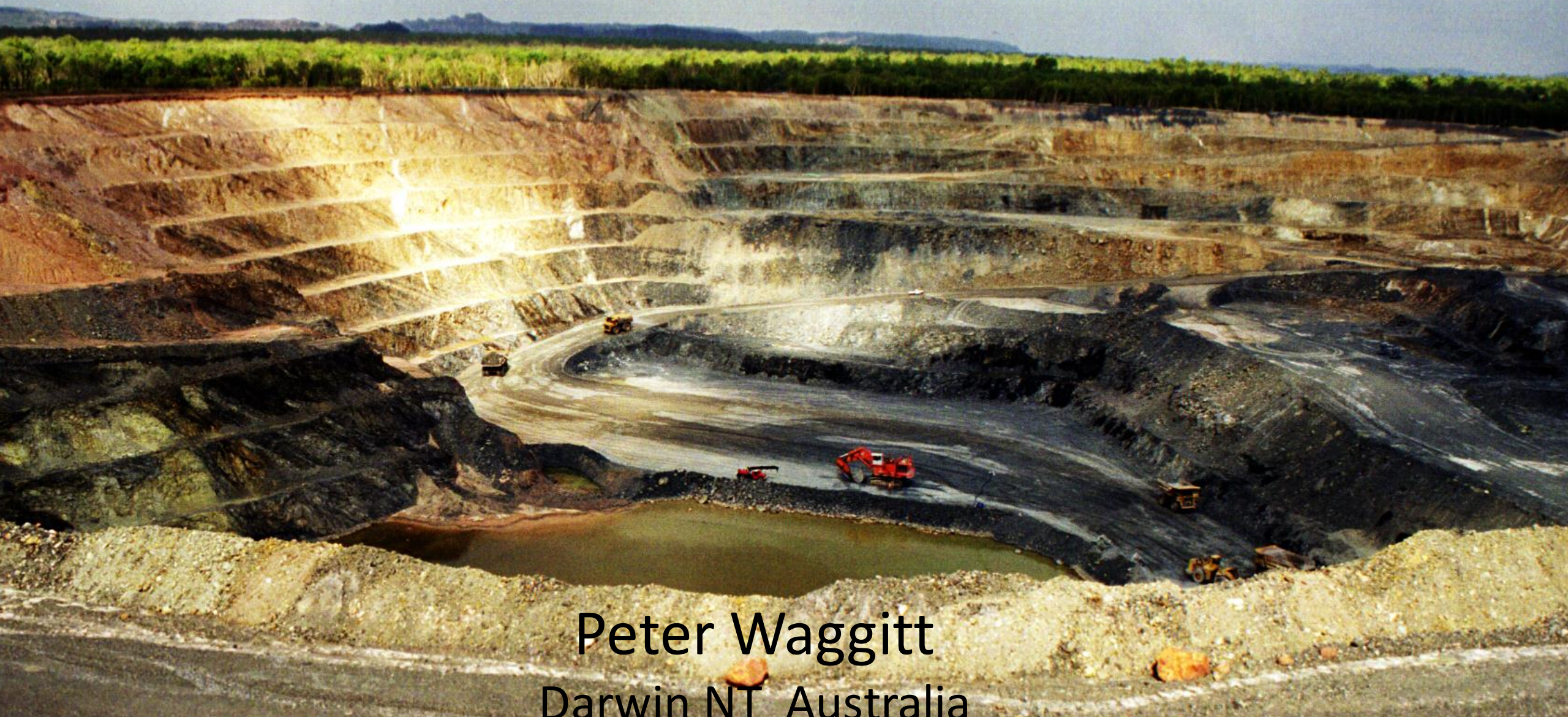


# Uranium mine remediation in Australia's Northern Territory



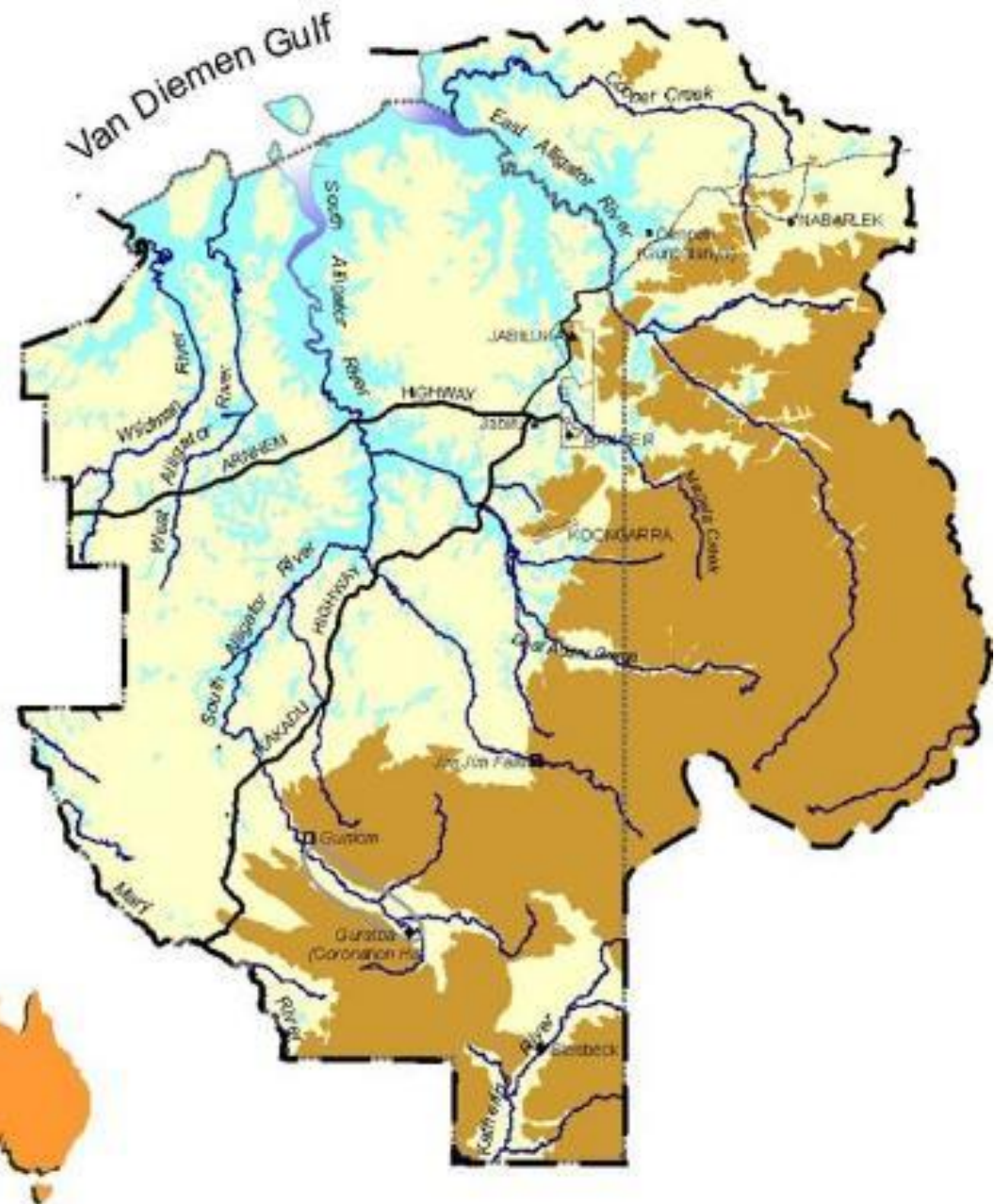
