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Attachment A- McDills Water Bore Incident

The McDills No. 1 well was drilled as a petroleum well and lost integrity after it had been converted to a water bore for use by the pastoralist.

McDills No 1 was drilled by Amerada Petroleum in 1965 to a depth of 10,515 feet (3,205 m), with 20 inch surface casing (10.4 m), 13-3/8 inch outer casing (365 m) and 9-5/8 inch inner casing to 919 m. Open-hole drilling and coring then continued to total depth of 3,205m. The Well Completion Report (attached) states that both surface and outer casing were cemented to surface with the 9-5/8 inch casing cemented to an estimated depth of 2,350 feet (about 716 m, or 200 m above the casing shoe). Artesian water was struck at 715 m. The bore was plugged with cement, then the casing above the plug was perforated from 594 – 596 m (in the conversion to allow water to enter the well bore) and was completed with headworks as a water bore (designated RN 5028).

The Department of Infrastructure Planning and Environment's report (attached) states; "It is not known why the water bore was completed in this way. Soon after completion the headworks corroded, allowing the bore to flow freely". There is no mention that casing or cement failed, although, this remains a possibility yet is unconfirmed especially within the 9-5/8" & 13-3/8" casing annulus given that it was not isolated and so in direct contact with high temperature and saline water.

McDills No.1 well was successfully decommissioned (by ensuring any oil and gas reservoirs were isolated) according to the Department's (Mines and Energy) requirements. The well was then plugged back with cement and converted to a water bore for the pastoralist's use.

Although the McDills No. 1 well incident was not an uncontrolled release of oil and gas under the responsibility of the Department, it still remains of great concern to the community, even if the release was saline (non-potable) water. This concern is justified and shared by the Department because it still comes back to the way the well was first constructed and then maintained.

Since 1965, when McDills No. 1 well was drilled and then decommissioned, the well construction and decommissioning standards of the department have been raised considerably in order to meet world's best practice. The original Well Completion Report for McDills No 1 (attached) does not reflect any glaring well construction deficiencies. It does however, along with the Department of Infrastructure Planning and Environment's report (also attached), suggest possible factors that may have led to the corrosion and eventual failure.

Furthermore, the well was drilled before the Department issued the Schedule of Onshore Petroleum Exploration and Production Requirements (the Schedule) and so it is difficult to determine how critical well construction factors were addressed as currently required.

The flowing water was measured as highly saline. However, it is not clear whether the Amerada Petroleum utilised premium, high grade and corrosive resistant casing and headworks. Furthermore, because the Schedule had not yet been released by the Department, it is not possible to determine what other well construction standards were followed. The reports do not confirm if the operator was required to follow practices that meet American Petroleum Institute (API) standards as the Schedule requires today (see Clause 303 of the Schedule). In addition to the lack of information on material standards (especially grade of casing), the lack of regulatory standards and information in the reports do not explicitly address the following critical factors that must be addressed today;

- What casing pressure tests were conducted?
- What cementing integrity tests were carried out? By tagging or pressure test?

- The 9-5/8" casing was not cemented to surface, as is required today, but to 2350 feet (stated as 'estimated'). If estimated, how was it measured to be at an acceptable height? That is, how was zonal isolation from all other water reservoirs confirmed? Especially given that Artesian water was struck about the position of top of cement of 9-5/8 casing? How was zonal isolation of the 13-3/3" casing cement confirmed? What measures were taken given that the 9-5/8" & 13-3/8" casing annulus would be in direct contact with the highly saline water?
- Were any lost circulation zones identified? If so, how was the cementing program modified to counteract these?
- Was the plugged back well converted to a benign environment? That is, was corrosion inhibitor, oxygen scavenger and biocide utilised as part of the final benign fluid (when plugged and abandoned)?

The above are only some of the most critical prescriptive requires that operators must address in their drilling and well construction programs before gaining regulatory approval. They are also factors that are specifically targeted and confirmed through the Department's robust compliance monitoring procedures; carried out before operators are allowed to proceed with the program. If unacceptably addressed, operators may be asked to cease operations and repeat the unapproved portion. For example, if a pressure test proves or seems inconclusive, the operator will be required to carry out a remedial cement job and then follow this up with another mandatory pressure test to confirm integrity.

