Legacy Uranium Production sites in Northern Territory, Australia

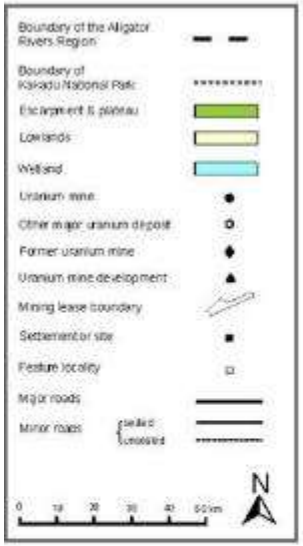
Peter Waggitt

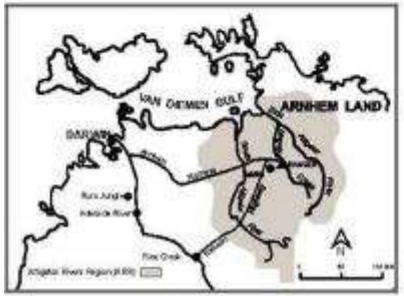
August 2018

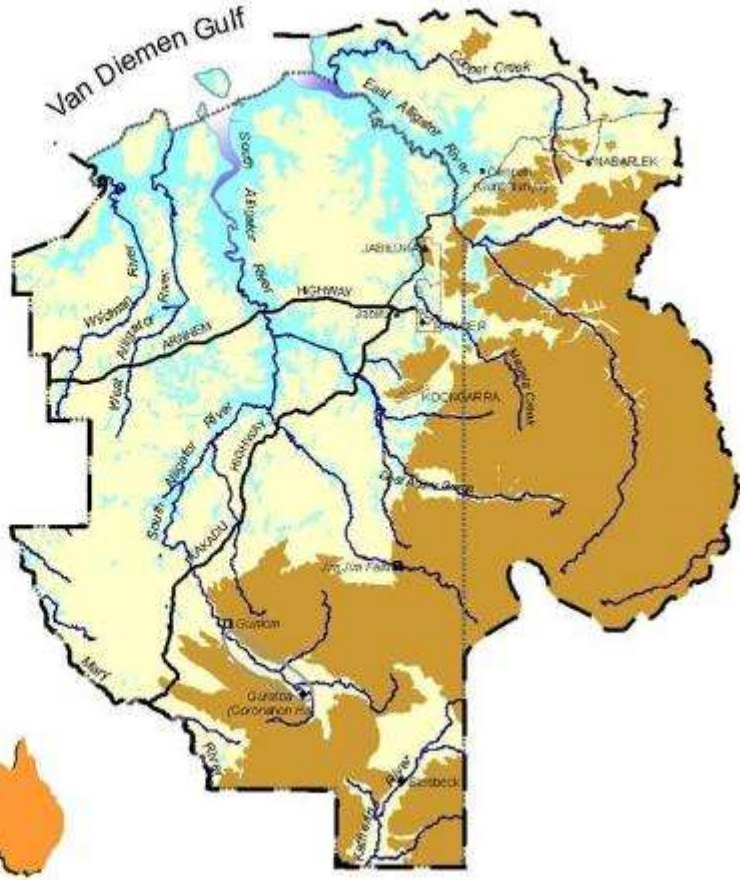
DEPARTMENT OF **PRIMARY INDUSTRY AND RESOURCES**

AUSTRALIA'S NORTHERN TERRITORY

Alligator Rivers Region







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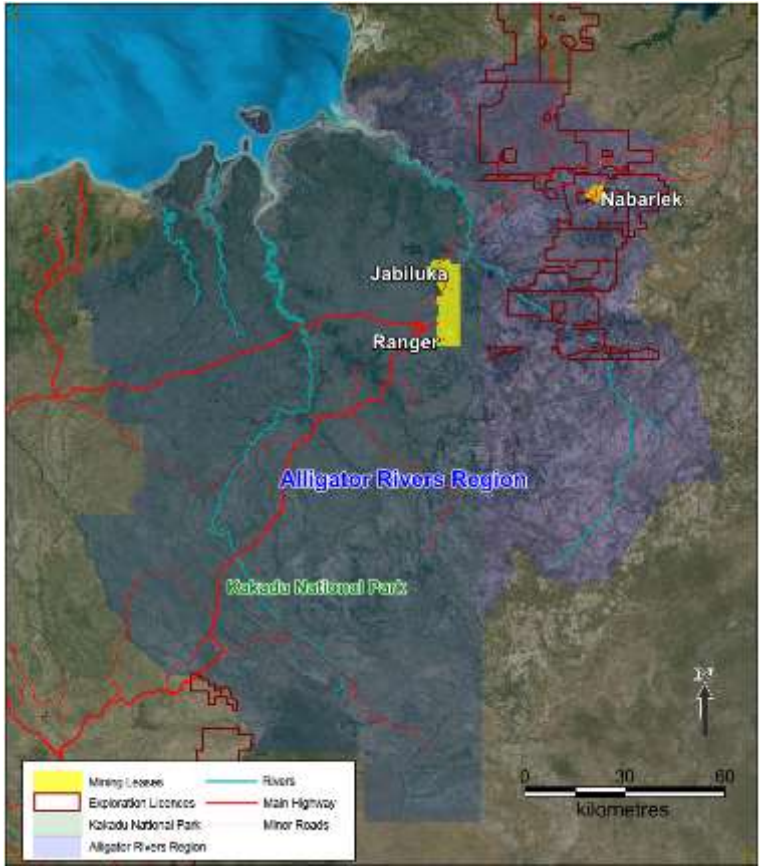
AUSTRALIA'S NORTHERN TERRITORY

NT and Uranium mining

- More or less continuous the end of WW2
  - Rum Jungle, South Alligator field, Moline, Westmoreland (1950-60s)
  - Nabarlek (1978-88), Jabiluka development work
- Currently only Ranger Mine is operating
  (Energy Resources of Australia)



AUSTRALIA'S NORTHERN TERRITORY

