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Territory
Government

NORTHERN TERRITORY GEOLOGICAL SURVEY

RECORD 2009-003



Bringing Forward Discovery: two-year report

**Report on activities and achievements
in the first two years of the initiative,
1 July 2007–30 June 2009**

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**Darwin
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EXECUTIVE SUMMARY

Bringing Forward Discovery is a four-year (2007–2011) \$14.4 million Northern Territory Government exploration investment attraction strategy designed to improve the Territory's competitiveness as a destination for exploration investment, and to increase the likelihood of new mineral discoveries.

Bringing Forward Discovery has three main components:

1. Continued acquisition and delivery of high-quality pre-competitive geoscientific data, including regional gravity surveys and geoscience mapping programs, to stimulate exploration and lower exploration risk in greenfields areas (\$11 million over four years).
2. A program of collaborations with industry for drilling and geophysical surveys in greenfields regions (*Geophysics and Drilling Collaborations*). The industry collaborations provide funding of 50% of exploration costs (up to \$100 000) for selected projects that are assessed to have the greatest potential to open up under-explored areas of the Territory (\$2.4 million over three years, commencing in 2008/09).
3. Continued promotion of the Territory as an attractive destination for exploration and mining investment (\$1 million over four years).

Implementation of the initiative is the responsibility of the Northern Territory Geological Survey (NTGS) within DRDPIFR.

During *Bringing Forward Discovery*, mineral exploration expenditure in the Northern Territory has reached record levels (\$146.2 million during 2008/09) and the NT has increased its share of Australian exploration expenditure. The Territory has significantly improved its expenditure relative to competitor states such as South Australia and, to date, has maintained its levels of expenditure better than any other Australian jurisdiction during the downturn.

During *Bringing Forward Discovery*, the Territory has seen an exploration boom for copper-gold in the Tennant Region, phosphate in the Georgina Basin, nickel, copper, uranium and rare earths in the Arunta Region, petroleum and coal in the Pedirka Basin, and uranium in the Amadeus Basin, Ngalia Basin and Murphy Inlier region. Exploration in the Pine Creek Orogen and McArthur Basin has remained strong, whereas activity in the Tanami has been relatively limited. A number of new discoveries, maiden resources and significant resource upgrades have occurred across the Territory during *Bringing Forward Discovery*, significantly adding to the Territory's resource base.

Results and outputs

Selected achievements and outputs of *Bringing Forward Discovery* to date are summarised below.

Regional Geoscience Programs

Targeted geoscience programs in greenfields areas including geological mapping, and modern geoscientific analysis to enhance regional prospectivity

- 30 new scientific publications (reports, records, and refereed publications), 5 new maps and 20 new GIS products have been released by NTGS during *Bringing Forward Discovery* to date.
- Fundamental breakthroughs have been made in understanding the prospectivity of the Arunta Region, and promoting this prospectivity to industry.
- New copper-gold prospects have been discovered by NTGS in the Harts Range area, suggesting a link between copper-gold mineral systems and 1780–1760 million year old granites in central Australia.
- A deep seismic survey has been completed across central Australia in collaboration with Geoscience Australia, to assess the hydrocarbon potential of the Georgina Basin and mineralisation pathways in the Arunta Region.
- The discovery of the Territory's oldest rocks in western Arnhem Land has established a link between Archaean inliers and the Territory's richest uranium deposits.
- A major breakthrough in understanding the Pine Creek Orogen has led to the identification of distinct terranes with differing prospectivity and commodities, and suggests that the Alligator Rivers Uranium Field is geologically different to the rest of the Northern Territory.
- The Northern Territory's flagship geoscience publication, "The Geology and Mineral Resources of the NT", is now in an advanced draft form with publication planned for 2010.

- The first edition of the Metallogenic Map of the NT has been released.
- There was record attendance at the AGES2009 conference in Alice Springs, despite the global economic downturn, reflecting strong industry interest in NTGS's geoscience programs.

Gravity Surveys

Regional helicopter-supported ground gravity surveys to measure the density of underlying rocks, in order to assist undercover exploration targeting,

- Coverage of the NT with high-resolution regional gravity has increased from 9% to 27% in the past two years, and is projected to be 38% by the end of the initiative.
- Nearly 20 000 new gravity stations have been acquired over 232 000 km², focused on the Arunta Region and Georgina Basin (central Australia and Barkly region, respectively), with significant industry participation in the surveys.

Geophysics and Drilling Collaborations

Industry collaborations to provide funding of 50% of exploration drilling or geophysics costs (up to \$100 000) for projects that are assessed to have the greatest potential to open up under-explored areas of the Territory.

- Round 1 of the Collaborations program resulted in five drilling programs and four geophysical surveys being completed, with results of strong geological merit that are likely to stimulate and assist further exploration targeting.
- Round 2 of the program (2009/10) attracted 40 applications (a 42% increase on Round 1) with 14 applications (twelve drilling programs and two geophysical surveys) receiving funding.

Geoscience Knowledge Management

Attracting exploration by effectively managing and distributing geoscience knowledge and data, including making all information compatible and more readily available.

- Distribution of minerals and petroleum exploration reports has increased from 9785 in 2006–07 to 18 614 in 2008–09.
- In 2008–09, 6384 NTGS products were distributed, and the InfoCentre handled 4533 client enquiries.
- The NTGS Oracle geoscientific database is well advanced, with completion of the Proof-of-Concept phase of the project. The geochemistry component of the database is approaching suitability as a production database.
- All open-file minerals company reports (about 14 800) are now scanned and available in digital format, with scanning of petroleum reports now well underway. All of these reports will be made available online by the end of the initiative.
- Testing, staff training and building modifications have been undertaken in advance of the delivery of NTGS's hyperspectral core logger (Hylogger) in late 2009, as part of the Northern Territory involvement in the National Virtual Core Library.

Promotion and Investment Attraction

Improving the Territory's competitive position in a globally competitive market for resource investment, through pro-active investment attraction activities

- The NT has raised its profile amongst Chinese explorers, through a sustained strategy including six outbound industry delegations to China, promotion of 53 exploration projects in China, and 67 inbound visits by Chinese companies to the NT.
- The Territory has undertaken two industry delegations to Japan, including dedicated NT investment seminars in Tokyo and numerous meetings with Japanese corporations.
- The Annual Geoscience Exploration Seminar has continued to increase its attendance every year, with over 200 delegates in 2009, even during the worst of the global industry downturn.

Outcomes for the Territory

Under *Bringing Forward Discovery*, the NT has experienced increased exploration activity and discoveries, and has increasingly become a preferred location for exploration investment. Specific outcomes include:

- The Territory has experienced an unprecedented exploration boom since the commencement of the initiative, with the Territory outperforming all other jurisdictions in growth in exploration expenditure.
- The Territory's share of Australian mineral exploration has increased from 5.3% to 6.6%, with the Territory being the only jurisdiction to maintain record levels of expenditure through the global financial crisis.

- The Arunta Region is now a significant greenfields exploration province with active exploration for commodities such as nickel, vanadium, uranium and copper-gold.
- NTGS mapping in the eastern Arunta Region has directly led to the discovery of the Blackadder nickel-copper sulfide prospect by Mithril Resources, and the emergence of this area as one of Australia's hottest greenfields nickel provinces.
- Phosphate exploration in the Georgina Basin has been enhanced by an NTGS study that extensively tested Territory water bores for phosphate, leading to at least one new phosphate discovery, at Ammaroo.
- The *Geophysics and Drilling Collaborations* has successfully raised the profile of the *Bringing Forward Discovery* initiative, and delivered promising new exploration results in underexplored areas.
- The Japan Mineral Investment Attraction Strategy has seen \$24.5 million committed to greenfields exploration in the Northern Territory through three joint venture agreements, one of which has led to major iron ore discoveries near Roper Bar.
- The China Minerals Investment Attraction Strategy has significantly raised the Northern Territory's profile in the Chinese market and has led to the signing of nine agreements between Chinese companies and Australian explorers.
- Annual attendance at the PDAC conference in Toronto has directly led to at least one greenfields joint venture in the Northern Territory by a Canadian company.

Plan for final two years

In the final two years of *Bringing Forward Discovery*, planned highlights include:

- All NTGS reports and historical exploration company reports will be made available online.
- "The Geology and Mineral Resources of the NT" will be released as hardcopy, CD and online versions.
- A major new industry collaboration will be undertaken with CSIRO in the Ngalia Basin to study uranium mineral systems.
- \$1.8 million will be invested in collaborative drilling and geophysics in greenfields areas.
- Scanning of drillcore and online availability of images and mineral maps of NTGS's drillcore collection will commence.
- Regional geoscience projects will be finalised with numerous maps and reports released.
- A new study on Cenozoic (younger) basins of the Northern Territory.
- New gravity data will be acquired over a further 11% of the Territory, including completion of coverage over the Arunta Region.
- International promotion and investment attraction campaigns will be refocused, following a review of the success of the program to date.

An independent review of *Bringing Forward Discovery* is scheduled for 2010, in order to assess the success of the initiative, and provide recommendations on future programs for consideration by Government.

INTRODUCTION

Bringing Forward Discovery (BFD) is a four-year (2007–2011) \$14.4 million investment attraction strategy designed to improve the Territory's competitiveness as an destination for exploration investment, and to increase the likelihood of new mineral discoveries. It follows on from the *Northern Territory Exploration Initiative* (\$16M; 1999–2003) and *Building the Territory's Resource Base* (\$15.2M; 2003–2007).

Bringing Forward Discovery has three main components:

1. Continued acquisition and delivery of high-quality pre-competitive geoscientific data, including regional gravity surveys, and geoscience mapping programs to stimulate exploration in greenfields areas (\$11M over four years).
2. A program of collaborations with industry for drilling and geophysical surveys in greenfields regions (*Geophysics and Drilling Collaborations*). The industry collaborations provide funding of 50% of exploration costs (up to \$100 000) for selected projects that are assessed to have the greatest potential to open up under-explored areas of the Territory (\$2.4M over three years, commencing in 2008/09).
3. Continued promotion of the Territory as an attractive destination for exploration and mining investment (\$1M over four years).

The component programs under *Bringing Forward Discovery* are consistent with recommendations of an external review of the Northern Territory Government's exploration investment attraction programs by ACIL Tasman in 2006.

Planning, management and implementation of the *Bringing Forward Discovery* initiative is the responsibility of the Northern Territory Geological Survey within DRDPIFR. Much of the promotion and investment attraction activities are the responsibility of the Resource Development group, who were a separate division in 2007/08, but who moved under the Northern Territory Geological Survey on 1 July 2008.

REGIONAL GEOSCIENCE PROGRAMS

A fundamental role of geological surveys is to provide baseline data and interpretations of the regional geology and prospectivity of specific areas of the Territory through targeted geoscientific investigations. Under *Bringing Forward Discovery*, a major focus has been on upgrading the knowledge of the geology and prospectivity of selected under-explored regions of the Territory, with a focus on areas where it is believed that new high-quality geoscience data could have maximum impact in stimulating exploration. This is undertaken by the Regional Prospectivity Program of NTGS.

During *Bringing Forward Discovery*, a number of major improvements have been implemented in the way NTGS geologists capture field data and produce maps. This includes:

- Digital capture of field geological data on hand-held devices in the field, allowing immediate capture of field data into a format for download into corporate databases.
- Development of consistent databases for geological data collected in the field.
- Commencement of routine capture of geological map linework by geologists digitally into MapInfo (GIS) format, using digital tablets.
- Streamlining of processes for making geochemical data from NTGS field programs immediately available to clients via the STRIKE web-mapping system.

Results of the regional geoscience programs are communicated to industry throughout the course of the projects prior to the release of final publications, through forums such as AGES, website updates and through regular updating of corporate databases. The spatial distribution of regional geoscience programs under *Bringing Forward Discovery* is shown in [Figure 1](#), and the locations of Geological Regions mentioned in the text are shown in [Figure 2](#). A full list of publications is given in [Appendix 1](#).