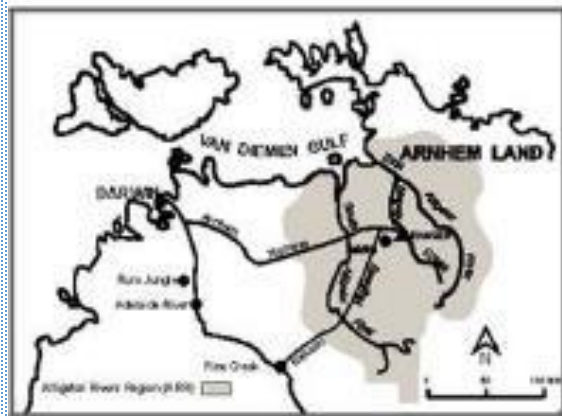
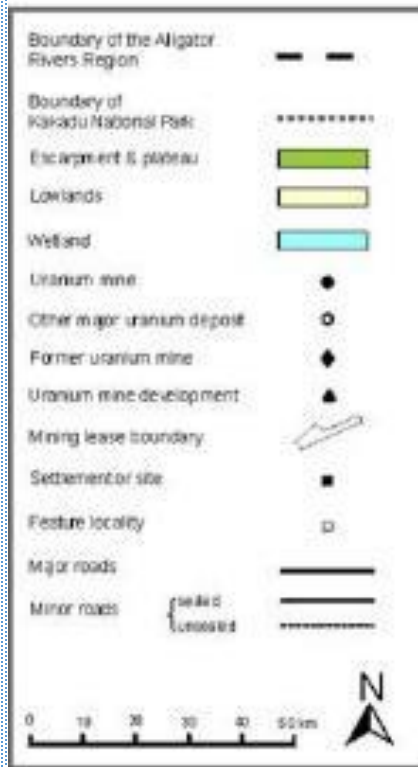
Peter Waggitt  
Darwin NT Australia