Uranium and the Northern Territory

- A long history…
  - 1869: Goyder found a green coloured mineral "*that was not copper"* – torbernite perhaps?
  - 1912, Dr H L Jensen, the then Government Geologist, reported the existence of uranium in the Rum Jungle area
  - 1949: Jack White found Uranium at Rum Jungle
  - 1953: Bruce Walpole found U at Coronation Hill
    - Contemporary finds included Adelaide River, Sleisbeck and all the other South Alligator Valley deposits - Scinto 1-6, Rockhole. El Sherana, Saddle Ridge, etc
  - Queensland Border area
  - Alligator Rivers Region

The good old days……

Whites Open Pit, Rum Jungle Mine

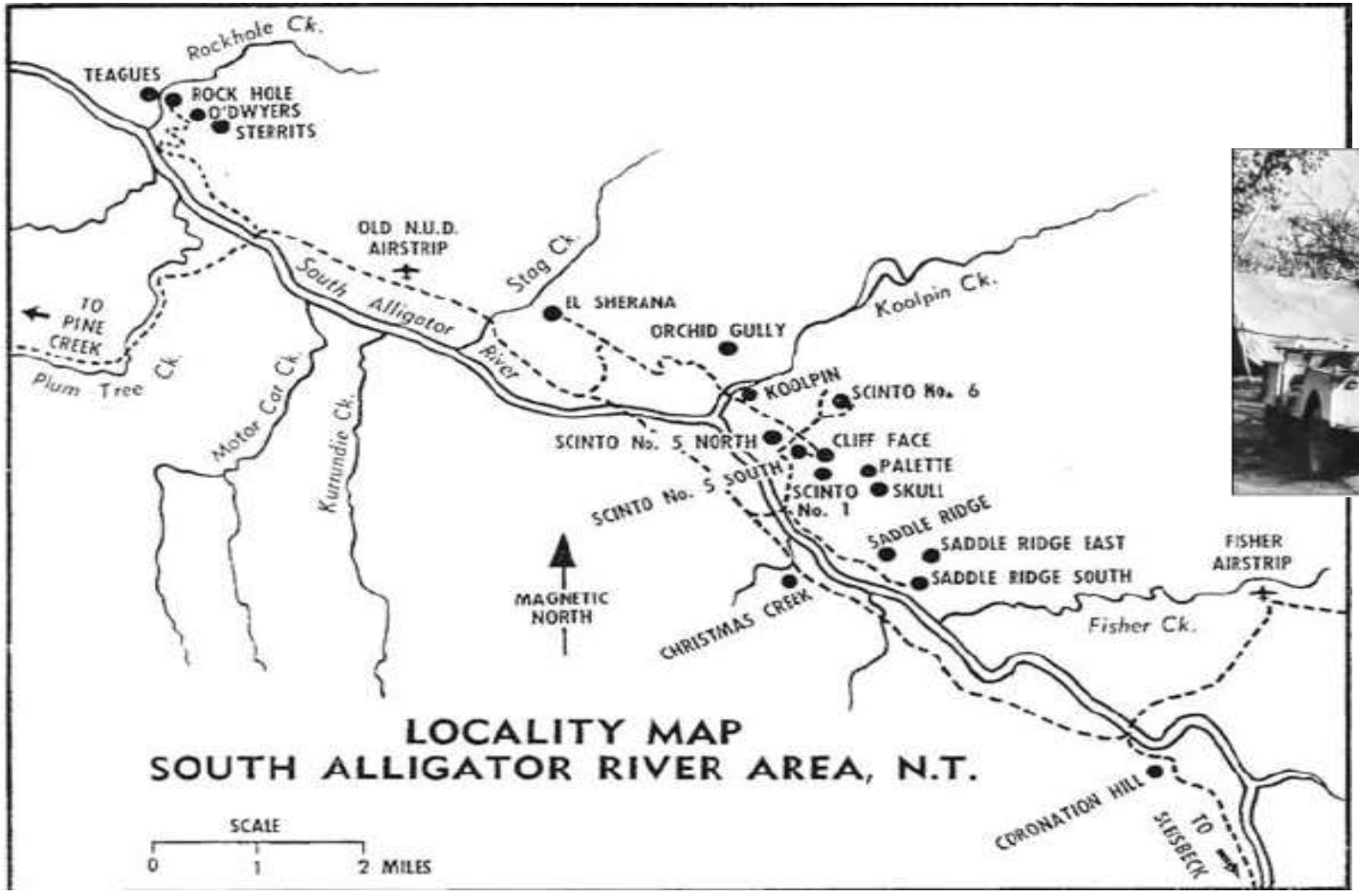
Since 1954 Uranium mining activity has been more or less continuous in the NT