Arunta Region

The vast Arunta Region in central Australia is a highly prospective, but under-explored region that has been largely neglected by explorers in the past. Since 2000, NTGS has been undertaking a major campaign of geological mapping and prospectivity studies in the Arunta Region, with numerous maps and products from the western half of the region released during the *NT Exploration Initiative* and *Building the Territory's*

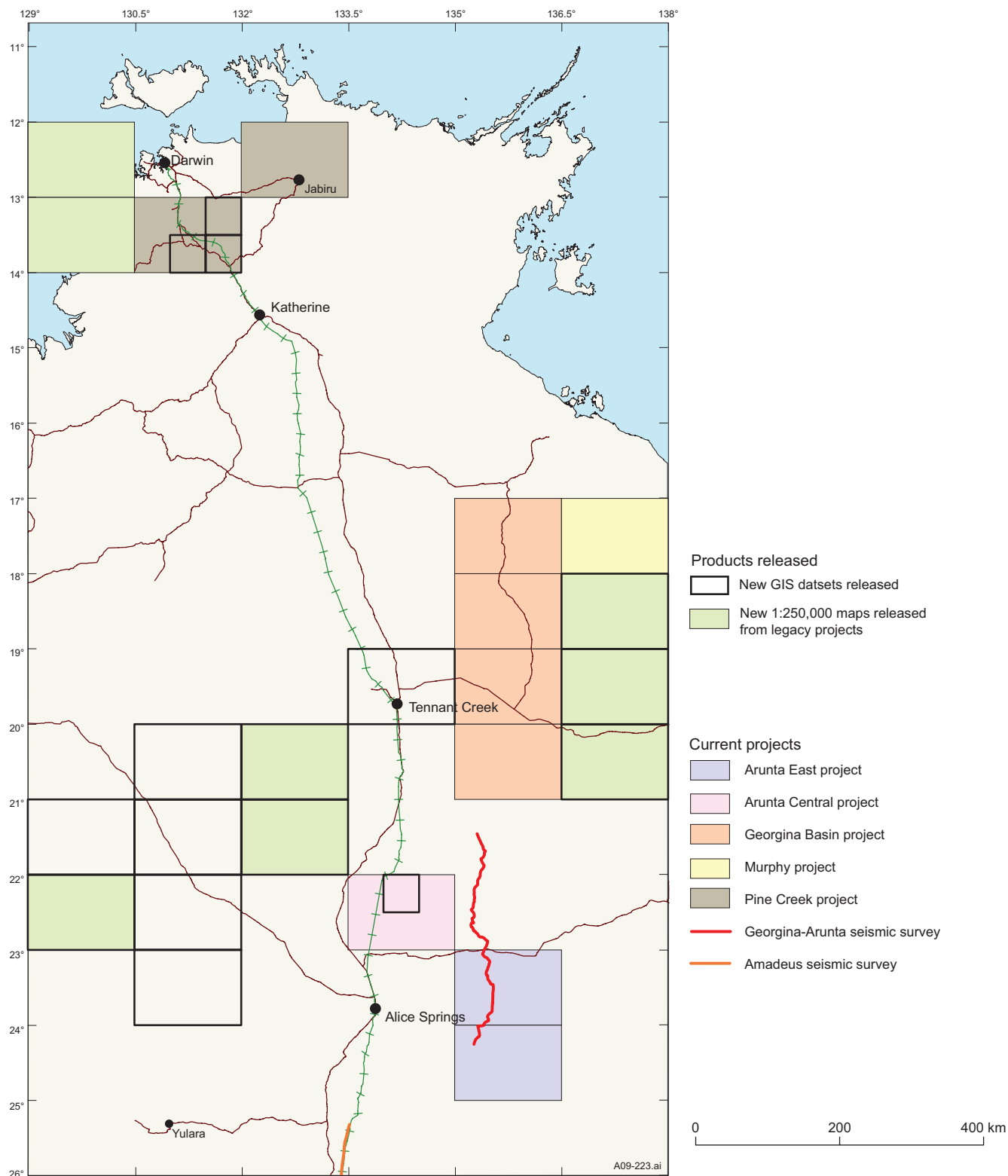


Figure 1. Spatial distribution of regional geoscience projects and products during the first two years of *Bringing Forward Discovery*.

Resource Base. NTGS's efforts in the Arunta Region have resulted in a significant change in the perception of the Arunta's exploration potential by explorers. The area is now almost completely covered by exploration tenure, with numerous active exploration programs and several newly discovered prospects and resources.

Under *Bringing Forward Discovery*, NTGS has been focusing on the eastern half of the Arunta Region, with projects underway on the 1:250 000-scale mapsheets, Illogwa Creek and Hale River (Eastern Arunta project)



Figure 2. Geological Regions of the Northern Territory

and Alcoota (Central Arunta project; [Figure 1](#)). This has built on NTGS's ongoing commitment to the Arunta Region, in terms of understanding and presenting a consistent geoscientific framework for one of the most diversely prospective, yet under-explored areas within the NT.

In addition to the two major projects outlined in detail below, the following has been achieved in the Arunta Region under *Bringing Forward Discovery*.

- Publication of four hardcopy 1:250 000 geological maps, 13 GIS datasets and one combined explanatory notes document, largely from work undertaken under *Building the Territory's Resource Base*.
- Release of the Central Arunta gravity survey, providing the first detailed gravity datasets over around 50% of the Arunta Region.
- Draft completion of the first detailed geological framework and prospectivity document of the Arunta Region in 15 years.
- Completion of the Georgina-Arunta seismic survey, providing the first deep crustal imaging of a complete cross-section of the Arunta Region.
- Two AGES abstracts and presentations on the regional-scale prospectivity of the Arunta Region.

Eastern Arunta project

Objective

The Eastern Arunta project is designed to upgrade geological knowledge and highlight the prospectivity of the eastern Arunta Region. This involves new mapping and geoscience, and integration of a large body of historical data into a comprehensively revised framework and prospectivity assessment for the area. This project commenced under *Building the Territory's Resource Base*, although progress was delayed during early stages of the project due to high staff turnover rates.

Status

Fieldwork is complete on the Quartz and Todd 1:100 000-scale mapsheets, and compilation of maps and explanatory notes is underway.

Achievements under BFD to date

NTGS work in this area has stimulated extensive exploration company interest and has resulted in an increase in exploration expenditure in an area that had previously received little interest. Specific achievements include:

- Discovery of copper mineralisation in mafic rocks by an NTGS mapping team led to the Blackadder nickel-copper discovery by Mithril Resources, and the emergence of the eastern Arunta Region as one of Australia's top greenfields nickel sulfide provinces.
- Presentations on the project at AGES 2008 and 2009 have led to significant interest in the area and widespread recognition of its prospectivity.
- Subdivision of previously undivided metamorphic units into identified stratigraphic packages and igneous suites, resulting in a more coherent geological framework for explorers.
- Extensive and diverse outcrops of mafic units with anomalous copper, nickel and platinum-group elements have been mapped and characterised.
- A potentially significant relationship between 1780–1760 Ma granites (including the Aremra Granite Suite) and Fe-oxide copper-gold mineralisation has been proposed.
- Discovery of a new copper-gold prospect (Harding Springs Cu-Au prospect) and recognition of the Illogwa Schist Zone as potentially a major fluid and mineralising pathway.
- Identification of diverse terranes in the Casey Inlier, and new Cu-REE mineralisation.

Plan for final two years of BFD

Completion of all fieldwork on the Illogwa Creek 1:250 000 map, and release of 1:100 000 maps of Quartz and Todd (hardcopy and GIS), with accompanying explanatory notes.

Central Arunta project

Objective

This project aims to provide a modern geoscientific analysis of the Arunta Region in the Alcoota 1:250 000 sheet area. This area has not been investigated in a regional geological context since the early 1970s, and has not been subjected to significant exploration. A better understanding of this poorly outcropping area is also critical to an improved understanding of the geology and prospectivity of the Arunta Region as a whole.

Status

- Map production is in the linework development stage, and to date 70% of the outcrop areas of the map has been compiled.
- Writing of the explanatory notes to accompany the map has commenced, with the introductory and some stratigraphic sections in draft form.

Achievements under BFD to date

- The project has better defined the extent of the various tectonothermal events across the region, and established stratigraphic correlations between the various metasedimentary units.
- A comprehensive petrological and geochemical database has been acquired across the area, along with the dating of 19 rock units.

Plan for final two years of BFD

- Compilation and release of Alcoota 1:250 000 geological map (hardcopy and GIS), interpreted geology map and explanatory notes.
- Gravity traverses will be conducted across the area to model the major structures across the region.

Georgina Basin

Objective

To complete geological mapping and a revision of the stratigraphy of the Georgina Basin, in order to provide an improved framework for assessing the potential for mineralisation for phosphate and other commodities. This project commenced under *Building the Territory's Resource Base* and included remapping of the basin, stratigraphic drilling and phosphate testing of waterbore cuttings.

Status

- All work is completed on this project, and final outputs are awaiting final editing and QC. Expected public release date of final products is September 2009.

Achievements under BFD to date

- The revision of the stratigraphy and a significant improvement to the mapping of four 1:250 000 geological mapsheets, Alroy, Frew River, Walhallow and Brunette Downs, will assist current phosphate, petroleum and base metals explorers and form the basis for future work to interpret the regional gravity and understand the 3D geometry of the basin.
- Outputs to be released in September 2009 include 1: 250 000-scale hardcopy and GIS format maps for Alroy, Frew River, Walhallow and Brunette Downs and a combined explanatory notes for the four mapsheets.
- Release of a comprehensive report and GIS entitled *Geology and resource potential of the southern Georgina Basin*, resulting from work done under *Building the Territory's Resource Base*. This has directly resulted in a significant increase in petroleum and mineral exploration in this region.
- A record on stratigraphic drilling and petrography in the Georgina Basin has been released.
- A record on phosphate testing of waterbores in the Georgina Basin and adjacent Wiso Basin was released early in *Bringing Forward Discovery*. This report identified numerous new phosphate occurrences, and has directly contributed to a significant phosphate discovery at Ammaroo by Aragon Resources, who were following-up an anomalous phosphate occurrence defined by this study.
- Large areas of the basin have been covered by the Barkly A gravity survey, to provide a better framework for interpreting the underlying basement.

Plan for final two years of BFD

- Release of final map products and reports from the project in September 2009.
- Release of the Barkly A gravity survey in late 2009.
- Interpretation of the Georgina-Arunta seismic line in 2010, to provide a new stratigraphic and tectonic framework for petroleum and mineral explorers in the southern Georgina basin.

Pine Creek Orogen

The purpose of current NTGS studies in the Pine Creek Orogen is to undertake a modern geoscientific analysis of the stratigraphy and tectonic setting of the province, which is one of the most prospective geological regions in the NT. This project commenced under the previous initiative *Building the Territory's*

Resource Base, although the early progress of the project was delayed through high staff turnover and land access issues. The project includes a number of distinct modules which are described separately below.

Western Arnhem Land mapping

Objective

The objective of the western Arnhem Land mapping project is to revise and better constrain the stratigraphic and tectonic framework of the Palaeoproterozoic basement of the area, in order to establish correlations (if any) with the central Pine Creek Orogen and to form an improved framework for exploration for uranium and other commodities.

Status

- Fieldwork is complete on the Howship and Oenpelli 1:100 000 mapsheets. Digital linework capture is 40% complete and digital capture of field observation site data is 90% complete.

Achievements under BFD to date

The geological framework of western Arnhem land has been substantially revised, leading to a new understanding of the relationship of this region with the rest of the Pine Creek Orogen. Specific achievements include:

- The discovery of widespread and previously unknown outcropping Archaean basement throughout western Arnhem Land, with major implications for uranium mineral systems in the area.
- A complete revision of the Archaean and Palaeoproterozoic basement stratigraphy in western Arnhem Land, with a more coherent and well constrained stratigraphic framework.
- First dating of the Cahill Formation (host to the Ranger U mine) showing that it is a unique sedimentary package that has no known correlatives elsewhere in the NT.
- Presentations at AGES 2009 and at the AusIMM U conference were very well received by industry and stimulated extensive debate.
- Two externally published papers released, and one in press, all in collaboration with Geoscience Australia, in the journal *Precambrian Research*.

Plan for final two years of BFD

- Compilation and release of Howship and Oenpelli 1:100 000 geological maps (hardcopy and GIS) and explanatory notes.

Litchfield Province

Objective

The objective of the Litchfield Province module is to revise and better constrain the stratigraphic and tectonic framework of the Palaeoproterozoic geology of the area, in order to establish correlations (if any) with the central Pine Creek Orogen and to form an improved framework for mineral exploration.

Status

- All fieldwork is complete.
- The Litchfield North 1:250 000 interpretation map and Litchfield South 1:250 000 interpretation map are at final correction and edit stage.
- An NTGS Record entitled "Mafic units of the Litchfield Province" has been written and awaits peer review and edit.
- A report summarising all NTGS studies in the Litchfield Province since 2004 is in preparation.

Achievements under BFD to date

- The age of the metamorphic basement in the Litchfield Province, along with stratigraphic correlation with the central Pine Creek Orogen, has been established, confirming the area's prospectivity for a wide range of commodities.
- The mafic units in the province (previously combined as the Wangi Basics) have been characterised and subdivided, and have implications for the tectonics and nickel and platinum prospectivity of the area.
- Two externally published papers, in collaboration with Geoscience Australia, have been released in the journal *Precambrian Research*.

Plan for final two years of BFD

Compilation and release of final products from the Litchfield Province module, including two reports and map products.

Pine Creek 1:250 000 mapsheet

Objective

To provide upgraded and updated digital and hardcopy versions of the Pine Creek 1:250 000 geological mapsheet. The existing map is one of the oldest and most out-of-date geological maps in the Territory. Given that this is possibly the most prospective sheet in the entire Territory, a new version is long overdue. The new map is being compiled from existing 1980s 1:100 000 geological mapping, with local areas of new mapping and updates to reflect the modern understanding of the geological framework.

