SEDIMENTARY URANIUM:
HOW IT WAS FIRST DISCOVERED IN THE FROME EMBAYMENT

5th Sprigg Symposium
“Regolith: Mineral Deposits & Environment”

Presentation
by
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“On the flanking Lake Frome Plains, drilling by Petromin NL, Exoil N.L. and Transoil N.L. has established the presence of uranium and radon gas in what is now regarded as a new sedimentary uranium province”

Annual Report SA Department of Mines 1969-1970
Questions to ask

What happened at this time to bring about this new discovery?

What favourable events took place? Were they commercial, economic, bureaucratic, scientific or coincidental?

What new geological understanding was gained?

Were there any new technologies involved?
Early time line
Uranium discovery in SA

1890  First record of Uranium in South Australia
1905  D. Mawson notes presence of sedimentary uranium in US, but suggests exploration in “granite country” in Australia
1906  Uranium/Copper association in Moonta mine
1906  Uranium rush to Radium Hill
1910  Uranium exploration boom at Mt Painter
Early time line
Uranium in SA

1929  E. de Hautpick raises possibility of sedimentary uranium in SA and publishes a pamphlet promoting its potential.

1944  Mineral Chemist R.G. Thomas suggests sedimentary uranium potential in Frome Embayment.

1948  R.C. Sprigg visits sedimentary uranium deposits in US.


1954  A.W.G. Whittle considers all SA uranium to be formed by late stage igneous phenomenon associated with granites.

1954-1961  Operation of Radium Hill mine
Why search for sedimentary uranium in the 1960s?

- Commercial opportunity for nuclear power generation from 1966.
- Commonwealth export controls relaxed in early 1967.
- Nickel Boom developing (1969-1970)
- US sedimentary U companies had SA interest from 1967.
- US visits by SA geologists from 1967-1968
- Exploration techniques improving eg down hole logging
- Rapid success (Beverley 1969)
Time line
Sedimentary Uranium in SA

1967    Kerr McGee Corporation starts exploring for sedimentary uranium on Eyre Peninsula.
1968    Petromin and Kerr McGee start sedimentary uranium exploration in Frome Embayment.
1969    Discovery of Beverley deposit
1972    Discovery of Honeymoon deposit
1974    Discovery of Gould’s Dam deposits
What is the time frame of Frome Embayment sedimentary uranium discovery?

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<tr>
<th>Location</th>
<th>Initial Licence</th>
<th>Discovery</th>
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<tr>
<td>Beverley</td>
<td>April 68</td>
<td>Nov 69</td>
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<tr>
<td>Honeymoon</td>
<td>July 68</td>
<td>Nov 72</td>
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<tr>
<td>Gould’s Dam</td>
<td>Jan 69</td>
<td>Nov 74</td>
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Kerr McGee
(US based and first sedimentary uranium explorer in SA)
Exploration approach

Eyre Peninsula (August 1967 – March 1969)

Aerial radiometric surveys (November – December 1967)

Field mapping and ground check of anomalies

Non cored rotary drilling programme (72 holes) of Cenozoic relying primarily on
down hole gamma, resistivity and self potential logs (July – August September
1968)

Frome Embayment (July 1968-July 1969)

Aerial radiometric surveys.

Non core rotary drilling (9 holes) of Quaternary and Mesozoic succession north of
the Beverley licence areas
Who were the successful explorers for sedimentary uranium 1969-1975?

PETROMIN GROUP

A conglomerate of entrepreneurs, local geologists and consultants, which included Geological Services Pty Ltd, Exoil NL, Transoil NL, Minoil Pty Ltd. Entrepreneur Bill Siller, was prominent.

MINAD TETON JOINT VENTURE

A JV involving Mines Administration Pty Ltd, an associate, later a subsidiary of CSR Ltd, and Teton Exploration Drilling Co Pty Ltd of Wyoming, initially privately owned, but later a subsidiary of the US based United Nuclear Corporation.
Who were the successful explorers for sedimentary uranium 1969-1975?