- Rum Jungle - now the focus of a remediation planning project
- Significant deposits were found in the Pine Creek geosyncline and up into the Alligator Rivers Region
- South Alligator Valley

  - 54 radiological anomalies; 19 mine sites
    - Commonwealth funded hazard reduction works
    - Adelaide River and Pine Creek areas
- Other minor sites at Westmoreland and Adelaide River
- 1960s exploration led to Nabarlek, Ranger , Koongarra and Jabiluka
- Ranger operating since 1980
- Other recent but small finds throughout the NT

AUSTRALIA'S NORTHERN TERRITORY

South Alligator Valley – early activity



AUSTRALIA'S NORTHERN TERRITORY

South Alligator Uranium Field

- Operated between 1959 and 1965
- The total production for this field was approximately 840 tonnes of $U_30_{8.}$
- Area now stage 3 of Kakadu NP
- Need to clean up mining sites
- Program of survey and hazard reduction
- Studies and consultation began 1997
- Legacy sites remediated 2006-7

Sleisbeck open cut c. 1995

After remediation in 2007

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Hazard Reduction

Rockhole Mine, Shaft #3

SAV Mill, near Rockhole mine

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South Alligator Uranium Field Remediation

- Small field operated 1956-65
- 13 small mines produced about 850t U_3O_8
- Also a small mill
- Hazard Reduction works for public safety 1991-92
  - Physical safety
  - Radiological safety
- Remediation of sites 2007-8
- Extensive consultation from early 2000
  - Dry season working
  - Local people involved
- Containment completed 2008
  - Monitoring and management ongoing
  - Annual inspections and radiation checks
  - No radiological issues
- Traditional Owners to assess for completion


Photo: Joe Fisher


1992


2010


2015

SAV containment site

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Other Legacy Uranium sites

- Older mines in the Pine Creek area

  e.g. Fleur de Lys

  – Now lies within a gold mine that has been restarted a couple of times

- Adelaide River Mines – 100 km from Pine Creek; very small sites; remediated, but mostly physical safety issues
- Westmoreland area – Queensland border; remote and small; focus of new exploration interest

Rum Jungle Uranium Field

- Rum Jungle operated between 1954 and 1971 mining and processing copper and uranium ores; 2 main mines and 2 satellite sites
- The site was previously remediated on two occasions; the most recent works were completed in 1986
- Remediation was considered a success at the time and met the objectives set for the project
- AMD was substantially reduced as a result of the remediation, however situation does not meet current standards and there are signs of deterioration of the covers
- In 2009, a National Partnership Agreement between the Australian and the Northern Territory government investigated what further remediation was required
- A preferred rehabilitation strategy has been developed in consultation with stakeholders and is currently undergoing optimisation and finalisation
- An Environmental Impact Statement is currently being prepared for the implementation of the preferred rehabilitation strategy
- A decision on financial commitment for rehabilitation of the site will be made on finalisation of the preferred rehabilitation strategy
- Some remedial action at RJ Creek South this year on old WRD covers