For more detailed information on the Department's well construction assessment and compliance monitoring processes and standards please refer to Department's Inquiry Submission on pages; 28 to 36.

Clause 317 of the Schedule details the current requirements in relation to 'Transfer of Wells after Conversion to Water Wells'. The Department of Infrastructure Planning and Environment should be consulted in relation to its maintenance requirements for water bores.

NT Petroleum Drilling Wells Master Sheet information

Location: Onshore,
Basin: Pedirka basin
Purpose: Exploration
Tenement: OP57
Legislation: PPMA(NT) / PSSA(AUS)
Operator: Amerada Petroleum Corporation of Australia
Drilling contractor: Aust Drilling Co
Drill Rig / Rig make/model: National N-55
Elevation: 125.577m
Total Measured Depth: 3204.972m
Water depth from ground level: 120.7
Status comment: Converted to water well
Spud Date: 27/05/1965
Total Depth date: 02/09/1965
Rig Release Date: 05/09/1965
HC shows: minor gas
Comments: Completed as water well no significant shows

Great artesian basin Water Allocation Planning Document

Water allocation planning for the great artesian basin water control district

DRAFT: Great Artesian Basin (NT) Water Allocation Plan 2013-2023

http://www.lrm.nt.gov.au/water/water_allocation/plans/gabwap#.VJEHsyUfAI

Anacoora

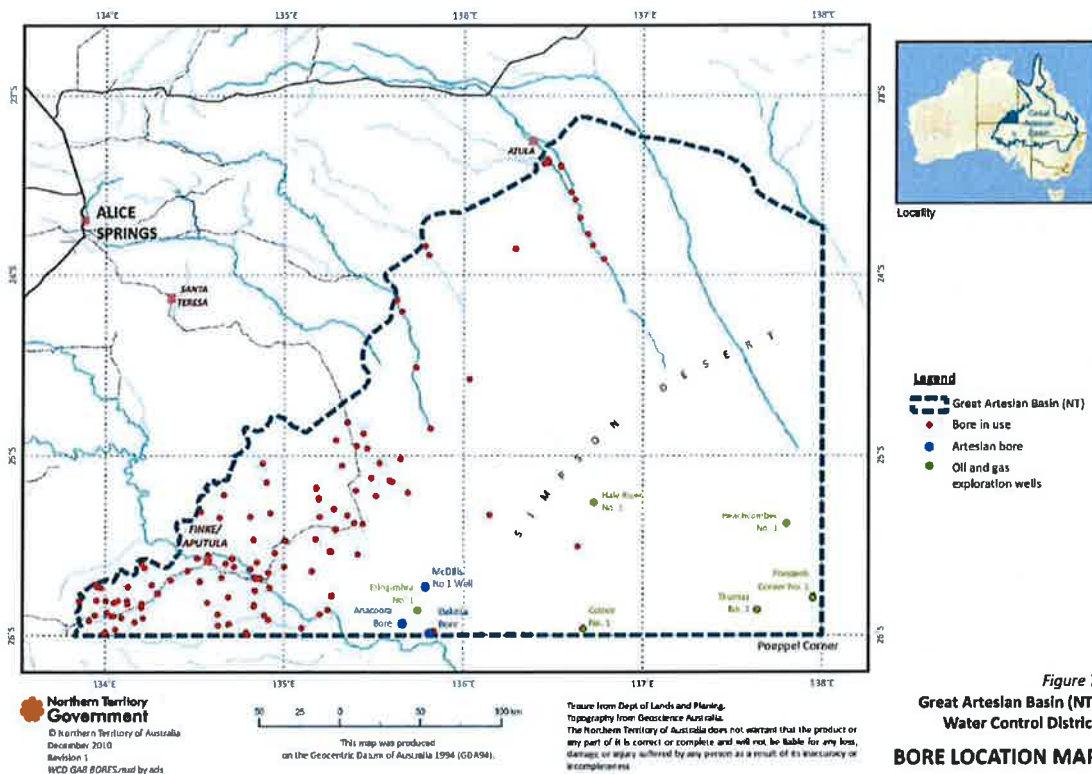
- Artesian bore.
- Had upward losses of GAB water (hence was artesian flowing).
- Successfully controlled with no residual flows.
- Intended to have pressure monitoring head-works installed within the next two years with funding from the GAB sustainability initiative program.
- In 1898 the first Artesian bore Anacoora was completed.