ERIC RUDD PTY LTD
The private consulting company of Professor Eric Rudd, University of Adelaide.

SEDIMENTARY URANIUM NL
Public Exploration Company, based in Sydney, with an authorised market capitalisation of $20 million focussing on the exploration for sedimentary uranium in South Australia.

CARPENTARIA EXPLORATION NL
Exploration subsidiary of Mount Isa Mines Pty Ltd.

PACMINEX NL
Exploration subsidiary of CSR Ltd.
Beverley Discovery

April 1968  First exploration licence over Frome Embayment by Petromin Group adjacent Mt Painter block

September/
October 1968  Additional exploration acreage obtained by Petromin Group

October 1968  Aerial Scintillometer Survey shows anomalies along modern watercourses

February/
June 1969  Reconnaissance drilling found anomalous uranium

November 1969  First hole “closer to range” intersects Beverley deposit
<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>July 1968</td>
<td>Carpentaria Exploration takes out Exploration Licence on and adjacent Olary region. Initial focus on basement rocks.</td>
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<tr>
<td>August 1969</td>
<td>Anomalous uranium in groundwater from water wells. Aerial anomalies also determined along drainage system.</td>
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<tr>
<td>End 1971</td>
<td>Carpentaria determination of South Eagle prospect.</td>
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<tr>
<td>September 1972</td>
<td>Carpentaria Joint Venture with Minad-Teton JV</td>
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<td>November 1972</td>
<td>Minad JV discovers Honeymoon resource noting that alteration characteristics, radioactivity and sandstone thickness in a buried paleochannel as critical indicators</td>
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<tr>
<td>September 1973</td>
<td>Minad / Carpentaria JV with Sedimentary Uranium NL in adjacent Exploration Licence</td>
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<tr>
<td>September 1974</td>
<td>Detailed report on Honeymoon resource by all JV partners.</td>
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Gould’s Dam Discovery
First Stage

January 1969  Eric Rudd Pty Ltd takes out Exploration Licence.

Jan- June 1969  Examination of extant water well records.

Collection of new water well samples for radioactivity testing.

Re-examination of existing petroleum aeromagnetic surveys, tentative determination of paleochannels.

Examination of existing holes for lignite and evaporites.

Late 1969  Ten Hole drilling programme, close to mineralisation.

February 1970  Exploring for ‘fronts’ in the sands between oxidised and unoxidised areas.

Mid 1970  Anomalous uranium bearing sediments determined
Gould’s Dam Discovery - Second Stage

February 1971  Exploration Licence taken out over same area by Pacminex with Rudd maintaining an interest and acting as consultant.

Rest of 1971  Experimental geophysical surveys including gravity, resistivity and magnetics by Government together with additional low level magnetics and scintillometer survey.

February 1972  Paleodrainage determined

September 1972  Farm in by Esso Minerals

January 1973  Completion of 53 hole drilling program by Esso without success. Withdrawal from JV.

February 1973  Pacminex report anomalous uranium

November 1973  Minad-Teton JV

November 1974  Discovery of Gould’s Dam deposits
Role of Government

- Ongoing interest in Uranium eg Bulletin on Mt Painter 1971
- Report on water resources in Frome Embayment 1965
- Subsequent contribution of staff to exploration
- Field Mapping 1970-1990
- Stratigraphic Drilling 1972 with follow-up stratigraphic base.
- Experimental ground geophysical surveys 1971
- Environmental assessment
- Stored data
What were the successful ingredients of sedimentary uranium exploration 1968-1975?

- Supporting regulatory regime
- Rapidly established US links providing technical, financial and market support
- A mix of large companies, new companies, associated consultants
- Inspiration from universities viz Professor Eric Rudd
- Experienced locally based geologists
- Joint ventures including up to 4 separate parties
- Close liaison with State Government, which provided regional mapping, drilling, experimental geophysics etc
- Availability of risk capital often from companies associated with petroleum
- Persistence and Luck