Rum Jungle April 2004

Photo: Michael Waggitt

AUSTRALIA'S NORTHERN TERRITORY

Nabarlek Mine

- Operated 1979-1980
- Produced about 10,800t U_3O_8
- Decommissioned and remediated during the 1995-6 wet season
- Initial seeding quite successful
- Severe impacts on vegetation from Cyclone Monica in 2006
- Revegetation recovery ongoing and generally satisfactory
- Some issues related to infrastructure removal still to be completed
- Minor clean up works planned
- Weed management & erosion control programs in place
- Monitoring of water still ongoing
- Regular inspections by regulators and stakeholders
- Still an active exploration program here

AUSTRALIA'S NORTHERN TERRITORY

Jabiluka

- Deposits discovered in 1971 & 1973
- EIS approved 1979
- Development on hold after 1983 election
- ERA purchase site 1991
- New EIS submitted 1997
- Development decline excavated 1998-9
- Development stopped 1999
- Care and maintenance begun 2003
- Site majority remediated by end 2003
- Pond remediated 2013
- Revegetation underway; monitoring continues

1998 – Portal & decline construction

Site in 2002

2018 – Portal area

Ranger Uranium Mine – Major Activities

- Stockpile processing, continues; included laterite ore until Q 1 2018
- Production for 2017 was 2089 tonnes U_3O_8
- All U_3O_8 production to cease by January 2021
- Radiation Protection team still in place and actively monitoring all aspects of the operation; no significant issues
- Development of Mine Closure Plan including closure criteria is ongoing
- Updated Mine Closure Plan to be released shortly
- Continuing closure-related works in progress:
  - Direct disposal of tailings from mill to Pit 3
  - Dredging of tailings to transfer from TSF to Pit 3
  - Operation of Brine Concentrator for process water
  - Revegetation work ongoing at Trial Land Form
  - Some work to modify (notch) the east wall of the TSF
- Commenced first phase backfill of Pit 1, work well advanced
  - Expressed pore water from drainage system collected and returned to process water circuit for treatment

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Ranger Uranium Mine 2018

Tailings disposal - Pit 3

- Mining ceased late 2012; underfill of ~30M t waste rock placed and under-drains installed by the end of 2013
- Schedule call for total of ~23M t of tailings to be moved from TSF to Pit 3 by 2020
- Dredge arrived on site in September 2015 with commissioning completed May 2016
- As of Q1 2018 the task was about 33% complete with work rate now meeting design specifications.
- Sub-aerial deposition initially now becoming sub-aqueous
- Mill tailings reporting directly to Pit 3 since late 2014

Ranger Mine
Pit 3 Tailings disposal
September 2017

Ranger Uranium Mine 2018

Pit 1 Back fill

- Pit 1 closure works saw 7700+ wicks installed in the tailings in 2012
- Followed by a geotextile layer and an initial preload of waste rock to commence consolidation of the tailings.
- The rock surface was capped with laterite to allow rainfall to be collected as non-process water
- Expressed pore water is collected in a dewatering sump and pumped to the process water circuit for treatment
- Placing backfill of waste rock commenced in April 2017
- ~12.2Mt waste rock to be placed project on schedule for completion Q2 2018.
- Final landform design under way; cover will be clean waste rock

Ranger Pit 1
August 2017

AUSTRALIA'S NORTHERN TERRITORY

Summary

- NT has a long history of uranium mining
- Ranger uranium mine is the only mine operating at present and remediation planning and activities are well advanced. Ranger has to cease processing in 2021 and clear site by 2026
- Many legacy sites from earlier times; majority remediated
  - One “modern” remediated site - Nabarlek
  - One site revegetating - Jabiluka
  - One legacy site under remediation – Rum Jungle
  - South Alligator remediation and containment project is complete; Long Term Surveillance and Monitoring program in place
  - Other legacy sites are being managed by LMU
- Revegetation is progressing at Nabarlek and Jabiluka
- LTSM programmes being developed for Ranger, Nabarlek and Jabiluka

Thank you

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