# NT and Uranium

- NT has a long association with uranium
  - Early days – 1912 Goyder’s discoveries, etc
  - Rum Jungle – 1949 White’s discovery; 1954-71 - Cu & U mining
  - Adelaide River - 1955-64 – Minor deposits
  - South Alligator Valley - 1955-64: 13 mines producing ~850t  $U_3O_8$
- Recent & Current activities
  - Nabarlek- 1980-89; ~11,800t  $U_3O_8$
  - Jabiluka – 1980s discovery; EIS; Development decline ~1700 m; closure in C&M and revegetation
  - Ranger – Longest currently operating U mine in Australia
- Other prospects
  - Koongarra; Angela/Pamela; Biglyri; Angularli, etc



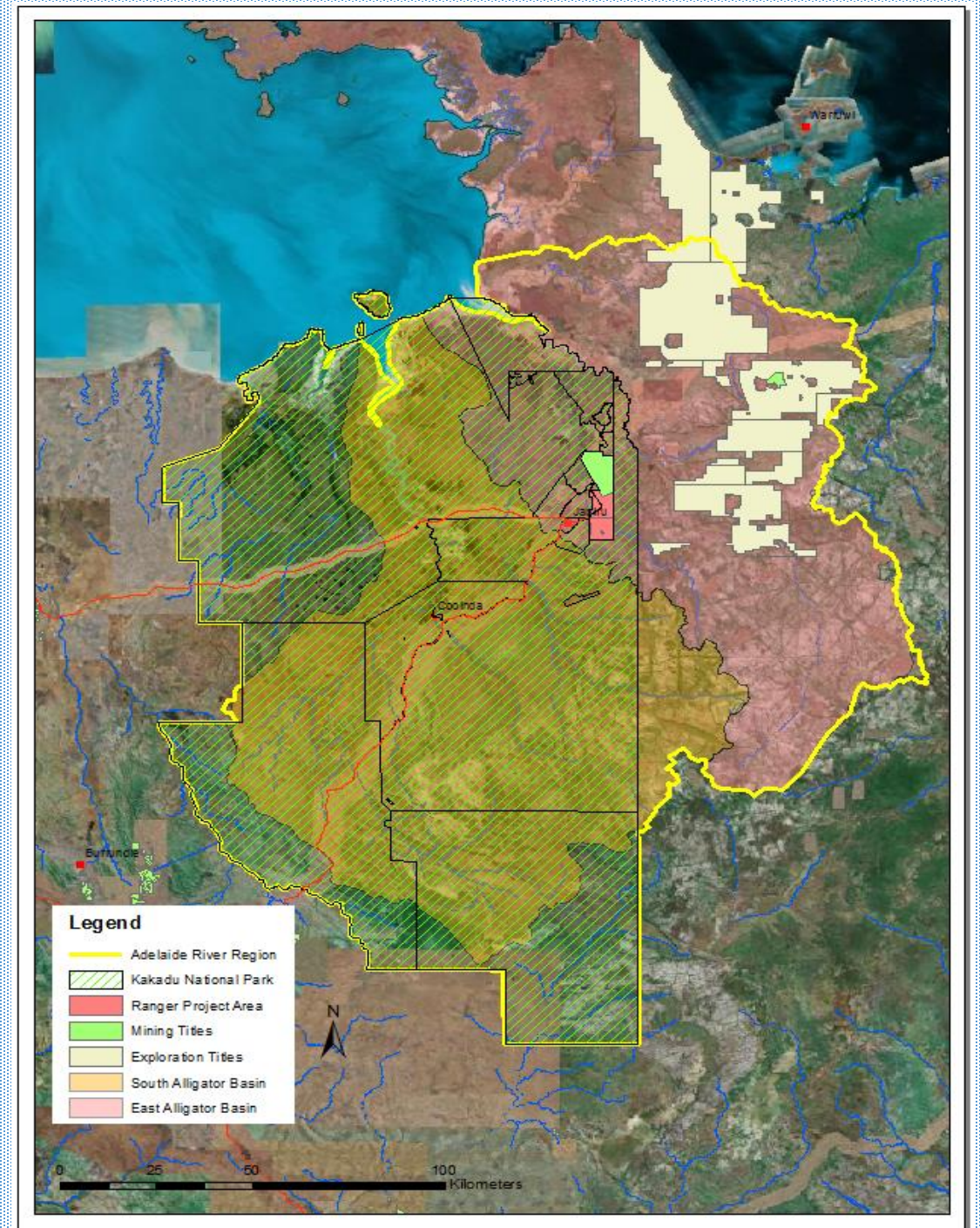
# Alligator Rivers Region



# NT and Uranium mining

Concentrated in the Pine Creek Geosyncline, especially ARR

- Currently only Ranger Uranium Mine operating
  - Unique location surrounded by WH dual-listed Kakadu National Park
  - Scheduled to cease processing in January 2021
  - Completion of remediation due by January 2026
  - Jabiluka prospect under LT C&M
- Previously production at:
  - Rum Jungle – remediation (3dr attempt) underway
