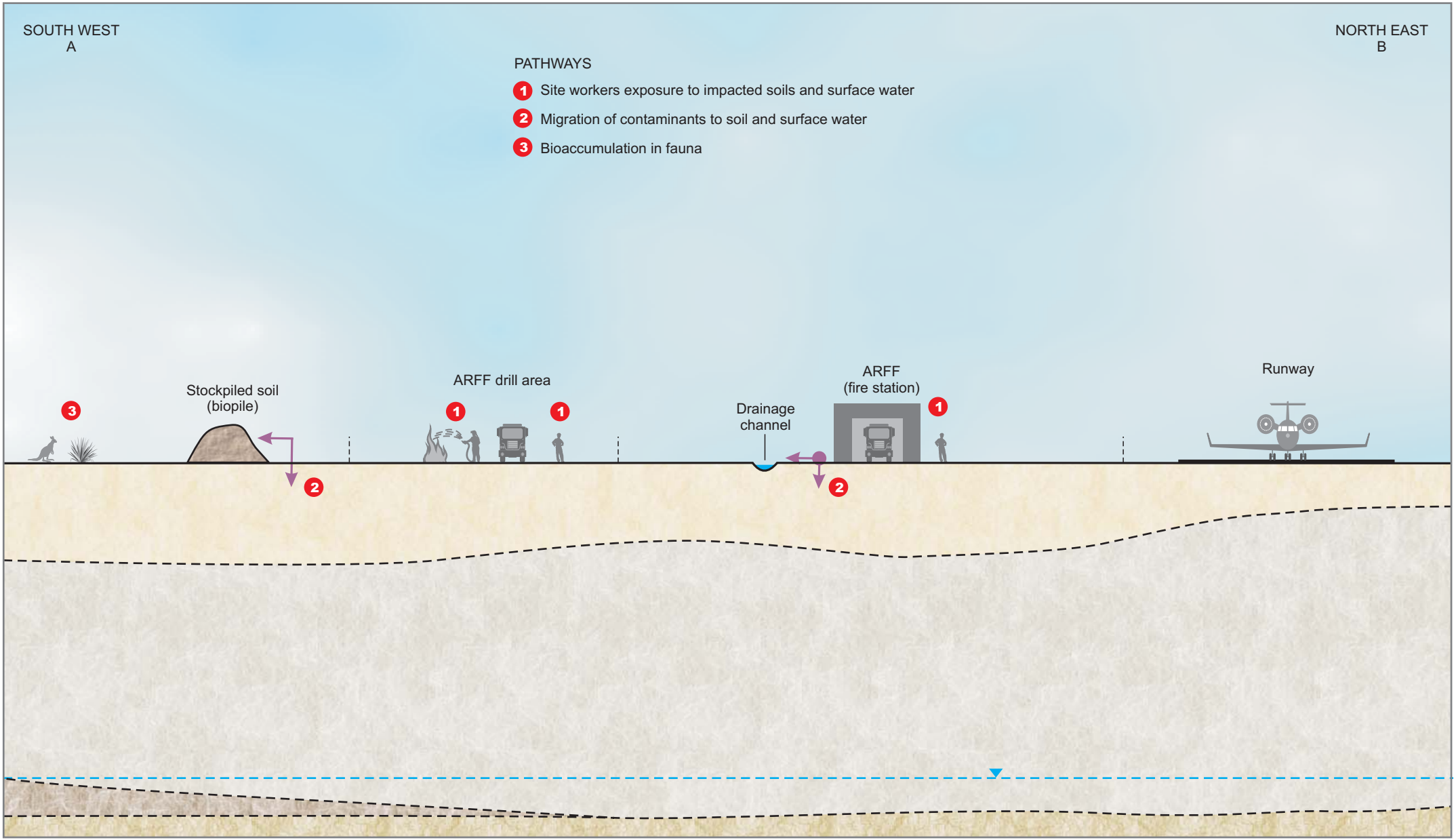
Data Source: Northern Territory Lands: bores and geology mapping (2015); Google Earth: imagery (May 2015, extracted Jul 2016). Created : jvc



LEGEND

- Sand
- Clay/sand
- Sandstone
- Siltstone

Tertiary clays

- Possible sources of PFAS
- Migration of contaminants
- Perched water table

NOTE

Conceptual diagram only - not to scale

Airservices Australia
Preliminary Site Investigation

Ayers Rock (Yulana) Airport Conceptual Site Model (Cross Section A-B)

Job Number	31-34249
Revision	A
Date	24 AUG 2016

Figure 4a

AU\Launceston\Projects\31\34249\3134249_LTN_04.cdr

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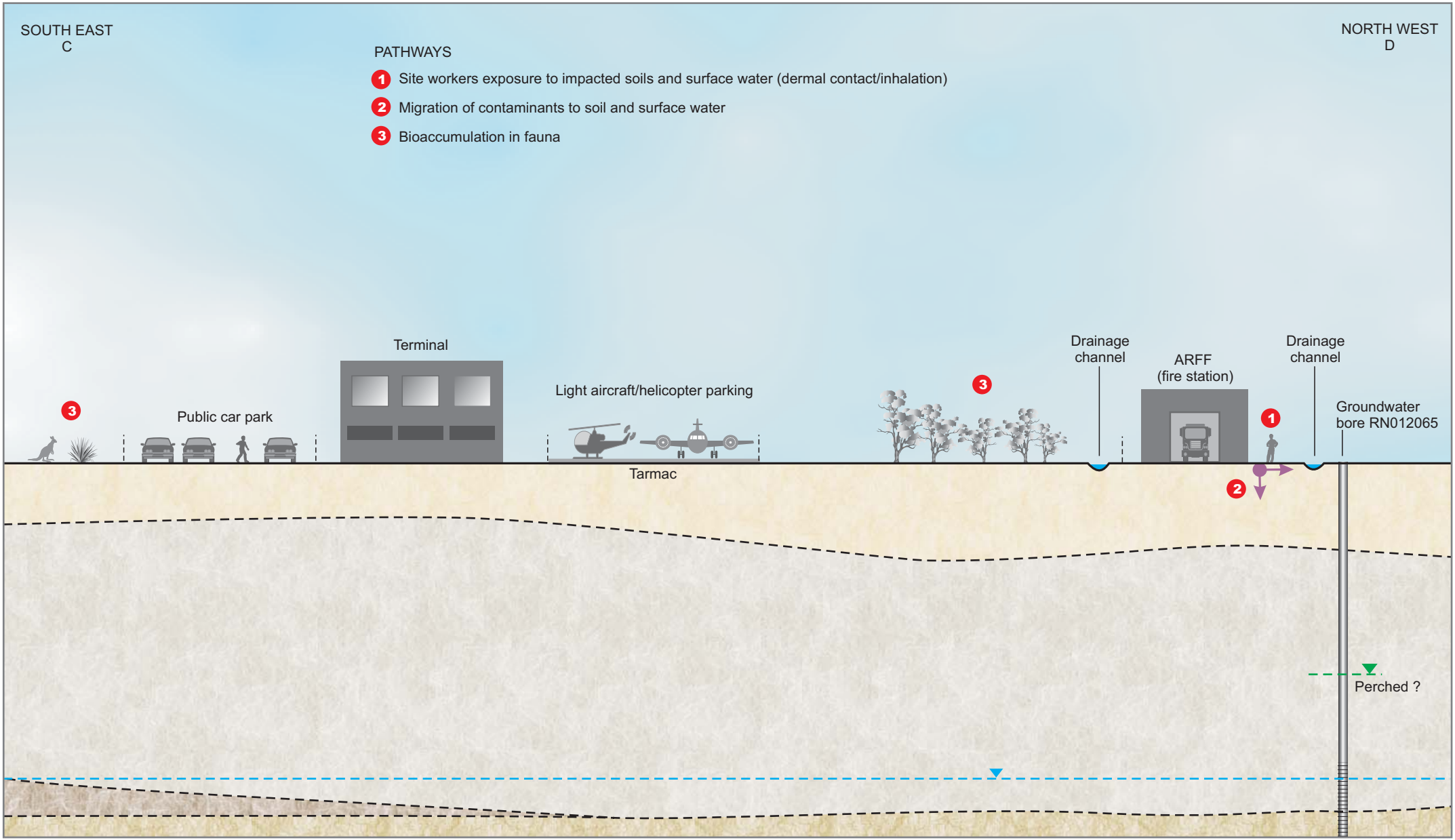

LEGEND

- Sand
- Clay/sand
- Sandstone
- Siltstone

Tertiary clays

- Possible sources of PFAS
- Migration of contaminants
- Perched water table

NOTE

Conceptual diagram only - not to scale

Airservices Australia
Preliminary Site Investigation

Ayers Rock (Yulana) Airport Conceptual Site Model (Cross Section C-D)

Job Number	31-34249
Revision	A
Date	24 AUG 2016

Figure 4b

AU\Launceston\Projects\31\34249\3134249_LTN_05.cdr

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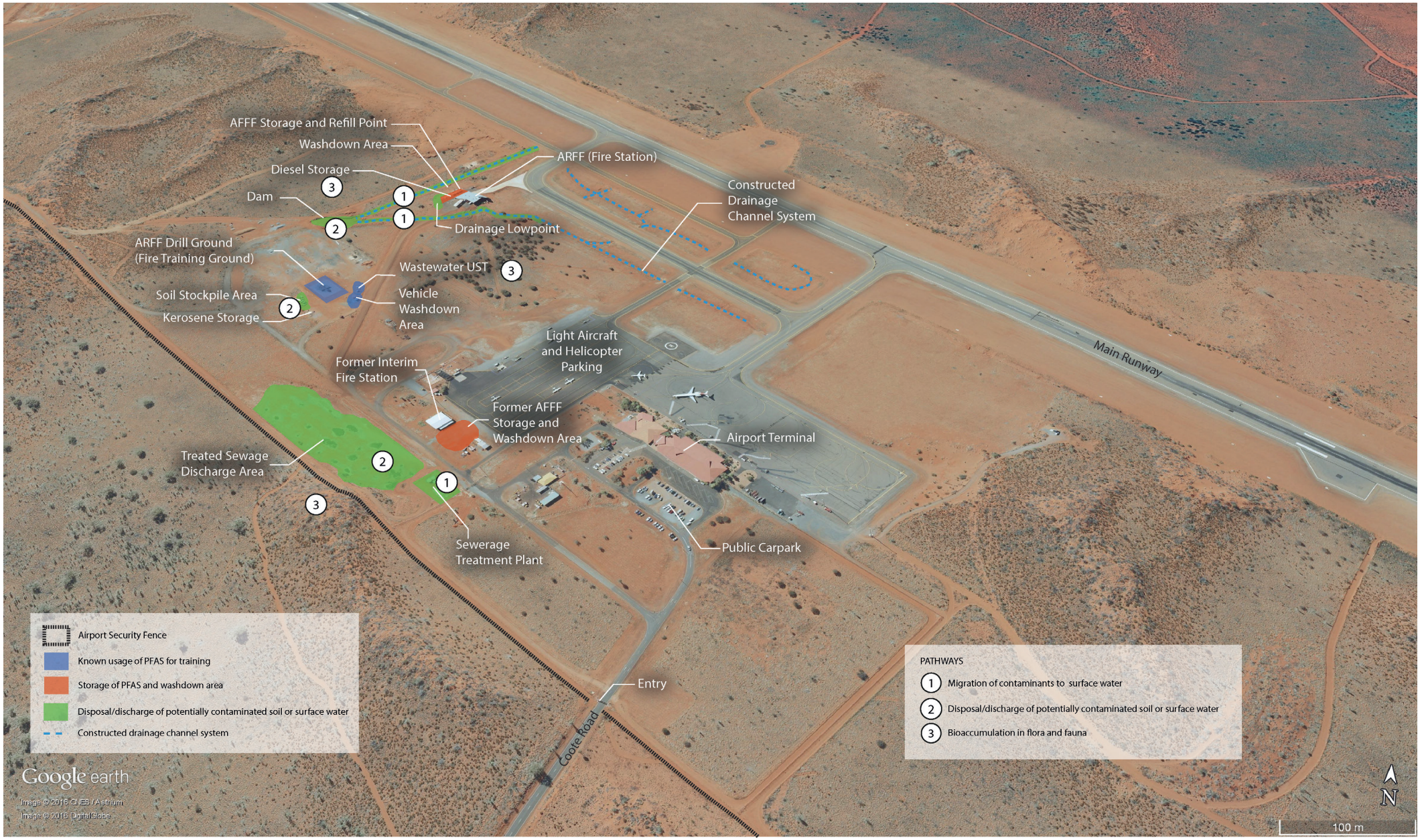

Paper Size A4

N

GHD

airservices

Airservices Australia Ayers Rock (Yulara) Airport
Preliminary Site Investigation

Job Number	31-34249
Revision	C
Date	10 Jan 2016

Conceptual Site Model Pathways Figure: 5

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Appendix B – Certificates of Title

NORTHERN TERRITORY OF AUSTRALIA

Record of Administrative Interests and Information

Record of Administrative Interests and Information
The information contained in this record of Administrative Interests only relates to the below parcel reference.

Parcel Reference: Lot 00101 Town of Yulara plan(s) S 81/079

(See section 38 of the Land Title Act)

Note: The Record of Administrative Interests and Information is not part of the Land Register and is not guaranteed by the Northern Territory of Australia, and the NT Government accepts no Liability for any omission, misstatement or inaccuracy contained in this statement.

Registrar General

Government Land Register

Controlling Agency	DEPT.OF PLANNING AND INFRASTRUCTURE

Custodian - Registrar General (+61 8 8999 6252)

Current Title
CUFT 700 692 (order 1)

Tenure Type
ESTATE IN FEE SIMPLE

Tenure Status
Current

Area Under Title
4 square kilometres 95 hectares 9000 square metres

Owners
Northern Territory of Australia
C/- The Crown Solicitor, Dept. of Law, 5 Mitchell Street, Darwin NT 0800

Easements
(none found)

Unit Entitlements
(none found)

Transfers
(none found)

Tenure Comments
(none found)

Historic Titles
CUFT 700 691 (order 1)
CUFT 696 394 (order 1)
CUFT 696 393 (order 1)
CUFT 645 567 (order 1)
CUFT 563 147 (order 1)
CUFT 561 168 (order 1)
CUFT 559 017 (order 1)
CUFT 034 056 (order 1)
Visit the website http://www.nt.gov.au/justice/bdm/land_title_office/

Custodian - Surveyor General (+61 8 8995 5353)

Address
200 COOTE RD, YULARA

Survey Plan
S 81/079

Parcel Status
CURRENT

Parcel Area
4 square kilometres, 95 hectares, 9000 square metres

Map Reference
Code 047 Scale 5000 Sheet 15.11
Code 047 Scale 5000 Sheet 15.12
Code 890 Scale 2500 Sheet 28.22
Code 890 Scale 2500 Sheet 28.23
Code 890 Scale 2500 Sheet 29.22
Code 890 Scale 2500 Sheet 29.23

Parent Parcels
(none found)

Parcel Comments
AIRPORT SITE. PROP CROWN GRANT TO NORTHERN TERRITORY OF AUSTRALIA, NT GAZ G20 22/5/1981. NAMED "CONNELLAN AIRPORT" NT GAZ G22 5/6/1981. 20M2 OF COUNTER SPACE GIVEN 3 YEAR LEASE NTG G49 10/12 /82. 15.4 M2 OF COUNTER SPACE GRANT OF 4 YR LEASE (WITH FURTHER OPTION OF 3 YRS) NTG G22 6/6/1984. LEASE OVER PART (LOT 231A) - S92/204. GRANT OF 3 YR LEASE NTG G21 30/5/1984 OF 8.62 M2 OF COUNTER SPACE. GRANT OF 3 YR LEASE NTG G21 30/5/1984 OF 8.77 M2 OF COUNTER SPACE PRCL3 YEAR LEASE APPROVED BY MINISTER FOR RENTAL OF COUNTER SPACE AT AIRPORT TERMINAL ON 30/11/82. TRANSPORT & WORKS TO ISSUE (REF LAP81/55).

Survey Comments
(none found)

Proposed Easements
(none found)

Municipality
(none found)

Region
ALICE SPRINGS

Custodian - Valuer General (+61 8 8982 5700)

Owner's Last Known Address
Northern Territory of Australia, C/- The Crown Solicitor Dept. of Law 5 Mitchell Street Darwin NT 0800

Parcels in Valuation
Lot 00101 Town of Yulara

Unimproved Capital Value
$1,000,000 on 01/07/1995

Valuation Improvements
(none found)

Custodian - Property Purchasing (+61 8 8999 7722)

Acquisitions
(none found)

Custodian - Building Advisory Service (+61 8 8999 8965)

Building Control Areas

BBYUL001 - Building Control Area	YULARA BUILDING AREA

Building Permits

Application Number:	9 of 14
Permit to Occupy Issued Date:	13/09/2009
Description:	new Fire Station
Permit to Occupy Type:	Full Code
Number of Residental Units:	
Australian Bureau of Statistics Type:	(none found)
Building Class:	Office Warehouse Factory
Area:	972 square metres

Application Number:	13 of 14
Permit to Occupy Issued Date:	17/03/2009
Description:	Additions to existing building Minor internal alterations for provision of x-ray screening equipment and associated infrastructure
Permit to Occupy Type:	Full Code
Number of Residental Units:	
Australian Bureau of Statistics Type:	(none found)
Building Class:	Assembly building
Area:	(none found)

Application Number:	8 of 14
Permit to Occupy Issued Date:	13/09/2006
Description:	airport fire station hot fire training ground
Permit to Occupy Type:	Full Code
Number of Residental Units:	
Australian Bureau of Statistics Type:	(none found)
Building Class:	Non-habitable building Structure (Fence, Mast)
Area:	(none found)

Visit the website http://www.nt.gov.au/lands/building/

Custodian - Town Planning and Development Assessment Services (+61 8 8999 6057)

Planning Scheme Zone

NOZONE No NT Planning Scheme zone applies

Interim Development Control Orders

(none found)

Planning Notes

The NT Planning Scheme may apply to development on this land.

Planning Applications

File Number
PA1992/0138

Type
Subdivision

Date Received
02/04/1992

Application Purpose
CREATE 1 LOT BEING HANDLED BY WATERS JAMES MCCORMACK

Application Status
Approved

Other Affected Parcels
(none found)

Instrument Signed
01/06/1992

Instrument Number
CS0247

Instrument Issued
Signed

Instrument Status

Custodian - Power and Water Corporation (1800 245 092)

Meters on Parcel

Power Water - Electricity	6
Power Water - Water	2

For Account balances, contact the Power and Water Corporation.

Custodian - Pool Fencing Unit (+61 1300 301 059)

Swimming Pool/Spa Status
(none found)

For more information, contact the Pool Fencing Unit (+61 1300 301 059).

Custodian - Mines and Energy (+61 8 8999 5322)

For information on possible Exploration Licences, contact Mines & Energy or visit the website http://www.nt.gov.au/ntg/minen.shtml

For information on possible Petroleum Titles, contact Mines & Energy for further details.

Custodian - Environment and Heritage (+61 8 8924 4139)

Results of site contamination assessment
(none found)

For further information contact Environment and Heritage or visit the website
http://www.nt.gov.au/nreta/environment/waste/register/index.html

Other Interests
For Account balances, contact the Council

Date Registered: 06/06/2006 **Volume** 700 **Folio** 692

Duplicate Certificate as to Title issued? No

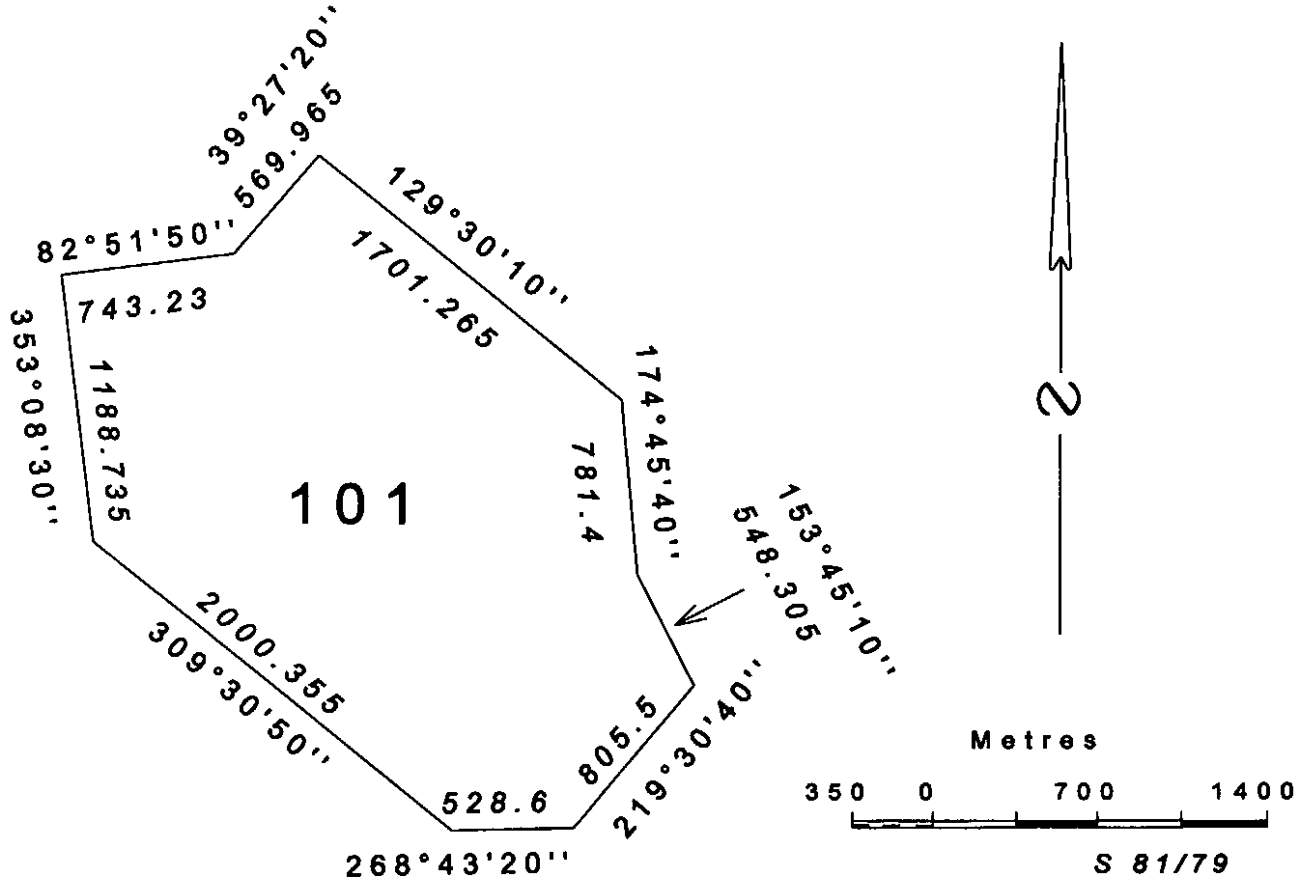
SEARCH CERTIFICATE

Lot 101 Town of Yulara from plan(s) S 81/079
Area under title is 4 square kilometres 95 hectares 9000 square metres

Owner:
Northern Territory of Australia
of C/- The Crown Solicitor, Dept. of Law, 5 Mitchell Street, Darwin NT 0800

Registered Date	Dealing Number	Description
		Previous title is **Volume** 700 **Folio** 691
01/05/2007	643812	Sublease to Voyages Hotels & Resorts Pty Ltd - expiring 31/12/2017 (424353)
06/11/2003	533933	Sublease to Voyages Hotels & Resorts Pty Ltd - part - expiring 29/06/2007 (387794)
01/06/1999	424353	Lease to GPT Funds Management 2 Pty Limited as Trustee of the Ayers Rock Resort Trust - part - expiring 30/6/2032
13/11/1997	387794	Lease to GPT Funds Management 2 Pty Limited as Trustee of the Ayers Rock Resort Trust - part - expiring 30/6/2007
15/02/1993	280610	Lease to Airservices Australia - part - expiring 30/6/2008

End of Dealings



Appendix C – Site photographs

Photo 1	Photograph
Drain located in the fire training ground	
Photo 2	**Photo**
Stockpile located in the vicinity of the fire training ground	

Photo 3	Photo
Former hose cleaning apparatus for use in removing dirt and detritus from external surface of hose (not for internal flushing).	
Photo 4	**Photo**
Fire services separator	

Photo 5	Photo
Fire training ground with mock plane	

Photo 6	Photo
Fire training ground with mock plane	

Photo 7	Photo
Sewage treatment plant	
Photo 8	**Photo**
Sewage treatment plant discharge area	

Photo 9	Photo
Former interim fire station area (facing away from building)	
Photo 10	**Photo**
Surface water channel with water	

Photo 11	Photo
Fire Station, viewed from northeast	
Photo 12	**Photo**
Storage of Solberg at Fire Station	

Appendix D – Groundwater data search results

IN 2/273
RN 12065

THE NORTHERN TERRITORY OF AUSTRALIA
Control of Waters Ordinance

FINAL STATEMENT OF BORE

From	To	Description of Strata
0.00	6.00	RED & LIGHT BROWN STONE
6.00	12.00	LIGHT BROWN STONE
12.00	18.00	BROWN SANDY STONE.
18.00	24.00	WHITE & BROWN STONE.
24.00	30.00	WHITE CLAY & BROWN STONE
30.00	36.00	BROWN CLAY & WHITE STONE.
36.00	42.00	WHITEISH GREY STONE

Name of Bore -
RN 12065

Name of Property -
Ayers Rock

Description of Property -
N.T.

Name of Owner -
NTRB

Name of Contractor -
NRB

Name of Driller -
B. L. Dandy

Location of Bore (or supply sketch on back hereof) - SITE 5'N
5 KL ~~miles~~
(a) N NE / S SE / E NW / W SW of (b) 12061 N.W. Village

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Date of Commencement -
10/3/79

Date of Completion -
10/3/79

Total Depth - ??
37.49m

Particulars of Casing - SET BETWEEN 30.58m
LENGTH OF 6" 3/8 Bore + 37.04m

Particulars of Perforations or Screens -
37.08 x 6" BLANK.

Additional information of interest about the bore - Drilled Always with 7" Hammer Bit

Map No: SG 52-8
Grid Reference: 398869

Samples of strata and water supplies
~~have been~~ *
will be *
left at the following trading place -

N.R.B. OFFICE A/S

Signature

* Strike out which does not apply.

For office use only -

Water	1st Supply	2nd Supply	3rd Supply
Struck at	18.00m	36.00m	
Standing Water Level		12.30m	
Pumping Supply: G.P.M.	1 L/S	2½ L/S	
Duration of Pump Test			
Water Level During Test			
Quality: Good, Fair, Bad	CONDUCTIVITY 3,500 PPM 2170 TDS		

0 - 30.58 6" Blank
30.58 - 37.04 6" Perf
37.04 - 39.54 6" Blank

(4)

WATER ANALYSIS

Department of Transport & Works
Water Division, Darwin N.T.

WR 4/1A

Laboratory Register No.	84/85/1760
Date received in Laboratory	3/5/85 ✓

Bottle No.	Time of sampling	Date of sampling
PT39	1030	18/4/85

LOCATION AND DETAILS
AYERS ROCK YULARA 6" BORE REN 12065 DEPTH 28m DISCH 1.0LPS WRA6019

RSP1259

Proposed water use:- Domestic, Stock, Irrigation, other (specify)

ANALYSIS — PHYSICAL

☐ pH	7.5	☐ Colour (Hazen units)	
☐ Specific conductance (microsiemens/cm at 25° C)	3390	☐ Turbidity (NTU's)	
☒ Total dissolved solids (mg/L - by evaporation at 180° C)	2170	☐ Suspended solids (mg/L)	

ANALYSIS — CHEMICAL (mg/L)

☐ Sodium, Na	490	☒ Chloride, Cl	670
☐ Potassium, K	59	☒ Sulphate, SO_4	532
☐ Calcium, Ca	117	☒ Nitrate, NO_3	69
☐ Magnesium, Mg	73	☐ Bicarbonate, HCO_3	214
☐ Total Hardness (as $CaCO_3$)	592	☐ Carbonate, CO_3	
☐ Total Alkalinity (as $CaCO_3$)	176	☐ Fluoride, F	1.1
☐ Iron, (total) Fe	0.7	☐ Orthosphosphate, PO_4	
☐ Silica, SiO_2	81	☒ NaCl (calc. from chloride)	1109

ANALYSIS — ADDITIONAL (mg/L)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Manganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd
☐	☐	☐

THE SAMPLE AS ANALYSED ~~COMPLIES~~/DOES NOT COMPLY WITH NORTHERN TERRITORY DRINKING WATER STANDARDS AS RECOMMENDED BY THE NORTHERN TERRITORY DEPARTMENT OF HEALTH.

This Laboratory is registered by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its terms of registration. This document shall not be reproduced except in full.

Analysed By: J. COOK Date 15 / 5 /85

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

4278.846 G. L. DUFFIELD, Government Printer of the Northern Territory

BORE SAMPLING DETAILS

R.N. : 12065

LOCATION OF BORE : A/Rock Airport

BORE NAME :

Temp 25°C

TOTAL DEPTH : 37.49 m

S.W.L. : 11.22

CST

DATE : 18.4.85

Samples 1030 am

DETAILS OF CASING : 6"

LITRES PER METRE : 16

DETAILS OF PUMPING : Pumped for 45 mins @ 1.4p
Pump set at 28.00 mtes

TYPE OF PUMP TO BE USED : Sub

COMMENTS :

Samples
PT 39
PQ 79

AS80/113

WATER CONDUCTIVITY ANALYSIS

BORE:

REGISTERED NUMBER 12065

LOCATION: AYERS ROCK

TESTED BY: V GARNER ✓

DATE TESTED: 29.2.80.