Status

- Fieldwork in the western Pine Creek to update the geology in the Litchfield Province has been completed. Digital capture of three of the six existing 1:100 000 mapsheets has been completed; capture of fourth mapsheet is well advanced.

Plan for final two years of BFD

- Release of revised Pine Creek 1:250 000 geological mapsheet (hardcopy and GIS format) along with remaining constituent 1:100 000 mapsheets.

Geochronology of sedimentary packages

Objective

To undertake detrital zircon dating of stratigraphic units across the Pine Creek Orogen, in order to determine provenance signatures and establish stratigraphic correlations.

Status

- All data acquisition is complete. Preliminary results of the work were released at AGES2009.

Achievements under BFD to date

The project has made significant advances in stratigraphic correlations and province subdivision in the Pine Creek Orogen, including:

- Establishment of a likely correlation between the metasedimentary units of the Litchfield province and the Burrell Creek Formation in the central Pine Creek Orogen.
- Recognition that the Palaeoproterozoic metasedimentary rocks in western Arnhem Land were deposited at a different time and in a different sedimentary basin to the rest of the Pine Creek Orogen, implying that western Arnhem Land, including the East Alligator Uranium Field, may be an unrelated terrane.

Plan for final two years of BFD

Compilation and release of an NTGS record on sedimentary packages and correlations within the Pine Creek Orogen.

Murphy Inlier

Objective

This project is being undertaken to assess mineral potential and to provide geological guidance for mineral exploration in the Murphy Inlier region, which has potential for copper, uranium, gold, platinum, lead-zinc and rare earth element mineralisation.

Status

- A study on the alteration systems and prospectivity of the Seigal Volcanics is being finalised for publication.
- Studies of uranium, gold and copper mineral systems in the Murphy Inlier area are underway.

Achievements under BFD to date

- Preliminary fluid inclusion data indicate that uranium and copper were transported by fluids with similar physico-chemical characteristics, indicating potential for the presence of a single uranium–copper system.
- Widespread potassic alteration of the Seigal Volcanics shows that there has been extensive flow of hydrothermal fluids, indicating that this formation is an attractive exploration target for uranium and copper mineralisation.
- Elevated uranium and rare earth elements (REE) values in rock samples collected from the alteration zone surrounding the Eva uranium–gold mine, along with the similar geological setting of this deposit to Coronation Hill, makes this locality an attractive exploration target. Elevated values of bismuth and selenium detected during geochemical sampling suggest that more than one mineral system may exist in this locality. Drilling by NuPower Resources, planned for August this year, is expected to provide new data.
- The presence of native gold in the Westmoreland Conglomerate has been confirmed and indicates potential for palaeoplacer gold deposits.
- Field reconnaissance in the Nicholson River 1:100 000 geological mapsheet area (to be mapped in 2010) has showed the presence of iron-rich rocks similar to the Koolpin Formation of the Pine Creek Orogen, which hosts several important gold deposits.
- Results were presented to industry at AGES2008 and 2009.

Plan for final two years of BFD

- Mapping of the Nicholson River Special 1:100 000 geological mapsheet will occur during 2010.
- A report will be released on the petrology, geochemistry and alteration systems in the Seigal Volcanics.
- A report on the mineral systems in the Murphy Inlier region will be compiled towards the end of *Bringing Forward Discovery*.

Territory-wide programs

Geology and Mineral Deposits of Northern Territory

Objective

The *Geology and Mineral Deposits of the Northern Territory* will be the NTGS's flagship publication, that will be the first point of call for all information on the geology and resources of the Northern Territory. It is a technical publication targeted at mineral and petroleum explorers, and will be released as a hard copy book, a CD version, and an interactive online version. The publication has a number of authors comprising senior geological staff from across NTGS, and is currently being managed by an editorial board.

Status

- As of June 30, 2009, drafts exist of 43 of the 44 chapters. 10 of the chapters have been fully edited, and four of the chapters completely formatted.

Achievements under BFD to date

- The project has necessitated a review of NTGS's understanding of the geology and mineral resources right across the Territory, and has led to important revisions in the Geological Regions subdivision and first-order geological framework of the Northern Territory. This is the first compilation of the Territory's geology and mineral resources in a single volume and it has also led to the first modern summaries of the geology and resources of a number of basins and provinces.

Plan for final two years of BFD

- The digital and hardcopy release of the publication is scheduled to occur in 2010, with a high profile Ministerial launch anticipated.

Upgrades of NT-wide geological databases

Throughout *Bringing Forward Discovery*, NTGS has endeavoured to improve the quality and accessibility of its Territory-wide databases. Highlights of database upgrades during the first two years of the initiative include:

- Compilation of all published geochronological data (dating of rocks and minerals) for the Northern Territory into the first comprehensive spatially referenced geochronology database of the NT.
- The Mineral Occurrence Database of the NT (MODAT) has been comprehensively updated and upgraded to provide a searchable, spatially referenced current dataset of all recognised mineral deposits and occurrences, including information on location, size, shape, origin, geological setting, lithology, metamorphism, structure, mineralisation, wall rock alteration, exploration and mining, past production, ore reserves and references.
- A complete update of the NT Diamond Indicator Minerals database is underway (see below).
- The Territory's whole-rock geochemical database (including all geochemistry from NTGS's projects) has been updated and processes implemented to ensure ongoing updating and delivery of NTGS project-based geochemical data to clients via the NTGS online web mapping system STRIKE. An upgraded spatially referenced whole rock geochemical dataset containing major and trace element data was released at AGES 2009.

Metallogenic map of the NT (1:2.5 million scale)

The first Metallogenic Map of the Northern Territory was released as 1:2 500 000 hardcopy geological map at AGES 2009. The map shows the spatial distribution of the various styles of mineral deposits and major occurrences in the context of the style of mineralisation, broad lithostratigraphic subdivisions, lithological host units and major structures. The map utilised the upgraded and updated MODAT database.

Mafic rocks of the Northern Territory

Objective

To identify rock units largely comprising, or hosting, substantial mafic and ultramafic rocks that may be associated with mineralisation (particularly Ni, Cu and PGE); and to use petrogenetic interpretations of mafic and ultramafic rock units to contribute to an understanding of the regional palaeotectonic environments of the NT. The eastern Arunta Region has been the focus of most data collection and interpretation to date.

Status

- Approximately 250 new geochemical and petrographic samples of mafic and ultramafic rocks in the Alice Springs and Illogwa Creek 1:250 000 mapsheets have been processed.
- New data has been integrated with additional relevant NTGS data, and external data (largely available through Geoscience Australia's OZCHEM database) and interpretation is underway. These data will form the basis of a report summarising the standardised approach adopted, the petrogenetic and tectonic implications of the data, and the possible prospectivity of mafic rocks in this area. It is planned that this report will also integrate publicly available data over a wider area of the Arunta Region into a tectonic overview from the perspective of mafic igneous activity. Identified gaps or limitations of the data will be highlighted for future work.

Achievements under BFD to date

- A standardised NTGS approach has been developed to: (1) collecting, summarising and interpreting relevant geochemical, isotopic, petrographic and field data; and (2) the integration of these data with existing published or publicly available data and interpretations.
- Geochemical data and interpretations from the eastern Arunta Region have contributed to the Eastern Arunta project, which has been highlighting the high prospectivity of mafic rocks in the area.

Plan for final two years of BFD

- A report will be produced summarising the standardised approach adopted, the petrogenetic and tectonic implications of the data, and the prospectivity of mafic rocks in this area. It is planned that this report will also integrate publicly available data over a wider area of the Arunta Region. Identified gaps or limitations of the data will be highlighted for future work.

Gold deposits of the Northern Territory

A comprehensive update of the NTGS Report on *Gold deposits of the Northern Territory* (published in 1999) has been completed and will be released in September 2009.

Diamond Commodity Study - database upgrade and NT-wide prospectivity analysis

Objective

To update the existing Diamond Indicator Database by including exploration data that has become available since the last update in 2005, and by expanding the data fields captured to include a number of additional criteria important for exploration. The updated and expanded database will include many thousands of new sample sites. The data will be incorporated into an NT-wide diamond prospectivity assessment.

Status

To date, data has been captured from exploration reports that have been open filed since 2005.

Plan for final two years of BFD

Release of an updated Diamond Indicator Database as a Digital Information Product (DIP), along with an NTGS Report entitled *A diamond prospectivity analysis of the Northern Territory*. Detailed information on previously closed file locations of diamondiferous rocks, such as at Timber Creek, and further public domain data on the Merlin field will be included.

Partnerships with the Commonwealth

National Geochemical Survey of Australia

Objective

Under the Federally-funded Onshore Energy Security Initiative (OESI), Geoscience Australia is coordinating with all the State and Territory geological surveys to collect, analyse, compile and interpret a consistent Australia-wide dataset of transported regolith geochemistry. The National Geochemical Survey of Australia (NGSA) is collating data on the geochemical composition of transported regolith at about 1400 sites around Australia, including 223 sites in the NT. The purpose of the project is to provide a pre-competitive layer of geochemical data and information regarding the distribution of geochemical elements across the Territory (and Australia) to assist with area selection for mineral exploration.

Status

Sampling of over 80% of the 223 sites across the Northern Territory was completed by June 2009. This was a major logistical exercise involving land access negotiations right across the Territory, and helicopter access to numerous very remote sites (Figure 3). To date, 15% of the samples have been geochemically analysed by Geoscience Australia. Geoscience Australia contributed \$276 800 towards field costs for the acquisition, although this only covered 85–90% of the costs. NTGS is contributing \$67 000 towards geochemical analysis of the samples, of which \$18 000 was expended by June 2009.

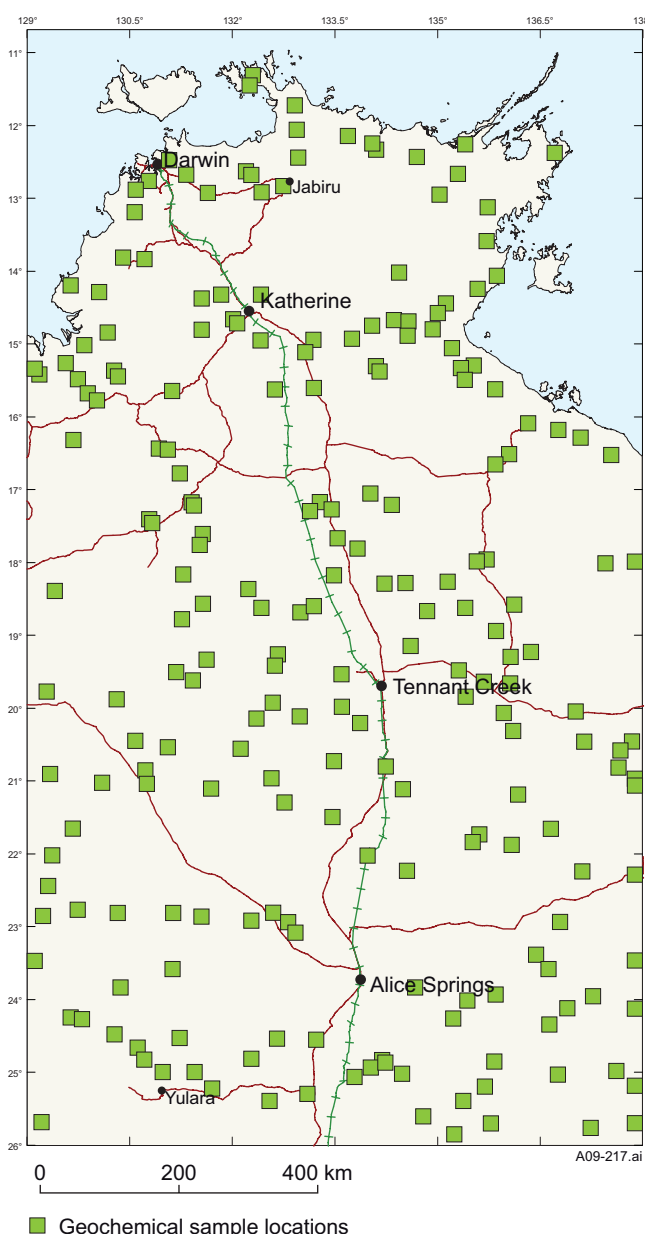


Figure 3. Distribution of Northern Territory sample sites for the National Geochemical Survey of Australia

Plan for final two years of BFD

Sampling will be completed during 2009, and geochemical analysis will be complete in 2009/10. NTGS staff will collaborate with Geoscience Australia on interpretation of the data, both for the Australia-wide Geoscience Australia dataset and report, and on a NT-specific report on the distribution of geochemical elements in the NT.

Seismic surveys

Two large-scale deep seismic traverses were undertaken as a collaboration between NTGS and GA. These form a component of the OESI and were undertaken as part of the ongoing cooperation between the NTGS and Geoscience Australia under the National Geoscience Agreement (NGA).