  - South Alligator - remediated
  - Nabarlek – remediated
- Exploration continues
  - Three operators
  - 5 projects



# Ranger Uranium Mine

- Discovered by airborne survey 1969
- Two public inquiries 1977 & 1978
- Began operations 1980
- Open pit mining from 2 pits
  - #1 1980-1995
  - #3 1997-2013
  - Underground resource (R3D) only explored c.2500m decline and 400m crosscut
  - Processing to end January 2021
  - Remediation to complete January 2026
- Production
  - Lifetime  $U_3O_8$  production to date c.128,000 t

## Remediation

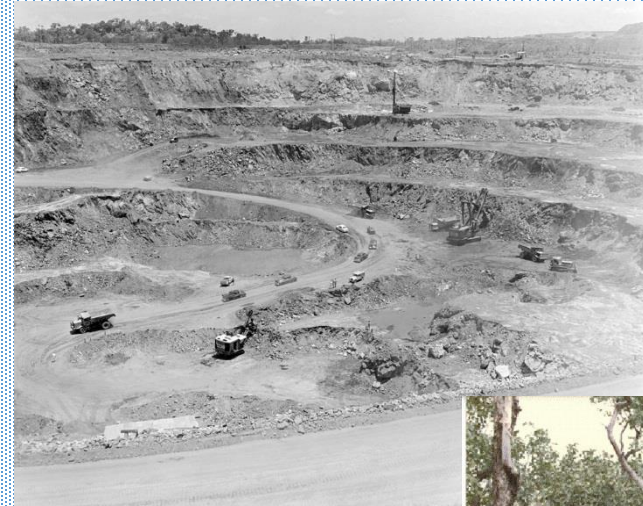
Progressing at Jabiluka and Ranger sites



# Uranium Mine Remediation

## Three “phases of production”

- Rum Jungle 1949 to 1964
  - Site remediated in 1976 and 1986
  - New program underway since 2008
- South Alligator Valley 1959 to 1965
  - Hazard reduction works 1991-2
  - Sites remediated 2006 & 2007
- “Modern production”
  - Nabarlek 1979 -1988; production ~ 10,800t  $U_3O_8$ ; remediation in 1995
  - Ranger 1980 to present; progressive remediation has begun