BOTTLE NO.	DATE	TIME	DEPTH	DISCHARGE	SAMPLER		CONDUCTIVITY
2495	19.2.80	1050			N. WASARA		3500

WATER ANALYSIS

Department of Transport & Works
Water Division, Darwin NT

WR 4/1

Laboratory Register No	Date received in Laboratory	Bottle No	Time of Sampling	Date of Sampling
80/0064	10.1.80	ZC 38	1530	14.12.79

LOCATION AND DETAILS
Yulara Village – RN 12065 – Disch: 3.4 lps Tap RSP. 1259 (H)

Proposed water use:-Domestic, Stock, Irrigation, other (specify)

ANALYSIS – PHYSICAL

☐ pH	7.4	☐ Colour (Hazen units)	
☐ Specific conductance (microsiemens/cm at 25° C)	4000	☐ Turbidity (NTU's)	
☐ Total dissolved solids (mg/l - by evaporation at 180 ° C)	2540	☐ Suspended solids (mg /l)	

ANALYSIS – CHEMICAL (mg/l)

☐ Sodium, Na	530	☒ Chloride, Cl	755
☐ Potassium, K	85	☒ Sulphate, SO_4	630
☐ Calcium, Ca	167	☒ Nitrate, NO_3	64
☐ Magnesium, Mg	90	☐ Bicarbonate, HCO_3	251
☐ Total Hardness (as $CaCO_3$)	787	☐ Carbonate, CO_3	
☐ Total Alkalinity (as $CaCO_3$)	206	☒ Fluoride, F	1.6
☐ Iron, (total) Fe	0.3	☐ Orthophosphate, PO_4	
☐ Silica, SiO_2	85	☐ NaCl (calc. from chloride)	1244

ANALYSIS – ADDITIONAL (mg/1)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Maganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd

Analysed By: H. HENKEL Date 18/ 1 /80

WATER INVESTIGATIONS UNIT
ALICE SPRS.
23 JAN 1980
DEPT. OF TRANSPORT & WORKS

REMARKS

The sample as analysed is considered suitable for:–

Drinking water – ~~YES~~/NO
Irrigation – YES/NO
Stock watering – YES/NO
Other (specify) – YES/NO

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

Note:– Advice and Water quality information can be obtained by contacting the Senior Engineer Water Quality, Darwin Phone 89 6072.

15303/79
A.B. CAUDELL, Government Printer of the Northern Territory.

WATER ANALYSIS

Laboratory Register No. 79/0688

Date received in Laboratory 1.6.79

WR 4/1

Bottle No.	Time of sampling (hrs)	Date of sampling
YU 96	0850	16.5.79

LOCATION AND DETAILS

Ylara Village Site - Ayers Rock File 60.6 SG.52.8 398868 Depth: 29.5m

RSP.1259(h) Disch: 3.5 lps. Temp: 26°c Discharge Pipe Pumping Test Final

Sample RN/12065 Sampler: R. Kneebone

ANALYSIS - PHYSICAL

pH	7.3	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3990	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2550	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2657	Total alkalinity (as $CaCO_3$)	200
Sodium chloride (calc from chloride)	1259	Total hardness (as $CaCO_3$)	731
Chloride, Cl	764	Sodium, Na	550
Sulphate, SO_4	638	Patassium, K	86
Nitrate NO_3	65	Calcium, Ca	148
Bicarbonate, HCO_3	244	Magnesium, Mg	88
Carbonate, CO_3		Iron (total), Fe	0.3
Fluoride, F	1.6	Silica, SiO_2	72

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 21 / 6 / 79

REMARKS: The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water, as the total dissolved solids exceed the maximum permissable level.

Suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER ANALYSIS

Laboratory Register No. 79/0396

Date received in Laboratory 27/3/79

WR 4/1

Bottle No. ZQ 01 | Time of sampling (hrs) 1300 | Date of sampling 10/3/79

LOCATION AND DETAILS Yulara Village RN 12065 Depth 42 M Discharge 3.0 lps Airlift

RSP 1259 H. Sampler R. Darby.

ANALYSIS - PHYSICAL

pH	7.8	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	4010	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2587	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2572	Total alkalinity (as $CaCO_3$)	185
Sodium chloride (calc from chloride)	1388	Total hardness (as $CaCO_3$)	730
Chloride, Cl	842	Sodium, Na	570
Sulphate, SO_4	625	Patassium, K	85
Nitrate NO_3	24	Calcium, Ca	148
Bicarbonate, HCO_3	226	Magnesium, Mg	90
Carbonate, CO_3		Iron (total), Fe	33.4
Fluoride, F	2.0	Silica, SiO_2	73

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: G. Johnston Date 17/4/79

REMARKS: The total dissolved solids, iron and fluoride all exceed the 1971 W.H.O. International Standards for drinking Water. Unsuitable for human consumption. Suitable for Stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER CONDUCTIVITY ANALYSIS.

BORE: REGISTERED NUMBER: 12065

LOCATION: AYERS ROCK

DATE TESTED: 23.3.79 TESTED BY: V. GARNER

BOTTLE No.	DATE	TIME	DEPTH	DISCHARGE	SAMPLER		CONDUCTIVITY
ZK91	10.3.79	1200	18M	1.0	R.DARBY		3500
ZH69	"	1230	36M	2.5	"		4100
ZQ1	"	1300	42M	3.0	"		4200

YULARA VILLAGE WATER RESOURCES 60.6D

RN 12065
IN 2/273
5047 Mt Olga

DEPTH (m)				DESCRIPTION
0	-	3	SAND AND GRAVEL	Poorly sorted reddish brown sand and gravel.
3	-	6	SAND	Poorly sorted angular sand cemented together in a calcareous matrix.
6	-	15	CLAY	Light and dark brown clay with sand grains.
15	-	24	CLAY	Dark brown clay with sand grains.
24	-	36	CLAY	White to light brown calcareous clay with minor amounts oflignite. Sand content varies.
36	-	42	SILTSTONE	White dolomitic siltstone with hard bands of reddish purple IRONSTONE and CHERT.

SUMMARY

0	-	3	Sand and gravel - Quaternary
3	-	36	Clay, minor sand - Tertiary
36	-	42	Dolomitic Siltstone

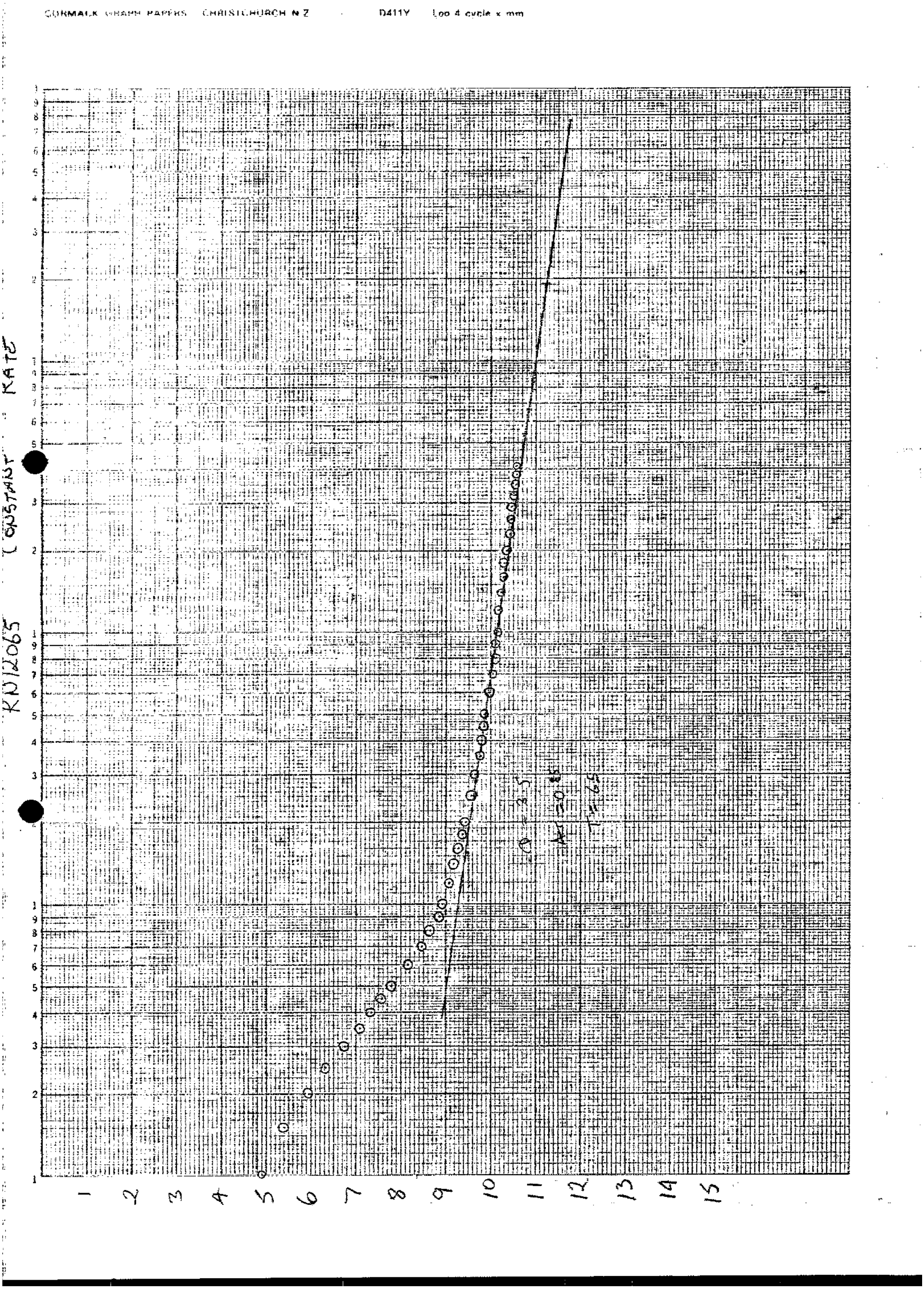
MAJOR AQUIFERS

18m	1 ls^{-1}	Tertiary sand
35.5 ~~36~~m	1.5 ls^{-1}	Base of Tertiary clay

Geoff Knott

GEOFF KNOTT
HYDROGEOLOGIST

MARCH '79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D411Y Log 4 cycle x mm
KATER
RN012065
CONSTANT
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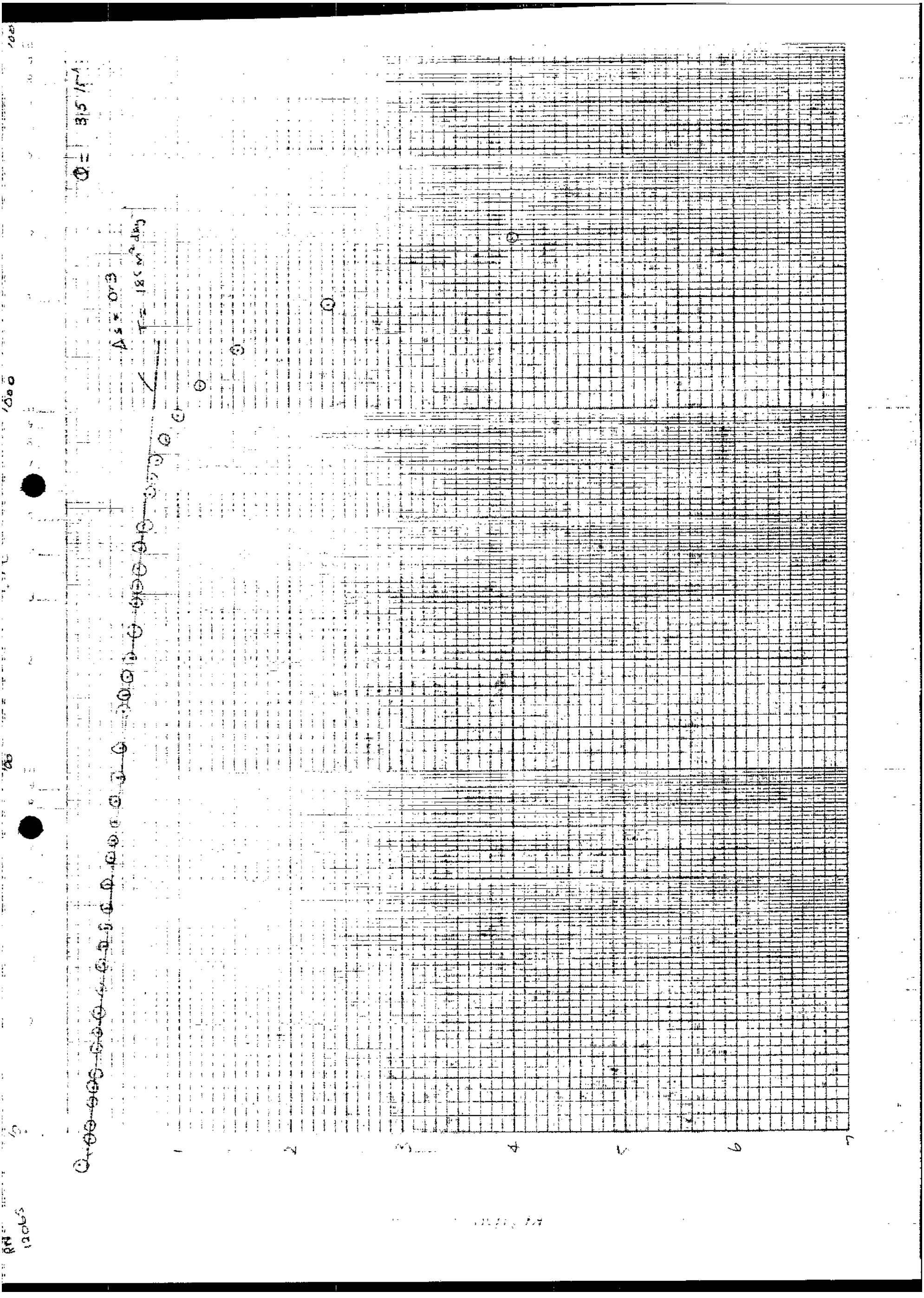


NTA 1718

DATE 10/3/74 BORE No. RN 12065 Driller: Davey

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details
1000	/	/		SHIFT FROM RN 12064 TO RN 12065
				SET UP & DRILL 8" SURF CASING IN
				8" CASING IN BROWN CLAY 4.60m
				DRILL TO 6m WITH 7" HAMMER
				& REAM OUT TO 4.60m WITH 9 5/8 Rotary BIT
1110	6m	6m		RED & LIGHT BROWN STONE
1140	/	/	35	ADD D/C
1145	12m	6m		LIGHT BROWN STONE
			10	ADD D/C
1155	18m	6m		BROWN SANDY STONE DAMP. W/S @ 18m
			10	ADD D/P W/C 18m
1205	24m	6m		WHITE & BROWN STONE
			10	ADD D/P
1215	30m	6m		WHITE ochre & BROWN STONE
			15	ADD D/P
1230	36m	6m		BROWN ochre & WHITE STONE
			20	ADD D/P
1250	42m	6m		WITHDRAW REAM STONE W/S @ 18m
				PUMP TEST
				RUN IN 6" CASING.

BIT DATA

No.	Size	Type	Worn cond'n
17418	9 7/8	Roll	USED
39045	7"	DOM	USED
BIT			
			INCREASE TO 2 L/S
ZQ 1 - ZO.44			
3,500 PPM			

STRING DATA

Item	O.D.	Length	Prog. tally
HAMMER BIT & SUB			1.75
D/C	4½	5.73	7.48
D/C	4½	6.01	13.49
D/P	4½	6.00	19.49
D/P	4½	6.00	25.49
D/P	4½	6.00	31.49
AT 36.00m			
ZQ.6 - ZH.69			3,500 PPM.
T/P	4½	6.00	37.49
SWL 12.30m			

MUD DATA

CONDUCTIVITY	3,500 PPM		

RUN IN 6" CASING. - CASING DETAILS

BLANK	1	2.50.	5	5.40	27.07
3/8 PERF	2	6.46 8.96	6	6.25	33.32
	3	6.15 15.11	7	6.22	39.54
	4	6.56 21.67			

14702/69.... W. G. Murray, Government Printing Office, Canberra

DEPARTMENT OF TRANSPORT & WORKS

WATER & SEWERAGE DIVISION

GEOPHYSICAL BORE LOG

R.N.: 12065 AREA: AYERS ROCK STATUS: INVESTIGATION

MAP REFERENCE: SG 52-8 GRID CO-ORD:. 398 869

ELEVATION: S.W.L.: 12·3m

CASING DETAILS: 39·54 m x 6"

DRILLER: W. R. B. DATE COMMENCED: 10·3·79

DEPTH DRILLED: DATE COMPLETED: 10·3·79

RADIOMETRIC LOG DATA

SERVICE: W. R. B. LOG TYPE: GAMMA RAY DATE: 28·3·79

RUN NO.: 2 SCALE: V: 1 = 100 H:

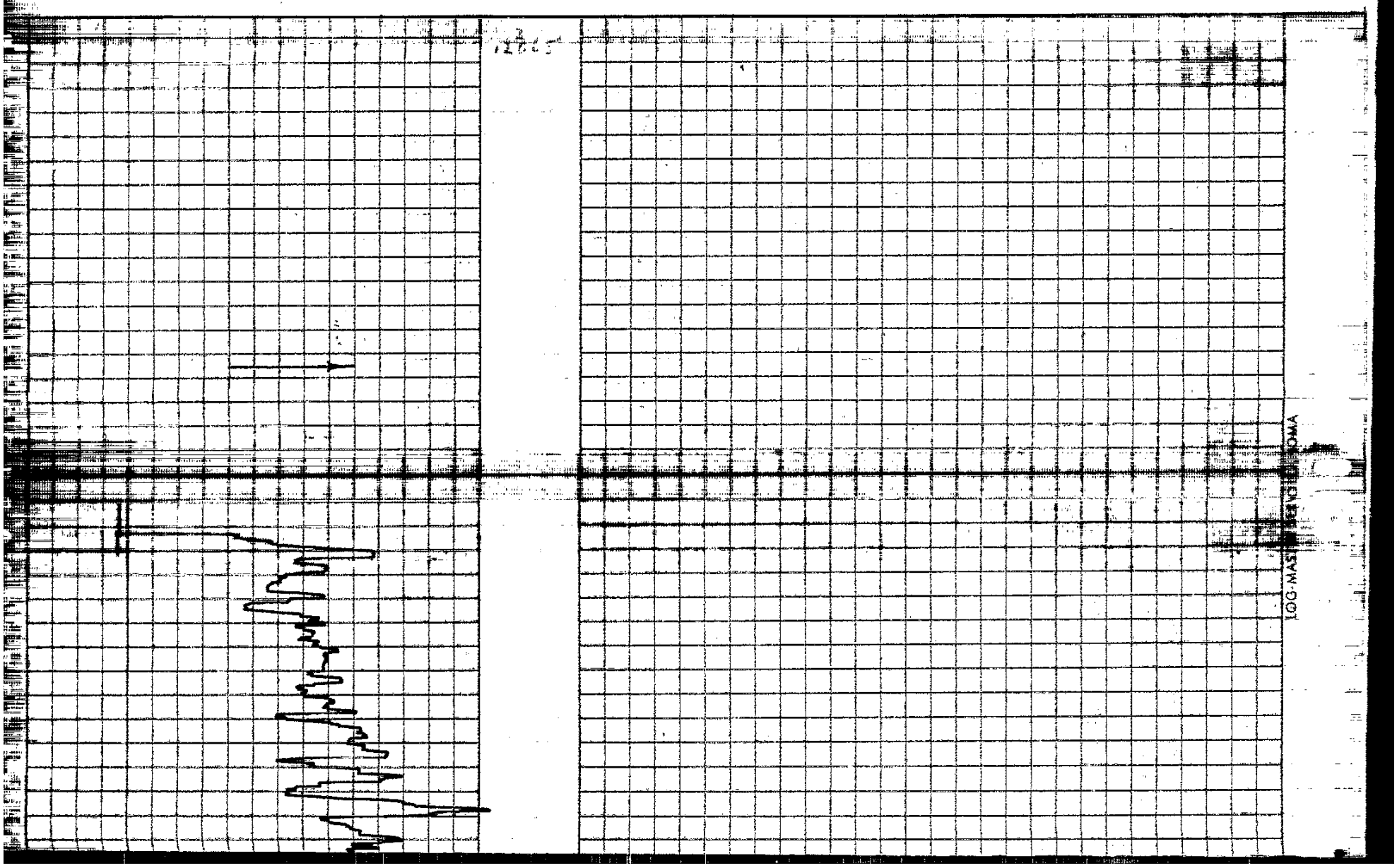
SENSITIVITY: RANGE: 4

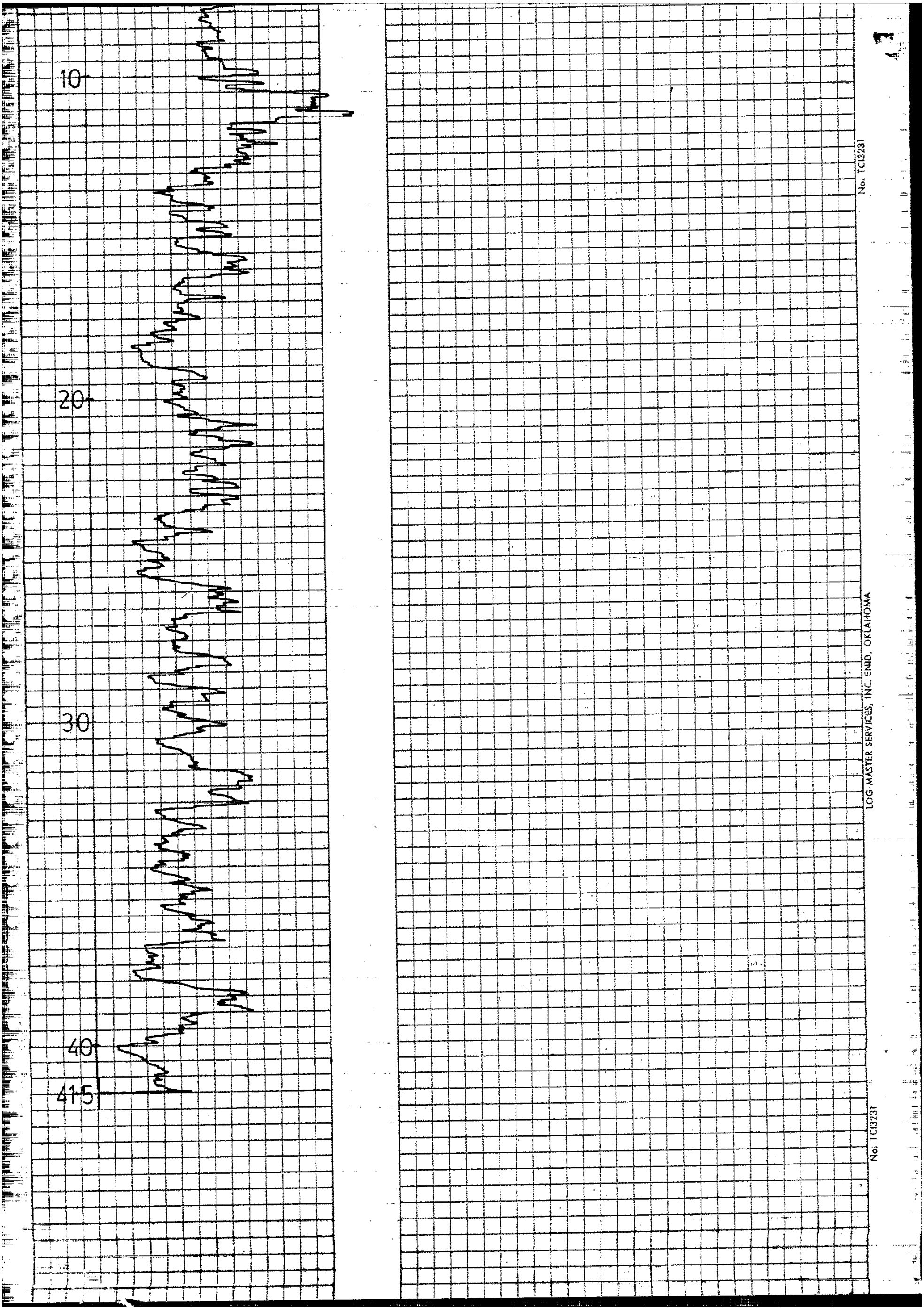
TIME CONSTANT: 2 sec SPEED: 4·3 M/MIN.

1st READING: 41·5 m INSTRUMENT: LM444 B LMG 15

LAST READING: 1·2 m OBSERVER: R. P.

INTERVAL: 40·3 m




10
20
30
40
41.5
No. TCI3231
LOG-MASTER SERVICES, INC., ENID, OKLAHOMA
No. TCI3231

DEPARTMENT OF TRANSPORT & WORKS

WATER & SEWERAGE DIVISION

GEOPHYSICAL BORE LOG

R. N. 12065 AREA: AYERS ROCK

STATUS: INVESTIGATION

MAP REFERENCE: SG 52-8

GRID CO-ORD: 398 869

ELEVATION:

S. W. L.: 12·3 m

CASING DETAILS: 39·54 m x 6"

DRILLER: W. R. B.

DATE COMMENCED: 10·3·79

DEPTH DRILLED:

DATE COMPLETED: 10·3·79

RADIOMETRIC LOG DATA

SERVICE: W. R. B.

LOG TYPE: GAMMA RAY

DATE: 28·3·79

RUN NO: 3

SCALE: V: 1 =100 H:

SENSITIVITY

RANGE: 2

TIME CONSTANT: 2 sec

SPEED: 5 M/ MIN

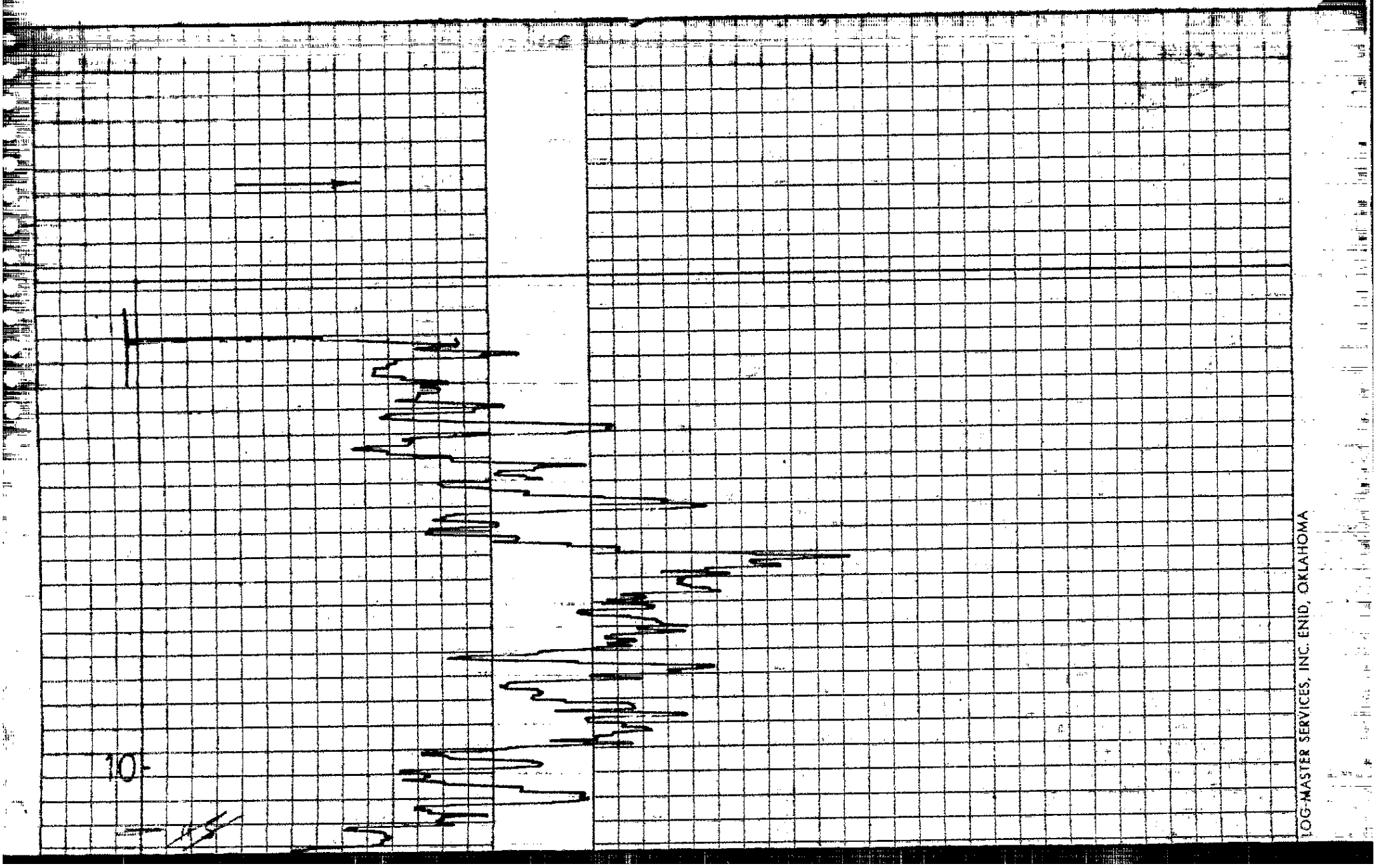
1st READING: 41·5 m

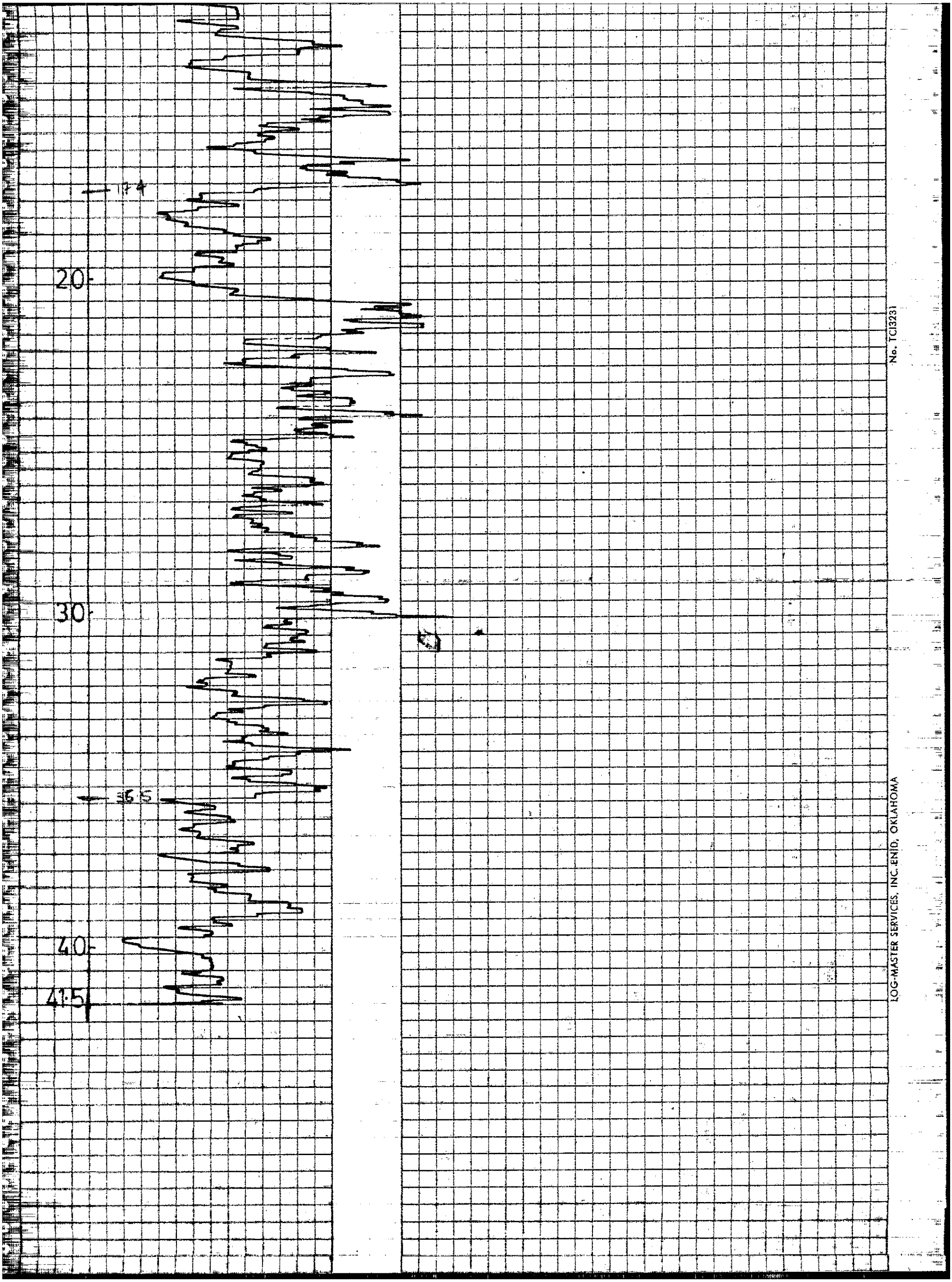
INSTRUMENT: LM 444 B LMG 15

LAST READING 1·2 m

OBSERVER: R P.