Reflection seismic data was acquired over two traverses, one across the southern Georgina Basin and eastern Arunta Region and one across the southern Amadeus Basin (**Figure 1**). These traverses were designed to provide new insights into crustal architecture to better understand the structures that may have controlled hydrocarbon and mineral systems in these areas. Add-on geophysical surveys (gravity and magnetotellurics) were also acquired as part of the programs.

Georgina-Arunta survey

The Georgina-Arunta seismic survey is a 376 km-deep seismic traverse extending from the southern Davenport Ranges across the southern Georgina Basin, then across the entire eastern Arunta Region east of the Harts Range and into the Amadeus Basin, ending near Todd River Downs station (**Figure 1**). Within the southern Georgina Basin, the transect aims to provide a architectural framework which can be used to evaluate the geological history of the basin and better understand the petroleum systems in the area. The data will also be useful in understanding base metals mineral systems that have been identified in this region. The section through the Arunta Region crosses the exhumed core of the Alice Springs Orogen, and is expected to image many of the large-scale structures that are likely to have controlled copper, gold, base metals and uranium mineralisation. The survey is expected to result in fundamental new insights into the understanding of tectonics of Central Australia.

The survey was undertaken in May and June 2009. The total estimated cost of seismic acquisition for the Georgina-Arunta survey was \$2 082 000, of which NTGS contributed \$100 000. NTGS also contributed to the survey through undertaking land access negotiations through the Indigenous Engagement Unit, and by undertaking detailed gravity acquisition along the survey route. NTGS will also be heavily involved in the interpretation of the final processed data, which is expected to take place in 2010/11. Final outputs will be jointly badged as both Geoscience Australia and NTGS products.

Amadeus Basin (northern end of the GOMA line)

The Amadeus Basin traverse was a component of the larger Gawler-Officer-Musgrave-Amadeus (GOMA) Survey that continues into South Australia, crossing the Musgrave Province, Officer Basin and the northern section of the Gawler Craton. This survey was funded through GA, PIRSA and AuScope. Approximately 77 km of this 634 km traverse is located in the NT. The survey was designed to assess structures in the southern Amadeus Basin that may control hydrocarbon accumulation.

GRAVITY SURVEYS

A commitment under *Bringing Forward Discovery* was the acquisition of regional gravity datasets over under-explored areas. Regional gravity data, which maps variations in the density of rock bodies at depth, is a crucial tool both for exploration targeting and in the regional interpretation of buried geology. Given that the primary focus of the geological survey is to assist explorers in area selection and targeting under-cover mineralisation, the acquisition of regional gravity data is considered to be a fundamental priority for the Territory. Prior to *Bringing Forward Discovery*, only 9% of the Territory was covered by gravity data at a station spacing of 4 km or less. The remainder of the Territory was covered by 1960s-era gravity data that was collected at a station spacing of 11 km, which is too coarse to be of much use for exploration.

In the first two years of *Bringing Forward Discovery*, nearly 20 000 new gravity stations were acquired over 232 236 km². This has been focused in central Australia and the Barkly region and has increased coverage over the Territory to 27%. It is planned that by the end of the *Bringing Forward Discovery*, 38% of the Territory will be covered by gravity data at a station spacing of 4 km or less.

An additional 6800 gravity stations have been added to the NT's open file gravity dataset through co-funded gravity acquisition under Round 1 of the *Geophysical and Drilling Collaborations*. These will be incorporated in the NT regional gravity stitch, along with all of the *Bringing Forward Discovery* surveys, and made available to all explorers.

The current and future gravity coverage over the Northern Territory acquired under *Bringing Forward Discovery* is summarised in **Figure 4**. Statistics for the total gravity acquisition (excluding *Geophysics and Drilling Collaborations*) in the first two years of *BFD* are as follows:

• Number of stations	19 667
• Area covered by surveys	232 236 km ²
• Total value of surveys (incl GST)	\$1 666 574
• Total value of surveys (excl GST)	\$1 515 067
• NTG contribution	\$1 236 203

Central Arunta gravity survey (2007/08)

• Number of stations	12 285
• Area of survey	115 700 km ²
• Cost	\$928 976 (excl GST; including industry contribution of \$278 864).

The Central Arunta gravity survey was undertaken across a large area of central Australia in mid-2008. The survey was largely collected on a 4 x 4 km station spacing. However, agreements were reached with Arafura Resources, Atom Energy, Ausquest Limited, Minotaur Exploration, Mithril Resources, NuPower Resources and Uramet Minerals to infill the survey down to station spacings of 2 x 2 km or 1 x 1 km. In order to make it attractive for companies to infill the survey and make the data open file, NTGS increased the number of Government-funded stations in areas where companies were willing to pay for infill. Also, NTGS increased station density over ground held by Newmont Australia in return for Newmont agreeing to immediately open file existing data in the area. These collaborations with industry substantially improved the quality of the survey and the return on investment for Government, with over 30% of the gravity stations being funded by industry. The entire survey was made open file in late 2008.

Arunta East gravity extension (2008/09)

• Number of stations	114
• Area of survey	436 km ²
• Cost	\$7 923 (excl GST).

The Arunta East gravity extension was undertaken as an add-on to new 2 x 2 km gravity acquisition by Mincor Resources in the Georgina Basin. NTGS acquired 114 stations to fill in a gap between Mincor's tenements and the existing 2006 NTGS Arunta East gravity dataset, to ensure that when the Mincor data becomes open file the two surveys will be seamless.

Barkly A gravity survey (2008/09)

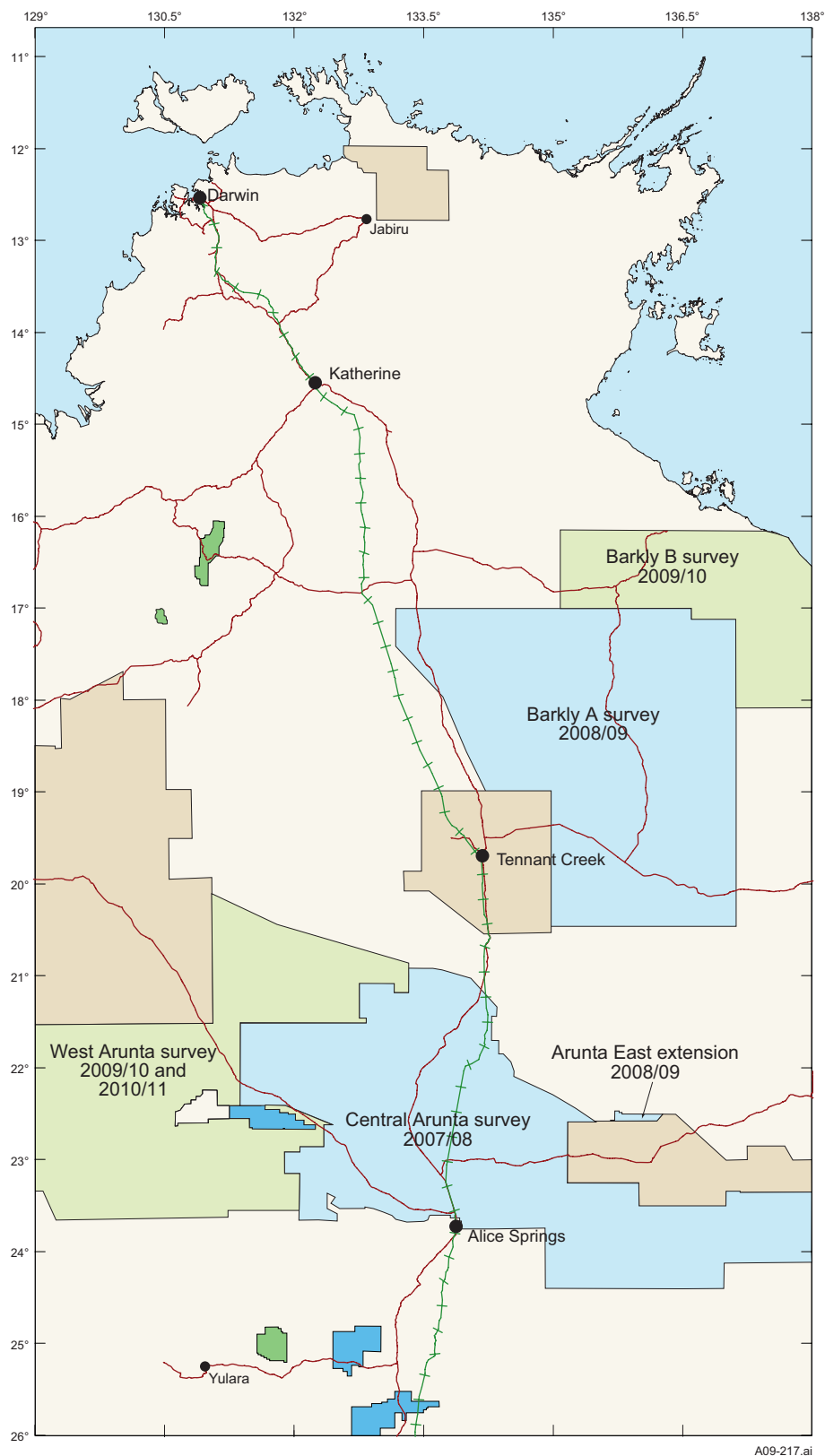
• Number of stations	7268
• Area of survey	116 100 km ²
• Cost	\$578 168 (excl GST).

The Barkly A gravity survey was undertaken in mid-2009, with acquisition occurring on a 4 x 4 km station spacing across the Barkly Tableland, to assist explorers in looking undercover for buried mineralisation, and to assist NTGS in interpreting the undercover geology. This survey is being extending to the northwest in 2009/10, as the Barkly B survey (**Figure 4**).

GEOPHYSICS AND DRILLING COLLABORATIONS

Background

In the 2008 NT Budget, the Government announced an additional \$2.4 million for the final three years of *Bringing Forward Discovery* for a new program of collaborative funding for greenfields exploration geophysics and drilling. The *Geophysics and Drilling Collaborations* program provides 50% of costs (up to \$100 000) to assist companies with the costs of selected exploration geophysics or drilling in remote areas



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High-resolution gravity coverage prior to *Bringing Forward Discovery*

Bringing Forward Discovery gravity coverage

2007–09

2009–11

Geophysics and Drilling Collaborations gravity coverage

Round 1
2008/09

Round 2
2009/10

0 200 400 km

Figure 4. Coverage of current and proposed gravity surveys under *Bringing Forward Discovery*.

The program aims to increase the intensity of exploration in under-explored greenfields regions of the Territory. The information gained from these collaborative drilling programs is made public three months after completion, in order to increase the knowledge base of the Territory's geology and resources, and assist with future exploration.

Process – Round 1

Following development of the procedures and guidelines for the program, a call for applications to the program was made on 1 August 2008 and applications closed on 5 September 2008. A total of 28 applications were received from a range of local and interstate companies, including 15 applications for funding for drilling programs and 13 applications for geophysical surveys.

The applications were assessed by a panel composed of technically proficient personnel as well as independent members who provided transparency to the application and assessment process. The Assessment Panel was composed of the Director of the NT Geological Survey, Program Leader for Regional Prospectivity, Exploration Evaluation Geologist, Chief Executive Officer of the NT Resources Council and a representative from the Policy and Coordination Division of the Department of the Chief Minister.

Members of the Assessment Panel ranked the eligible applications against the Assessment Criteria individually and these rankings were then collated and averaged at the Panel meeting. The Assessment Criteria, to which applications would be assessed, was provided to all potential applicants throughout the entire application process through the Collaborations website. Recommendations were made on the basis of the averaged rankings of each application and these recommendations were then approved by the Executive Director, Minerals and Energy. Seven applications for funding of drilling programs were awarded along with four geophysical surveys, for a total of \$773 480.

Within three months of the completion of programs, companies were required to submit a report, along with all drill core or geophysical data to the Northern Territory Geological Survey, at which time a final payment was made. All of this information is to be made open file three months after its receipt.

Summary of results

The programs undertaken as part of Round 1 of the Collaborations are summarised in [Table 1](#), with the location of the programs shown in [Figure 5](#). Highlights of the results are as follows

- Drilling at Lindemanns Bore (Proto Resources) was geologically successful, providing a stratigraphic section through the Birrindudu Basin and encountering wide intersections of gabbro (up to 180 m in thickness) that were previously unknown in the area. This was in an area that had seen very little exploration in the past, and led to a rush of pegging of exploration leases in the area, although early reports of potentially significant mineralisation in the hole were not substantiated by subsequent assays.
- Drilling in the Rover field (Adelaide Resources) encountered magnetite-bearing volcanic rocks, suggesting that the magnetic anomalies north of the known field may not be Tennant Creek-style ironstones.
- Drilling of the Marqua anomaly (Uramet Minerals) encountered granite at a depth of 237 m beneath the Georgina Basin.
- Drilling by Bondi Mining in the Murphy Inlier region intersected a 100m-wide zone of hematite-chlorite alteration with anomalous uranium and copper, providing apparent proof-of-concept that the area has potential for Westmoreland-style uranium deposits.
- Gravity surveys in the Amadeus Basin by Quasar Resources and Central Petroleum demonstrated the utility of the technique in delineating structures and potential diapirs in the basin.
- A gravity survey in the Ngalia Basin (Thundelarra Resources) has identified a major structure in the central part of the basin that will be a focus for future uranium exploration.