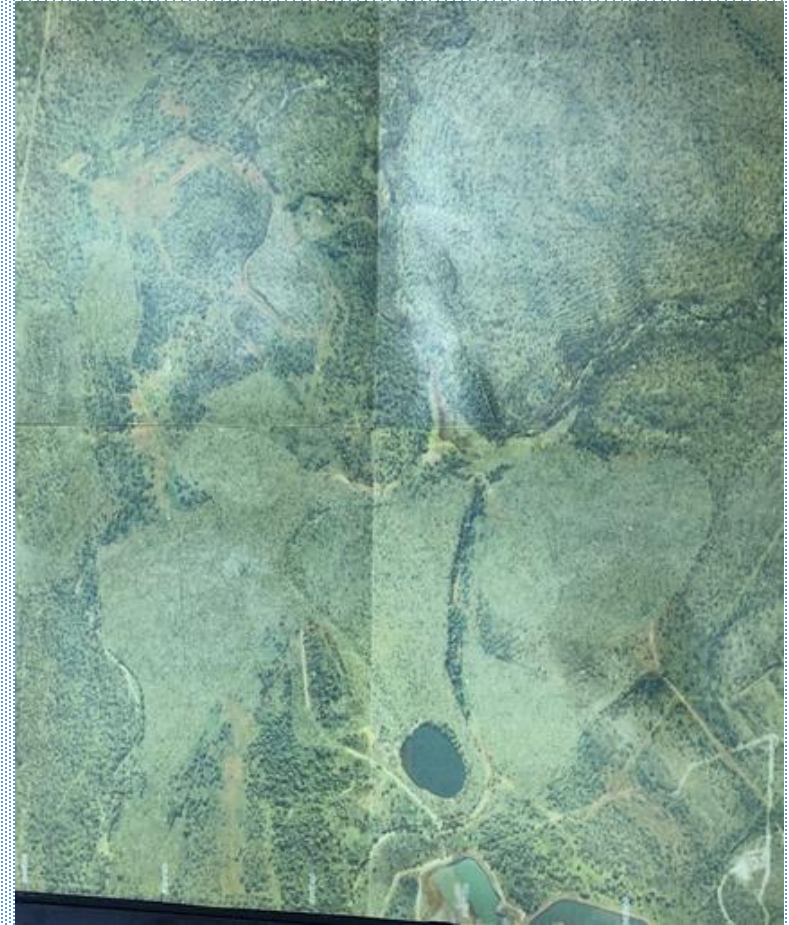
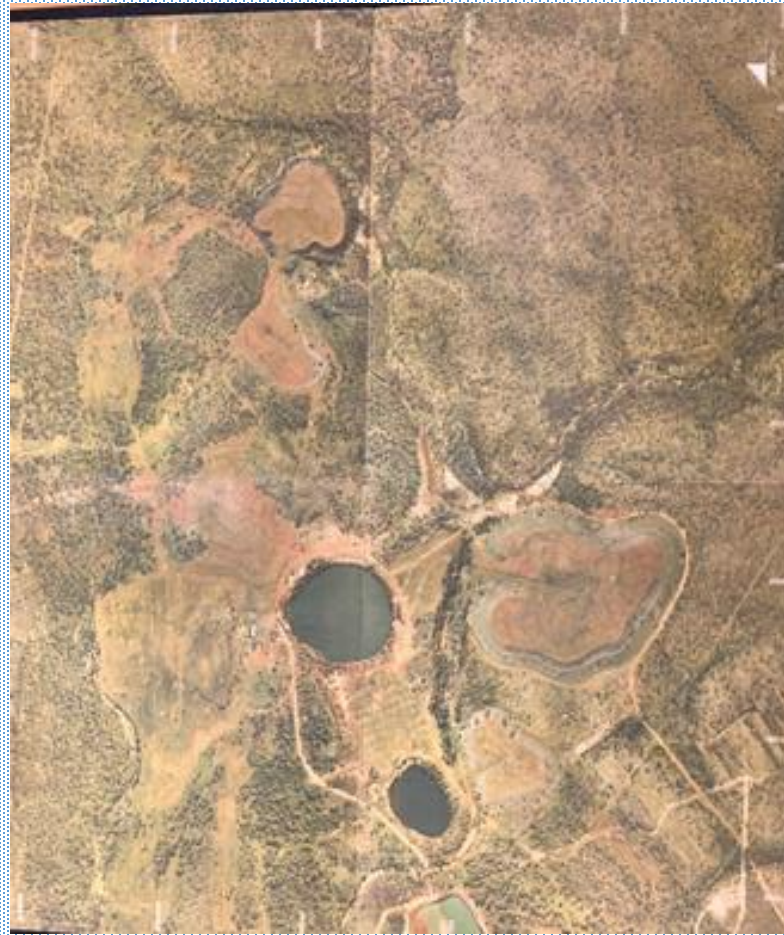