INTERVAL: 40·3 m




20
30
40
41.5
No. TCI3231
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA

RN012065

IN 2/273

RN 12065

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance

FINAL STATEMENT OF BORE

From	To	Description of Strata
0.00	6.00	RED & LIGHT BROWN STONE
6.00	12.00	LIGHT BROWN STONE
12.00	18.00	BROWN SANDY STONE.
18.00	24.00	WHITE & BROWN STONE.
24.00	30.00	WHITE CLAY & BROWN STONE
30.00	36.00	BROWN CLAY & WHITE STONE.
36.00	42.00	WHITISH GREY STONE

Location of Bore (or supply sketch on back hereof) SITE SN

.....5 K/L..... ~~Miles~~

(a) N NE S SE E NW W SW of (b) 12061 .....

.....& NEW Village.....

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - DRILLED ALWAYS WITH 7" HAMMER BIT

Map No: SG 52-8
Grid Reference: 398869

Samples of strata and water supplies
~~have been~~ *
will be *
left at the following trading place -

.W.R.B....OFFICE....A/S.....

.....R Dandy.....
Signature

* Strike out which does not apply.

For office use only -

Name of Bore - RN 12065

Name of Property - AYERS Rock

Description of Property - N.T.

Name of Owner - NTRB

Name of Contractor - WRB

Name of Driller - B R. DANDY

Date of Commencement - 10/3/79

Date of Completion - 10/3/79

Total Depth - 37.49m

Particulars of Casing - SET BETWEEN 30.58m LENGTH OF 6" 3/8 BWF + 37.04m

Particulars of Perforations or Screens - 33.08 x 6" BLANK.

Water	1st Supply	2nd Supply	3rd Supply
Struck at	18.00m	36.00m	
Standing Water Level		12.30m	
Pumping Supply: ~~G.P.H.~~ L/S	1 L/S	2½ L/S	
Duration of Pump Test			
Water Level During Test		[redacted]	
Quality: Good, Fair, Bad	CONDUCTIVITY 3,500 PPM		

2/273

WATER ANALYSIS

Department of Transport & Works
Water Division, Darwin N.T.

WR 4/1A

Laboratory Register No.	84/85/1760
Date received in Laboratory	3/5/85
Bottle No. PT39	Time of sampling 1030	Date of sampling 18/4/85

LOCATION AND DETAILS
AYERS ROCK YULARA 6" BORE [redacted]EN 12065 DEPTH 28m DISCH 1.0LPS WRA6019

RSP1259

Proposed water use:- Domestic, Stock, Irrigation, other (specify)

ANALYSIS — PHYSICAL

☐	pH	7.5	☐ Colour (Hazen units)
☐	Specific conductance (microsiemens/cm at 25° C)	3390	☐ Turbidity (NTU's)
☒	Total dissolved solids (mg/L - by evaporation at 180° C)	2170	☐ Suspended solids (mg/L)

ANALYSIS — CHEMICAL (mg/L)

☐	Sodium, Na	490	☒ Chloride, Cl 670
☐	Potassium, K	59	☒ Sulphate, SO_4 532
☐	Calcium, Ca	117	☒ Nitrate, NO_3 69
☐	Magnesium, Mg	73	☐ Bicarbonate, HCO_3 214
☐	Total Hardness (as $CaCO_3$)	592	☐ Carbonate, CO_3
☐	Total Alkalinity (as $CaCO_3$)	176	☐ Fluoride, F 1.1
☐	Iron, (total) Fe	0.7	☐ Orthosphosphate, PO_4
☐	Silica, SiO_2	81	☒ NaCl (calc. from chloride) 1109

ANALYSIS — ADDITIONAL (mg/L)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Manganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd
☐	☐	☐

THE SAMPLE AS ANALYSED ~~COMPLIES~~/DOES NOT COMPLY WITH NORTHERN TERRITORY DRINKING WATER STANDARDS AS RECOMMENDED BY THE NORTHERN TERRITORY DEPARTMENT OF HEALTH.

This Laboratory is registered by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its terms of registration. This document shall not be reproduced except in full.

Analysed By: J. COOK Date 15 / 5 /85

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

4278.846 G. L. DUFFIELD, Government Printer of the Northern Territory

WATER ANALYSIS

2/273

Laboratory Register No. 79/0688

Date received in Laboratory 1.6.79

[redacted] WR 4/1

Bottle No.	Time of sampling (hrs)	Date of sampling
YU 96	0850	16.5.79

LOCATION AND DETAILS

Yulara Village Site - Ayers Rock File 60.6 SG.52.8 398868 Depth: 29.5m

RSP.1259(h) Disch: 3.5 lps. Temp: 26°c Discharge Pipe Pumping Test Final

Sample RN/12065

ANALYSIS - PHYSICAL

Sampler: R. Kneebone

pH	7.3	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3990	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2550	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2657	Total alkalinity (as $CaCO_3$)	200
Sodium chloride (calc from chloride)	1259	Total hardness (as $CaCO_3$)	731
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Sulphate, SO_4	638	Patassium, K	86
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Bicarbonate, HCO_3	244	Magnesium, Mg	88
Carbonate, CO_3		Iron (total), Fe	0.3
Fluoride, F	1.6	Silica, SiO_2	72

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 21 / 6 / 79

REMARKS: The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water, as the total dissolved solids exceed the maximum permissable level.

Suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER ANALYSIS

IN 2/273

Laboratory Register No. 79/0396

Date received in Laboratory 27/3/79

WR 4/1 [redacted]

Bottle No. ZQ 01 | Time of sampling (hrs) 1300 | Date of sampling 10/3/79

LOCATION AND DETAILS Yulara Village RN 12065 Depth 42 M Discharge 3.0 lps Airlift

RSP 1259 H. Sampler R. Darby.

ANALYSIS - PHYSICAL

pH	7.8	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	4010	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2587	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2572	Total alkalinity (as $CaCO_3$)	185
Sodium chloride (calc from chloride)	1388	Total hardness (as $CaCO_3$)	730
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Nitrate NO_3	24	Calcium, Ca	148
Bicarbonate, HCO_3	226	Magnesium, Mg	90
Carbonate, CO_3		Iron (total), Fe	33.4
Fluoride, F	2.0	Silica, SiO_2	73

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: G. Johnston Date 17/4/79

REMARKS: The total dissolved solids, iron and fluoride all exceed the 1971 W.H.O. International Standards for drinking Water. Unsuitable for human consumption. Suitable for Stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

Regulation 8 ... N.T.A. 181

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance IN 2/282

FINAL STATEMENT OF BORE RN 12074

From	To	Description of Strata
0.00	24.00	BROWN STONE + SAND
24.00	30m	BROWN STONE + CLAY
30.00	76m	WHITE CLAY, STONE + SAND

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE S SE E NW W SW of (b) ...(2 NW).....

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - Drilled ahead with 7" Hammer Bit

Map No: 5047

Grid Reference: MAG 152 117

Samples of strata and water supplies
~~have been~~
will be *
left at the following trading place -

...W.T.B. OFFICE. A/S.....

.....R Dads.....
Signature

* Strike out which does not apply.

For office use only
PIPE PULLED HOLE BACK FILLED
RH 1-5-79

Name of Bore - RN12074 (2NW)

Name of Property - AYERS RANCH

Description of Property - N.A.

Name of Owner - NTBR

Name of Contractor - W.T.B

Name of Driller - R. DADBY

Date of Commencement - 22/3/79

Date of Completion - 22/3/79

Total Depth - 39.m

Particulars of Casing - NIL

Particulars of Perforations or Screens - 2" G.W.P. To Bottom + Bottom 4 Inches Open Perfs

Water	1st Supply	2nd Supply	3rd Supply
Struck at	W/C 32m		
Standing Water Level	14.85m		
Pumping Supply: ~~G.P.M.~~ L/S	1.45		
Duration of Pump Test			
Water Level During Test			
Quality: Good, Fair, Bad	CONDUCT 3,500	LAST SAMPLE 3,900.	

(4)

WATER ANALYSIS

Laboratory Register No. 79/0568

Date received in Laboratory 9.3.79

WR 4/1

Bottle No.	Time of sampling (hrs)	Date of sampling
Z0 30	1345	22.3.79

LOCATION AND DETAILS
Ayers Rock RN/12074 Depth: 39 m Disch: 1.0 lps Airlift

RSP. 88

ANALYSIS - PHYSICAL

pH	7.6	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3580	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2520	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2582	Total alkalinity (as $CaCO_3$)	161
Sodium chloride (calc from chloride)	1002	Total hardness (as $CaCO_3$)	998
Chloride, Cl	608	Sodium, Na	393
Sulphate, SO_4	850	Patassium, K	63
Nitrate NO_3	65	Calcium, Ca	253
Bicarbonate, HCO_3	196	Magnesium, Mg	89
Carbonate, CO_3		Iron (total), Fe	unsuitable for determination
Fluoride, F	1.9	Silica, SiO_2	63

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: G.JOHNSTON Date 21/5/79

REMARKS:

WATER [illegible]
ALICE [illegible]
30 AUG 1979
DEPT. OF TRANSPORT & WORKS

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER CONDUCTIVITY ANALYSIS.

BORE: REGISTERED NUMBER: 12074

LOCATION: Ayers Rock

DATE TESTED: 3-5-79 TESTED BY: R Boeyen

BOTTLE No.	DATE	TIME	DEPTH	DISCHARGE	SAMPLER	CONDUCTIVITY
ZH 62	22-3-79	1430	34 M	1.0 l/sec	R. Derby	3700
ZH 96	22-3-79	1445	37 M	1.0 l/sec	"	3700

YULARA VILLAGE.WATER RESOURCES 60.6D

RN 12074
IN 2/282
5047 Mt Olga

Depth (m)			Description
0	-	6	SAND, Reddish brown, and gravel.
6	-	18	SAND, Light brown poorly sorted sand, minor clay.
18	-	30	CLAY & SAND, Reddish brown clay with sand
30	-	39	SILTSTONE, White sandy calcareous siltstone

SUMMARY

0	-	6	Sand and gravel	Tertiary
6	-	18	Sand	
18	-	30	Clay and sand	
30	-	39	Siltstone	

MAJOR AQUIFER

~~32m~~ 33.5 1.0 ls^{-1} Fractured siltstone.

Geoff Knott

GEOFF KNOTT
HYDROGEOLOGIST

October 1979

NTA 171B

DATE 22/3/74 BORE No. RN 12074 (2 NW) Driller: Peoples

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details
1100				CHANGE HOLLY SUB & DRILL TO
				6m WITH HAMMER BIT ROLL
				OUT & RUN 9 7/8 ROLL TO 4.40m
				PULL OUT & RUN IN SURFACE CASING
1200	6m	6m		ADD D/C BROWN SAND & STONE.
1220	12m	6m		AS ABOVE
				ADD D/C
1235	18m	6m		BROWN STONE & SAND
				ADD D/P
1255	24m	6m		AS ABOVE
				ADD D/P
1320	30m	6m		BROWN STONE & CLAY
				ADD D/P
1345	36m	6m		WHITE CLAY & STONE & SAND W/C 32m 16/5
				ADD D/P CONDUCTIVITY 3,500
1430	39m	3m		WHITE CLAY PULL OUT 20.30 - 21.96
				TOTAL DEPTH 39.00m 21.47 - 21.62 CONDUCTIVITY 3,900
				PULL OUT & RUN 2" GWP.
				SWL 16.85m

BIT DATA				STRING DATA				MUD DATA
No.	Size	Type	Worn cond'n	Item	O.D.	Length	Prog. tally	
13648	9 7/8	RC	USED					
39406	7"	30T	USED	HAMMER BIT	5.13			
							1.75	
				D/C	4 1/2	5.73	7.48	
				D/C	4 1/2	6.01	13.49	
				D/P	4 1/2	6.00	19.49	
				D/P	4 1/2	6.00	25.49	
				D/P	4 1/2	6.00	31.49	
				D/P	4 1/2	6.00	43.49	

14702/69.... W. G. Murray, Government Printing Office, Canberra

DEPARTMENT OF TRANSPORT & WORKS
WATER INVESTIGATION UNIT
GEOPHYSICAL BORE LOG

R N : 12074 AREA: ~~ARYES~~ AYERS ROCK STATUS : INVESTIGATION

MAP REFERENCE : 5047 GRID CO ORDS : 982 – 117 AMG

ELEVATION : S. W. L. : 14·85 M

CASING DETAILS : NIL

DRILLER : W.I.U. \ AS DATE COMMENCED : 22-3-'79

DEPTH DRILLED : 39·00 M DATE COMPLETED : 22-3-'79

RADIOMETRIC LOG DATA

SERVICE : W.I.U. \ AS LOG TYPE : GAMMA DATE : 2\4\79

RUN NO. : 4 SCALE : V : 1=100 H :

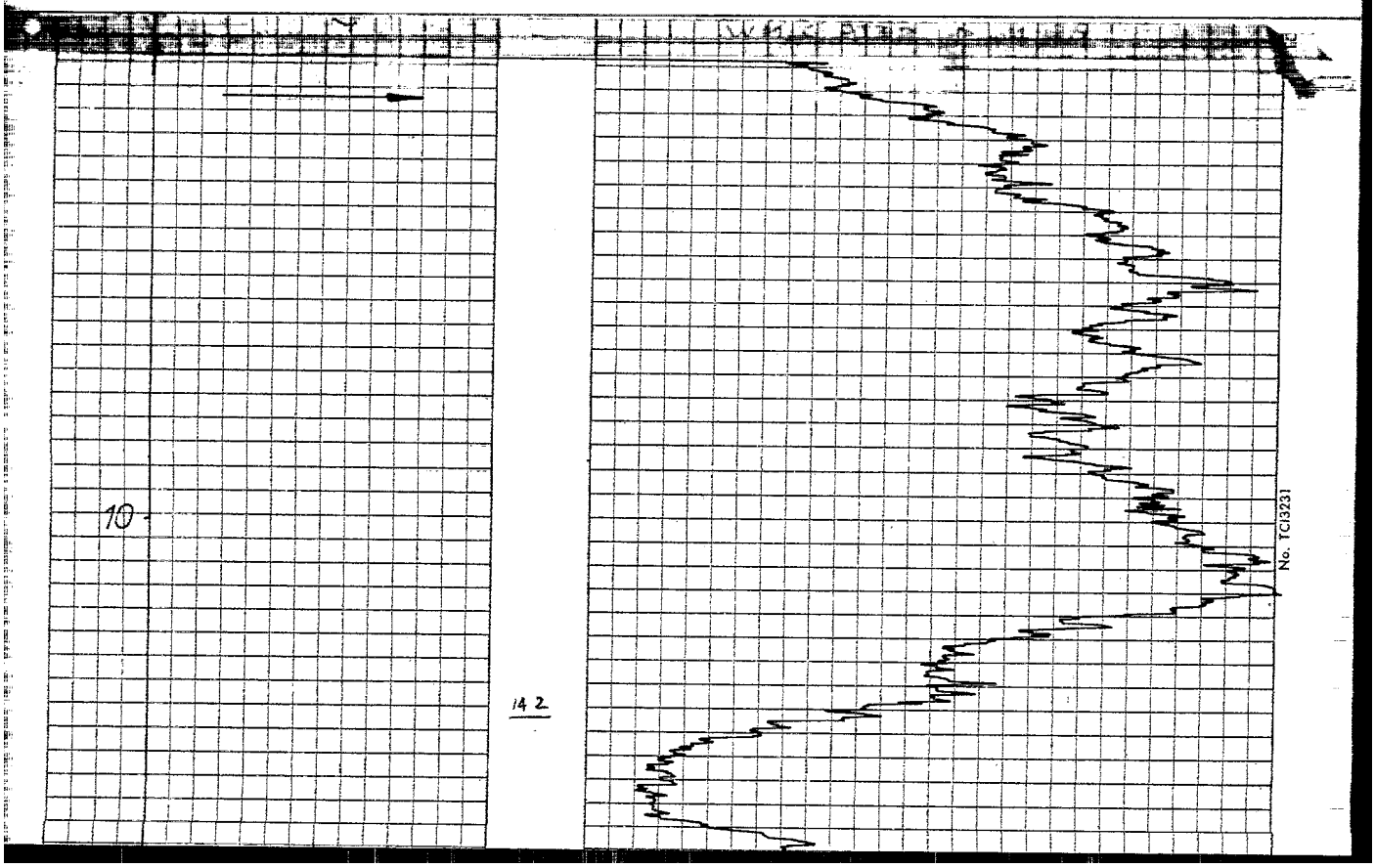
SENSITIVITY : RANGE : 4

TIME CONSTANT : 4 SPEED : 11 M/ MIN :

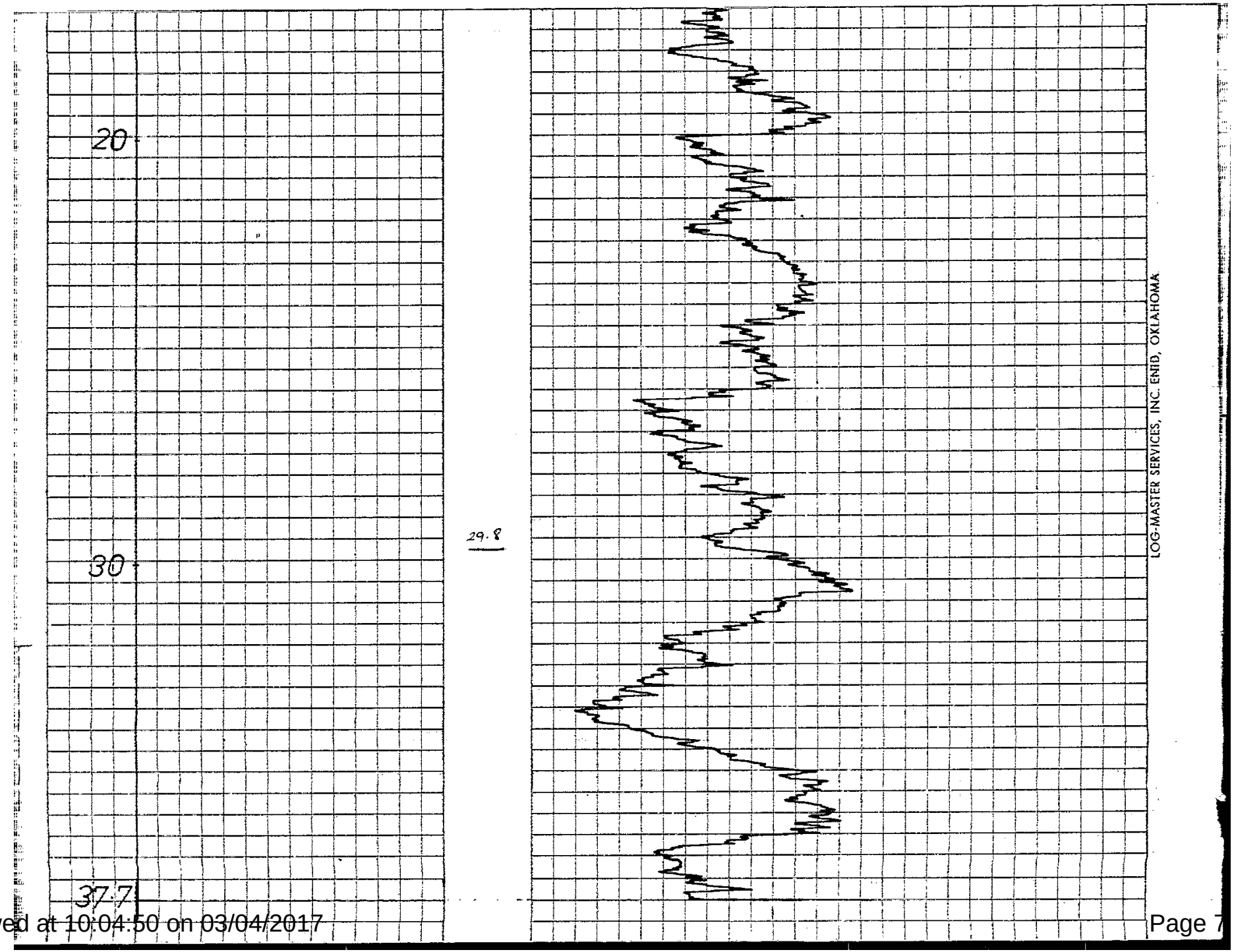
1st READING : 37·7 M INSTRUMENT : LM444B LMG 15

LAST READING : 1·10 M OBSERVER : R.P

INTERVAL : 36·6 M



DEPARTMENT OF TRANSPORT & WORKS



DEPARTMENT OF TRANSPORT & WORKS

WATER INVESTIGATION UNIT

GEOPHYSICAL BORE LOG

R.N 12074 AREA: ~~ARYES~~ AYERS ROCK STATUS: INVESTIGATION

MAP REFERENCE: 5047 GRID CO ORDS: AMG 982 117

ELEVATION : S. W. L. : 14·85 M

CASING DETAILS : NIL

DRILLER : W.I.U.\AS DATE COMMENCED : 22-3-79

DEPTH DRILLED : 39 00 M. DATE COMPLETED : 22-3-79

RADIOMETRIC LOG DATA

SERVICE : W.I.U.\AS LOG TYPE : GAMMA DATE : 2\4\79

RUN NO. : 2 SCALE : V : 1=100 H :

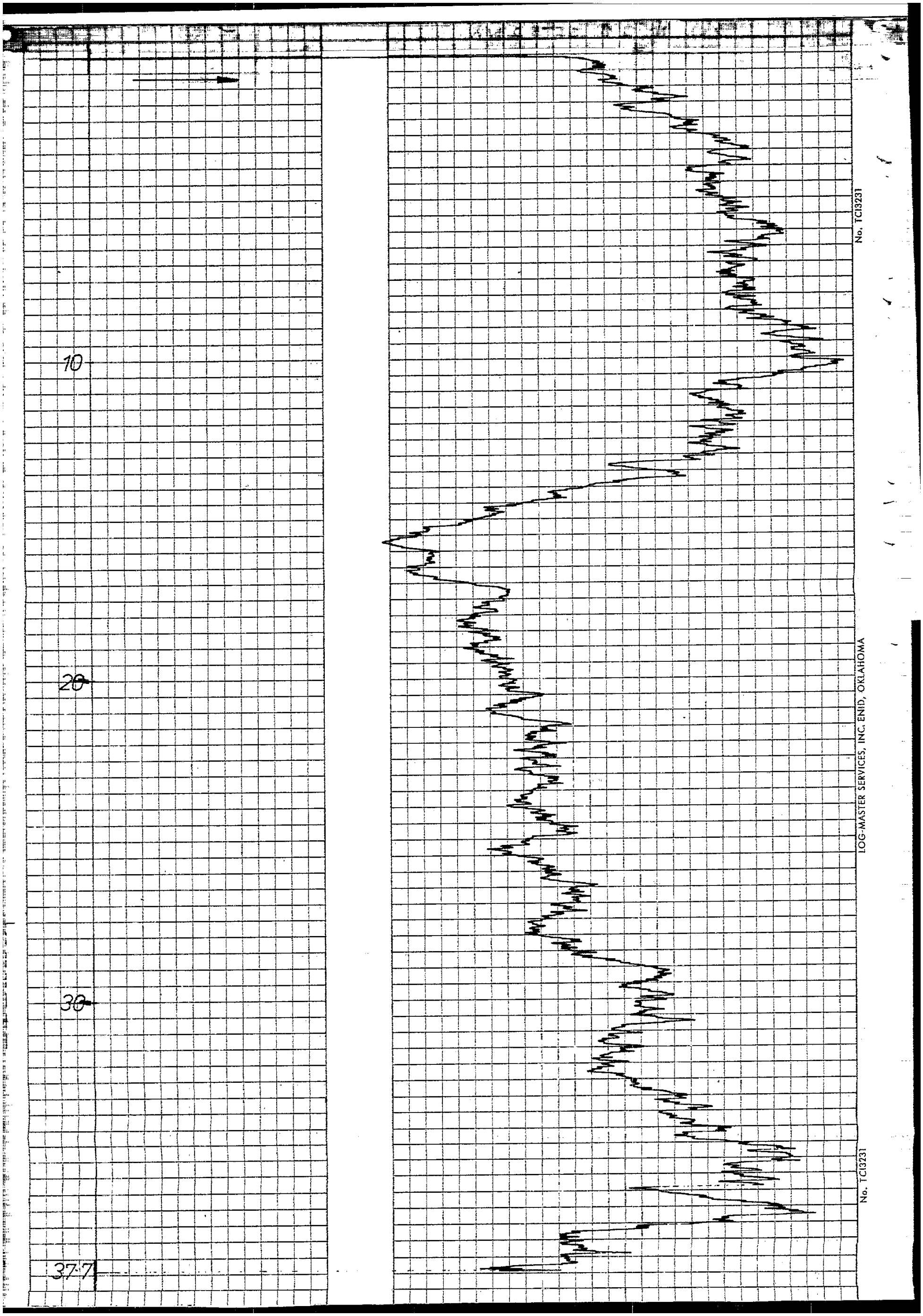
SENSITIVITY : RANGE : 4

TIME CONSTANT : 4 SPEED : 16 M/ MIN :

1st READING : 37·7 M INSTRUMENT : LM. 444B LMG. 15

LAST READING : 1 10 M OBSERVER : RP

INTERVAL : 36·6 M


10
20
30
37.7
No. TCI3231
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
No. TCI3231

Regulation 8

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance

FINAL STATEMENT OF BORE

RN012074

N.T.A. 181

IN 2/282

RN 12074

From	To	Description of Strata
0.00	24.00	BROWN STONE & SAND
24.00	30m	BROWN STONE & CLAY
30.00	36m	WHITE CLAY, STONE & SAND

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE S SE E NW W SW of (b) ...(2 NW).....

.....

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - Pilliton allway with 7" Hammer Bit

Map No: 5047

Grid Reference: ANG 182 117

Samples of strata and water supplies
~~have been~~ *
will be *
left at the following trading place -

...W.T.B....OFFICE....A/K.....

.....

Signature

* Strike out which does not apply.

For office use only -

Name of Bore - RN12074 (2NW)

Name of Property - AYERS ROCK

Description of Property - N.A.

Name of Owner - NTRB

Name of Contractor - W.T.B

Name of Driller - R. DOBBY

Date of Commencement - 22/3/74

Date of Completion - 22/3/74

Total Depth - 39.m

Particulars of Casing - N/C

Particulars of Perforations or Screens - 2" G.W.P. To Bottom + Bottom Length Opy Pc.