Due to the cancellation of programs by St Barbara Limited and Mithril Resources, and an underspend by Dunmarra Energy and Uramet Minerals, the program was underspent and these funds are being carried over into Round 2 of the *Geophysics and Drilling Collaborations* program.

Company		Gravity Stations	Original grant	Final amount	Comments/results
GEOPHYSICS					
Quasar Resources	Mount Ebenezer gravity	1540	\$58 000	\$58 000	Successfully completed, and data submitted to NTGS
Quasar Resources	Kulgera gravity	3100	\$100 000	\$100 000	Successfully completed, and data submitted to NTGS
Central Petroleum	Henbury gravity	530	\$28 620	\$28 620	Successfully completed, and data submitted to NTGS
Thundelarra Exploration	Western Ngalia Basin gravity	1702	\$65 709	\$65 709	Gravity survey identified major structures in Ngalia Basin that may focus uranium mineralisation
DRILLING		Metres drilled (cored)			
Dunmarra Energy	Sturt Plateau Bitumen project	352 (0)	\$39 201	\$12 836	Drilling program failed to intersect significant bitumen. Narrow intersections of bitumen encountered in basalt.
Bondi Mining	Murphy uranium diamond drill project	~2000 (1100)	\$100 000	\$100 000	Drilling provided important stratigraphic information and intersected an encouraging 100 m-wide zone of hematite-chlorite alteration with anomalous uranium and copper
Proto Resources	Limbunya drilling	751 (751)	\$100 000	\$100 000	Strong technical success. Hole intersected gabbro intrusions up to 180 metres in thickness.
Uramet Minerals	Marqua Magnetic Anomaly M1	264 (24)	\$31 950	\$28 306	Hole intersected granite at a depth of 237 m. No significant mineralisation
Adelaide Resources	Rover project	>800 (~400)	\$100 000	\$100 000	Two holes (Rover 2 and Rover 27) intersected magnetite-bearing volcanic rocks. Third hole (Rover 1 North) intersected highly altered sediments. No significant mineralisation.
Saint Barbara	Tennant Creek IOCG – eastern extensions	0	\$50 000	\$0	Program cancelled due to financial difficulties
Mithril Resources	Indiana skarn copper project	0	\$100 000	\$0	Program cancelled due to financial difficulties
Total			\$773 480	\$593 471	

Table 1. Summary of Round 1, *Geophysics and Drilling Collaborations*.

Round 2

A call for applications for Round 2 of the Collaborations closed on 17 April 2009. Forty applications were received from 28 companies for Round 2, representing a 42% increase from Round 1. This reflects the high level of industry interest in the program. As part of the assessment process, the panel capped drilling costs at \$160/m and gravity survey costs at \$100/station, to ensure a fair distribution of funding.

As a result of the assessment, 14 projects from 13 companies have been granted funding for the 2009/10 financial year, for a total of \$943 275. The amount exceeds the budgeted amount of \$800 000, as it includes funds from Round 1 projects that did not proceed due to the company having insufficient funds. A list of the successful applicants is in [Table 2](#), and the distribution of the funded projects is in [Figure 5](#). This is an increase in the number of projects funded from 11 projects in Round 1. Most Round 2 programs are scheduled to be completed during the 2009 field season.

Summary

The Geophysics and Drilling Collaborations program has been extremely well received by industry. Round 1 resulted in numerous positive drilling results and a large volume of new gravity data, despite the failure of two companies to undertake their proposed programs. The underspend from Round 1 has been carried forward to fund additional programs in Round 2, and to undertake significant value-adding to the drill core and other data acquired under the program, including geochronology, geochemistry and hyperspectral scanning of all drill core. This will provide an additional point of difference between NTGS's collaborations program and similar programs in other states.

The program has led to a much higher industry recognition of the Bringing Forward Discovery initiative, and has coincided with a significant improvement in the Territory's share of Australian exploration expenditure.

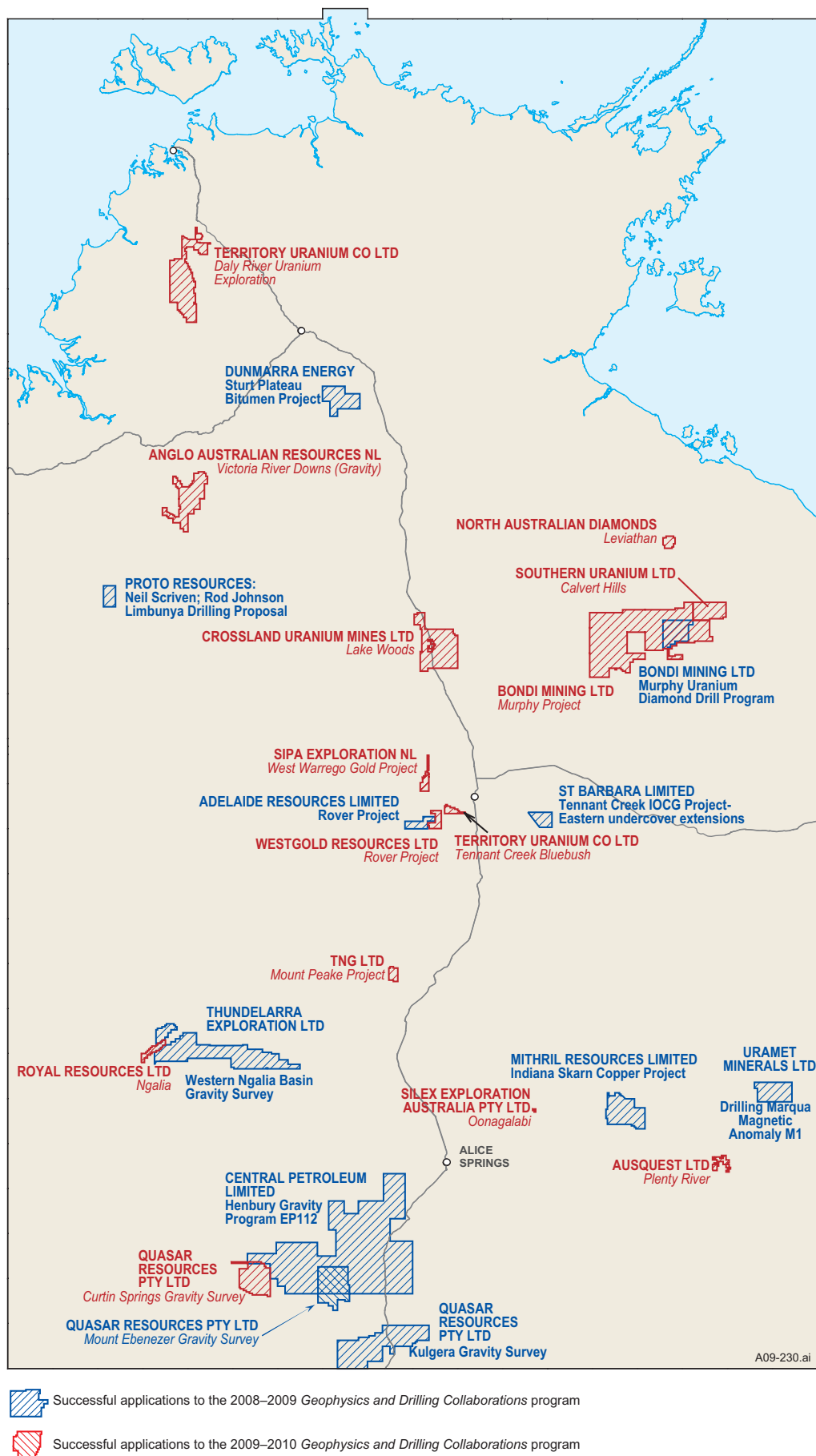


Figure 5. Spatial distribution of projects awarded funding under the Geophysics and Drilling Collaborations.

DRILLING			
Company	Tenement	Program name	Funding Granted
AusQuest Ltd	EL23792	Plenty River	\$100 000
Territory Uranium Co Ltd	EL25222 and EL25223	Daly River Uranium Exploration	\$100 000
TNG Ltd	EL23074	Mt Peake Project	\$75 000
Territory Uranium Co Ltd	EL24966	Tennant Creek Bluebush	\$100 000
Southern Uranium Ltd	EL24837	Calvert Hills	\$75 000
Crossland Uranium Mines Ltd	EL23687, EL24520 and EL25631	Lake Woods	\$35 000
Silex Exploration Australia Pty Ltd	ML22624	Oonagalabi	\$37 000
Bondi Mining Ltd	EL24694, 24841, 25710, 26138, 26139, 26140	Murphy Project	\$100 000
Westgold Resources Ltd	EL25511	EL25511 Rover Project	\$100 000
North Australian Diamonds	EL24192	Leviathan	\$40 000
Sipa Exploration NL	EL22359, EL23992 and EL26822	West Warrego Gold Project	\$38 625
Royal Resources Ltd/ Aldershot Resources Ltd	EL24571	Ngalia	\$33 000
GEOPHYSICS			
Company	Tenement	Program name	Funding Granted
Anglo Australian Resources NL	EL25423, EL25422	Victoria River Downs	\$40 000
Quasar	EL26246	Curtin Springs Gravity Survey	\$59 650

Table 2. Projects selected for funding under Round 2 of the *Geophysics and Drilling Collaborations* program.

GEOSCIENCE KNOWLEDGE MANAGEMENT

Effective management of geoscience knowledge is one of the keys to attracting exploration, by making all information compatible and more readily available. This is a core business of the Territory's investment attraction efforts. NTGS's Geoscience Knowledge Management Program includes the following elements:

- Storage, management and distribution of geoscience data to industry and the public, including NTGS publications and company reports, through the Minerals and Energy Information Centre.
- Storage and display of drill core at facilities in Darwin and Alice Springs, a statutory requirement under the *Mining Act* and *Petroleum Act*.
- Editing, formatting and production of NTGS publications and promotional material.
- Production and maintenance of spatial databases and GIS products.
- Statutory assessment of technical reports from exploration programs and extraction of data for inclusion in corporate databases.
- Development and management of the NTGS website and use of the latest technology to deliver data.

In addition to the projects outlined in detail below, highlights of activities undertaken during *Bringing Forward Discovery* include:

- Updating of mineral exploration reporting guidelines and standard formats for the submission of data under the *Mining Act*.
- 1:100 000 and 1:250 000 maps, 1:250 000 explanatory notes and the NTGS Report series have all been scanned and available to clients in a digital format. The 1:100 000 explanatory notes have been scanned but require formatting and QC prior to public release. Once these explanatory notes

are released, all NTGS publications will have been digitised and will be available to clients on CD or DVD, and/or via the website.

- Reports on ad hoc sampling by explorers and researchers from drill core held in the core libraries are now specifically identified within minerals (MEX) and petroleum (PEX) databases to better assist clients.
- Ongoing upgrading and rationalisation of NTGS's core collections at Farrell Crescent and Power Street.

NTGS corporate geoscientific database

Background and history

NTGS is currently in the process of developing a comprehensive corporate database, with a data management platform that can engage with a variety of delivery mechanisms for spatial data. The current lack of a robust corporate database management system affects not only ease of access and data quality, but it causes internal time-wasting in the creation and cross-checking of data sets from many sources.

A tender to develop a proof-of-concept spatial database for geoscientific data was awarded to a Dialog/Geometry consortium bid in March 2006. The project involved migrating geochemistry and basic drilling data from an existing MS Access database into a new data structure, and also developing a geological data model using spatial data from the Auvergne 1:250 000 geological mapsheet as the pilot.

The corporate database application is made up of an Oracle database with a .NET, Apache Tomcat and IIS forms interface and a customised web mapping interface based on an integrated Exposure and MapVault application. The solution uses the current ageing business application server to host the Oracle database with the interface hosted on a virtual server in the Department of Business and Employment Data Centre.

The initial build phase was completed in August 2007 with the first test version of the system being installed. Data migration was then undertaken with a lot of time and effort given to data and system validation. User acceptance testing of the eight modules commenced in November 2007 and took much longer than anticipated. Over 650 bugs, design issues and enhancements have been logged, although some issues were interrelated to other enhancements or bugs. The project was extended to include high-priority enhancements deemed to give the database and spatial viewer greater functionality from day one.

The proof-of-concept brought up a couple of major issues related to integration with other spatial software: one with the check-in of data into MicroStation cartographic software, and the other is related to the check-in and check-out of data into and from NTGS's GIS application, MapInfo. The process of resolving these issues is ongoing.

Current status and future work

The final stages of the project were to set up and complete a production install, and to write the project findings report. The production install and back up system checking was completed on 20 May 2009 with a baseline version established. A three-month warranty period is currently in progress. Although some fixes are still required to the bulk upload templates to allow easier importing of geochemistry data into the database, the geochemistry modules are considered fully suitable for a production database, albeit with some enhancements to be considered over the next year. The geological unit and observations database is still considered a proof of concept and needs further review and work before it can be considered a production system. The findings report draft is currently being circulated for comment.