# Rum Jungle

- Operated 1949 to 1964, uranium and copper production
- No initial remediation
- Simple clean up 1976
- Remediation 1986; \$18.6 m;
- Report of failure of covers to maintain specification 2000
- Review of situation 2003-4
- New project devised 2004/5
- New National Partnership Agreement with Commonwealth 2007
  - New studies and designs; ATO consultation
  - Issues of AMD; Aboriginal Land; adjacent mining activity
  - Renewal of agreements
  - Work on going with final designs being completed after agreements with TOs



# Rum Jungle





# South Alligator Valley 1959 to 1965



Production ~ 850t U<sub>3</sub>O<sub>8</sub> from 13 small mines

Area designated as Stage 3 of Kakadu National Park

- WH dual listed

Survey & inventory 1986

Hazard reduction (radiological and physical) 1995

- Dose constraint of 0.3mSv/y met due to limited residence times

Comprehensive planning process commenced 2000

Studies and plan development 2002-2004

Finance & implementation 2006-7

- Radiological sign off achieved with no problems

Monitoring and surveillance ongoing

Sign off being considered by stakeholders

# South Alligator Valley



1956



1992



2015

# Jabiluka

- Discovered 1971 (I) and 1973 (II)
  - Total resource 163,000t U3O8 @ 0.53%
- Never mined due to government changes
- Ownership changes, then government changes
- Underground exploration & development 1998
  - 1.8 km decline and cross cut; vent raise; workshops etc; water management pond
- Closed out in 2003
  - Backfill decline; remove infrastructure; clean pond ; partial revegetation
  - Removal of pond in 2013
- Under long term C&M
- Revegetation underway since 2005



# Jabiluka



2013 – removal of the interim water management pond



2015 – central area planting



April 2019 – recent inspection

# Koongarra

- Discovered by Noranda in 1970
  - Resource of 14,540 t  $U_3O_8$  @ 0.8%
- Only exploration bores and a camp
- Never mined
- Site handed back to Traditional Owner in 2013 and now part of KNP
- Titles ceased in 2019
- Site clean up and remediation commencing this year
- 2 dry seasons at least for work



# Recent - Nabarlek

- Discovered : 1970; proved up 1971
- Ore body mined in 1979 dry season (546,437t @ 1.84%  $U_3O_8$ )
- Operated 1979-1988 producing 11,084 t  $U_3O_8$
- Mothballed in 1989
- Remediation commenced and completed 1995/6 wet season
  - Tailings had been milled directly to the pit
  - Relatively little waste rock
  - Pond and pit filling and landscaping
  - Water management
- Revegetation on-going



1987



1995



1999



2006

# Current remediation - Ranger



Pit 1  
Backfill in  
progress

Pit 3  
Tailings  
deposition



# Ranger - Tailings



Dredge on Tailings dam - current



Underfill going into Pit 3 ,  
2014



Pit 3 looking East - 2019



# Ranger - Revegetation



Trial Land form at Ranger



# Summary and Conclusions

- NT has a long uranium mining history
- Early sites simply abandoned
- Some remediation failed to last
- Historic legacies are being remediated
- Recent remediation operations showing signs of success
- Ranger mine remediating progressively as operations wind down
- Lessons learned:
  - Stakeholder communications
  - Financing
  - Prior planning and regular updates

An aerial photograph showing a landscape with a central cleared area, possibly a road or a small field, surrounded by dense, green and brownish vegetation. The cleared area is light-colored and runs vertically through the center of the image. The surrounding vegetation is a mix of green and brown, suggesting a natural or semi-natural environment.

# Thank You

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