Water	1st Supply	2nd Supply	3rd Supply
Struck at	W/C 32m		
Standing Water Level	14.85m		
Pumping Supply: ~~G.B.H.~~ U/S	145		
Duration of Pump Test			
Water Level During Test			
Quality: Good, Fair, Bad	CONDUCT 3,500	WEST SAMPLE 3,900	

WATER ANALYSIS

2/282

Laboratory Register No. 79/0568

Date received in Laboratory 9.5.79

WR 4/1

Bottle No.	Time of sampling (hrs)	Date of sampling
Z0 30	1345	22.3.79

LOCATION AND DETAILS
Ayers Rock, RN/12074 Depth: 39 m. Disch: 1 lps. Airlift RSP. 88

Sampler: R. Darby

ANALYSIS - PHYSICAL

pH	7.6	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3580	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2520	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2582	Total alkalinity (as $CaCO_3$)	161
Sodium chloride (calc from chloride)	1002	Total hardness (as $CaCO_3$)	998
Chloride, Cl	608	Sodium, Na	393
Sulphate, SO_4	850	Patassium, K	63
Nitrate NO_3	65	Calcium, Ca	253
Bicarbonate, HCO_3	196	Magnesium, Mg	89
Carbonate, CO_3		Iron (total), Fe	N.D.
Fluoride, F	1.9	Silica, SiO_2	63

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 21/5/79

REMARKS: The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water as the Total Dissolved Solids exceed the maximum permissible level. Suitable for Stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

Viewed at 15:08:46 on 25/08/2016

Bore Report RN012081

RN012081

Uluru Water Quality - Field Parameters

SAMPLE No.	DATE SAMPLED	WATER WELL No.	GPS POSITION			PUMP TYPE	TPS PARAMETERS					Colorim.
			Datum	South	East		Dis.Ox. (mg/L)	E.C. (uS/cm)	pH	Redox (mV)	Temp (Deg.C)	NO_3^- (mg/L)
UL98/1	18/08/98	RN 12161	AGD 66	25 13' 14"	131 01' 40"	Grundfos	-	3060	7.18	-40	27.2	72
UL98/2	19/08/98	RN 12066	AGD 66	25 13' 42"	130 57' 54"	Grundfos	5.30	2517	6.92	-6	26.2	122
UL98/3	19/08/98	RN 12081	AGD 66	25 12' 16"	130 58' 24"	Grundfos	4.83	4200	6.95	90	27.3	38
UL98/4	19/08/98	RN 12164	AGD 66	25 13' 43"	130 58' 54"	Grundfos	6.05	4430	7.19	-51	27.2	52
UL98/5	20/08/98	RN 12058	AGD 66	25 16' 39"	130 55' 41"	Grundfos	5.19	2442	6.97	50	26.1	77
UL98/6	20/08/98	RN 10693	AGD 66	25 16' 56"	130 56' 23"	Grundfos	3.62	2435	6.97	-125	26.0	77
UL98/7	20/08/98	RN 13363	AGD 66	25 13' 45"	130 58' 18"	Grundfos	5.29	2959	7.01	90	26.3	-
UL98/8	21/08/98	RN 12453	AGD 66	25 15' 24"	130 56' 52"	Grundfos	2.30	2090	7.24	-10	25.7	120
UL98/9	21/08/98	RN 12454	AGD 66	25 15' 03"	130 57' 00"	Grundfos	0.85	2280	7.16	49	25.6	26
UL98/10	21/08/98	RN 10689	AGD 66	25 17' 23"	130 54' 24"	Grundfos	4.05	2637	6.96	-11	26.4	60
UL98/11	21/08/98	RN 12453	AGD 66	25 15' 24"	130 56' 52"	Grundfos	2.30	2090	7.24	-10	25.7	120
UL98/12	21/08/98	RN 12453	AGD 66	25 15' 24"	130 56' 52"	Grundfos	2.30	2090	7.24	-10	25.7	120
UL98/13	23/08/98	RN 11547	AGD 66	25 12' 37"	131 00' 55"	Grundfos	6.57	1284	7.19	29	26.5	71
UL98/14	24/08/98	RN 11541	AGD 66	25 22' 14"	131 01' 22"	Grundfos	0.48	2500	6.92	-91	26.6	-
UL98/15	24/08/98	RN 16195	AGD 66	25 21' 28"	131 02' 40"	Grundfos	2.30	1320	7.00	6	27.2	21
UL98/16	24/08/98	RN 11605	AGD 66	25 22' 11"	131 02' 41"	Grundfos	5.70	1185	7.00	73	26.5	53
UL98/17	25/08/98	RN 6380	AGD 66	25 21' 47"	131 02' 50"	Grundfos	1.00	2491	7.03	-168	26.9	Lo
UL98/18	26/08/98	RN 11545	AGD 66	25 21' 49"	131 01' 04"	Grundfos	3.30	1348	7.21	133	26.6	80
UL98/19	26/08/98	RN 11545	AGD 66	25 21' 49"	131 01' 04"	Grundfos	3.30	1348	7.21	133	26.6	80
UL98/20	26/08/98	RN 11545	AGD 66	25 21' 49"	131 01' 04"	Grundfos	3.30	1348	7.21	133	26.6	80
UL98/21	26/08/98	RN 11551	AGD 66	25 21' 42"	131 01' 22"	Grundfos	2.54	1060	7.29	111	27.0	71
UL98/22	26/08/98	RN 10 692	AGD 66	25 16' 10	130 58' 37"	Grundfos	2.80	4000	7.17	-36	27.0	47

Uluru Water Quality Chemical Data

Sample No.	RN 12161	RN 12066	RN 12081	RN 12164	RN 12058	RN 10693	RN 13363
	UL98/1	UL98/2	UL98/3	UL98/4	UL98/5	UL98/6	UL98/7
	980105	980106	980107	980108	980109	980110	980111
Sampling Date: 1998	18-Aug	19-Aug	19-Aug	19-Aug	20-Aug	20-Aug	20-Aug
Temp	27.2	26.2	27.3	27.2	26.1	26	26.3
pH	7.18	6.92	6.95	7.19	6.97	6.97	7.01
Total Dissolved Solids mg/L	1880	1610	2850	2680	1620	1600	2020
Electric Conductance mS/cm	3060	2517	4200	4430	2442	2435	2959
Dissolved Oxygen mg/L as O_2	-	5.3	4.83	6.05	5.19	3.62	5.29
Nitrate mg/L as N	72	122	38	52	77	77	69
Fluoride mg/L as F	1.2	0.83	0.95	1.2	0.98	0.95	1.1
T. Alkalinity mg/L as $CaCO_3$	173.75	158.75	188.75	212.5	180	182.5	187.5
Chloride mg/L as Cl	508	432	713	811	420	424	543
T. Hardness mg/L as $CaCO_3$	564.1	546.2	973.4	728.9	603	580.9	704.3
Sulphate mg/L as SO_4	454	331	763	618	364	358	496
Calcium mg/L as Ca	137	116	215	142	130	120	160
Magnesium mg/L as Mg	53.9	62.3	106	90.9	67.6	68.3	74
Sodium mg/L as Na	380	279	497	593	263	271	371
Potassium mg/L as K	46	46.6	65.3	73.4	36.6	38.1	48.1
T. Iron mg/L as Fe	0.028	0.064	0.015	0.022	0.034	0.128	0.022
Manganese mg/L as Mn	0.044	0.031	0.062	<.005	0.006	0.112	0.007
Selenium mg/L as Se	2	3.9	3.1	3.6	2.6	2.5	3
Zinc mg/L as Zn	0.093	0.08	0.086	0.088	0.161	0.106	0.13
Copper mg/L as Cu	<.005	<.005	<.005	<.005	<.005	0.006	<.005
Aluminium mg/L as Al	<.005	<.005	<.005	<.005	<.005	<.005	<.005
Uranium ^{238} mg/L	2.5	1.1	2.5	3.2	1.6	1.7	2
Bromide mg/L as Br	1.92	2.44	3.49	4.12	1.92	1.94	2.68
Gross Alpha Conc. Bq/L	<.05	<.04	0.12	0.2	<.05	<.03	<.05
Gross Beta Conc. Bq/L	1.08	1.21	1.86	2.09	0.96	1.1	1.28
Silicon mg/L as Si	37.7	35.5	36.9	34.6	35.5	36.4	39
Sulphur mg/L as S	155	107	292	221	122	122	175
Iodide mg/L as I	-	-	-	-	-	-	-
Boron mg/L as B	0.701	0.82	1.13	0.7	0.999	0.698	0.823
Barium mg/L as Ba	0.02	0.021	0.038	0.025	0.02	0.049	0.021
Strontium mg/L as Sr	1.22	1.34	1.65	1.2	2.06	1.19	1.38
Arsenic mg/L	0.5	0.2	0.3	0.4	0.2	0.3	0.3
Tritium Activity (T unit + error)	<0.4	<0.3	<0.4	<0.4	<0.4	<0.3+/- 0.2	<0.3+/- 0.2
Oxygen as ^{18}O ‰ SMOW	-6.18	-5.76	-5.8	-5.71	-5.91	-6.04	-5.91
Deuterium as D ‰ SMOW	-46.8	-43.8	-44.6	-44.8	-45.3	-44.3	-43.6

RN 12081

JOB # 9874

Sample #	Code #	$\delta^{13}C$	^{14}C	^{14}C	R.N.
		‰ PDB	pMC±1σ	yrBP±1σ	
UL98//1	cs 1653	-8.2	29.7 ± 1.0	9750 ± 270	12161
UL98//2	cs 1654	-7.3	27.7 ± 1.0	10330 + 290 - 280	12060
UL98//3	cs 1655	-8.6	19.1 ± 1.5	13320 + 680 - 630	12081
UL98//4	cs 1660	-9.3	31.7 ± 1.0	9240 ± 250	12164
UL98//5	cs 1664	-9.2	33.2 ± 1.0	8860 ± 240	12058
UL98//6	cs 1665	-9.5	41.5 ± 1.0	7060 ± 200	10693
UL98//7	cs 1666	-8.6	23.9 ± 0.9	11510 ± 300	13363
UL98//8	cs 1667	-6.9	24.2 ± 0.9	11410 ± 300	12453
UL98//9	cs 1668	-9.2	Background <2 % MC	> 30000	12454
UL98//10	cs 1669	-8.9	33.2 ± 0.9	8860 ± 200	10689
UL98//13	cs 1670	-11.5	93.5 ± 1.3	540 ± 120	11547
UL98//14	cs 1671	-10.6	Background <2 % MC	> 30000	11541
UL98//15	cs 1672	-9.1	25.8 ± 0.9	10880 ± 290	16195
UL98//16	cs 1673	-8.6	39.1 ± 1.0	7550 ± 200	11605
UL98//17	cs 1674	-9.9	Background <2 % MC	> 30000	6380
UL98//18	cs 1677	-8.8	28.1 ± 0.9	10210 ± 250	11545
UL98//21	cs 1679	-7.9	40.6 ± 1.7	7240 + 350 - 330	11551
UL98//22	cs 1680	-9.5	36.1 ± 1.0	8200 ± 230	10692

Please note that the age given assumes that there is no interaction between water and the rock matrix and assumes that the C-14 activity of the DIC in the groundwater is 100 PMC when recharged.

A surcharge of $100 per sample is charged for providing ages assuming different hydrochemical evolutionary paths for the groundwater. Please contact me if this service is required.

002 ENVGEO & GWATER AGSO 03/05 '99 MON 15:56 FAX +61 2 6249 9970

Viewed at 15:08:46 on 25/08/2016

Bore Report RN012081

'raw' time based or radioactive decay equation

Uluru

REG N°	12126	12066	[redacted]	12164	12058	10693	13363	12453	12454
Sample No.	UL98/1	UL98/2	UL98/3	UL98/4	UL98/5	UL98/6	UL98/7	UL98/8	UL98/9
Date: 1998	18-Aug	19-Aug	19-Aug	19-Aug	20-Aug	20-Aug	20-Aug	21-Aug	21-Aug
$\delta^{13}C$ (‰ PDB)	-8.2	-7.3	-8.6	-9.3	-9.2	-9.5	-8.6	-6.9	-9.2
^{14}C (pMC+/-σ)	29.7 +/-1.0	27.7 +/- 1.0	19.1 +/- 1.5	31.7 +/- 1.0	33.2 +/- 1.0	41.5 +/- 1.0	23.9 +/- 0.9	24.2 +/- 0.9	Background <2 % MC
^{14}C (yrBP+/-1σ)	9750 +/- 270	10330 +290 -280	13320 +680 -630	9240+/-250	8860 +/- 240	7060 +/- 200	11510 +/- 300	11410 +/- 300	>30000
36Cl/Cl (x10-15)	90	156	132	152	121	116	112	146	152
36Cl (x106) ($\times 10^6$ atoms/L)	777	1145	1599	2094	863	835	1033	823	1105

REG N°	10689	11547	11541	16195	11605	6380	11545	11551	10692
Sample No.	UL98/10	UL98/13	UL98/14	UL98/15	UL98/16	UL98/17	UL98/18	UL98/21	UL98/22
Date: 1998	21-Aug	23-Aug	24-Aug	24-Aug	24-Aug	25-Aug	26-Aug	26-Aug	26-Aug
$\delta^{13}C$ (‰ PDB)	-8.9	-11.5	-10.6	-9.1	-8.6	-9.9	-8.8	-7.9	-9.5
^{14}C (pMC+/-σ)	33.2 +/- 0.9	93.5 +/- 1.3	Background <2 % MC	25.8 +/- 0.9	39.1 +/- 1.0	Background <2 % MC	28.1 +/- 0.9	40.6 +/- 1.7	36.1 +/- 1.0
^{14}C (yrBP+/-1σ)	8860 +/- 200	540 +/- 120	>30000	10880 +/- 290	7550 +/- 200	>30000	10210 +/- 250	7240 +350 -330	8200 +/- 230
36Cl/Cl (x10-15)	113	335	113	129	130	80	169	160	137
36Cl (x106)	919	564	802	370	238	537	373	204	1696

RN 12081

preliminary, statistical errors to be supplied.

Regulation 8

N.T.A. 181

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance

I.N. 2/289

RN 12081

WELL STANDING OF BORE

From	To	Description of Strata
0.00	6.00	BROWN STONE.
6.00	12.00	BROWN & LIGHT BROWN STONE
12.00	18.00	LIGHT BROWN & SANDY STONE
18.00	33.00	LIGHT BROWN CLAY & STONE
33.00	43.00	BROWN STONE.
43.00	48.00	BROWN CLAY & STONE.
48.00	68.00	BROWN SANDY STONE
68.00	90.00	GREY & BROWN STONE & CLAY FALLING IN

Name of Bore - RN 12081 (3NNW)

Name of Property - Ayers Rock

Description of Property - N.P.

Name of Owner - N.T.R.B.

Name of Contractor - W.R.B

Name of Driller - R Ramsay

Date of Commencement - 29/3/79

Date of Completion - 30/3/79

Total Depth - ~~Original~~ 93.00m

Particulars of Casing - 43.46 x 6" Blank casing

Particulars of Perforations or Screens - Nil

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE S SE E NW W SW of (b) ...(3NNW.).....

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - TOP WATER CASED OFF TO 43.46m. Drill to 43.00m WITH 7" Butt Bit. From 43.00m to 43.19 86.00 5½ Butt Bit. From 86.00 to 89.00m 5½ BLADE BIT

Map No: AMG 564 971

Grid Reference: 970 84

Samples of strata and water supplies
~~have been~~ *
will be *
left at the following trading place -

W.R.B. OFFICE A/S

R Ramsay
Signature

* Strike out which does not apply.

For office use only -
Bore not certified 12.8.79 JH

ID82.80

Water	1st Supply	2nd Supply	3rd Supply
Struck at	~~15~~ 20.29 SEEPAGE	W/L 20.45 ~~20~~	~~75~~
Strengths ~~Water-level~~	56.43 ~~66~~ 66.09 3,500 ppm ½ l/s	75.25m 3900 ppm 2 l/s	78.83m 3700 ppm 2 l/s
Pumping Supply: ~~G.P.M.~~ l/s		½ l/s	~~1½~~
Duration of ~~Pump Test~~	S.W.L	46-65m	
Water Level During Test			
Quality: Good, Fair, Bad		CONDUCT 3500 ppm	CONDUCT 3500 ppm

AQUIFERS	20.29	29.45	56.93	66.09	75.25	79.83	FINAL
seepage	½ l/s		< ¼ l/s	1.0	1.0	2.0	4.0.

Cased off

WATER ANALYSIS

Department of Transport & Works
Water Division, Darwin N.T.

WR 4/1A

Laboratory Register No.	Date received in Laboratory	
84/85/1759	3/5/85 ✓	
Bottle No.	Time of sampling	Date of sampling
PQ73	1630	17/4/85

LOCATION AND DETAILS
AYERS ROCK 6" BORE RN 12081 DEPTH 28m DISCH 0.5LPS WRA6019

RSP1259

Proposed water use:- Domestic, Stock, Irrigation, other (specify)

ANALYSIS — PHYSICAL

☐ pH	7.7	☐ Colour (Hazen units)	
☐ Specific conductance (microsiemens/cm at 25° C)	3710	☐ Turbidity (NTU's)	
☒ Total dissolved solids (mg/L - by evaporation at 180° C)	2470	☐ Suspended solids (mg/L)	

ANALYSIS — CHEMICAL (mg/L)

☐ Sodium, Na	492	☒ Chloride, Cl	690
☐ Potassium, K	57	☒ Sulphate, SO_4	672
☐ Calcium, Ca	166	☒ Nitrate, NO_3	55
☐ Magnesium, Mg	87	☐ Bicarbonate, HCO_3	243
☒ Total Hardness (as $CaCO_3$)	772	☐ Carbonate, CO_3	
☐ Total Alkalinity (as $CaCO_3$)	199	☐ Fluoride, F	0.8
☐ Iron, (total) Fe	0.3	☐ Orthosphosphate, PO_4	
☐ Silica, SiO_2	84	☒ NaCl (calc. from chloride)	1142

ANALYSIS — ADDITIONAL (mg/L)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Manganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd
☐	☐	☐

THE SAMPLE AS ANALYSED ~~COMPLIES~~/DOES NOT COMPLY WITH NORTHERN TERRITORY DRINKING WATER STANDARDS AS RECOMMENDED BY THE NORTHERN TERRITORY DEPARTMENT OF HEALTH.

This Laboratory is registered by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its terms of registration. This document shall not be reproduced except in full.

Analysed By: J. COOK Date 15 / 5 85

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

4278.846 G. L. DUFFIELD, Government Printer of the Northern Territory

BORE SAMPLING DETAILS

R.N. : 12081

LOCATION OF BORE : A/Rock

TEMP 26°C

BORE NAME :

TOTAL DEPTH : 88.99

Time

SAMPLES 1630

S.W.L. : 14

DATE : 17·4·85

DETAILS OF CASING : 6" 43·66 CASING.

LITRES PER METRE : 16

DETAILS OF PUMPING : PUMPED FOR 150 mins @ ½ lps

PUMP SET 28 MTRS

TYPE OF PUMP TO BE USED : SUB

COMMENTS :

SAMPLES

PQ73 ✓

PJ53

WATER ANALYSIS

Department of Transport & Works
Water Division, Darwin NT

WR 4/1

Laboratory Register No: 80/0065
Date received in Laboratory: 10.1.80

Bottle No	Time of Sampling	Date of Sampling
ZN 88	1515	14.12.79

LOCATION AND DETAILS
Ayers Rock - RN 12081 - Disch: 1.2 lps Tap RSP. 88

Proposed water use:-Domestic, Stock, Irrigation, other (specify)

ANALYSIS — PHYSICAL

☐ pH	7.5	☐ Colour (Hazen units)	
☐ Specific conductance (microsiemens/cm at 25° C)	3760	☐ Turbidity (NTU's)	
☒ Total dissolved solids (mg/l - by evaporation at 180 ° C)	2520	☐ Suspended solids (mg /l)	

ANALYSIS — CHEMICAL (mg/l)

☐ Sodium, Na	477	☒ Chloride, Cl	711
☐ Potassium, K	79	☒ Sulphate, SO_4	665
☐ Calcium, Ca	188	☒ Nitrate, NO_3	59
☐ Magnesium, Mg	92	☐ Bicarbonate, HCO_3	238
☒ Total Hardness (as $CaCO_3$)	847	☐ Carbonate, CO_3	
☐ Total Alkalinity (as $CaCO_3$)	195	☐ Fluoride, F	1.5
☐ Iron, (total) Fe	0.3	☐ Orthophosphate, PO_4	
☐ Silica, SiO_2	84	☐ NaCl (calc. from chloride)	1172

ANALYSIS — ADDITIONAL (mg/l)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Maganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd

Analysed By: H. HENKEL

WATER INVESTIGATIONS UNIT
ALICE SPRINGS
21 JAN 1980
DEPT. OF TRANSPORT & WORKS

Date 17/ 1 / 80

REMARKS

The sample as analysed is considered suitable for:—

Drinking water — ~~YES~~/NO
Irrigation — YES/NO
Stock watering — YES/~~NO~~
Other (specify) — YES/NO

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

Note:- Advice and Water quality information can be obtained by contacting the Senior Engineer Water Quality, Darwin Phone 89 6072.

15303/79
A.B. CAUDELL, Government Printer of the Northern Territory.

WATER ANALYSIS

		Laboratory Register No.	79/0573
		Date received in Laboratory	9.5.79
WR 4/1	Bottle No. YK 35	Time of sampling (hrs) 0915	Date of sampling 31.3.79

LOCATION AND DETAILS

Ayers Rock - RN/12081 Depth: 93 m. Disch: 4.0 lps. Airlift RSP. 88

Sampler: Darby

ANALYSIS - PHYSICAL

pH	7.9	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3770	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2580	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2558	Total alkalinity (as $CaCO_3$)	179
Sodium chloride (calc from chloride)	1195	Total hardness (as $CaCO_3$)	784
Chloride, Cl	725	Sodium, Na	480
Sulphate, SO_4	670	Patassium, K	75
Nitrate NO_3	62	Calcium, Ca	166
Bicarbonate, HCO_3	218	Magnesium, Mg	90
Carbonate, CO_3		Iron (total), Fe	1.2
Fluoride, F	1.5	Silica, SiO_2	70

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 30 / 5 / 79

REMARKS:

The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water as the total dissolved solids exceed the maximum permissible level. suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER CONDUCTIVITY ANALYSIS.

BORE: REGISTERED NUMBER: 12081

LOCATION: Ayers Rock

DATE TESTED: 3-5-79 TESTED BY: R. Boerger

BOTTLE No.	DATE	TIME	DEPTH	DISCHARGE	SAMPLER	CONDUCTIVITY
ZN 69	29-3-79	1545	28 M	½ l/sec	R. Darby	3800
YU 71	"	1600	33 M	½ l/sec	"	3800
ZQ 79	30-3-79	0820	43 M	½ l/sec	"	3600
ZQ 36	"	1315	58 M	¼ l/sec	"	4000
ZD 18	"	1410	68 M	1.0 l/sec	"	4000
ZN 72	"	1445	78 M	2.0 l/sec	"	3900
ZH 98	"	1530	83 M	4.0 l/sec	"	4000
ZK 09	31-3-79	0915	93 M	4.0 l/sec	"	4000

YULARA VILLAGE WATER RESOURCES 60.6D

RN 12081
IN 2/289
5047 Mt Olga

Depth (m)			Description
0	-	3	SAND. Dark reddish brown, with minor silt.
3	-	20	SAND. Light brown poorly sorted well rounded sand with silt.
20	-	58	CLAY & SAND. Brown clay with sand. Minor carbonaceous material from 30 to 33m.
58	-	75	SANDSTONE. Poorly sorted angular sand.
75	-	93	SILTSTONE. White siltstone with sand.

SUMMARY

0	-	3	Sand	Tertiary
3	-	20	Sand	
20	-	58	Clay and sand	
58	-	75	Sandstone	
75	-	93	Siltstone	

MAJOR AQUIFERS

66.09 [illegible]m 1.0 ls^{-1} Sandstone
75.25 [illegible]m 1.0 ls^{-1} [illegible]
79.88 [illegible]m 2.0 ls^{-1} Fractured Siltstone

Geoff Knott.

GEOFF KNOTT
HYDROGEOLOGIST

October 1979

Viewed at 15:08:46 on 25/08/2016

Bore Report RN012081

KG SURVEY INFORMATION

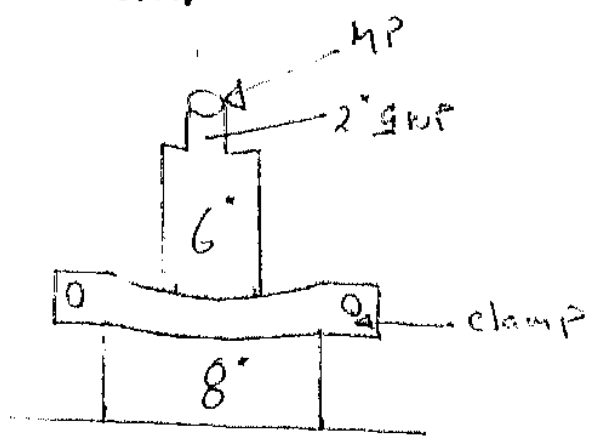
64

BORE NAME _____ R.N. 12081. LOCALITY YALARA

VERTICAL Datum AHD. Level Book 32/22. P19. Date 15-1-82.

Point	R. L.	Remarks
GL.	495.40	
top of 8"	495.933.	
MP. 2" brass.	496.218	

Bore sketch



HORIZONTAL

Co-ordinates Easting	Co-ordinates Northing	Grid	Map Zone	Remarks

Locality sketch

BENCHMARK Name 12081.

R.N. 12081.

R.L. 496.140

Particulars Deck Spike in Desert Oak.

NTA 1718

DATE 24/3/79 BORE No. RN12081 (3NNW) Driller: DOOLEY

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA	
				TO BOGEY TO GET INTO 12080									Kelly 11.84	6.80 +.75 8.55
1330				MOVE TO RN81 + SET UP. DRILL TO			Button							
				6m WITH 7" HAMMER & RSEM		7"	Button	USED						
				TO 4.00m WITH 9⅞ Roll c/bit		9⅞	Roll	USED	HAMMER BIT & SUB					
				LENGTH OF 8" 4.60m								1.75		
1440	6m	6m		BROWN STONE										3.55
				AND D/C					D/C	4½	5.72	2.68		
1500	12m	6m		BROWN & LIGHT BROWN STONE										14.28
				AND D/C					D/C	4½	6.01	13.49		
1510	18m	6m		LIGHT BROWN SANDY STONE (SEEPAGE)										20.29
				AND D/P					D/P	4½	4.58	14.07		
1530	23m	5m		LIGHT BROWN clay STONE										24.87
				AND D/P					D/P	4½	4.58	22.65		
1545	28m	5m		AS ABOVE : W/C ½ L/S 3,500 PPM										29.45
				AND D/P ZN69 - ZQ.29					D/P	4½	4.58	27.23		
1600	33m	5m		AS ABOVE										34.03
				PULL UP ZQ.33 - YV.71	½ L/S 3,500 PPM									

14702/69....

W. G. Murray, Government Printing Office, Canberra

NTA 1718

DATE 30/3/79 BORE No. RN12081 3NNW Driller: DARBY

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details
0730	33m	✓		COMM Drilling
				ADD D/P
0805	38m	5m		BROWN STONE
				ADD D/P
0820	43m	5m		AS ABOVE
				PULL OUT & CAST OFF FOR WATER
				THEN RUN IN & DRILL ON WITH 5½ HAMMER BIT
				KS-½ DB-431 5"WH" NEW
				6" CASING all BLANK 34421
				5.32 x SHOE
				6.28. 11.58 LAST SAMPLE BEFORE RUNNING CASING 3,500 RPM
				5.92. 17.50 ZR.79 - ZN.78 ½ 45
				5.70 23.20
				5.65 28.85
				6.21 35.06
				[redacted]
				6.40 41.46
				5.50 46.96 CUTOFF 3.50m TOTAL 43.46m

BIT DATA No.	Size	Type	Worn cond'n
	7"	BUTT	USED

STRING DATA Item	O.D.	Length	Prog. tally
			27.23
D/P	4½	4.58	31.81
D/P	4½	4.58	36.39

MUD DATA	
	34.03
	38 61
	43.19

NTA 1718

DATE 30/3/79 BORE No. RN 12081 3NNW Driller: DANNY

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA		
1200	43			RUN IN COLLARS & RODS & BLOWHOLE DRY.	39420	5½	BUT	HBW	HAMMER		BIT	1·30			
												36·39	-·45		43·19
1205				ADD D/P					D/P	4½	4·58	[illegible]	40·97		
1220	48m	5m		BROWN CLAY & STONE											47·77
				ADD D/P					D/P	4½	4·58	[illegible]	45·55		
1255	53m	5m		BROWN SANDY STONE											52·35
				ADD D/P					D/P	4½	4·58	[illegible]	50·13		
1315	58m	5m		AS ABOVE SOME CLAY				¼	4½	3,500 RPM		24·5-29·36			54·93
				ADD D/P					D/P	4½	4·58	[illegible]	54·71		
1340	63m	5m		AS ABOVE SOME GREY CLAY											67·51
				ADD D/P					D/P	4½	4·58	[illegible]	59·29		
1410	68m	5m		BROWN SANDY STONE INCREASE TO 1½/S						3,500 RPM		29·68-34·18			66·09
				ADD D/P					D/P	4½	4·58	[illegible]	[illegible]		
1425	73m	5m		GREY & BROWN STONE & CLAY								63·87			70·67
				ADD D/P					D/P	4½	4·58	[illegible]	68·65		
1445	78m	5m		AS ABOVE INCREASE TO 2½/S						3,900 RPM		34·72-39·10			76·25
				ADD D/P					D/P	4½	4·58	[illegible]	73·03		
1530	83m	5m		AS ABOVE INCREASE TO 4½/S						3,700 RPM					79·83
				ADD D/P					D/P	4½	4·58	[illegible]	77·61		
1550	88m	5m		GREY & BROWN STONE & CLAY											84·41
				MUD D/P					D/P	4½	4·58	[illegible]	82·19	KELLY	
1630	90m	2m		AS ABOVE							TOTAL	88·99			88·99
				PULL UP. [illegible]											

14702/69.... W. G. Murray, Government Printing Office, Canberra

NTA 1718

DATE 31/3/79 BORE No. RN 12081 3NNW Driller: Dordy

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA
0730				CHANGE OVER TO 5½ BLADE BIT + DRILL ON TO 100.00m									
0915	93	93		CLAY CRUMBLY CHAN RAISED ON PULL OUT & SPIKE									
				FINAL 2M.09.YH.35					3,700	6BN	44/3		
				SWL. 14.65m.									

14702/69....

W. G. Murray, Government Printing Office, Canberra

DEPARTMENT OF TRANSPORT & WORKS
WATER INVESTIGATION UNIT
GEOPHYSICAL BORE LOG

R N 12081 AREA AYERS ~~AYRES~~. ROCK. STATUS INVESTIGATION

MAP REFERENCE 5047 GRID CO ORDS : A.M.G. 990114

ELEVATION : S. W. L. : 14·65 M

CASING DETAILS : 43·46 M x 6 BLANK. CASING.