Website

The NTGS web mapping application, STRIKE, has had several new data layers and minor enhancements added over the last two years. A user guide was produced and released in March 2008, while all full layer data downloads, previously only available in MapInfo format, were made available in both MapInfo (TAB) and ArcGIS (Shape) formats in June 2009.

Changes to the data layers include:

- Addition of new layers:
 - Aster imagery index, released 30/10/2008.
 - Landsat imagery index, released 30/10/2008.
 - Seismic Lines, released 22/12/2008.
 - Historical Petroleum Tenements, released 4/06/2009.
- Extensive modification of the geochemistry layer “Sampling-Wholerock” to include minor elements (now over 75 elements included), released on 23/12/2008.
- Export report function for attributes of Geophysical Company Survey added on 29/06/2009.

The NT Geological Survey website has been restructured to simplify and improve navigation. During this process, the NTGS home page has been reorganised and was given a new look. Web content has been checked, updated where required and any out-of-date material has been removed. Many more publications and datasets have been made available as downloadable products than were previously available. This includes the entire proceedings of the Central Australian Basins Symposium, released in late 2007. The Geophysical Image Web Server software was upgraded from version 7 to version 8 and some new functionality added.

Hylogger

The Commonwealth, through the Department of Innovation, Industry, Science and Research, is operating the National Collaborative Research Infrastructure Scheme (NCRIS) programme. AuScope Ltd is a company formed to receive funding under NCRIS and is committed to establish, operate and/or provide access to research infrastructure for the research capability “Structure and Evolution of the Australian Continent”. This capability includes the National Virtual Core Library (NVCL) component, in which the Northern Territory Geological Survey is a participant. It also includes a related project called the AuScope Grid, which provides the supporting network links, data management protocols, software, access and interoperability of the data products.

The NVCL project involves the building, provision and operation of Hylogger machines to photograph and hyperspectrally scan drill core and cuttings. This national system of spectroscopic instruments will enable the nation to progressively build a high-resolution image of earth materials for the upper one to two kilometres of the Australian continent, based on the huge and rich legacy of drill samples already held, and to be acquired by State and Territory agencies and industry in the future.

NVCL funding is provided over 4 years, finishing in 2010–11, and totals \$2 653 505. All full participants will receive and become the owner of a Hylogger machine, initially costed at \$244 433. The states/Territory are contributing to the project through in-kind provision of staff, housing and ongoing operation/maintenance of the machine and access to drill core and cuttings. The Hylogger machines are built by CSIRO Exploration and Mining, then delivered to each geological survey participant.

For the NT, the project increases the usefulness of the drill core and cuttings submitted by companies under the *Mining and Petroleum Acts* and held in the Core Facilities as:

- the scanned high resolution images will be available over the internet, giving wider and improved access to clients nationally and internationally.
- high-resolution images will enable targeting of material for requests to sample, reducing the time clients have to spend at the core facility and reducing the amount of core that core facility staff have to retrieve and layout for viewing by clients.
- the extra data produced by the hyperspectral scanning provides another layer of data for integration with geochemistry, geological and structural observations, and in some cases, will identify mineral compositions that cannot be identified by the naked eye or simple field tests.
- The data produced will provide a complementary dataset to those being produced by airborne hyperspectral surveys which are now being flown and submitted to government by explorers in increasing numbers. In some areas, possible interpretations of airborne data could be checked with near-surface data on relevant drill core, without the client needing to drill.
- Scanning newly submitted core will enable the capture of images before major oxidation has taken place and provide a record of the relatively fresh exposed surfaces.

- Scanning of core will enable a visible and hyperspectral record of the core to be kept, mitigating the loss of data when core is discarded due to deterioration/oxidation, or when replaced by core from the same area, or due to lack of space in core library storage areas.
- As regional geoscientific projects increasingly move into building 3D models, the more data that can be collected from rocks at depth the better the models.

In early October 2008, the Hylogger machine was delivered to the Winnellie Core facility for a one- to two-week trial and as a demonstration and training exercise (**Figure 6**). During the trial, the following drillholes were scanned from the NTGS collection:

- NTGS 83/3 Daly Basin.
- McA5 McArthur River.
- DDH2 Pine Creek Orogen.
- CHDDH49 Coronation Hill.

Following visits by the NTGS Core Facilities Manager to CSIRO and the NSW core library in Sydney, it was decided that modification of an existing room in the Winnellie core facility would be suitable for housing the Hylogger operations, rather than housing the Hylogger in a container. In preparation for the arrival of the Hylogger in late 2009, 60 m of mobile conveyors and fixed bench rollers have been purchased in order to provide a continuous feed in and out of the Hylogger, combined with 2 pallet lifts to minimise manual lifting and increase safety. The Hylogger room floor has been painted with non-slip paint and additional water hose reels and compressed air have been installed for cleaning and drying purposes.

Following training, NTGS staff processed the data from the 4 holes logged in the October 2008 trial, and a report is currently being compiled. To date 4000 m of core has been removed from racks, cleaned and wrapped ready for the return of the Hylogger. The machine is currently expected to arrive in October 2009. Work on re-traying oxidised core in readiness for the commencement of scanning is currently in progress. Recruitment of appropriate staff to manage and operate the Hylogger and interpret the data will be undertaken in the second half of 2009.



Figure 6. Hylogger machine scanning core during demonstration at Farrell Crescent core facility, October 2008.

Minerals and Energy InfoCentre

Client requests, delivery and promotion

The Minerals and Energy InfoCentre is responsible for providing information, distributing geoscientific products and managing submission and viewing or distribution of minerals and petroleum exploration reports, data and drill core.

The InfoCentre continues to manage more than 4500 enquiries and requests for data annually, despite a peak in the number of enquiries received in 2006-07. The graphs in **Figure 7** show that demand for information, exploration data and NTGS products continues to grow. The number of NTGS products distributed to clients each year has increased from 4620 in 2007-08 to 6384 in 2008-09. The number of company exploration reports distributed to clients has nearly doubled in the past two years, to be over 18 000 in 2008-09 (**Figure 7**).

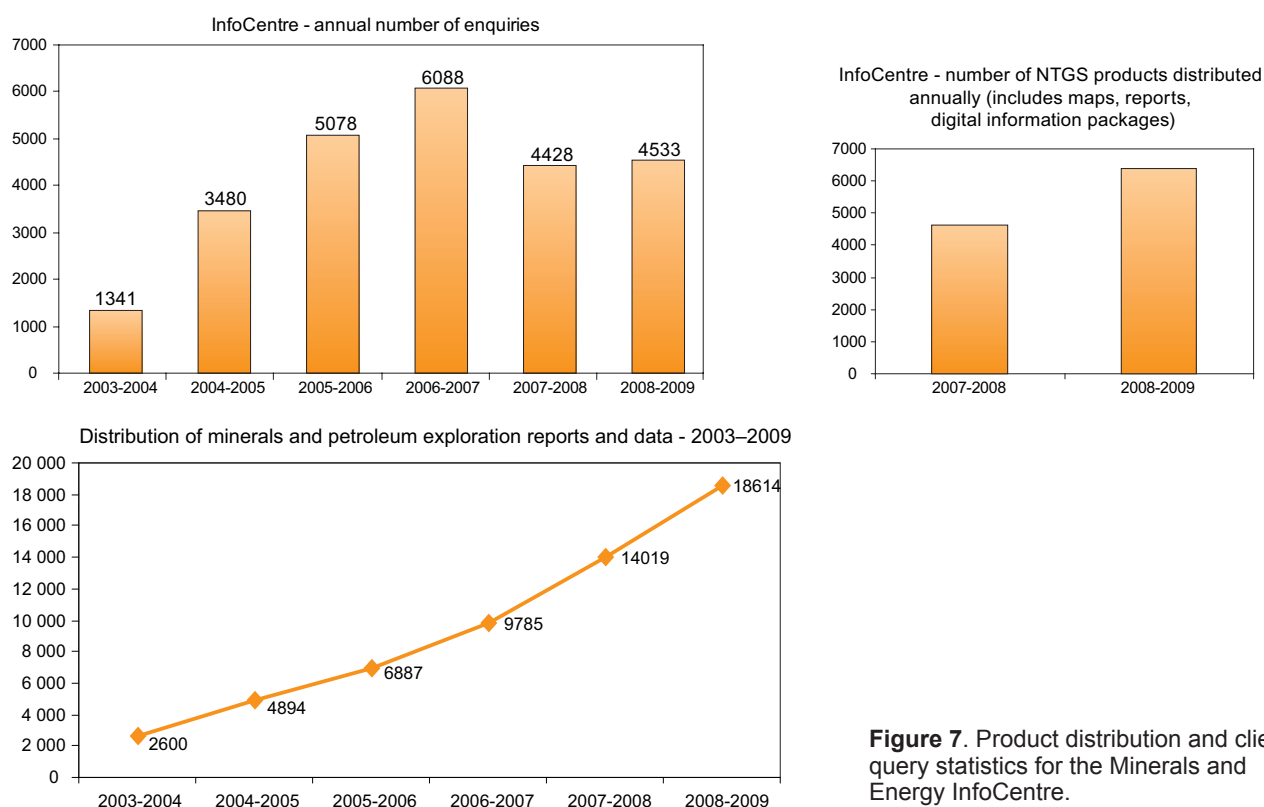


Figure 7. Product distribution and client query statistics for the Minerals and Energy InfoCentre.

Work has commenced on the introduction of a request management system, RefTracker, with the aim of improved client service, better statistical analysis and the development of a knowledge base to better inform staff when dealing with common or similar requests.

Petroleum data management and client service improvements

Significant resources have been committed under *Bringing Forward Discovery* to upgrading petroleum data management and the availability of petroleum data to industry clients. Prior to about 1999, seismic survey data submitted to the department under the *Petroleum Act* and the Commonwealth *Petroleum Submerged Lands Act* 1967 was received in a number of formats and a variety of media. To conserve and make all this data discoverable and accessible, not only requires comprehensive cataloguing, but transcription of the data to industry standard formats and modern media.

Significant efforts have been made to make the petroleum data collection more accessible for clients. Recently, this has included the transcription of data, primarily seismic data, from old 9-track magnetic reels and 8 mm Exabyte tapes to industry-standard 3590 cartridges and industry-standard formats eg SEG-Y for seismic data. The transcription is outsourced and involves more than just the copying of data, as tapes have deteriorated, data segments may be lost and the data format may be proprietary and unable to be read by many software packages. Highlights of the transcription of historical petroleum data during *Bringing Forward Discovery* include:

- Transcription of 220 Exabyte tapes in 2007-08 to high-capacity 3590 cartridges, or for some data, particularly well logs, to CD-ROM. These new 3590 cartridges and CDs, along with data previously transcribed in 2002-2004, have undergone QC and the improved data was released for public distribution in July 2008. Data has also been retrieved from previously unreadable floppy discs and copied to network drives or CD-ROM.
- Data from 514 recently located 9-track tapes have now been transcribed to 3590 cartridges or CD-ROM for smaller datasets, and await QC.
- An additional 41 Exabyte tapes containing data for 11 seismic surveys have also been transcribed and await QC.
- Significant cataloguing of petroleum digital data in the Petroleum Exploration catalogue, PEX, has been undertaken, concentrating on onshore data as the first priority.
- One analogue seismic survey (Simpson Desert B) has been digitised for use by industry in petroleum workstation software seismic survey. Seismic sections and related records were digitised by an industry client, and a copy given to the department.

Procedures and management practices have been reviewed and improved to provide better client service and implement more efficient practices, including increased cooperation and resource sharing with Geoscience Australia for petroleum data management, regular cleaning of offsite storage areas for improved data preservation, and rearrangement and consolidation of storage locations of reports and data to assist in management and accessibility. Open-filing procedures for petroleum data have been updated to ensure release within the shortest possible time-frame.

Digital capture and online availability of exploration company reports

A commitment made under *Bringing Forward Discovery* was to have all exploration company reports and NT Government geoscience documents available for viewing and download online, through implementation of new software and systems.

After ten years of scanning legacy non-confidential or open file mineral reports, originally submitted in paper form, all open file mineral reports, over 14 800 at the end of June 2009, and the majority of the remaining closed file reports are available in digital form. In 2009, the systematic scanning of petroleum reports commenced and 225 were completed by the end of June, with another 127 in progress and awaiting large format scanning of maps etc.

A project to scope and implement appropriate systems for online delivery of this digital company data will be undertaken through the second half of *Bringing Forward Discovery*.

INDIGENOUS ENGAGEMENT

Under *Building the Territory's Resource Base*, the Indigenous Business and Industry Services (IBIS) division of the then Department of Business, Economic and Regional Development (DBERD) was responsible for exploration- and mining-related Indigenous liaison and knowledge-building programs throughout the Territory. This function was not specifically included within *Bringing Forward Discovery*. However, at commencement of *Bringing Forward Discovery*, a senior officer (Peter Campbell) transferred from IBIS to NTGS, in order to set up a dedicated Indigenous Engagement Unit within NTGS, consistent with recommendations in the 2006 ACIL Tasman Review.