Dakota

- Artesian bore.
- Was cemented off below the surface.

McDills

- Artesian bore.
- Was rehabilitated with a controlled environmental flow (Humphreys and Kunde 2008).
- Intended to have pressure monitoring head-works installed within the next two years with funding from the GAB sustainability initiative program.
- Environmental discharge from the J aquifer at McDills bore is estimated to be 250ML/year.



Rehabilitation of flowing bores in the Northern Territory portion of the Great Artesian Basin

Humphreys, G; Kunde, B;

Northern Territory Department of Infrastructure Planning and Environment. Natural Systems Division.
<http://www.territorystories.nt.gov.au/handle/10070/251064>

“NOTE – this report was unfinished when staff involved left the Department. It was subsequently tidied up and updated with subsequent monitoring data. It has the status of DRAFT in recognition of some gaps and inconsistencies. John Childs, Alice Springs, 2008.”

MAJOR POINTS OF INTEREST

1. The overall aim of significantly reducing wastage of water and of artesian pressure was achieved.
2. “There are possible issues of inter-aquifer contamination arising from inadequate bore construction in the sub-artesian fringe. These issues are not addressed in this report.” – no mention of hydrocarbons.

Anacoora

- Non-petroleum bore
- Sunk by the South Australian Government in 1898.
- Total Depth was 381m
- Artesian water struck at 346m
- *“The bore was an experiment to test the country for artesian water, with a view to providing a stock route to Queensland. The question of stocking the country surrounding the bore was scarcely deemed worthy of consideration, and when water was located, therefore, and an inspection of the country a few miles eastward disclosed a continuation of sandhills, all future boring operations were cancelled, and a bore with a flow of 700,000 gallons per day was left unoccupied.”*

Completion details

- By cementing the stainless steel casing to the surrounding shale, upward losses of GAB groundwater have been contained.
- Losses into the sand and limestone bands within the shale but below the cemented casing are expected to be minimal, and the rehabilitation has been successful in restricting wastage.

Dakota

- Non-petroleum bore
- *“There is no knowledge of the drilling date, purpose, or original flow – total depth is stated as 1600 ft (488m) on the bore data file, but the information on file is clearly not original.”*

Completion details

- No artesian supply has been established at Dakota, and the bore has been cemented below surface.
- No supply has been established at the site of Dakota Bore. If the traditional owners wish to establish a community water supply at the location, then a new bore would need to be drilled to current standards.
- The monitoring bore was drilled to 30m deep, but only 13m of casing was inserted as “soft flowing sands” caused the hole to collapse beneath that point.
- The casing has no surface cement or concrete block, and is crooked at shallow depth, so should not be used as a water supply.
- In any case the water chemistry recorded for Dakota is not potable, although would be suitable for an emergency supply.

McDills

- The 1/7 petroleum bores drilled within the GAB. 6 of those were plugged on completion and do not require rehabilitation.

- “McDills No 1 was drilled by Amerada Petroleum in 1965 to a depth of 10,515 feet, with outer casing 13 3/8inch and inner casing 9 5/8 inch to about 1000m. Artesian water was struck at 715m. The bore was cement-plugged then the casing shot from 594 – 596m and was completed with headworks as a water bore (designated RN 5028). It is not known why the bore was completed in this way. Soon after completion the headworks corroded, allowing the bore to flow freely (D. Woolley pers comm).”

Completion details.

- Bore diagram below.
- Good for horticulture, eg dates, but very remote.
- OK for emergency use.
- Not suitable for long-term potable consumption.
- Being used by large herds of camels, herds of horses, and numbers of cattle with Andado pastoral lease ear tags.
- McDills is the most reliable source for continual pressure data of the GAB aquifers in the Territory, although it represents a mixture of aquifers due to construction (or poor construction).