DRILLER : W.I.U./A.S. DATE COMMENCED : 29·3·79

DEPTH DRILLED : 88·99 M DATE COMPLETED : 30·3·79

RADIOMETRIC LOG DATA

SERVICE : W.I.U./A.S. LOG TYPE : GAMMA DATE : 2·4·79

RUN NO. : 1 SCALE : V : 1 : 100 H :

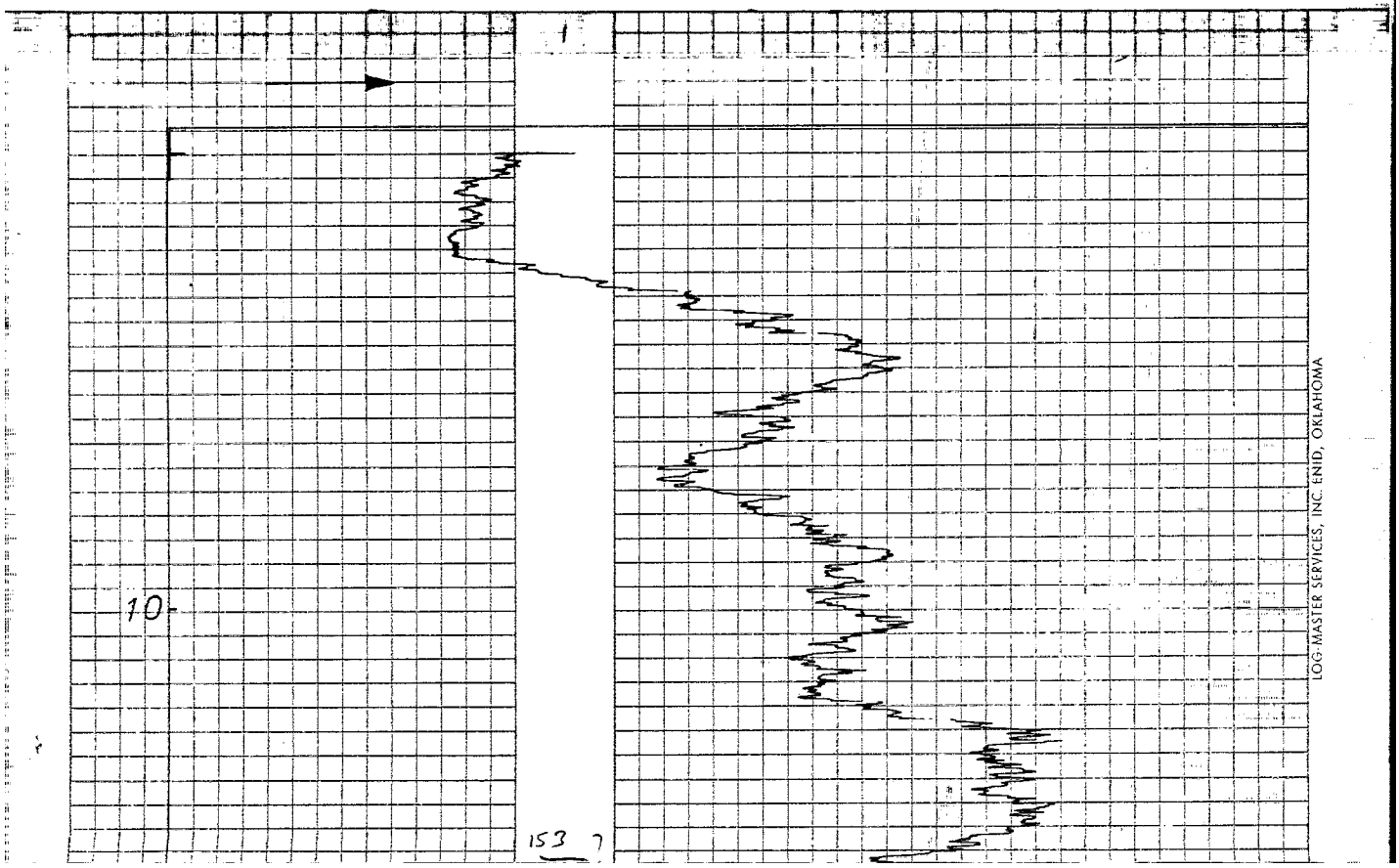
SENSITIVITY : RANGE : 4

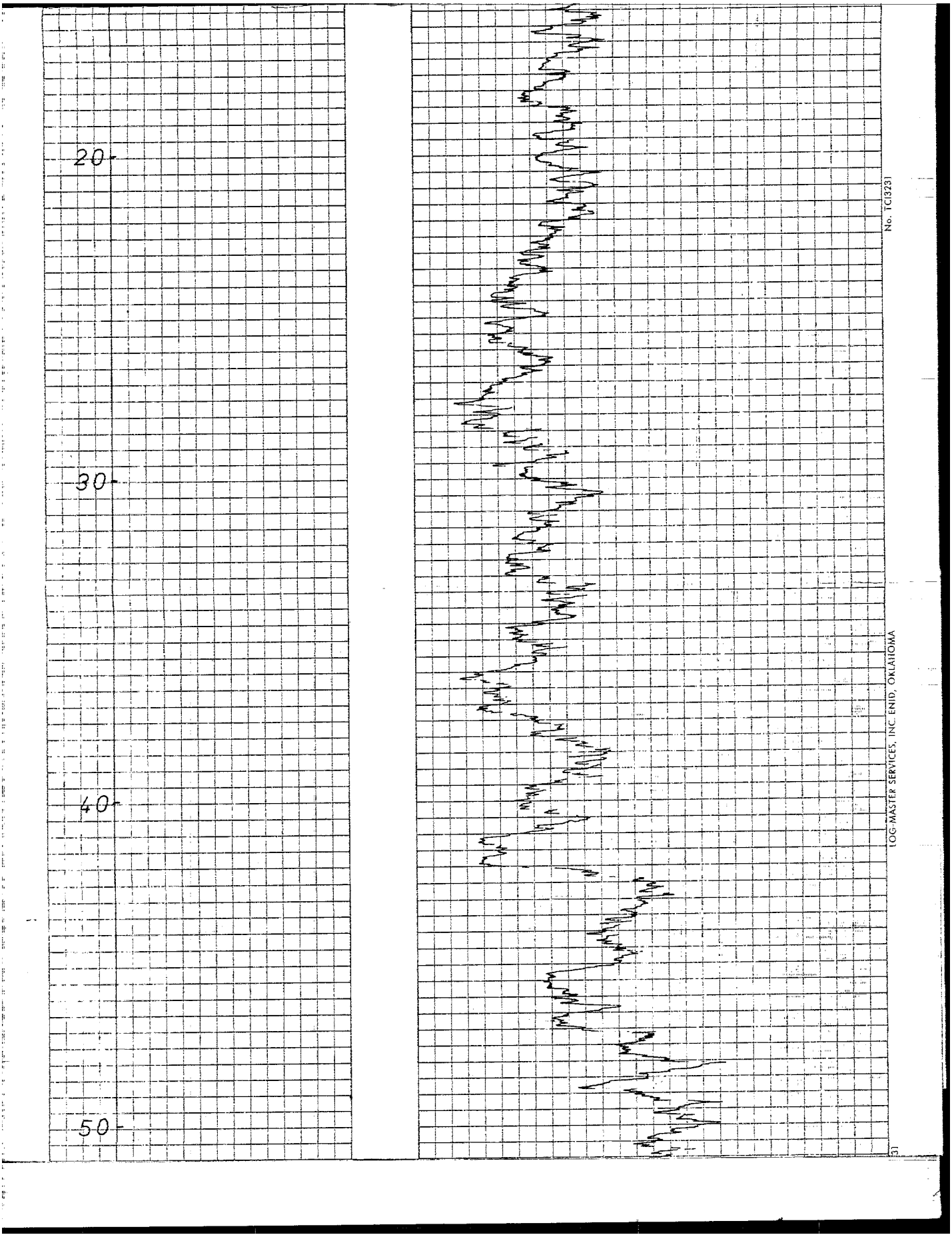
TIME CONSTANT : 4 SPEED : 12 M/ MIN :

1st READING : 1·10 M INSTRUMENT : LM 444 B

LAST READING : 84·2 M OBSERVER : R.P.

INTERVAL : 83·1 M

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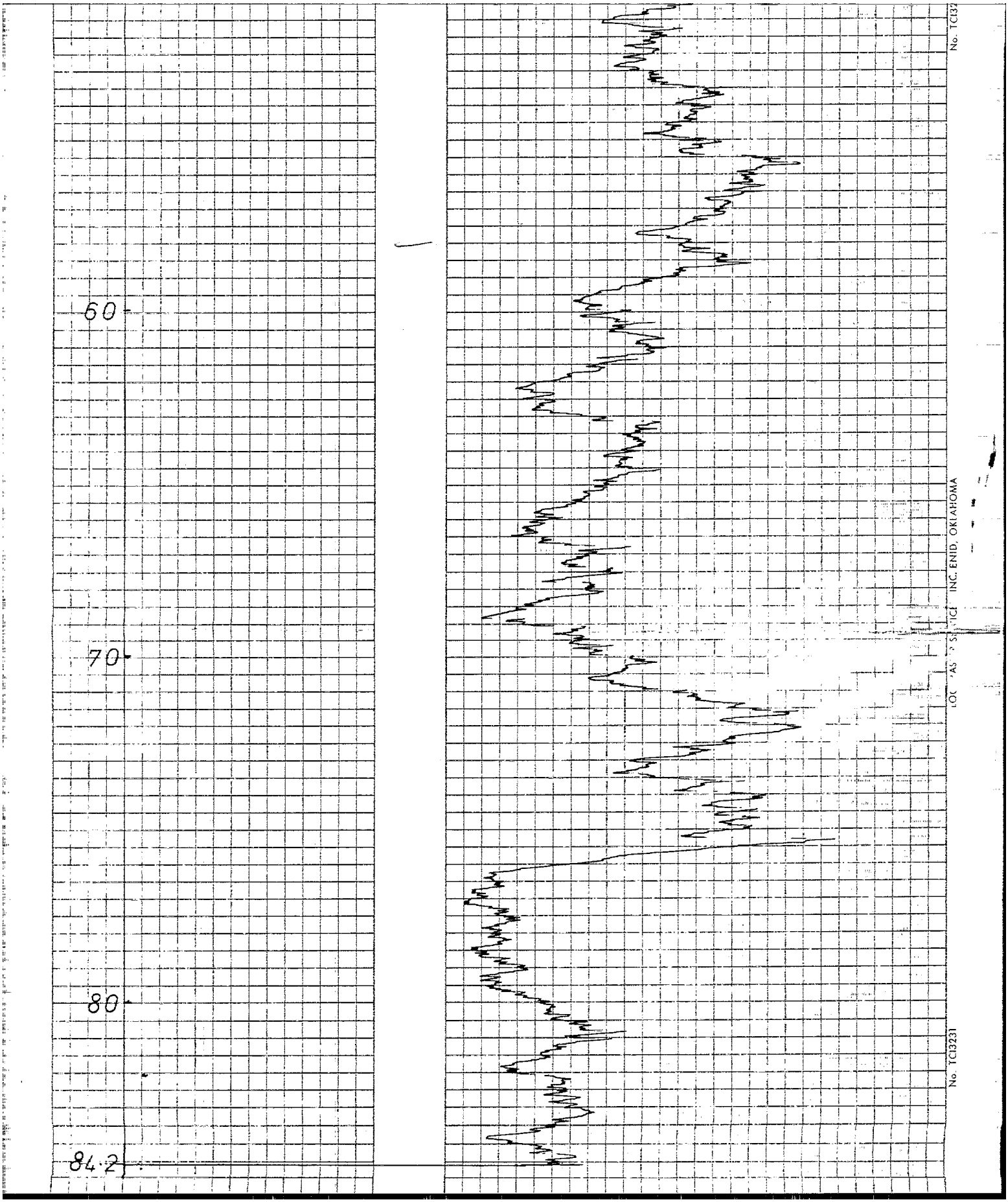
No. TCI3231
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA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No. TCI3231
INC. ENID, OKLAHOMA

DEPARTMENT OF TRANSPORT & WORKS
WATER INVESTIGATION UNIT
GEOPHYSICAL BORE LOG

R.N. 12081 AREA: AYERS. ROCK. STATUS: INVESTIGATION

MAP REFERENCE: 5047 GRID CO ORDS: A.M.G. 990114.

ELEVATION: S.W.L.: 14·65 M

CASING DETAILS: 43·46 Mx 6" BLANK. CASIN G.

DRILLER: W.I.U./A.S. DATE COMMENCED: 29·3·79

DEPTH DRILLED: 88·99 M DATE COMPLETED: 30·3·79

RADIOMETRIC LOG DATA

SERVICE: W.I.U./A.S. LOG TYPE: GAMMA DATE: 2·4·79

RUN NO.: 2 SCALE: V: 1 : 100 H:

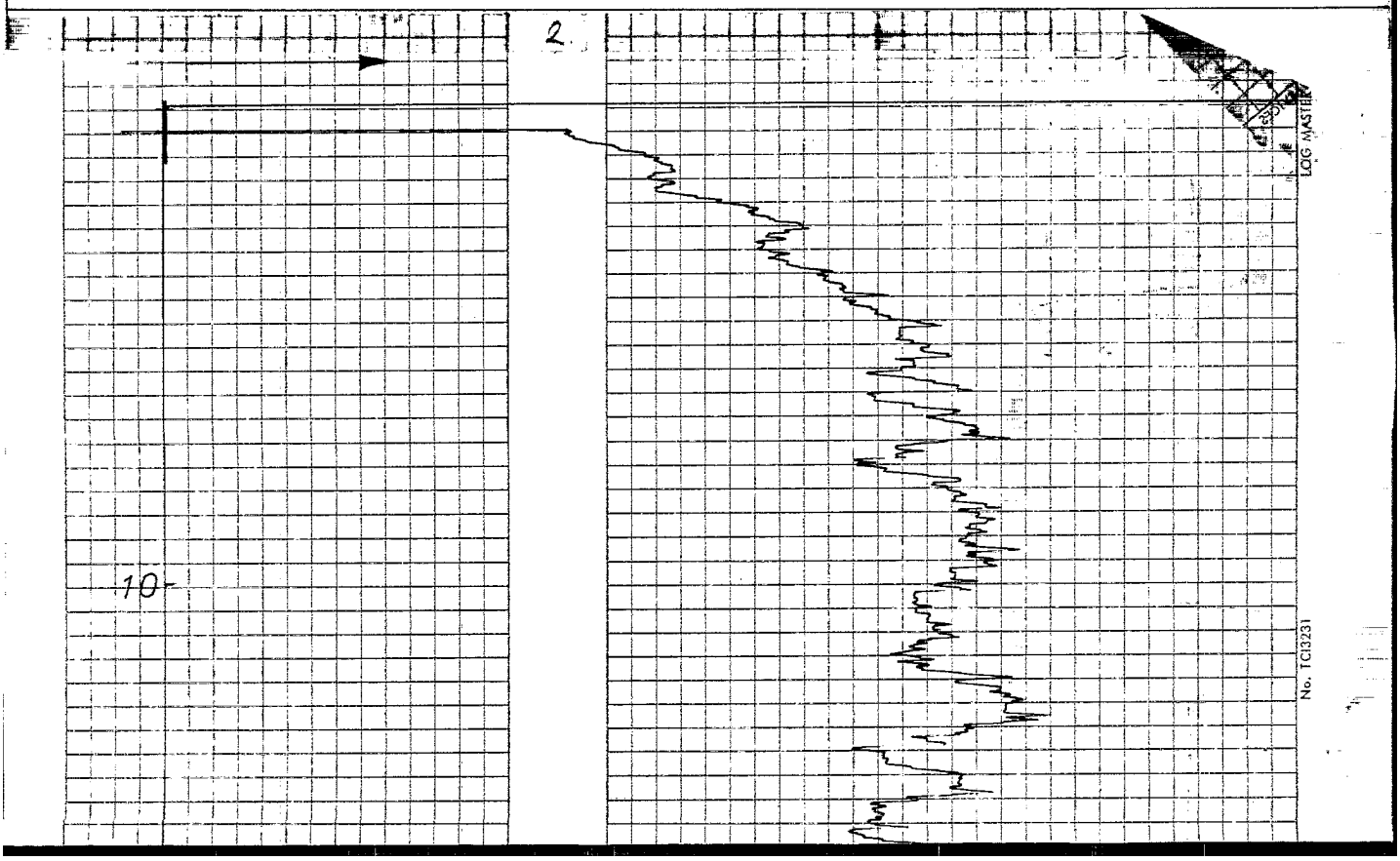
SENSITIVITY: RANGE: 4

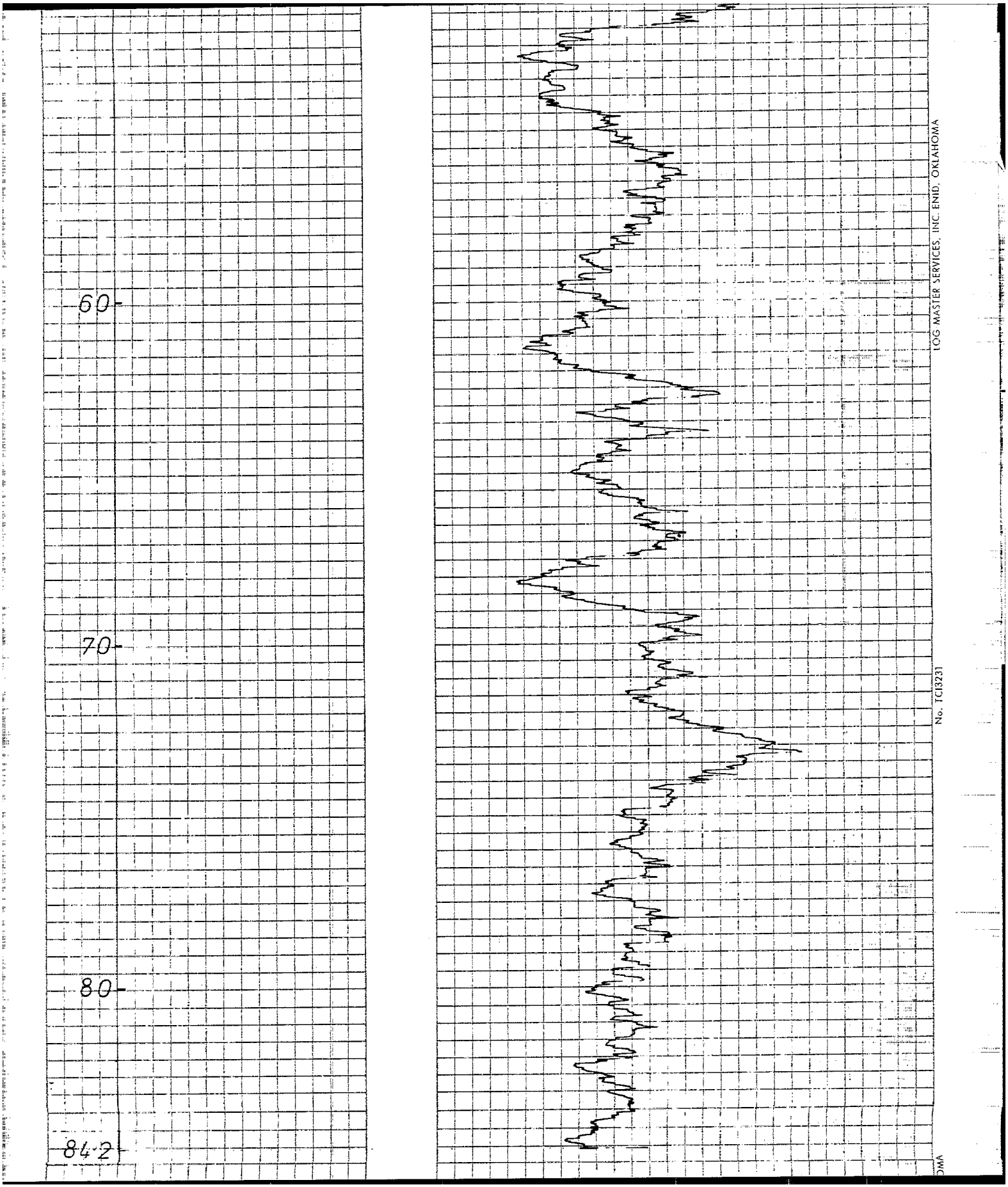
TIME CONSTANT: 4 SPEED: 18 M/ MIN:

1st READING: 84·2 M INSTRUMENT: LM 444 B

LAST READING: 1·10 M OBSERVER: R.P.

INTERVAL: 83·10 M

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LOG MASTER SERVICES, INC. ENID, OKLAHOMA
No. TCI3231

DEPARTMENT OF TRANSPORT & WORKS
WATER INVESTIGATION UNIT
GEOPHYSICAL BORE LOG

R.N.12081 AREA: AYERS. ROCK. STATUS: INVESTIGATION

MAP REFERENCE: 5047 GRID CO ORDS: A.M.G. 990114

ELEVATION: S.W.L.: 14·65 M

CASING DETAILS: 43·46 M × 6" BLANK. CASING.

DRILLER: W.I.U. / A.S. DATE COMMENCED: 29·3·79

DEPTH DRILLED: 88·99 M DATE COMPLETED: 30·3·79

RADIOMETRIC LOG DATA

SERVICE: W.I.U. / A.S. LOG TYPE: GAMMA DATE: 2·4·79

RUN NO.: 3 SCALE: V: 1:100 H:

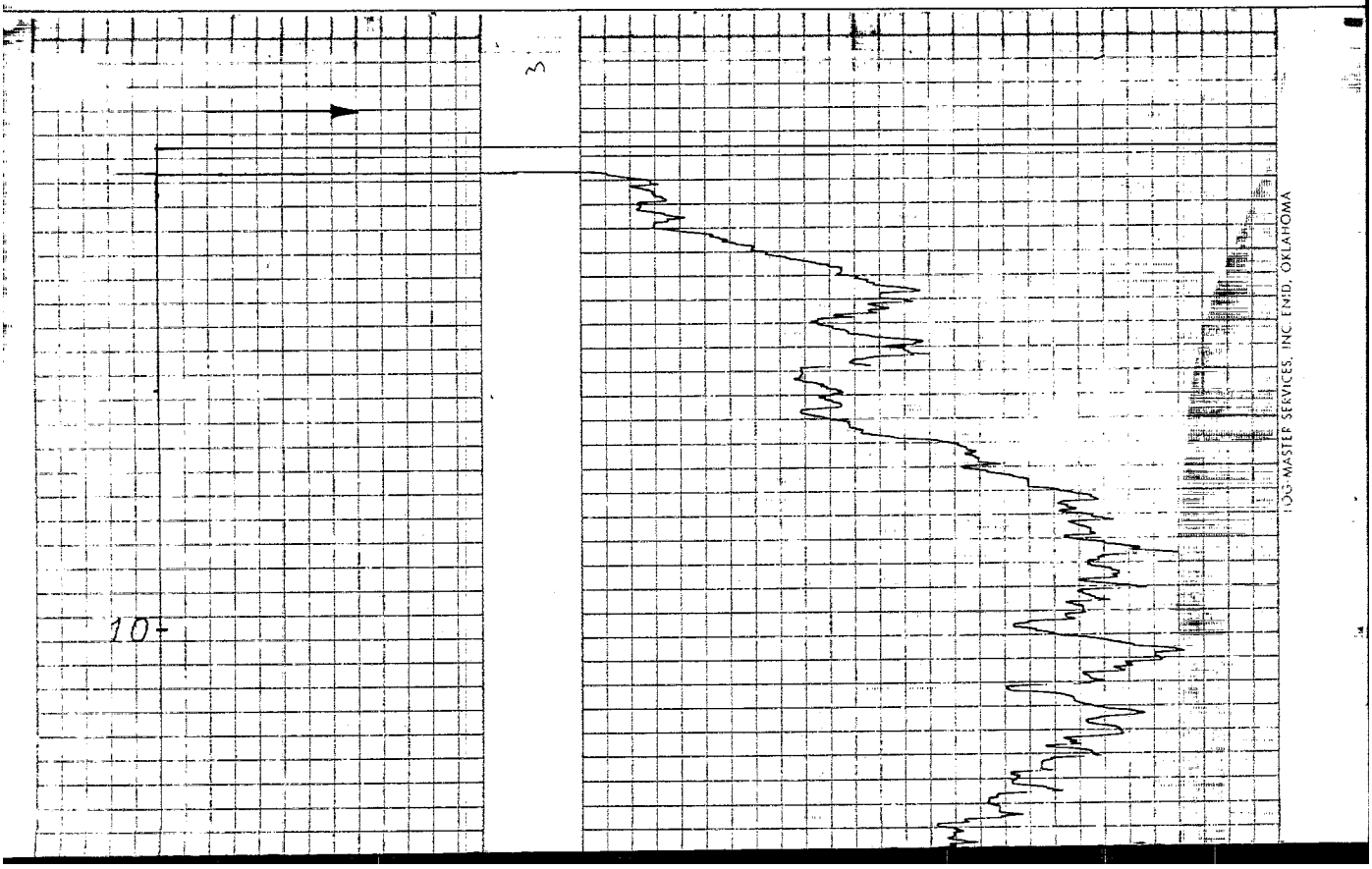
SENSITIVITY: RANGE: 4

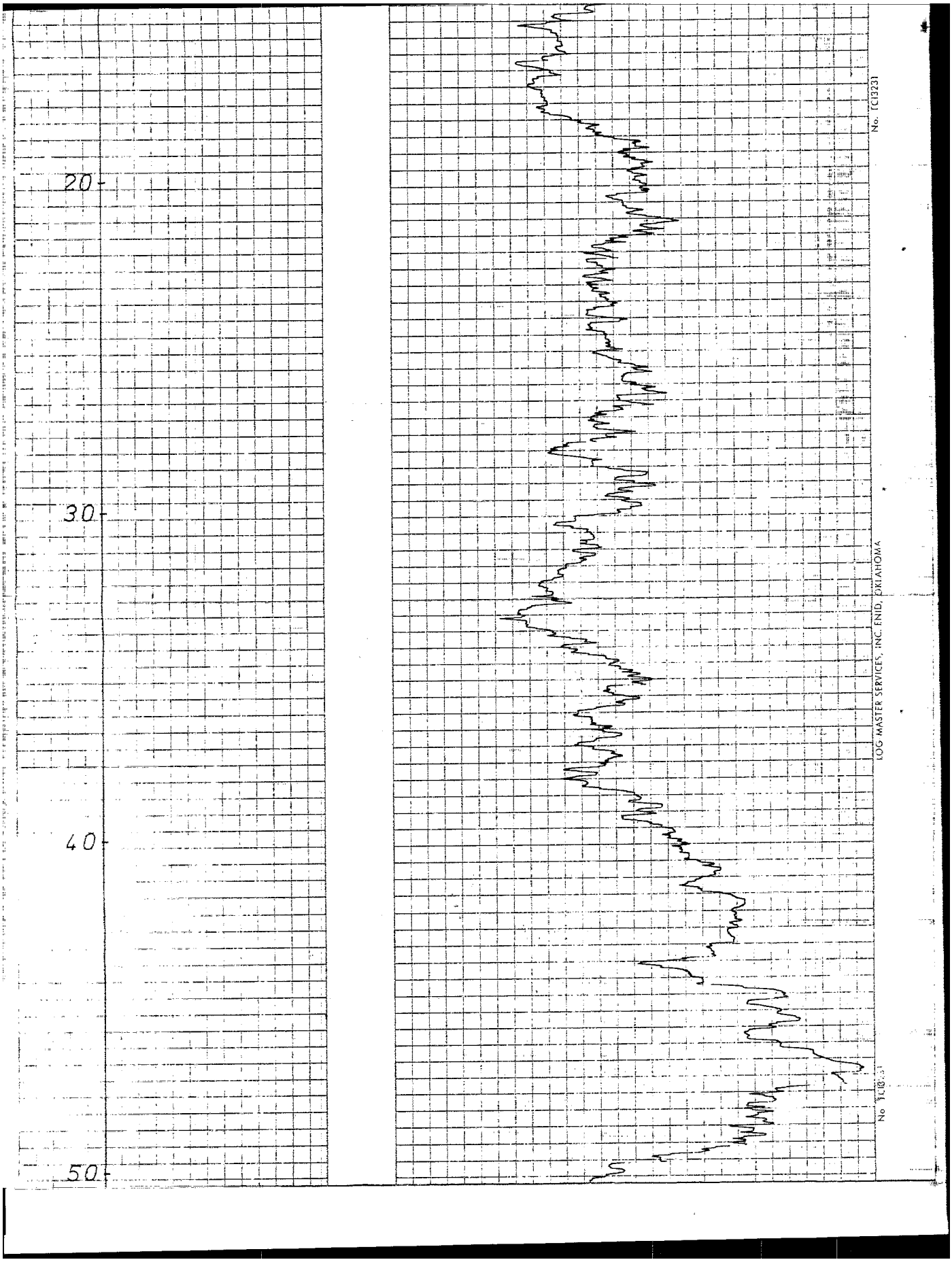
TIME CONSTANT: 4 SPEED: 13 M/ MIN:

1st READING: 84·2 M INSTRUMENT: LM 444 B

LAST READING: 1·20 M OBSERVER: R.P.

INTERVAL: 83·1 M

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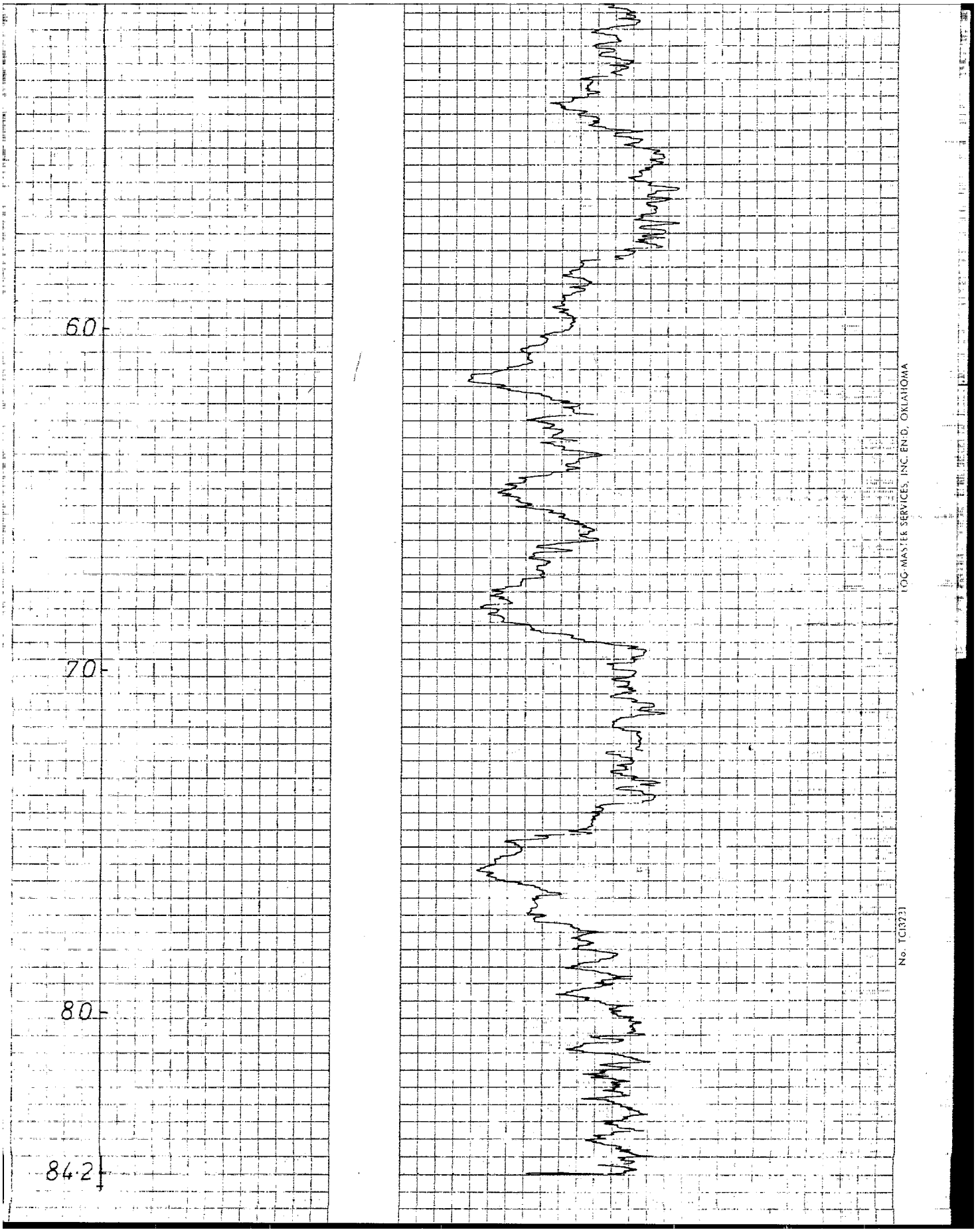
No. TCI3231
LOG MASTER SERVICES, INC. ENID, OKLAHOMA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84.2
LOG-MASTER SERVICES, INC. EN-D, OKLAHOMA
No. TC13231

Regulation 8

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance

FINAL STATEMENT OF BORE

RN012081

N.T.A. 181

IN. 2/289

RN. 12081

From	To	Description of Strata
0·00	6·00	BROWN STONE.
6·00	12·00	BROWN + LIGHT BROWN STONE
12·00	18·00	LIGHT BROWN + SANDY STONE
18·00	33·00	LIGHT BROWN CLAY + STONE
33·00	43·00	BROWN STONE.
43·00	48·00	BROWN CLAY + STONE.
48·00	68·00	BROWN SANDY STONE
68·00	90·00	GREY + BROWN STONE & CLAY FALLING IN

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE S SE E NW W SW of (b) ...(3 NNW)....