The primary role of the Indigenous Engagement Unit is to negotiate land access to Aboriginal Freehold land for the purpose of geological investigation by NTGS. This includes developing and maintaining quality relationships with Indigenous communities to ensure effective communication between Traditional Land Owners and the Geological Survey staff and its contractors. The unit is based in Alice Springs, with one full-time manager, and one full-time Indigenous Liaison Officer (currently part-time).

Achievements of the Indigenous Engagement Unit to date include:

- Development and implementation of new NTGS protocols and policies for access to Aboriginal Freehold land (including a strict 'Code of Conduct' for working on Aboriginal Land).
- Vastly improved land access for NTGS geologists on Aboriginal Freehold Land, removing the past impediments which had hindered NTGS's ability to assess and promote the prospectivity of remote Aboriginal land.

- Improved communication and working relationship with the Aboriginal Areas Protection Authority with regards to avoiding registered Sacred Sites.
- Development of strong personal relationships between the Indigenous Engagement Unit and traditional owners in remote and urban communities across the Territory.
- Improved communication and working relationships with Land Councils, with a draft Memorandum of Understanding on land access protocols prepared.
- Negotiation of access for soil sampling of over 100 sites randomly scattered across Aboriginal land across the Territory, as part of the National Geochemical Survey of Australia.
- Successful access negotiations for all NTGS projects on Aboriginal freehold land, including mapping and sampling programs, regional gravity surveys and a Seismic Acquisition Project in partnership with Geoscience Australia.
- Provision of guidance and support to Traditional Land Owners about the affects of resource development on Aboriginal land.
- On request, information and guidance has been provided to exploration companies on appropriate engagement techniques with Indigenous communities, with respect to accessing land for exploration.

PROMOTION AND INVESTMENT ATTRACTION

The ACIL Tasman Report *Bring Forward Discovery* stressed that the Northern Territory's objective is to maintain and improve its competitive position to attract global resource investment. It reported that the NT Government's previous promotion campaigns have been of high standard and the close engagement of the Minister for Mines has helped to differentiate the Territory. The report recommended that the Territory should continue its innovative approach to promotion and make the highest level approaches to involve China and Japan in more significant exploration and development projects.

The following report outlines the development and results of:

- the second phase of innovative promotion and
- the investment attraction strategies implemented for China and Japan.

Promotion

The promotion of *Bringing Forward Discovery* targets 4 markets; Australia, Canada, China and Japan. The target audience includes exploration and mining companies and investors. The promotion campaign developed for Australia, Canada and Japan is known as *Ore-Struck*. For China, a simplified campaign was developed to meet the requirements of the market.

The promotion campaign for *Bringing Forward Discovery* (BFD) has 2 objectives:

1. To promote the Northern Territory (NT) as a competitive destination for exploration, mining and investment and
2. To promote the programs of *Bringing Forward Discovery*.

Annual Geoscience Exploration Seminar (AGES)

The Annual Geoscience Exploration Seminar (AGES) is organised by the Northern Territory Geological Survey (NTGS) every year to communicate the results and significance of its targeted geoscience programs and is the flagship event to promote the geoscience programs of *Bringing Forward Discovery*. The program is targeted at mineral explorers and delivers new geoscience data and reports on recent exploration highlights. It includes industry presentations and provides practical information to assist with issues such as land access. The seminar also provides key networking opportunities with NTGS, its partners, government officials, industry and suppliers, and in 2009, had 217 registered delegates, including 128 mineral explorers.

AGES provides a powerful tool to promote *Bringing Forward Discovery* and encourage mineral exploration in the Northern Territory, and is now widely recognised as one of the best conferences of its type in the country. The results include:

- an increase of attendance each year; 9% in 2008 and 28% in 2009
- increased interest from international companies
- extensive media coverage; in 2009, 9 media organisations covered AGES with 20 interviews, a press conference and two media releases.

2009 AGES delegates (total 217)

217 AGES delegates (and 50 exhibitors at the Mining Services Expo - 267 people at venue)

- 126 Explorers from 62 Organisations (including international delegates)
- 17 Industry Service Suppliers
- 16 Research & Consultants
- 8 Aboriginal Organisations from 3 organisations
- 31 NT Government (including 17 NTGS)
- 5 Other Government (Commonwealth & Federal)
- 4 Industry Organisations
- 10 Other.

2008 AGES delegates (total 175)

175 AGES delegates (and 54 exhibitors at the Mining Services Expo and 130 at Mining Supply Seminar)

- 105 Explorers from 63 Organisations
- 11 Consultants
- 8 Aboriginal Organisations from 3 organisations
- 27 NT Government (including 17 NTGS)
- 8 Other Government (Commonwealth & Federal)
- 6 International delegates (China, Canada and Japan)
- 10 Media from 8 Organisations.

ORE-STRUCK campaign - Australia, Canada, Japan

The *Ore-struck* campaign has 3 elements; branding, event strategy and direct marketing.

Branding

In order to differentiate the NT from its competitors a series of branded campaigns have been developed.

In 2005, a campaign called *Top End Secret* was developed to promote the investment attraction program *Building the Territory's Resource Base*. The branding used a 'mission-possible' theme to reinforce to exploration companies that their mission to explore the Territory was possible and the NT Government was there to help.

In July 2007, the investment attraction program *Bringing Forward Discovery* was launched. For the new program the branding objective was different. Its aim was to draw attention to the *Bringing Forward Discovery* program which faced strong competition from the other State government investment attraction programs.

To capture the audience's attention, a tag-line was developed for the *Bringing Forward Discovery* called *Ore-struck*. The *Ore-struck* tagline communicated in a creative way that the NT is the prime location for explorers to strike 'ore' and make their discovery. A sequel theme and design was developed for *Ore-struck* to follow on from the *Top End Secret*'s mission possible. The *Ore-struck* design used rich outback Territory colours and the campaign tools included a sales kit, PowerPoint templates, exhibition materials, promotional items, the quarterly investment alert and website. For Japan, a further introduction fact sheet was developed and translated.

In a highly competitive market, the *Ore-struck* brand has delivered results and not only raised the profile of *Bringing Forward Discovery* but increased the use of its services:

- A significant increase in the distribution of exploration reports (from 9785 to 18 614 from 2006/07 to 2008/09) and NTGS products.
- The *Geophysics and Drilling Collaborations* program was successfully launched and included a brochure, display and power-point template.

Event strategy

The majority of the target audience resides outside of the Northern Territory and therefore it is important to meet them face to face on a regular basis by attending events. The event schedule includes external conferences and self-run seminars in Australia and abroad. The external events are industry specific and

provide exposure to key markets. Self-run events provide a more targeted means to communicate with the target audience.

From 2007 to 2009, the *Ore-struck* campaign covered 18 events across Australia, Japan and Canada (see [Table 3](#) for event calendar).

The external events include:

- AMEC National Congress (Perth)
- AusIMM Uranium Conference (Adelaide and Darwin)
- Mining the Territory (Darwin)
- Mining 2007 and 2008 (Brisbane)
- Australia - Japan Mineral Investment Seminar (Japan)
- PDAC (Canada).

Date	Event	Coverage	Location	Activity
FEB				
2008, 25-27 2009, 23-25	Australia – Japan Mineral Investment Seminar**	160	Japan	Team Australia Seminar Individual meetings Promotional Material
MAR				
2008, 2-5 2009, 27 Feb - 4 Mar	PDAC (Prospectors & Developers Association of Canada)**	40 000	Toronto	Display booth Australian investment seminar Individual meetings
2008, 17-19 2009, 23-25	AGES*	600	Alice Springs	Chinese Investment Seminar Display Booth Presentations Promotional Material
MAY				
2008, 11-16 2009, 11-17	China Ministerial Trip*	450	China	NT Investment Seminar Individual meetings Industry participation Minister involvement only 2009
2008, 9-21 2009, 18-24	Japan Ministerial Trip*	300	Japan	NT Investment Seminar Individual meetings Industry participation Minister involvement only 2009
2008, 21 - 23	BFD Launch + AMEC National Conference* (**)	800	Perth	NT Investment Seminar Booth Presentations Minister Involvement
JUN				
2008, 18-19 2009, 10-11	Australia's International Uranium Conference (AUSIMM)*	600	Adelaide Darwin	Display Booth Presentations NTGS products and promotional items
OCT				
2007, 3-5	BFD Launch	50	Adelaide	BFD Road Show
2008, 17-18	Japan trip	10	Japan	Presentation and Meetings
2008, 14-15	Mining the Territory*	200	Darwin	Presentations Display Booth
2007, 31Oct – 2 Nov 2008, 29-31	BFD Launch + Mining 2007* Mining 2008	50 800 900	Brisbane	Display Booth Presentations NTGS products and promotional giveaways
NOV				
2007, 13-15 2008, 11-13	China Mining* (**)	5000	Beijing	NT Seminar Individual Meetings NTGS products and promotional giveaways

* Ministerial participation

** Team Australia (led by Geoscience Australia and includes all states)

Table 3. Promotional and investment attraction events in the first two years of *Bringing Forward Discovery*

The external events successfully gained maximum profile for the Northern Territory. The results from these events include:

- Presentations delivered by the Department at all events.
- 13 key-note presentations delivered by the Minister.
- 10 exhibition booths promoted BFD and NTGS products and services.
- A high level of traffic at NT promotional booths relative to other states.
- A personal presentation on the NT to JOGMEC representatives at the Mining 2007 exhibition in Brisbane, with specific focus on the southern Georgina Basin, led to the first JOGMEC interest in the NT and an exploration joint venture in the Georgina Basin with Mincor Resources.
- A greenfields exploration joint venture by Canadian company CBR Gold in tenement package in the western Arunta Region was a direct result of discussions at PDAC 2008.

The self-run events include:

- Launch of *Bringing Forward Discovery* (Adelaide, Brisbane, Perth)
- NT Investment Seminars (Japan)
- AGES (Alice Springs).

The launch of *Bringing Forward Discovery* was a series of half-day seminars supported by strategic partner KPMG who provided the venue and catering. It was a successful exercise to raise the profile of the new investment attraction program and was attended by 30-40 executives in each city.

The NT Investment Seminars run in Japan were half-day seminars run in conjunction with JOGMEC (Japan Oil Gas and Metals National Corp) and the Australian Embassy in Japan. Presentations were delivered by the Department and industry to promote specific exploration projects in the Northern Territory. The seminars were attended by 60-80 Japanese executives and have delivered business results including a joint venture between Western Desert Resources and Itochu (for further information, please see Japan Investment Attraction).

Direct marketing

The third part of promotion is direct marketing which aims to maintain communication with existing contacts on a regular basis to promote *Bringing Forward Discovery* and NT Mineral Exploration Opportunities. The 2 direct marketing tools developed for this purpose are:

- *The NT Investment Alert*
This is a quarterly 'alert' sent by email that provides the latest information on NT investment opportunities, exploration, land access and upcoming events. The purpose of the alert is to maintain interest in the Northern Territory and to generate enquiries. Currently there are over 600 subscribers to the NT Investment Alert.
- *The Ore-struck website* (www.orestruck.nt.gov.au)
The website is promoted at events as part of the presentations and the sales kit. Its purpose is to provide more information on the benefits to exploring in the NT and the services of *Bringing Forward Discovery*.

China strategy

Promotion

A customised promotional campaign was developed for China titled "Australia's Northern Territory; Vast Land, Rich Minerals, Future Opportunity". The title communicated the main messages of Top End Secret in a more simplified format. The China promotional campaign incorporated other key messages:

- The NT Government welcomes Chinese investment and has a dedicated 4-year plan to assist Chinese companies to invest in the Northern Territory called the *China Minerals Investment Attraction Program*.
- The NT Government assists Chinese companies to identify exploration and mining investment opportunities and business partners.

The target audience for China includes the senior decision makers of State Owned Enterprises, Private Owned Enterprises and Government Geological Bureaus. The campaign design was created to appeal to a high net-worth / VIP level of executive. The design uses a gold logo incorporating the Northern Territory and campaign title. The campaign tools include a sales kit (with similar fact sheets and layout to the *Ore-Struck* Campaign), presentation templates, promotional materials and a basic website.

The China Campaign is similar to the *Ore-Struck* campaign and focuses on face-to-face interaction driven by an event strategy. This interaction occurs during inbound and outbound visits by Chinese companies. The events for China are listed in [Appendix 2](#).

Event strategy – outbound visits

There have been 4 outbound visits to China in 2007-09. The visits include external conferences and self-run events. The external events include the China Mining Congress and the Australia-China Mining Investment Seminars hosted by Austrade in Beijing. The Northern Territory has maximised its profile at these events by having:

- the only Australian Minister present to deliver the key-note at both forums
- the only Australian jurisdiction with an industry delegation
- focused promotion of specific exploration projects.