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - TOP WATER CASED OFF TO 43·46m. Drill TO 43·00m WITH 7" BUTT BIT. From 43·00m TO 86·00 5½ BUTT BIT. From 86·00 TO 89·00m 5½ BLADE BIT

Map No: ANG 5049

Grid Reference: 910 114

Samples of strata and water supplies ~~have been~~ * will be * left at the following trading place -

W.R.B. OFFICE A/S

A Bonney
Signature

* Strike out which does not apply.

For office use only -

Name of Bore - RN 12081 (3NNW)

Name of Property - AYERS Rock

Description of Property - N.P.

Name of Owner - N.T. P.W.

Name of Contractor - W.R.B

Name of Driller - R Bonney

Date of Commencement - 29/3/79

Date of Completion - 30/3/79

Total Depth - 88·99m

Particulars of Casing - 43·46 x 6" Blank casing

Particulars of Perforations or Screens - Nil

Water	1st Supply	2nd Supply	3rd Supply
Struck at	18m SEEPAGE	W/L 28·00m	43·00m
~~Standing~~ Water Level	68·00m 3,500 PPM 1 L/S	78·00m 3900 PPM 2 L/S	83·00m 3700 PPM 4 L/S
Pumping Supply: ~~G.P.M.~~ L/S		½ L/S	½ L/S
~~Duration of Pump Test~~	S.W.L	64-65m	
Water Level During Test			
Quality: Good, Fair, Bad		CONDUCT 3,500 PPM	CONDUCT 3,500 PPM

2/289

WATER ANALYSIS

Department of Transport & Works
Water Division, Darwin N.T.

WR 4/1A

Laboratory Register No.	Bottle No.	Time of sampling	Date of sampling
84/85/1759	PQ73	1630	17/4/85
Date received in Laboratory: 3/5/85			

LOCATION AND DETAILS
[redacted]ARS ROCK 6" BORE RN 12081 DEPTH 28m DISCH 0.5LPS WRA6019

RSP1259

Proposed water use:- Domestic, Stock, Irrigation, other (specify)

ANALYSIS — PHYSICAL

☐	pH	7.7	☐ Colour (Hazen units)
☐	Specific conductance (microsiemens/cm at 25° C)	3710	☐ Turbidity (NTU's)
☒	Total dissolved solids (mg/L - by evaporation at 180° C)	2470	☐ Suspended solids (mg/L)

ANALYSIS — CHEMICAL (mg/L)

☐	Sodium, Na	492	☒ Chloride, Cl 690
☐	Potassium, K	57	☒ Sulphate, SO_4 672
☐	Calcium, Ca	166	☒ Nitrate, NO_3 55
☐	Magnesium, Mg	87	☐ Bicarbonate, HCO_3 243
☒	Total Hardness (as $CaCO_3$)	772	☐ Carbonate, CO_3
☐	Total Alkalinity (as $CaCO_3$)	199	☐ Fluoride, F 0.8
☐	Iron, (total) Fe	0.3	☐ Orthosphosphate, PO_4
☐	Silica, SiO_2	84	☒ NaCl (calc. from chloride) 1142

ANALYSIS — ADDITIONAL (mg/L)

☐	Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐	Manganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd
☐		☐	☐

THE SAMPLE AS ANALYSED ~~COMPLIES~~/DOES NOT COMPLY WITH NORTHERN TERRITORY DRINKING WATER STANDARDS AS RECOMMENDED BY THE NORTHERN TERRITORY DEPARTMENT OF HEALTH.

This Laboratory is registered by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its terms of registration. This document shall not be reproduced except in full.

Analysed By: J. COOK Date 15 / 5 85

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

4278.845 G. L. DUFFIELD, Government Printer of the Northern Territory

WATER ANALYSIS

2/289

Laboratory Register No. 79/0573

Date received in Laboratory 9.5.79

WR 4/1

Bottle No. YK 35 | Time of sampling (hrs) 0915 | Date of sampling 31.3.79

LOCATION AND DETAILS

[redacted]s Rock - RN/12081 Depth: 93 m. Disch: 4.0 lps. Airlift RSP. 88

Sampler: Darby

ANALYSIS - PHYSICAL

pH	7.9	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3770	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2580	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2558	Total alkalinity (as $CaCO_3$)	179
Sodium chloride (calc from chloride)	1195	Total hardness (as $CaCO_3$)	784
Chloride, Cl	725	Sodium, Na	480
Sulphate, SO_4	670	Patassium, K	75
Nitrate NO_3	62	Calcium, Ca	166
Bicarbonate, HCO_3	218	Magnesium, Mg	90
Carbonate, CO_3		Iron (total), Fe	1.2
Fluoride, F	1.5	Silica, SiO_2	70

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 30 / 5 / 79

REMARKS:

The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water as the total dissolved solids exceed the maximum permissible level. suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78

C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER ANALYSIS

Department of Transport & Works
Water Division, Darwin NT

[redacted]

WR 4/1

Laboratory Register No: 80/0065
Date received in Laboratory: 10.1.80
Bottle No: ZN 88
Time of Sampling: 1515
Date of Sampling: 14.12.79

LOCATION AND DETAILS
Ayers Rock - RN 12081 - Disch: 1.2 lps Tap RSP. 88

2/289

Proposed water use:-Domestic, Stock, Irrigation, other (specify)

ANALYSIS – PHYSICAL

☐ pH	7.5	☐ Colour (Hazen units)	
☐ Specific conductance (microsiemens/cm at 25° C)	3760	☐ Turbidity (NTU's)	
☒ Total dissolved solids (mg/l - by evaporation at 180 ° C)	2520	☐ Suspended solids (mg /l)	

ANALYSIS – CHEMICAL (mg/l)

☐ Sodium, Na	477	☒ Chloride, Cl	711
☐ Potassium, K	79	☒ Sulphate, SO_4	665
☐ Calcium, Ca	188	☒ Nitrate, NO_3	59
☐ Magnesium, Mg	92	☐ Bicarbonate, HCO_3	238
☒ Total Hardness (as $CaCO_3$)	847	☐ Carbonate, CO_3	
☐ Total Alkalinity (as $CaCO_3$)	195	☐ Fluoride, F	1.5
☐ Iron, (total) Fe	0.3	☐ Orthophosphate, PO_4	
☐ Silica, SiO_2	84	☐ NaCl (calc. from chloride)	1172

ANALYSIS – ADDITIONAL (mg/1)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Maganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd

Analysed By: H. HENKEL Date 17/ 1 / 80

REMARKS

The sample as analysed is considered suitable for:–

Drinking water – ~~YES~~/NO
Irrigation – YES/NO
Stock watering – YES/NO
Other (specify) – YES/NO

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

Note:– Advice and Water quality information can be obtained by contacting the Senior Engineer Water Quality, Darwin Phone 89 6072.

15303/79 A.B. CAUDELL, Government Printer of the Northern Territory.

WATER ANALYSIS

Laboratory Register No. 79/0589

Date received in Laboratory 24.4.79

WR 4/1

Bottle No.	Time of sampling (hrs)	Date of sampling
YZ 44	1340	16.4.79

LOCATION AND DETAILS

Yulara Village Depth: 63 m. Disch: 1.0 lps. Airlift RSP. 1259

RN/12163 Sampler: R. Darby

ANALYSIS - PHYSICAL

pH	8.3	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	4840	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	3160	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	3259	Total alkalinity (as $CaCO_3$)	180
Sodium chloride (calc from chloride)	1549	Total hardness (as $CaCO_3$)	1082
Chloride, Cl	940	Sodium, Na	632
Sulphate, SO_4	935	Patassium, K	81
Nitrate NO_3	42	Calcium, Ca	244
Bicarbonate, HCO_3	220	Magnesium, Mg	115
Carbonate, CO_3		Iron (total), Fe	not suitable for determination
Fluoride, F	2.0	Silica, SiO_2	48

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 31/5/79

REMARKS: The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International standards for drinking water as the total dissolved solids exceed the maximum permissible level.

Suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER CONDUCTIVITY ANALYSIS

BORE: REGISTERED NUMBER: 12163

LOCATION: AYERS ROCK TESTED BY: R. BOEYEN

DATE TESTED: 10-5-79

BOTTLE NO.	DATE	TIME	DEPTH	DISCHARGE	SAMPLER		CONDUCTIVITY
ZN 97	23-4-79	1610	23 M	2.0 l/sec	R. DARBY		4,800
ZR 40	"	1645	33 M	2.0 "	"		4,300
[illegible]S 46	24-4-79	1245	48 M	1.0 "	"		4,900
YZ 29	"	1340	63 M	1.0 "	"		4,800

YULARA VILLAGE WATER RESOURCES 60.6D

RN 12163
IN 2/296
5047 Mt Olga

Depth (m)			Description
0	-	3	SAND. Dark reddish brown sand with silt.
3	-	12	SAND. Light brown silty sand.
12	-	38	SAND & CLAY. Reddish brown sand with clay.
38	-	63	SANDSTONE. Poorly sorted light grey sub angular sandstone, minor specks of mica, becoming coarser grained and more friable with depth.

SUMMARY

0	-	3	Sand	
3	-	12	Sand	Tertiary
12	-	38	Sand and clay	Tertiary
38	-	63	Sandstone	

MAJOR AQUIFERS

23m	2.0 ls^{-1}	Sand and clay	- Tertiary
48m	1.0 ls^{-1}	Sandstone	

Geoff Knott

GEOFF KNOTT
HYDROGEOLOGIST

October 1979

NTA 1718

DATE 24/4/79 BORE No. RN 12163 (3N) Driller: DARBY

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA
..	33m												
1020	/	/		CONT DRILLING									
				ADD D/P					D/P	4½	4.58	30.06	
1045	39m	85m		BROWN clay + STONE									
				ADD D/P					D/P	4½	4.58	34.64	
				SANDY CHANGE TO 5½ BLD		5½	BLD	USED					
1220	43m	5m		GREY SAND FOAMING IN									
				ADD D/P & FOAM					D/P	4½	4.58	39.22	
1245	48m	5m		GREY SAND FOAMING IN W/L W/S	1	6/8	4,000	USED	RM		26.68	78.46	
				ADD D/P					D/P	4½	4.58	43.80	
1310	53m	5m		GREY SAND & GREEN clay FOAMING IN									
				ADD D/P					D/P	4½	4.58	48.38	
1325	58m	5m		GREY SAND & BROWN clay FOAMING IN									
				ADD D/P					D/P	4½	4.58	52.96	53.86
1340	63m	5m		GREY SAND FOAMING IN									
				PULL OUT & RUN 2" GWP FINAL SAMPLE					42.44		43.29	5,000	RPM
									16/8				
				RUN 2" W/P TO 30.00m SAND									
				BLOW BACK TO BOTTOM COOL 6" CASING									
				SWL 16.20									

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NTA 1718

DATE 23/4/74 **BORE No.** RN12163 (3N) Driller: Darby

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA
1115	/	/		SETUP Rig + Drill TO 6m WITH									
				Hammer Bit, Pull out + Drill		7"	Button	USED	Hammer	Bit	+ SUB		
				To 7.60m WITH Roll bit		9 7/8	Roll	USED				1.75	
1125	6m	6m		RED SAND + LIGHT BROWN STONE									
				COMP U/S									
1520	/	/		mm D/C					D/C	4½	5.73		
1530	12m	6m		BROWN STONE									
				mm D/C					D/C	4½	6.01		11.74
1555	18m	6m		AS ABOVE W/C ¼ U/S									
				mm D/P					D/P	4½	4.58	16.32	
1610	23m	5m		AS ABOVE INCREASE TO 2 U/S		4,500	RPM		D/P	4½	4.58	20.90	
				mm D/P								ZN·97 - 7Z·01	
1625	26m	5m		BROWN SANDY STONE					D/P	4½	4.58	25.48	
				mm D/P									
1644	33m	5m		BROWN clay									
				PULL OUT + RIG DOWN TO RUN 6" CASE		LAST	SAMPLE	BETWEEN	CASING			ZP·24 - ZR·40	3,500 RPM
				24/4/74									
0400				LOAD + UNLOAD CASING BREAK HAMMER + CLEAN									
				RUN CASING									
				6" = 6m									
				6.70									
				6.80									
				5.85									
				5.27									
				6.65									
				5.70 — 36.97 CUT OFF 3.00m TOTAL 33.97m									

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Regulation 8

RN012163

N.T.A. 167

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance

IN 2/296
RN 12163

FINAL STATEMENT OF BORE

From	To	Description of Strata
0·00	6·00	RED SAND & LIGHT BROWN STONE
7·00	23·00	BROWN STONE
23·00	28·00	BROWN SANDY STONE
28·00	33·00	BROWN CLAY
33·00	38·00	BROWN CLAY & STONE.
38·00	43·00	GREY SAND & CAVING
43·00	48·00	AS ABOVE.
48·00	53·00	GREY SAND & GREEN CLAY
53·00	58·00	GREY SAND & BROWN CLAY
58·00	63·00	GREY SAND CAVING

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE S SE E NW W SW of (b) ...(3N)...

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - Drilled to 33.00 with 7" Hammer Bit. 33.00m to 63.00 5½ Blade Bit

Map No: 5047 AMG
Grid Reference: 000120.

Samples of strata and water supplies
• ~~have been~~ *
will be *
left at the following trading place -

..W...R.B...Office...A/S...

.....R. Darby...
Signature

* Strike out which does not apply.

For office use only -

Name of Bore - RN12163 (3N) Homestead

Name of Property - Ayers Rock

Description of Property - N.P.

Name of Owner - NTRB

Name of Contractor - WRB

Name of Driller - R. Darby

Date of Commencement - 23/4/79

Date of Completion - 24/4/79

Total Depth - 63·00m

Particulars of Casing - Cased over top water 33·97m x 6" Blank casing to 34·00m

Particulars of Perforations or Screens - Bottom length of ~~casing~~ 33·00m x 2" GWP

Water	1st Supply	2nd Supply	3rd Supply
Struck at	18·00	23·00	46·00m
Standing Water Level			14·20m
Pumping Supply: ~~G.P.H.~~ L/S	¼ L/S	2 L/S	1 L/S
Duration of Pump Test			
Water Level During Test			4700 PPM
Quality: Good, Fair, Bad	4,500 PPM	4,500 PPM	5,000 PPM

WATER ANALYSIS

		Laboratory Register No.	79/0574
		Date received in Laboratory	9.5.79
WR 4/1	Bottle No. YP 92	Time of sampling (hrs) 1600	Date of sampling 2.4.79

LOCATION AND DETAILS
Ayers Rock - RN/12082 Depth: 48 m. Disch: 3 lps. Airlift RSP. 88

Sampler: Darby

ANALYSIS - PHYSICAL

pH	7.7	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	4900	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	3340	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	3335	Total alkalinity (as $CaCO_3$)	178
Sodium chloride (calc from chloride)	1551	Total hardness (as $CaCO_3$)	1075
Chloride, Cl	941	Sodium, Na	650
Sulphate, SO_4	1000	Patassium, K	85
Nitrate NO_3	47	Calcium, Ca	248
Bicarbonate, HCO_3	217	Magnesium, Mg	111
Carbonate, CO_3		Iron (total), Fe	20
Fluoride, F	2.0	Silica, SiO_2	40

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 30 / 5 / 79

REMARKS: The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water as the total dissolved solids exceed the maximum permissible level. Suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

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WATER CONDUCTIVITY ANALYSIS.

BORE: REGISTERED NUMBER: 12082

LOCATION: Ayers Rock

DATE TESTED: 3-5-79 TESTED BY: R Boeyen

BOTTLE No.	DATE	TIME	DEPTH	DISCHARGE	SAMPLER	CONDUCTIVITY
YX 16	2-4-79	0915	18M	1.0 l/sec	R Datey	4800
ZD 91	"	0950	28M	2.0 l/sec	"	4800
ZE 62	"	1010	33M	3.0 l/sec	"	4900
ZD 43	"	1600	48M	2.0 l/sec	"	5000

YULARA VILLAGE WATER RESOURCES 60.6D

RN 12082
IN 2/290
5047 Mt Olga

Depth (m)			Description
0	-	9	CALCRETE, CALCAREOUS SANDSTONE
9	-	12	SAND. Light brown silty sand.
12	-	38	CLAY & SAND. Brown clay with sand.
38	-	48	SANDSTONE. Light grey micaceous sandstone, minor clay.
48	-	53	SANDSTONE. White clean poorly sorted sub angular sandstone.

SUMMARY

0	-	9	Calcareous Sandstone	Tertiary
9	-	12	Sand	
12	-	38	Clay and Sand	
38	-	53	Sandstone	

MAJOR AQUIFER

18m	1.0 ls^{-1}	Clay and Sand (Tertiary)
28m	1.0 ls^{-1}	
48m	0.5 ls^{-1}	Sandstone

Geoff Knott

GEOFF KNOTT
HYDROGEOLOGIST

October 1979

NTA 1718

DATE 31/3/79 **BORE No.** RN 12082 (3N) **Driller:** DARBY

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA		
1200	/	/		MOVE FROM 12081 TO 12082 BOGGED											
				& SET UP DRILL TO 6M WITH											
				7 3/8 BLADE BIT. REAM OUT TO 5.80m		7 3/8	BLD	0560	BLD BIT & SUB						
				WITH 9 7/8 ROLL BIT & RUN 8" SURF							.90				
				CASING.	*										
	6m	6m		HARD BROWN STONE.											
				(2/4/79)											
0730	6m	/		GREASE RIG ETC.	#				HAMMER BIT & SUB						
				COMM DRILLING								1.75			
0800				ADD D/C					D/C	4½	5.73	7.48			
0815	12m	6m		LIGHT BROWN STONE											
				ADD D/C					D/C	4½	6.01	13.49			
0915	18m	6m		AS ABOVE W/C 1L/S 4,500 PPM 14.60–18.16											
				ADD D/P					D/P	4½	4.58	18.07			
0930	23m	5m		BROWN STONE											
				ADD D/P					D/P	4½	4.58	22.65			
0950	28M	5m		WHITE & BROWN SANDY STONE INCREASE TO 2L/S 4,200 20.91-40.95											
				ADD D/P					D/P	4½	4.58	27.23			
1010	33m	5m		BROWN CLAY & STONE											
				PULL UP & PREPARE TO RUN 6" CASING											
				LAST SAMPLE TAKEN BEFORE RUNNING 6" CASING 4,200 PPM @ 2L/S 25.62-24.57											

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NTA 1718

DATE 2/4/74 BORE No. RN [redacted] 12082 (3N) Driller: DARBY

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA
1130	33	/		6" CASING									
				6.23 x SHOE									
				5.84									
				5.67									
				5.55									
				5.67									
				5.75 → 34.51 CUT OFF 1.00m	[redacted]								
1230	33m	/		RUN COLLARS & BOOT & CHANGE TO								26.11	
				5½ BLADE BIT		5½	BLD	USED	5½ BLADE BIT			US 013	
[redacted]30	/	/		[redacted]								.64	
1450	/	/		ADD D/P					D/P	4½	4.58	30.69	
1330	38m	5m		BROWN & GREY CLAY									
				PULL OUT & ADD 4.70m 6" CASING	TOTAL CASING IN HOLE 37.29m								
[redacted]													
1400	/	/		CONT DRILLING ADD D/P					D/P	4½	4.58		
1500	43m	5m		GARNISH & LIGHT BROWN CLAY									
				ADD D/P					D/P	4½	4.58	35.27	
1600	48m	5m		GREY SAND & GARNISH CLAY W/L ½ L/S 3,400					PUMP			20.43 - 4 P.92	
				ADD D/P					D/P	4½	4.58	39.85	
1645	53m	5m		LIGHT BROWN STONES HARD, WHITE & BROWN CLAY									
				PULL UP									

14702/69....

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NTA 1718

DATE 3/4/79 BORE No. RN 12082 (3N) Driller: DAN J

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details
6/30	53	✓		Grease Rig ect.
				Run in Rod's.
				Bit Blocks Pull out + clean
				Bit caught on Bottom of casing
				Mark casing 4.73m
				6.25 cut off 3.00m Total 46.19 Depth of Hole 50.44
				Bottom of casing 4.00m above Bottom of Hole.
				6" casing still in Hole.
				23.09 ↑ Bottom of casing 4.00m from Bottom of Hole. Top of casing 20.10m
				7/4/79
				Pull Back over 12082 risers up
				+ Run by Rod's + Kelly to fish 6" casing

BIT DATA No.	Size	Type	Worn cond'n

STRING DATA Item	O.D.	Length	Prog. tally
			39.85

MUD DATA		

14702/68....

W. G. Murray, Government Printing Office, Canberra

DEPARTMENT OF TRANSPORT & WORKS

WATER INVESTIGATION UNIT

GEOPHYSICAL BORE LOG

R N : 12082 AREA : AYERS ROCK STATUS : INVESTIGATION

MAP REFERENCE : A M G 5047 GRID CO ORDS : 000 120

ELEVATION :

S. W. L. :

CASING DETAILS : 23·09m x 6"

DRILLER : W. I. U.

DATE COMMENCED : 31·3·79

DEPTH DRILLED : 53·0m

DATE COMPLETED : 3·4·79

RADIOMETRIC LOG DATA

SERVICE : W. I. U.

LOG TYPE : GAMMA RAY

DATE : 7·6·79

RUN NO : 2

SCALE V : 1 = 200 H :

SENSITIVITY :

RANGE 10

TIME CONSTANT : 4 second

SPEED : 6·5 M/MIN

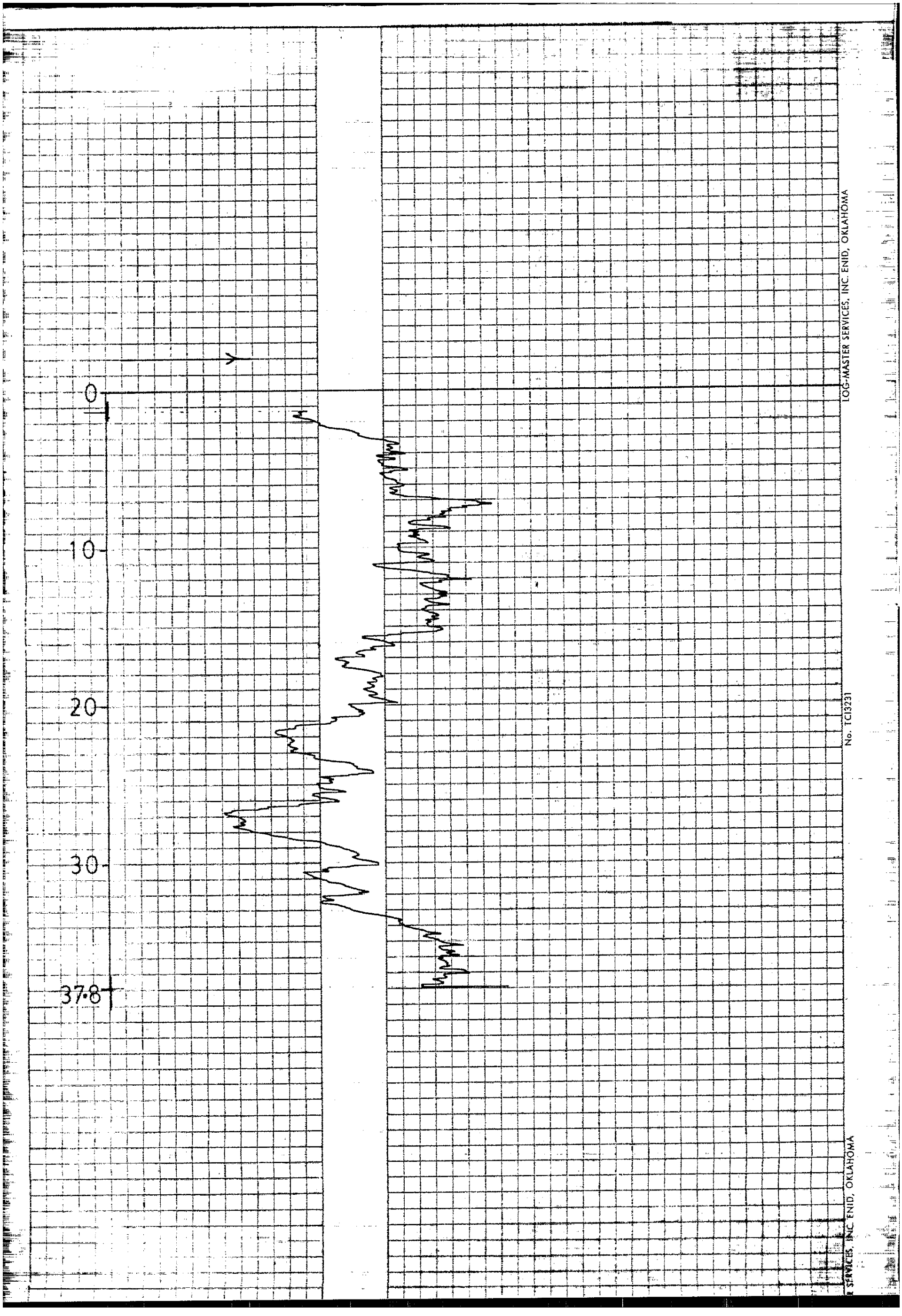
1st READING : 37·8 m

INSTRUMENT : LM 444 B LMG 15

LAST READING : 1·2 m

OBSERVER : R. P.

INTERVAL : 36·6 m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37.8
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
No. TCI3231
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA

DEPARTMENT OF TRANSPORT & WORKS

WATER INVESTIGATION UNIT

GEOPHYSICAL BORE LOG

W.I. 12082 AREA: GAMMA RAY

MAP REFERENCE A M G 5047

ELEVATION

CASING DETAILS: 23·09 m x 6"

DRILLER W. I. U.

DEPTH DRILLED: 53·0 m

STATUS: INVESTIGATION

GRID CO ORDS: 000 120

S W L:

DATE COMMENCED: 31·3·79

DATE COMPLETED: 3·4·79

RADIOMETRIC LOG DATA

SERVICE: W. I. U.

RUN NO: 1

SENSITIVITY:

TIME CONSTANT: 4 second

1st READING: 37·8 m

LAST READING: 1·2 m

INTERVAL: 36·6 m

LOG TYPE: GAMMA RAY

DATE: 7·6·79

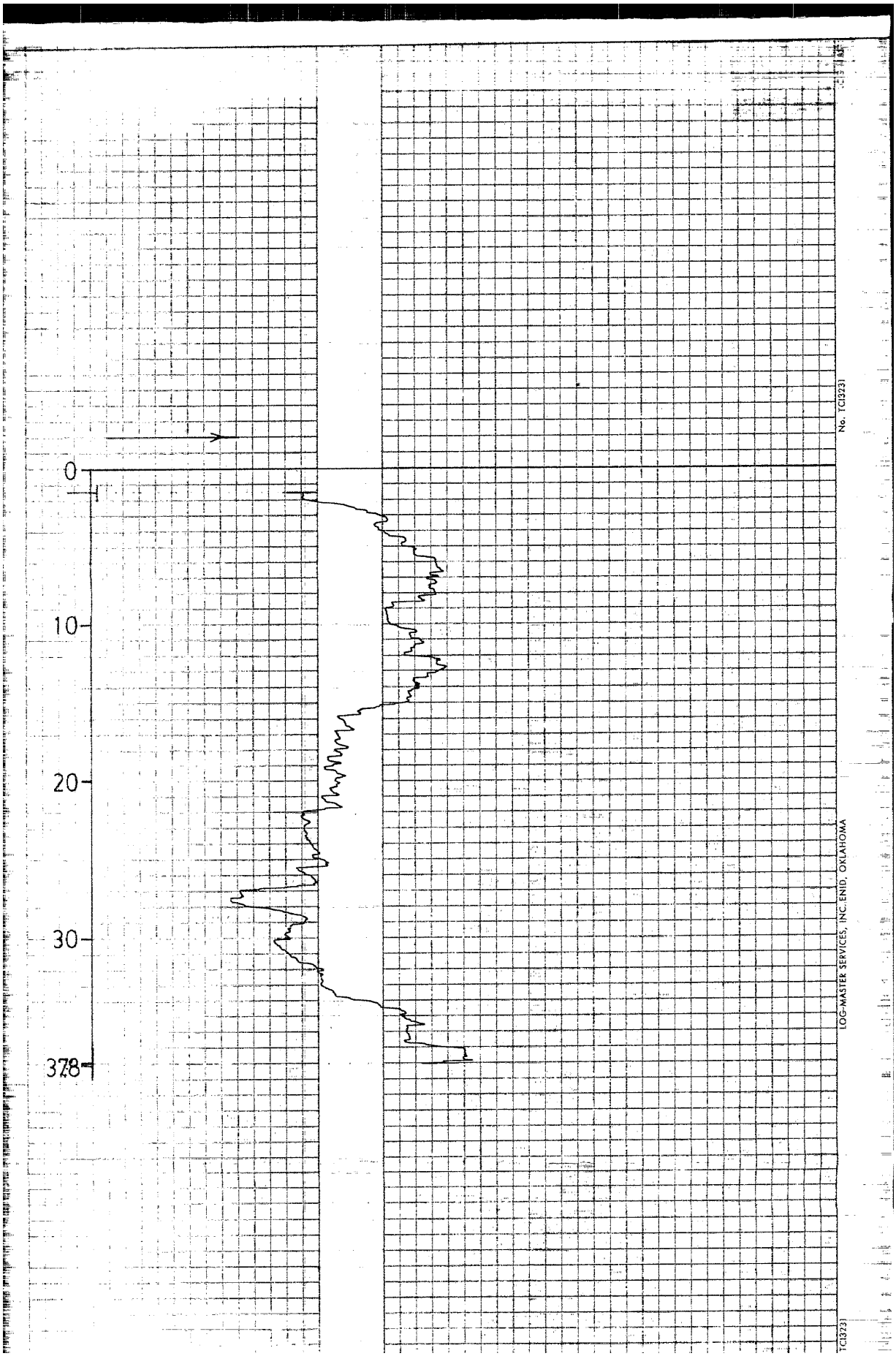
SCALE: V 1 = 200 H:

RANGE: 10

SPEED: 8 M/MIN

INSTRUMENT: LM444 B LMG 15

OBSERVER: R. P.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No. TCI3231
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
TCI3231

DEPARTMENT OF TRANSPORT & WORKS

WATER INVESTIGATION UNIT

GEOPHYSICAL BORE LOG

RN 12082 AREA AYERS ROCK STATUS: INVESTIGATION

REFERENCE: A M G 5047 GRID CO ORDS: 000 120

ELEVATION: S.W.L.:

CASING DETAILS: 23·09m x 6" at bottom

DRILLER: W. I. U. DATE COMMENCED: 31·3·79

DEPTH DRILLED: 53·0m DATE COMPLETED: 3·4·79

RADIOMETRIC LOG DATA

SERVICE: W. I. U. LOG TYPE: GAMMA RAY DATE: 7·6·79

RUN NO: 4 SCALE V 1 = 100 H:

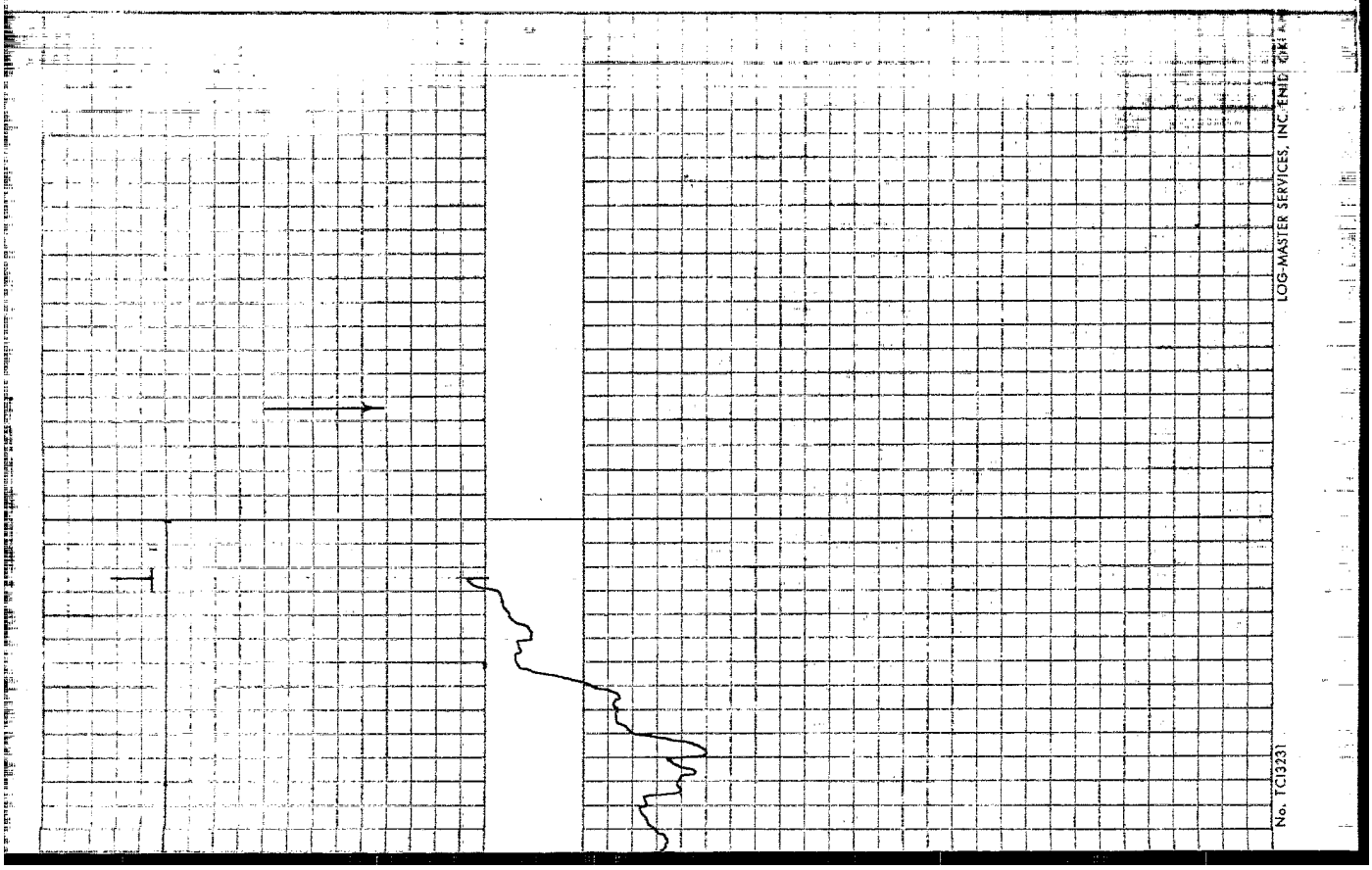
SENSITIVITY: RANGE: 10

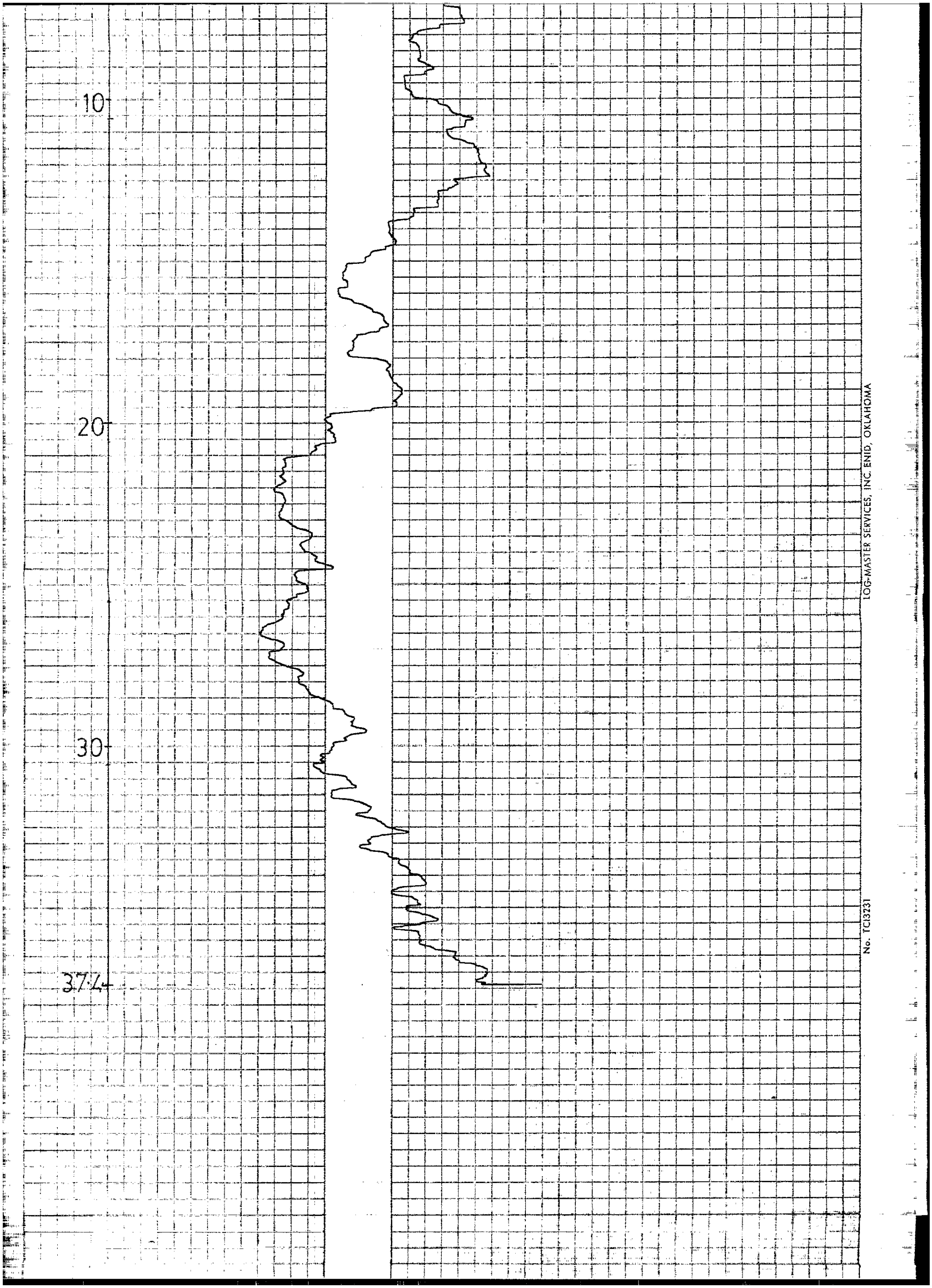
TIME CONSTANT: 4 second SPEED: 8 M/MIN.

1st READING 37·4 m INSTRUMENT: LM 444 B LMG 15

LAST READING: 1·2m OBSERVER: R. P.

INTERVAL: 36·2m

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LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
No. TC13231

DEPARTMENT OF TRANSPORT & WORKS

WATER INVESTIGATION UNIT

GEOPHYSICAL BORE LOG

R N 12082 AREA. AYERS ROCK

MAP REFERENCE. A M G 5047

ELEVATION:

CASING DETAILS : 23·09m x 6" at bottom

DRILLER. W. I. U.

DEPTH DRILLED : 53·0 m

STATUS : INVESTIGATION

GRID CO ORDS : 000 120

S. W. L. :

DATE COMMENCED. 31·3·79

DATE COMPLETED. 3·4·79

RADIOMETRIC LOG DATA

SERVICE : W. I. U.

RUN NO. 3

SENSITIVITY :

TIME CONSTANT : 4 second

1st READING. 37·8 m

LAST READING : 1·2 m

INTERVAL 36·6 m

LOG TYPE. GAMMA RAY

SCALE V· 1 = 200 H:

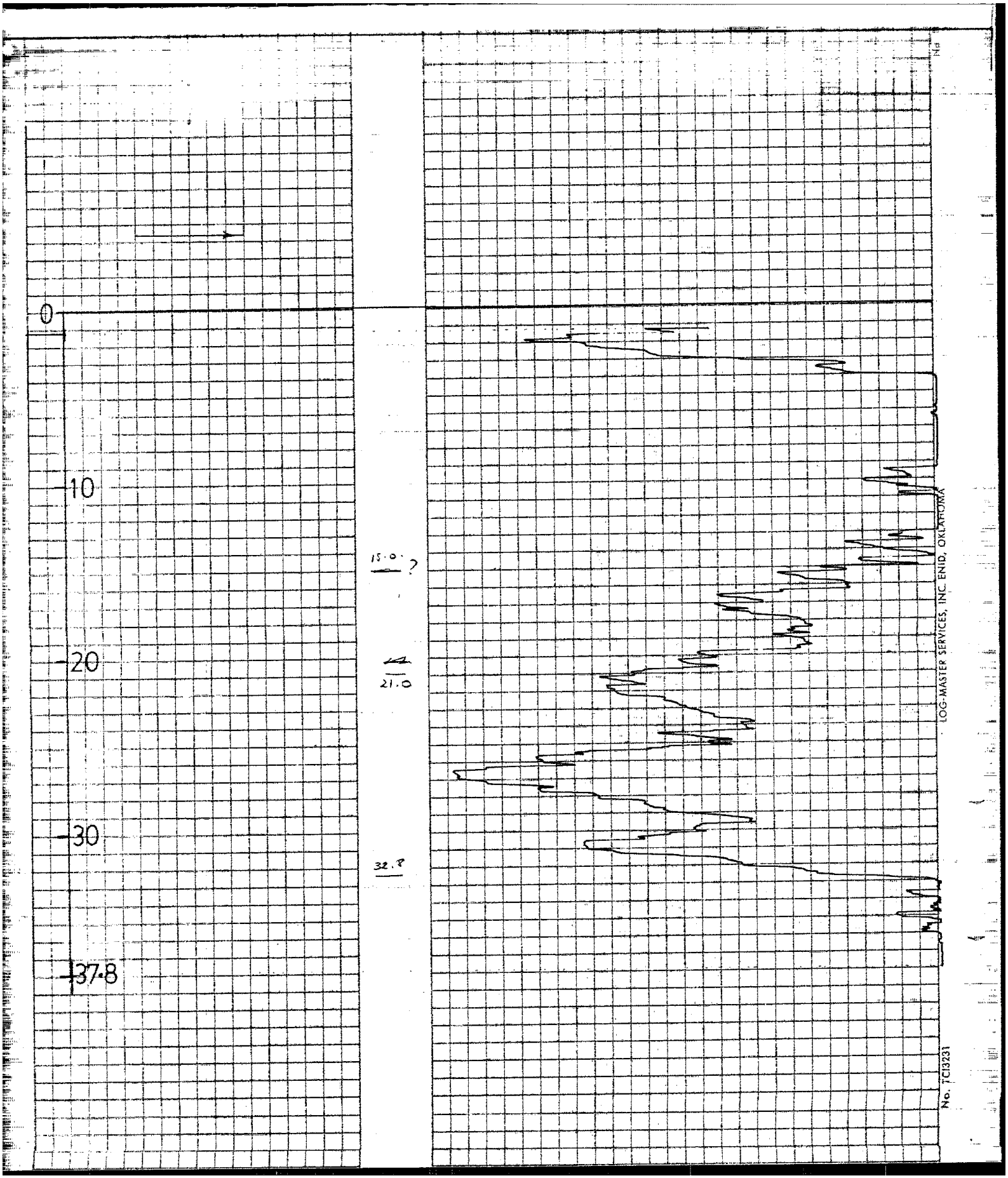
RANGE : 4

SPEED : 8 M/MIN.

INSTRUMENT LM 444 B LMG 15

OBSERVER. R. P.

DATE : 7·6·79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LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
No. 7C13231

Regulation 8

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance

IN 2/290

RN 12082

FINAL STATEMENT OF BORE

From	To	Description of Strata
0.00	6.00	HARD BROWN STONE.
6.00	18.00	LIGHT BROWN STONE.
18.00	23.00	BROWN STONE
23.00	25.00	WHITE & BROWN SANDY STONE
25.00	37.00	BROWN CLAY & STONE.
37.00	38.00	BROWN & GREY CLAY
38.00	43.00	CARBONISED & LIGHT BROWN CLAY
43.00	48.00	GREY SAND & CARBONISED CLAY
48.00	53.00	LIGHT BROWN STONE & WHITE & BROWN CLAY

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE S SE E NW W SW of (b) ...(7 M)....

.....

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - Drilled to 33.00m with 7" Hammer then Drill on to 53.00m

Map No: AMG 5047

Grid Reference: 000120

Samples of strata and water supplies
have been *
~~will~~ be *
left at the following trading place -

....W.R.B. OFFICE A/S.....

.....R Daly.....
Signature

* Strike out which does not apply.

For office use only -

Name of Bore - RN12082 (7M)

Name of Property - Ayers Rock

Description of Property - NP

Name of Owner - NTRB

Name of Contractor - W.R.B.

Name of Driller - R. Daly

Date of Commencement - 31/7/79

Date of Completion - 7/4/79

Total Depth - 53.00m

Particulars of Casing - 23.09 x 6" CASING STILLIN HOLE AT BOTTOM.

Particulars of Perforations or Screens - Nil

Water	1st Supply	2nd Supply	3rd Supply
Struck at	18.00m	28.00m	48.00m
Standing Water Level			
Pumping Supply: ~~G.I.H.~~ U/S	14/5	24/5	½ 4/8
Duration of Pump Test			
Water Level During Test			
Quality: Good, Fair, Bad	4,500 PPM	4,200 PPM	3,900 PPM

WATER ANALYSIS

27290

Laboratory Register No. 79/0574

Date received in Laboratory 9.5.79

WR 4/1

Bottle No.	Time of sampling (hrs)	Date of sampling
YP 92	1600	2.4.79

LOCATION AND DETAILS
Ay[redacted]s Rock - RN/12082 Depth: 48 m. Disch: 3 lps. Airlift RSP. 88

Sampler: Darby

ANALYSIS - PHYSICAL

pH	7.7	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	4900	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	3340	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	3335	Total alkalinity (as $CaCO_3$)	178
Sodium chloride (calc from chloride)	1551	Total hardness (as $CaCO_3$)	1075
Chloride, Cl	941	Sodium, Na	650
Sulphate, SO_4	1000	Patassium, K	85
Nitrate NO_3	47	Calcium, Ca	248
Bicarbonate, HCO_3	217	Magnesium, Mg	111
Carbonate, CO_3		Iron (total), Fe	20
Fluoride, F	2.0	Silica, SiO_2	40

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 30/5/79

REMARKS: The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water as the total dissolved solids exceed the maximum permissible level. Suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

Regulation 8

N.T.A. 181

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance

IN 2/284

FINAL STATEMENT OF BORE

RN 12076

From	To	Description of Strata
0·00	6·00	~~LIGHT BROWN~~ & BROWN STONE
6·00	12·00	RED & LIGHT BROWN & BROWN STONE
12·00	18·00	BROWN STONE & LIGHT BROWN CLAY
18·00	24·00	BROWN STONE & CLAY
24·00	30·00	BROWN & WHITEISH STONE
30·00	36·00	LIGHT GREY STONE

Name of Bore - RN 12076 (4 NW)

Name of Property - AYERS Rock

Description of Property - N.P.

Name of Owner - N.T.A.B.

Name of Contractor - W.T.B.

Name of Driller - R. Darby

Date of Commencement - 24/3/79

Date of Completion - 24/3/79

Total Depth - 37·69

Particulars of Casing - 4·80 x 8" SWAGE CASING

Particulars of Perforations or Screens - Nil

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE S SE E NW W SW of (b) (4 NW)

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - Drilled Ahead with 7" Hammer Bit Surface Casing Pulled Hole Back Filled 1-5-79.

Map No: 5047

Grid Reference: AMG 983932

Samples of strata and water supplies
~~have been~~ *
will be *
left at the following trading place -

W.T.B. OFFICE A/S

R. Darby
Signature

* Strike out which does not apply.

For office use only -

Water	1st Supply	2nd Supply	3rd Supply
Struck at	SEEPAGE 18·00	W/C 28·00	
Standing Water Level		12·6 am	
Pumping Supply: ~~C.P.H.~~		3 4/5	
Duration of Pump Test			
Water Level During Test			
Quality: Good, Fair, Bad		Conduct 3,600 @ 80	

(1)

WATER ANALYSIS

		Laboratory Register No.	79/0570
		Date received in Laboratory	9.5.79
WR 4/1	Bottle No. ZQ 64	Time of sampling (hrs) 1050	Date of sampling 24.3.79

LOCATION AND DETAILS
Ayers Rock RN/12076 Depth: 36m Disch: 3.0 lps Airlift

RSP. 88

ANALYSIS - PHYSICAL

pH	7.9	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3240	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2110	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2249	Total alkalinity (as $CaCO_3$)	176
Sodium chloride (calc from chloride)	986	Total hardness (as $CaCO_3$)	698
Chloride, Cl	598	Sodium, Na	410
Sulphate, SO_4	580	Patassium, K	68
Nitrate NO_3	75	Calcium, Ca	148
Bicarbonate, HCO_3	214	Magnesium, Mg	80
Carbonate, CO_3		Iron (total), Fe	18.6
Fluoride, F	1.5	Silica, SiO_2	74

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: G.JOHNSTON Date 21 / 5 / 79

REMARKS:

WATER INVESTIGATION UNIT
ALICE SPRINGS
30 AUG 1979
DEPT. OF TRANSPORT & WORKS

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER CONDUCTIVITY ANALYSIS.

BORE: REGISTERED NUMBER: 12076

LOCATION: Ayers Rock

DATE TESTED: 3-5-79 TESTED BY: R. Boeyen

BOTTLE No.	DATE	TIME	DEPTH	DISCHARGE	SAMPLER	CONDUCTIVITY
CQ 89	24-3-79	1030	30 M	3·0 l/sec	R. Daboy	3400
ZQ 65	"	1050	36 M	3·0 l/sec	"	3400

YULARA VILLAGE WATER RESOURCES 60.6D

RN 12076
IN 2/284
5047 Mt Olga

Depth (m)			Description		
0	-	3	SAND. Reddish brown.		
3	-	6	CALCRETE.		
6	-	18	SAND. Light brown poorly sorted rounded sand, with much silt.		
18	-	27	CLAY & SAND. Reddish brown clay with sand.		
27	-	30	SANDSTONE. Silicified purple brown sandstone with minor white siltstone.		
30	-	36	SILTSTONE. White calcareous siltstone with sand.		

SUMMARY

0	-	6	Sand, ~~cla~~ calcrete	Tertiary
6	-	18	Sand	
18	-	~~27~~ 26.7	Clay and sand	
26.7*	~~27~~	- 30	Sandstone	
30	-	36	Siltstone	

MAJOR AQUIFER

28m 3.0 ls^{-1} Base of Tertiary Clay.

Geoff Knott

GEOFF KNOTT
HYDROGEOLOGIST

October 1979

NTA 1718

DATE 24/3/79 **BORE No.** RN12076 (4NW) **Driller:** DARBY

Time	Depth	M drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA
0730				MOVE OVER SITE + SET UP, DRILL TO	1348	9 7/8	Roll	USED					
				6.00 WITH 7" HAMMER BIT, PULL OUT									
				+ CHANGE TO 9 7/8 ROLLER BIT + REAM	39645	7"	Butt	USED	HAMMER BIT + SUB				
				OUT TO 4.30 M FOR 8" SURF CASING								1.75	
0940	6m	6m		RED & LIGHT BROWN STONE									
				ADD D/C					D/C	4½	5.73	7.48	
0945	12m	6m		LIGHT BROWN + BROWN STONE (DAMP)									
				ADD D/C					D/C	4½	6.01	13.49	
1000	18m	6m		BROWN STONE + LIGHT BROWN CLAY	(SEEPAGE 18M)								
				ADD D/P					D/P	4½	6.00	19.49	
1015	24m	6m		BROWN STONE + CLAY									
				ADD D/P					D/P	4½	6.00	25.49	
1030	30m	6m		BROWN + WHITISH STONE	W/C 28M 34/5				CONDUCT 3,500 PPM				
				ADD D/P ZQ.28 – CQ.89					D/P	4½	6.00	31.49	
1050	36m	6m		LIGHT GRAY STONE									
				ZQ.64 – ZQ.65					CONDUCT 3,600				
				NO WATER [illegible] JUST 8"									
				SURF CASING									
				SWL 12.60m									

14702/69....

W. G. Murray, Government Printing Office, Canberra

DEPARTMENT OF TRANSPORT & WORKS
WATER INVESTIGATION UNIT
GEOPHYSICAL BORE LOG

R N. 12076 AREA: AYERS ROCK

STATUS : INVESTIGATION

MAP REFERENCE: 5047

GRID CO ORDS: 483 132

ELEVATION :

S.W. L. : 12·6m

CASING DETAILS : 4·8m x 8"

DRILLER : W. I. U.

DATE COMMENCED : 24·3·79

DEPTH DRILLED : 37·49m

DATE COMPLETED : 24·3·79

RADIOMETRIC LOG DATA

SERVICE : W. I.U.

LOG TYPE : GAMMA RAY

DATE : 2·4·79

RUN NO. : 1

SCALE : V : 1 = 100 H :

SENSITIVITY :

RANGE : 4

TIME CONSTANT : 4sec

SPEED : 13 M/ MIN :

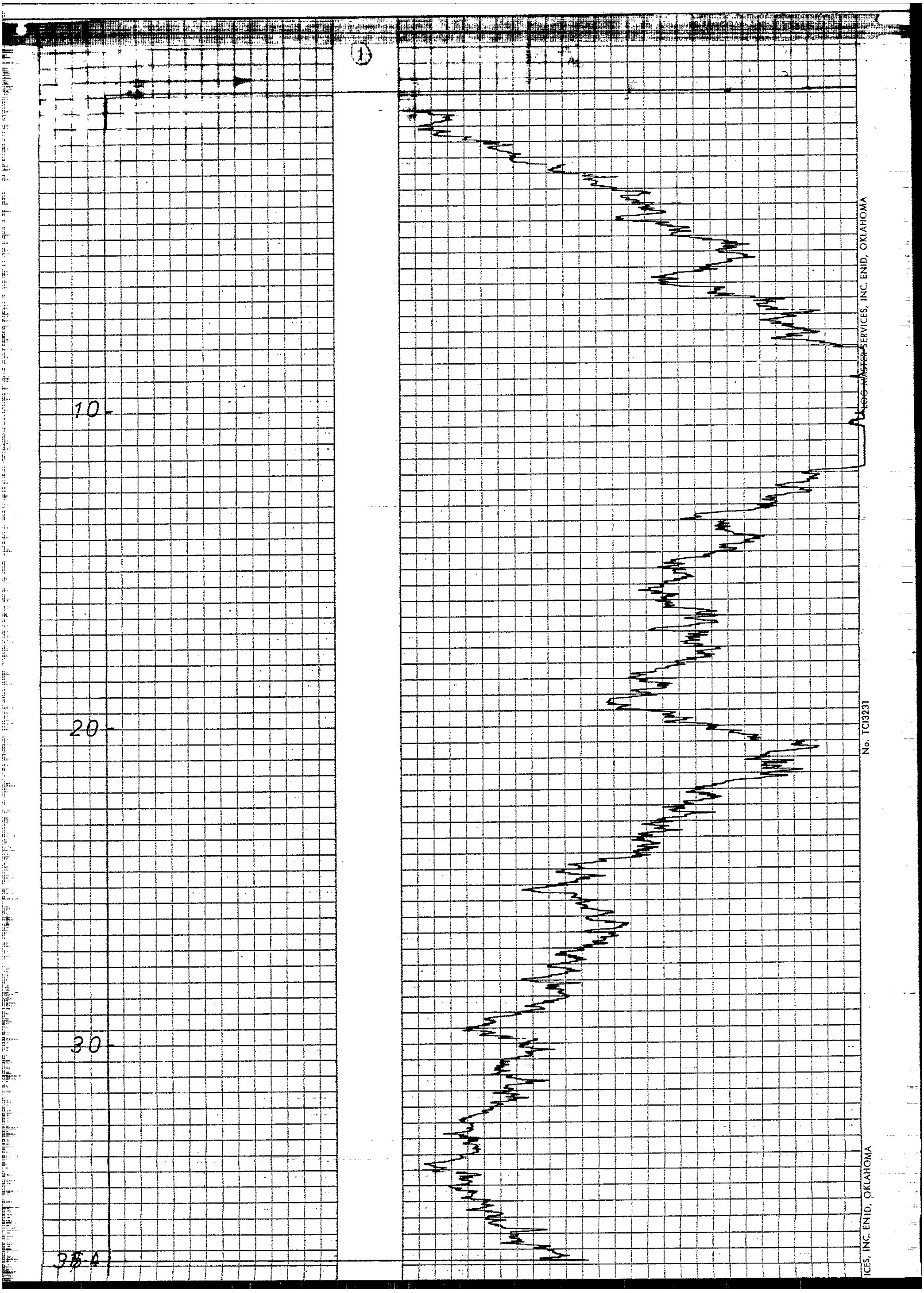
1st READING : 1·1m

INSTRUMENT : LM 444 B LMG 15

LAST READING : 37·0m

OBSERVER : R. P.

INTERVAL : 35·9m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LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
No. TCI3231
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA

DEPARTMENT OF TRANSPORT & WORKS
WATER INVESTIGATION UNIT
GEOPHYSICAL BORE LOG

R N 12076 AREA: AYERS ROCK

STATUS : INVESTIGATION

MAP REFERENCE : 5047

GRID CO ORDS : 483 132

ELEVATION :

S. W. L. : 12·6m

CASING DETAILS : 4·8m x 8"

DRILLER : W. I. U.

DATE COMMENCED : 24·3·79

DEPTH DRILLED : 37·49m

DATE COMPLETED : 24·3·79

RADIOMETRIC LOG DATA

SERVICE : W. I. U.

LOG TYPE : GAMMA RAY

DATE : 2·4·79

RUN NO. : 2

SCALE : V : 1 = 100 H :

SENSITIVITY :

RANGE : 4

TIME CONSTANT : 4 sec

SPEED : 16 M/ MIN :

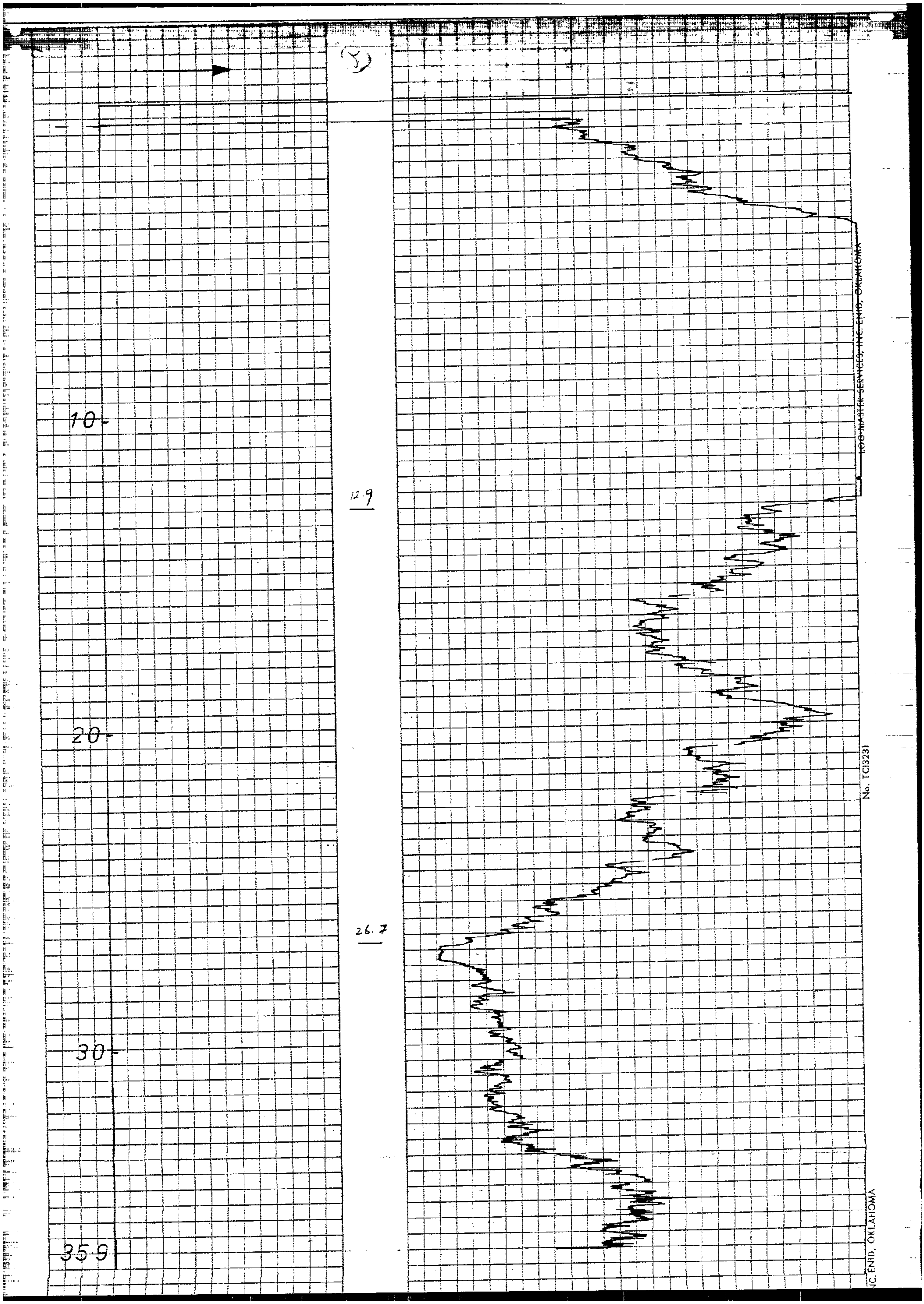
1st READING : 36·5m

INSTRUMENT : LM444B LMG 15

LAST READING : 1·1m

OBSERVER : R. P

INTERVAL : 35·4 m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LOG-MASTER SERVICE
No. TCI3231
INC. ENID, OKLAHOMA

DEPARTMENT OF TRANSPORT & WORKS
WATER INVESTIGATION UNIT
GEOPHYSICAL BORE LOG

R N : 12076 AREA: AYERS ROCK

STATUS : INVESTIGATION

MAP REFERENCE: 5047

GRID CO ORDS : 483 132

ELEVATION :

S. W. L. : 12·6m

CASING DETAILS : 4·8m x 8"

DRILLER : W. I. U.

DATE COMMENCED : 24·3·79

DEPTH DRILLED : 37·49 m

DATE COMPLETED : 24·3·79

RADIOMETRIC LOG DATA

SERVICE : W. I. U.

LOG TYPE : GAMMA RAY

DATE : 2·4·79

RUN NO. : 3

SCALE : V : 1 = 100 H :

SENSITIVITY :

RANGE : 10

TIME CONSTANT : 4 sec

SPEED : 18 M/ MIN :

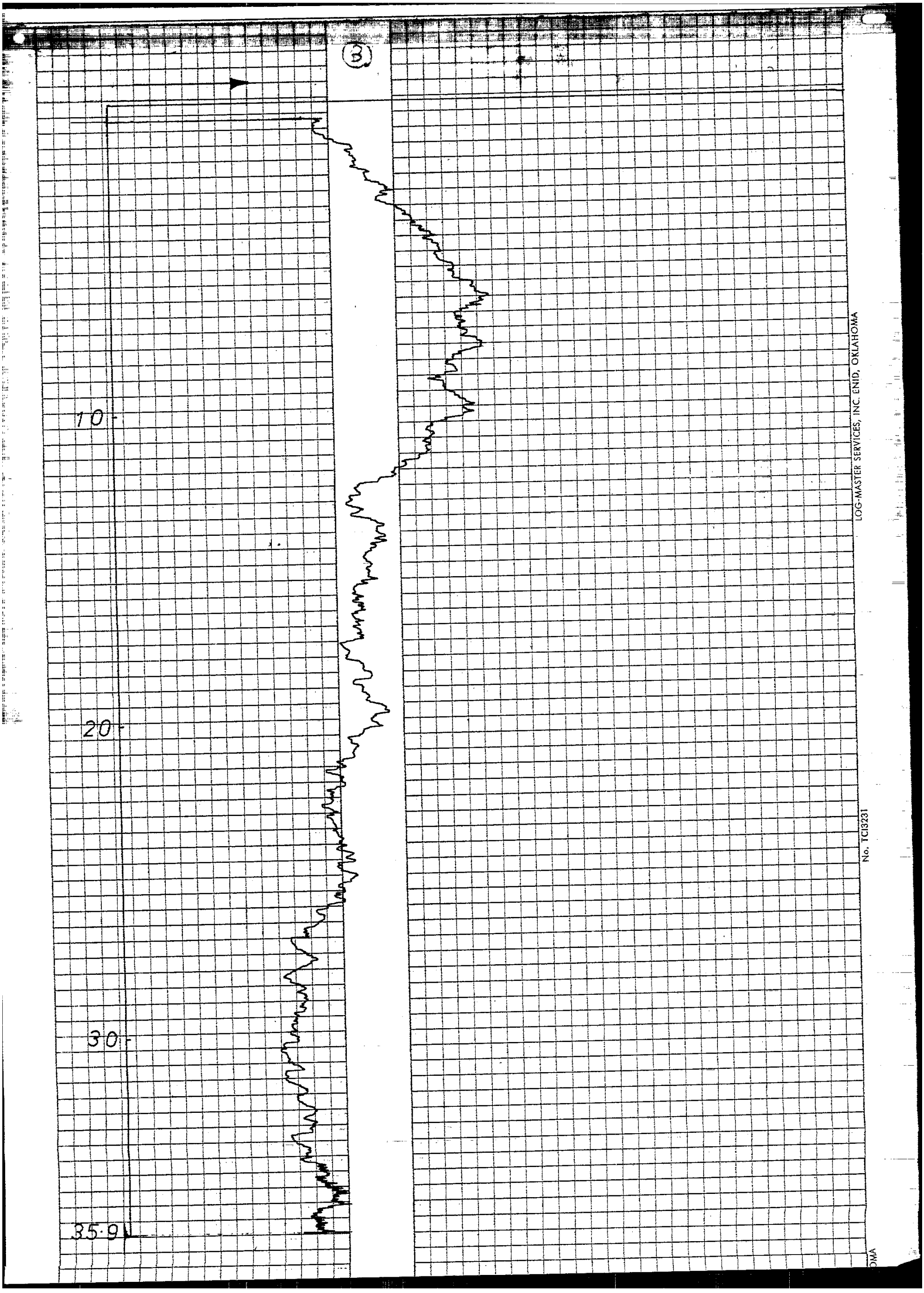
1st READING : 36·6 m

INSTRUMENT : LM 444B LMG 15

LAST READING : 1·1m

OBSERVER : R. P.

INTERVAL : 35·5m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LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
No. TCI3231

Regulation 8

RN012076

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance

IN 2/284

FINAL STATEMENT OF BORE

RN 12076

From	To	Description of Strata
0·00	6·00	~~Light Brown~~ & BROWN STONE & CLAY
6·00	12·00	LIGHT BROWN & BROWN STONE
12·00	18·00	BROWN STONE & LIGHT BROWN CLAY
18·00	24·00	BROWN STONE & CLAY
24·00	30·00	BROWN & WHITEISH STONE
30·00	36·00	LIGHT GREY STONE

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE S SE E NW W SW of (b) (4 NW)

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - Drilled ahead with 7" Hammer Bit

Map No: 5047

Grid Reference: AMG 983 132

Samples of strata and water supplies
~~have been *~~
will be *
left at the following trading place -

...W.T.B. Office A/S.....

.....Signature

* Strike out which does not apply.

For office use only -

Name of Bore - RN 12076 (4 NW)

Name of Property - Ayers Rock

Description of Property - N.P.

Name of Owner - N.T.B.

Name of Contractor - W.T.B.

Name of Driller - R. Daddy

Date of Commencement - 24/3/79

Date of Completion - 24/3/79

Total Depth - 37·49

Particulars of Casing - 4·80 x 8" SURF CASING

Particulars of Perforations or Screens - Nil

Water	1st Supply	2nd Supply	3rd Supply
Struck at	SEEPAGE 18 cms	W/C 28-00	
Standing Water Level		12·6 cm	
Pumping Supply: ~~C.P.H.~~ G/S		3 G/S	
Duration of Pump Test			
Water Level During Test			
Quality: Good, Fair, Bad		CONDUCT 3,600 @ 20°	

WATER ANALYSIS

2/284

Laboratory Register No. 79/0570

Date received in Laboratory 9.5.79

WR 4/1

Bottle No.	Time of sampling (hrs)	Date of sampling
ZQ 64	1050	24.3.79

TION AND DETAILS

Ayers Rock, RN/12076 Depth 36 mm Disch: 3.0 lps. AIRLIFT RSP. 88

Sampler: R. Darby

ANALYSIS - PHYSICAL

pH	7.9	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3240	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2110	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2249	Total alkalinity (as $CaCO_3$)	176
Sodium chloride (calc from chloride)	986	Total hardness (as $CaCO_3$)	698
Chloride, Cl	598	Sodium, Na	410
Sulphate, SO_4	580	Patassium, K	68
Nitrate NO_3	75	Calcium, Ca	148
Bicarbonate, HCO_3	214	Magnesium, Mg	80
Carbonate, CO_3		Iron (total), Fe	18.6
Fluoride, F	1.5	Silica, SiO_2	74

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 21 / 5 / 79

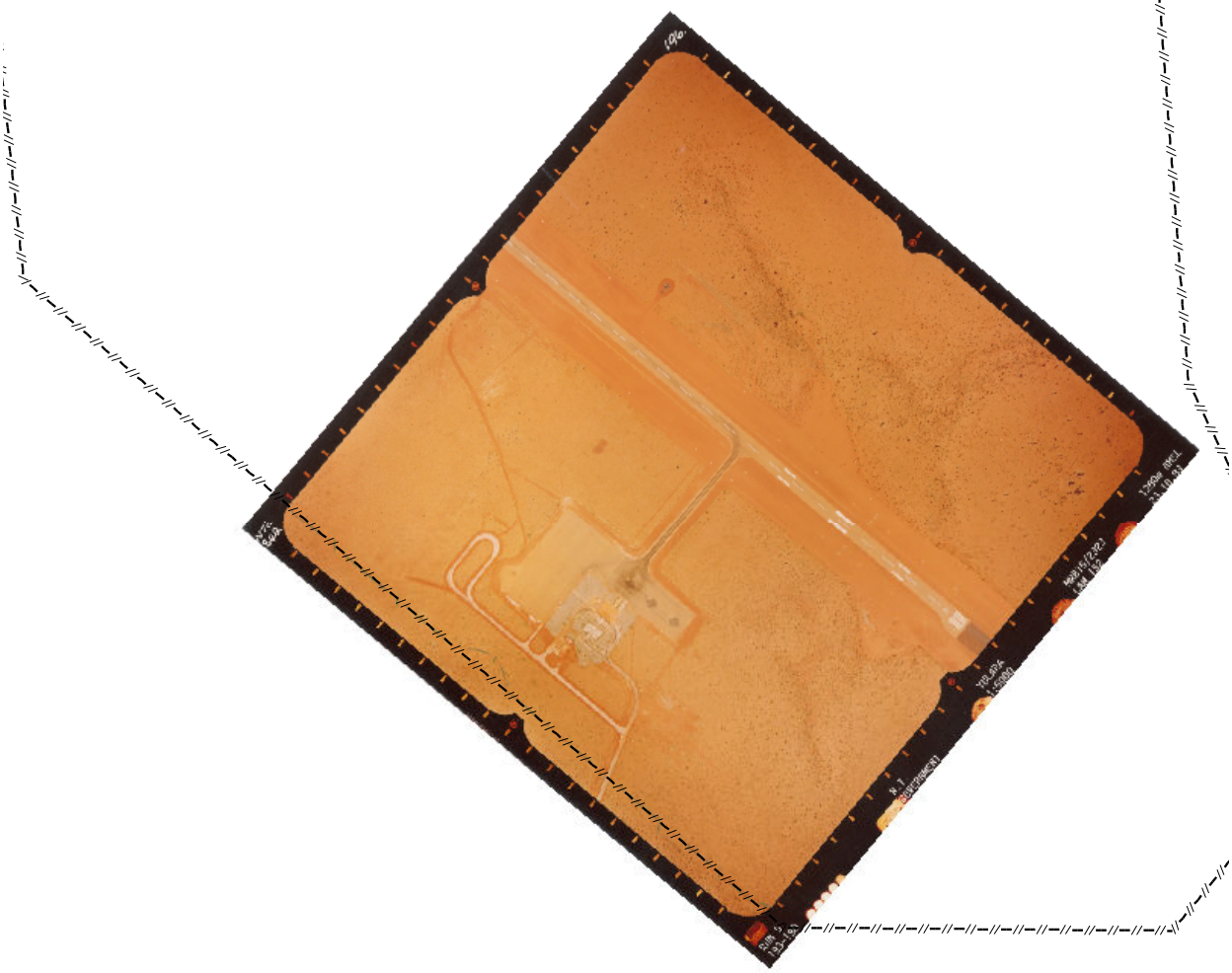
REMARKS: The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water and the Total Dissolved Solids exceed the maximum permissible level. Suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

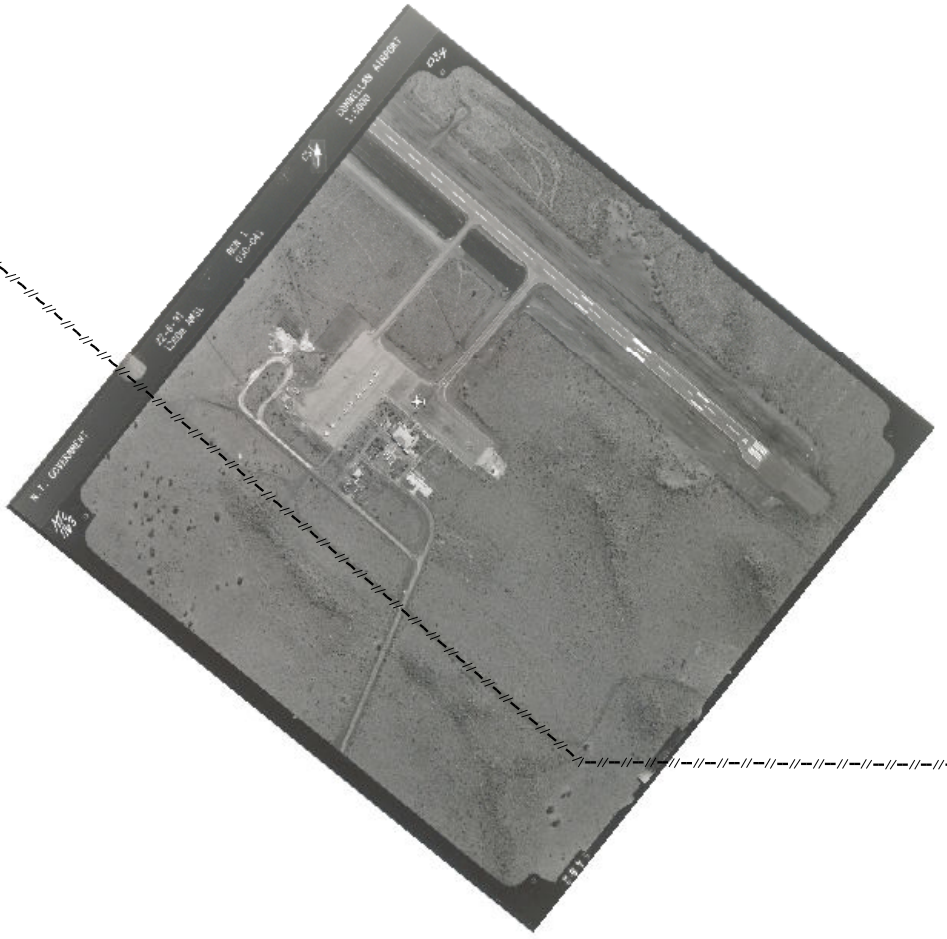
90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

Appendix E – Historical aerial photographs

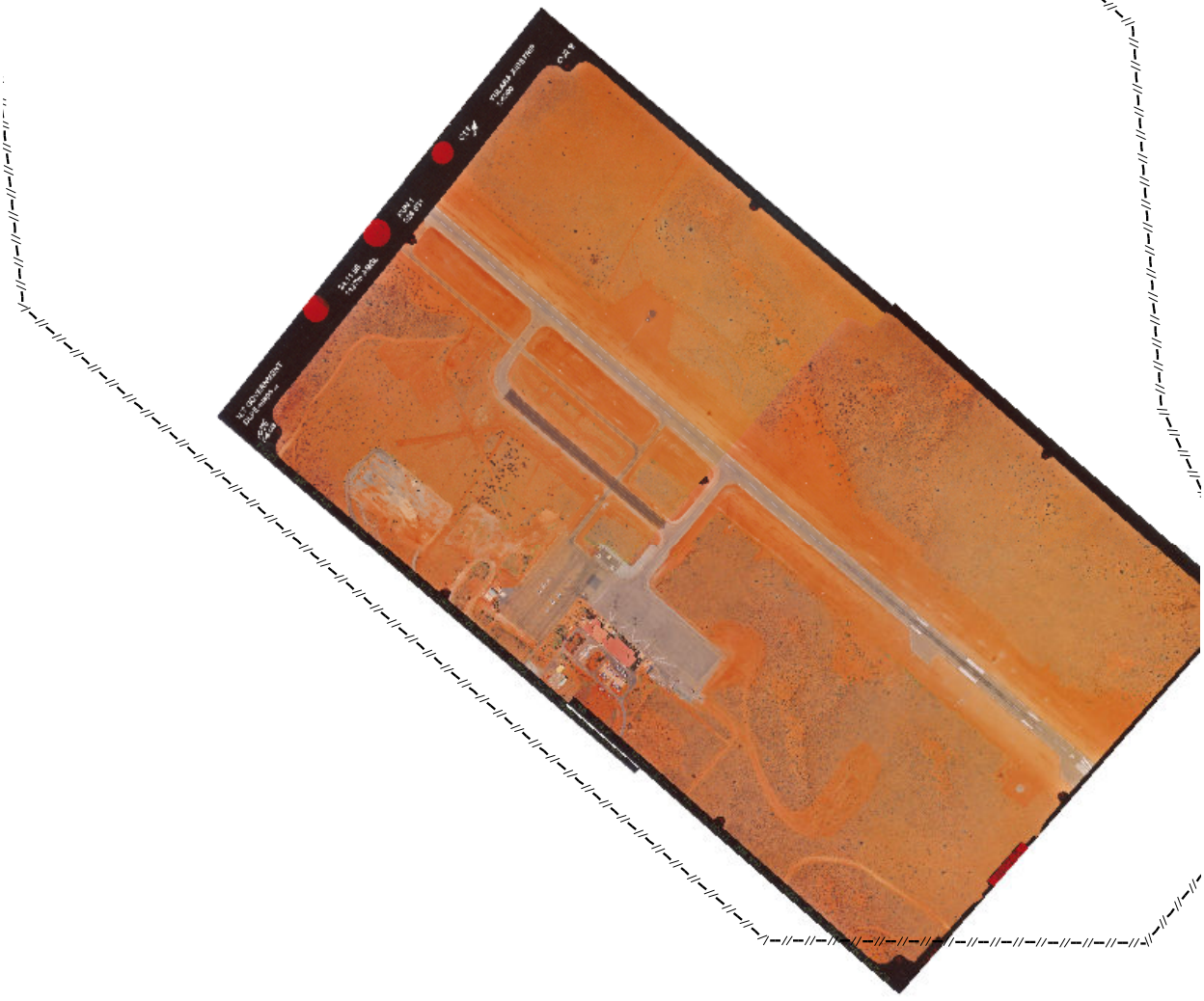
Document Identification	**Run: 5 Film: NTc842 Frame: 196 Scale: 1 : 5,000 (Colour)**
Photograph Date	**Date: 23 October 1983**



Document Identification	**Run: 1 Film: NTc1163 Frame: 34 Scale: 1 : 5,000 (Black & White)**
Photograph Date	**Date: 22 June 1991**



Document Identification	Run: 1 Film: NTc1403 Frames: 27 & 28 Scale: 1 : 4,000 (Colour)
Photograph Date	Date: 24 November 1998



Document Identification	Google Earth (Colour)
Photograph Date	Date: October 2015

Appendix F – Interview transcripts

	AYERS ROCK - Questions	
	[redacted] - Airservices	22/7/2016
1	What is the age of the current fire station and fire training ground? What was the previous use of these sites?	A temporary station was used for approximately 18 months between May 2004 and October 2005. Fire station – October 2005. Fire training ground – May 2004.
2	Has the location of ARFF site/s remained the same since the airport was opened?	Apart from the closure of the temporary station and opening of the permanent station all other locations have remained the same.
3	Is there an incident log that details where actual fires and fuel spills have been attended that required the use of firefighting foams? If not, can you recall any fires or fuel spills at the Airport? Dates?	No. Foam not used in any incidents and no incidents recalled.
4	Has AFFF been used at the airport? If yes: • do you know the name of the product? • how was it used? • when AFFF was used in training, how often and for how long did this occur? • what volumes were used and what was the methodology for wash down of waste and equipment? how widely was the AFFF dispersed aerially? Photos?	Ansulite used. A tank formerly containing Ansulite is still on site. Solberg is now used. Roof monitor, hoses. Used for training one to two times for month and was used before the pad was built. Training is now conducted with water with one foam event per year. *Note: Further information provided by [redacted] (Senior Environment Specialist at Air Services) via email on 7/09/2016* *Training with foam using a hose rather than a monitor, and therefore greater likelihood of 100% capture of foam on pad (less chance of overspray etc).*

	AYERS ROCK - Questions	
	[redacted] - Airservices	22/7/2016
5	Has AFFF ever been stored (or is stored) at the airport? If so: • where and for what purpose? • is there an inventory of AFFF storage within the Airport? • how were spent drums or excess product disposed of?	Stored in 200 L drums and 1000L totes. One bulk storage tank.
6	Has training involving AFFF (e.g. extinguishers, Airport Emergency Planning (AEP) exercises) been undertaken in areas outside of the current fire station and/or training ground? If so, where?	No
7	Are you aware of any AFFF use outside of the Airport but within the general vicinity?	No. Possible one annual exercise outside airport. *Note: Further information provided by [redacted] (Senior Environment Specialist at Air Services) via email on 7/09/2016* *Based on responses from other airports it is considered unlikely that AFFF was used during the annual exercise outside the airport.*
8	Are you aware of any soil/groundwater investigations and testing that have been undertaken across the wider Airport (i.e. outside of ARFF site)?	Soil sampling
9	Was wash down of fire fighting equipment restricted to the fire training areas?	Was conducted at the old temporary station and the current FS.
10	Where did the wash down water end up? Do any drains discharge off-site and, if so, where?	Wash water ends up in the sewage treatment plant (STP) on the airport

	AYERS ROCK - Questions	
	[redacted] - Airservices	22/7/2016
11	Has there been any significant bulk earth works (relevant to AFFF use) on the site that resulted in soil being relocated from one area of the airport to another?	No. Some remediation of hydrocarbon impacted soils stored near the FTG. Resulted in small stockpiles.
12	Does groundwater 'daylight' in areas of the site?	No
13	Is stormwater harvested within the Airport and if so, for what purposes and where?	No
14	Is groundwater abstracted within the Airport and if so, for what purposes and where?	No. It is used for town water supply further away from the airport.

	AYERS ROCK - Questions	
	[redacted] – Voyages Hotels & Resorts Pty Limited	21/7/2016
1	What is the age of the current fire station and fire training ground? What was the previous use of these sites?	Airport opened in 1982. Solberg is used by Airservices. Airports asked for the foam to be tested as it had an adverse impact on the sewage treatment plant. Resulted in a digester to be installed in the waste treatment process at the FTG.
2	Has the location of ARFF site/s remained the same since the airport was opened?	Understood the Airservices arrived in 2005. ARFF sites not used for any other purpose.
3	Is there an incident log that details where actual fires and fuel spills have been attended that required the use of firefighting foams? If not, can you recall any fires or fuel spills at the Airport? Dates?	No. Not aware of any incidents
4	Has AFFF been used at the airport? If yes: • do you know the name of the product? • how was it used? • when AFFF was used in training, how often and for how long did this occur? • what volumes were used and what was the methodology for wash down of waste and equipment? how widely was the AFFF dispersed aerially? Photos?	Questions for Airservices.
5	Has AFFF ever been stored (or is stored) at the airport? If so: • where and for what purpose?	Questions for Airservices.

	AYERS ROCK - Questions	
	[redacted] – Voyages Hotels & Resorts Pty Limited	21/7/2016
	• is there an inventory of AFFF storage within the Airport? • how were spent drums or excess product disposed of?	
6	Has training involving AFFF (e.g. extinguishers, Airport Emergency Planning (AEP) exercises) been undertaken in areas outside of the current fire station and/or training ground? If so, where?	Not by Airports. Question for Airservices.
7	Are you aware of any AFFF use outside of the Airport but within the general vicinity?	No
8	Are you aware of any soil/groundwater investigations and testing that have been undertaken across the wider Airport (i.e. outside of ARFF site)?	No
9	Was wash down of fire fighting equipment restricted to the fire training areas?	Yes
10	Where did the wash down water end up? Do any drains discharge off-site and, if so, where?	Questions for Airservices.
11	Has there been any significant bulk earth works (relevant to AFFF use) on the site that resulted in soil being relocated from one area of the airport to another?	No. Minor works associated with installation of digester.

	AYERS ROCK - Questions	
	[redacted] – Voyages Hotels & Resorts Pty Limited	21/7/2016
12	Does groundwater 'daylight' in areas of the site?	NO
13	Is stormwater harvested within the Airport and if so, for what purposes and where?	No. Not a lot of stormwater.
14	Is groundwater abstracted within the Airport and if so, for what purposes and where?	No

	AYERS ROCK - Questions	
	[redacted] - Airservices	22/7/2016
1	What is the age of the current fire station and fire training ground? What was the previous use of these sites?	A temporary station was used for approximately 18 months between May 2004 and October 2005. Fire station – October 2005. Fire training ground – May 2004.
2	Has the location of ARFF site/s remained the same since the airport was opened?	Apart from the closure of the temporary station and opening of the permanent station all other locations have remained the same.
3	Is there an incident log that details where actual fires and fuel spills have been attended that required the use of firefighting foams? If not, can you recall any fires or fuel spills at the Airport? Dates?	No. Foam not used in any incidents and no incidents recalled.
4	Has AFFF been used at the airport? If yes: • do you know the name of the product? • how was it used? • when AFFF was used in training, how often and for how long did this occur? • what volumes were used and what was the methodology for wash down of waste and equipment? how widely was the AFFF dispersed aerially? Photos?	Ansulite used. A tank formerly containing Ansulite is still on site. Solberg is now used. Roof monitor, hoses. Used for training one to two times for month and was used before the pad was built. Training is now conducted with water with one foam event per year. *Note: Further information provided by [redacted] (Senior Environment Specialist at Air Services) via email on 7/09/2016* *Training with foam using a hose rather than a monitor, and therefore greater likelihood of 100% capture of foam on pad (less chance of overspray etc).*

	AYERS ROCK - Questions	
	[redacted] - Airservices	22/7/2016
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6	Has training involving AFFF (e.g. extinguishers, Airport Emergency Planning (AEP) exercises) been undertaken in areas outside of the current fire station and/or training ground? If so, where?	No
7	Are you aware of any AFFF use outside of the Airport but within the general vicinity?	No. Possible one annual exercise outside airport. *Note: Further information provided by [redacted] (Senior Environment Specialist at Air Services) via email on 7/09/2016* *Based on responses from other airports it is considered unlikely that AFFF was used during the annual exercise outside the airport.*
8	Are you aware of any soil/groundwater investigations and testing that have been undertaken across the wider Airport (i.e. outside of ARFF site)?	Soil sampling
9	Was wash down of fire fighting equipment restricted to the fire training areas?	Was conducted at the old temporary station and the current FS.
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	AYERS ROCK - Questions	
	[redacted] - Airservices	22/7/2016
11	Has there been any significant bulk earth works (relevant to AFFF use) on the site that resulted in soil being relocated from one area of the airport to another?	No. Some remediation of hydrocarbon impacted soils stored near the FTG. Resulted in small stockpiles.
12	Does groundwater 'daylight' in areas of the site?	No
13	Is stormwater harvested within the Airport and if so, for what purposes and where?	No
14	Is groundwater abstracted within the Airport and if so, for what purposes and where?	No. It is used for town water supply further away from the airport.

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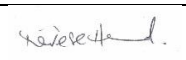
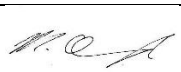
Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
DRAFT						
DRAFT B						11/10/16
DRAFT C						28/03/17
DRAFT D						04/04/17
DRAFT E						02/08/17
DRAFT F						04/08/17
0	N Crameri	T Hammond		M Clough		16/10/17

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