The Northern Territory has also run seven NT Investment Seminars in China in this time period. They have been run in-conjunction with Chinese partners and attended by 40-80 Chinese executives. The seminars are half day and present specific exploration opportunities and projects.

Event strategy – inbound visits

In March 2009, 28 Chinese executives attended AGES 2009. A customised program was scheduled which included a seminar called the *NT Investment Strategy Seminar* and a meeting program with NT explorers. The objective of the seminar was to bring together key stakeholders to provide information on how to do business in the Northern Territory. Presentations were delivered by the Department and 8 service companies.

Investment attraction

The *China Minerals Investment Attraction Strategy 2007-2011 (China Strategy)* was developed in late 2006 and endorsed by Cabinet in September 2007 ([Appendix 2](#)).

The Department's vision is two-fold:

- 5 Chinese investments in the Territory by 2011.
- Sustained growth in exploration and mining in the Northern Territory supported by increased Chinese investment activity.

The *China Strategy* has been successful to competitively position the Northern Territory as the preferred destination for mineral and metal supply for China. The Strategy has 5 aims, of which the following has been achieved:

- 1. To raise the profile of the NT's mineral investment opportunities**
 - 6 outbound China visits since Nov 2006, including 4 visits led by a Minister.
 - 7 NT Investment seminars run in China in-conjunction with 4 Chinese partners.
 - An increased awareness of the NT and mineral investment opportunities has been achieved through the China promotion campaign.
- 2. To target major Chinese companies and hot prospects**
 - Active contact with over 300 Chinese companies.
 - 67 visits made to the NT by 37 Chinese companies.
- 3. To work with strategic partners to develop China business**
 - 6 Chinese partnerships have been established which include 2 Cooperation Agreements, 1 Memorandum of Cooperation and 1 Memorandum of Understanding.
 - 10 local service sector companies provide program support which includes sponsorship of events in excess of \$60 000.
- 4. To identify NT exploration companies seeking Chinese investment**
 - 53 exploration projects submitted for promotion.
 - 16 exploration and mining executives travelled to China with Department.
- 5. To increase our capacity to service the China market**
 - A native Chinese speaker has been employed part-time in 2007 and full-time as of 2008.
 - Plans are underway for a Chinese web portal.

The *China Strategy* has been successful to advance exploration and mining projects through Chinese participation. This participation has been through direct investment, joint venture or cooperation. As of June 2009, nine agreements have been signed:

- i. Nupower & Jiangxi Legend (joint venture)
- ii. Thor Mining & CITIC (off-take)
- iii. ERD & Private Investor (acquisition)
- iv. Arafura Resources & ECE (equity investment)
- v. Arafura Resources & ECE (joint venture)
- vi. North Australia Iron Ore & Sinosteel Mining (MoU)
- vii. Territory Uranium & Anhui Geology & Mining (acquisition)
- viii. Australian Illmentite Resources & Shanghai Dongjia (MoU)
- ix. United Uranium Ltd & Hean Provincial Non-Ferrous (non-binding)

Another objective has been to encourage Chinese companies to apply for their own exploration licenses. As at June 2009, 43 exploration licenses have been applied for by 5 companies, 19 have been granted and 3 companies have commenced exploration programs. The results of the *China Strategy* are reported quarterly in the China report card ([Appendix 2](#)).

Japan strategy

The Japan Mineral Investment Attraction Strategy was approved in February 2008. The Cabinet decision was to undertake an enhanced program in Japan involving annual standalone Territory seminars. No formal Japan Strategy was drafted. The Japan Strategy has been successful to attract interest from the Japanese market and since 2008, the Department has run 2 stand-alone seminars ([Appendix 3](#)).

The first NT Investment Seminar in Tokyo in May 2008 was supported by JOGMEC (Japan Oil Gas and Metals National Corp.) and the Australian Embassy, and was attended by over 80 people. The NT delegation included the industry representatives: Proto Resources, Arafura Resources, Western Desert Resources, ERD and Clayton Utz. Over 20 NT exploration projects were promoted and more than 23 meetings were scheduled with 17 Japanese companies.

Following the May visit in 2008, Western Desert signed a joint venture agreement with Itochu Corporation on 23 December 2008. The deal outlined \$2M for 15% interests in project tenements and \$15M farm-in over 6 years to earn 51% of the project.

The second visit in May 2009 was led by Richard Galton, CE. The industry delegation included TNG, Toro Energy, Energy Metals, Central Petroleum, CSA and Clayton Utz. The visit included the 2nd NT Investment Seminar hosted by JOGMEC, the Australian Embassy and Austrade. Over 30 NT exploration projects were promoted and 17 Japanese companies were met.

The Japan Strategy has been successful in matching local exploration projects with Japanese investors. As of June 2009, three agreements have been signed (See Japan Report Card at Attachment C):

- i. JOGMEC & Mincor Resources (June 2008): \$4.5 million over 3 years to earn 40% in the Georgina Basin base metal project
- ii. JOGMEC & Bondi Mining (Dec 2008): \$3 million over 4 years to earn 51% in the Murphy uranium project
- iii. Itochu and Western Desert Resources (Dec 2008): \$17 Million to develop Roper Bar Iron Project

TRENDS IN EXPLORATION DURING *BRINGING FORWARD DISCOVERY*

Exploration activity has been at record levels during *Bringing Forward Discovery* to date, reflecting in part the global resources boom which continued until mid-late 2008. Areas that have seen a noticeable upturn in exploration include the Tennant Region, Georgina Basin and Arunta Region, with exploration continuing to be active in the Pine Creek Orogen and McArthur Basin. The Ngalia and Amadeus Basins have seen an increase in uranium exploration. The Tanami Region, which experienced a gold exploration boom in the 1980s and 1990s, is continuing to experience a relative downturn in exploration, due to the lack of new discoveries in the past decade.

Maps of mineral exploration licences and applications at the end of the past three financial years is shown in **Figure 8**. They show that most prospective regions have been covered by tenements through the course of *Bringing Forward Discovery*, although the large number of outstanding applications on land subject to the *Aboriginal Lands Rights Act* remains an impediment to exploration.

A number of new discoveries, maiden resources and resource upgrades have been announced during *Bringing Forward Discovery*, which have significantly added to the Territory's resource base. These include:

New discoveries:

- Blackadder Ni-Cu (Mithril Resources, Arunta Region) and numerous associated prospects (see below)
- Thunderball U (Thundelarra Exploration, Pine Creek Orogen)
- Ammaroo P (Aragon Resources, Georgina Basin)
- Mount Peake V-Fe-Ti (TNG Ltd, Arunta Region)
- Blamore 1 Coal (Central Petroleum, Pedirka Basin)

Known prospects upgraded

- N147 U (Uranium Equities, Pine Creek Orogen)
- Rover 1 Cu-Au (Westgold Resources, Tennant Region)
- Roper Bar Fe (Western Desert Resources, McArthur Basin)

Maiden resources

- Myrtle Pb-Zn (Rox resources, McArthur Basin)
- Explorer 108 Pb-Zn (Westgold Resources, Tennant Region)
- Mount Peake V-Fe-Ti (TNG Ltd, Arunta Region)

Significantly upgraded resources

- Wonarah P (Minemakers Ltd, Georgina Basin)
- Ranger U (ERA, Pine Creek Orogen)
- Napperby U (Toro Energy, Arunta Region)
- Bigrlyi U (Energy Metals, Ngalia Basin)
- Manbarrum Pb-Zn-Ag (TNG Ltd, Arunta Region)
- Nolans REE-P-U (Arafura Resources, Arunta Region)

Although the Government's exploration investment attraction programs are likely to have indirectly contributed to a number of these discoveries and new resources, NTGS can claim a direct involvement in a number of discoveries including:

Blackadder and associated prospects (nickel-copper, Mithril Resources). This discovery was made by following up NTGS reports of mineralised mafic rock encountered during mapping in the East Arunta project in 2008. In their initial ASX release, Mithril acknowledged NTGS's role in the discovery. Numerous new prospects have been discovered as a result, and NTGS is continuing ongoing releases of new data into the public domain to assist exploration in this region. The original application for these tenements by Mithril was also based on earlier AGES presentations by NTGS geologists.

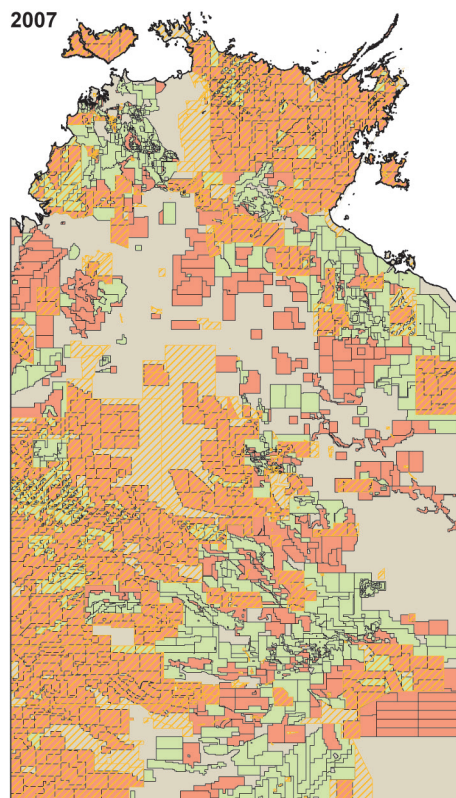
Mount Peake (vanadium, iron, titanium, TNG Ltd). This discovery was made by resampling core held by NTGS at Power Street core library. NTGS will be co-funding a deep drillhole at this prospect in Round 2 of the *Geophysics and Drilling Collaborations* to test whether nickel or platinum mineralisation occurs at depth.

Ammaroo (phosphate, Aragon Resources). Aragon Resources undertook a drilling program designed to follow up a positive result identified by NTGS phosphate testing of waterbores, and identified numerous high-grade phosphate intersections, making this an important new phosphate prospect.

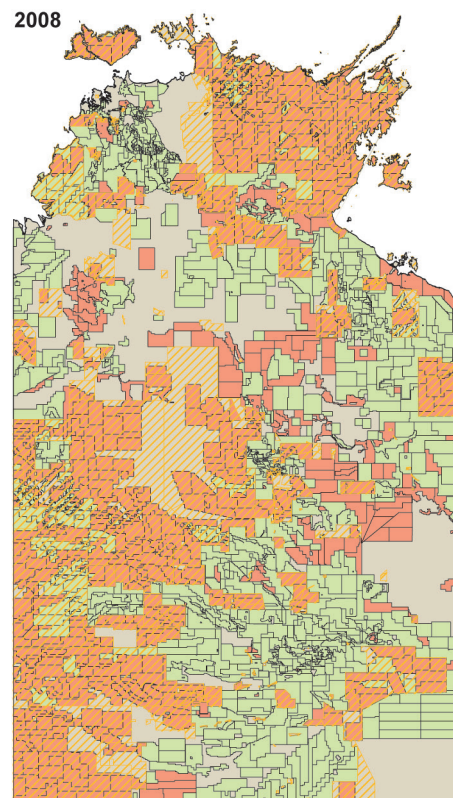
Roper Bar (iron, Western Desert Resources). An aggressive field program was funded through a \$17 million joint venture negotiated after WDR accompanied NTG delegation to Tokyo. This resulted in the discovery of high-grade extensions of the Roper Bar iron field.

Mineral Exploration Expenditure

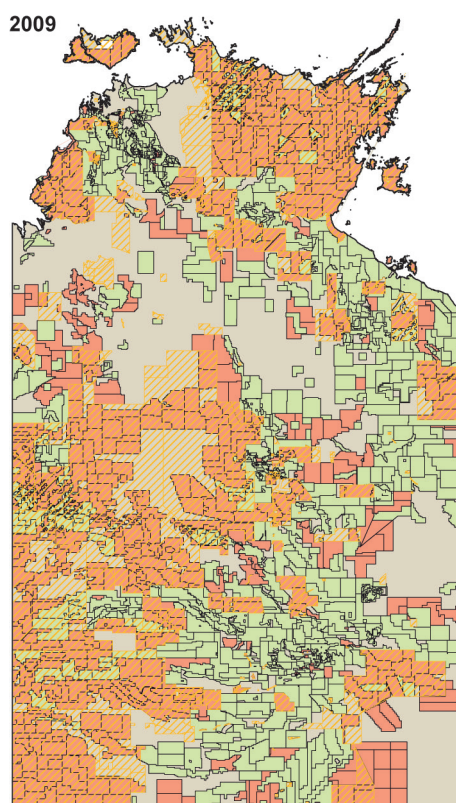
ABS mineral and petroleum exploration expenditure figures show that during the first two years of *Bringing Forward Discovery*, the Northern Territory has improved its exploration expenditure relative to competitor jurisdictions (**Figure 9, Table 4**). In the 2008/09 financial year, a record \$146.2M was spent of mineral exploration (up by 10% over 2007/08's record of \$132.7 million).



EL application EL granted
Aboriginal freehold land



EL application EL granted
Aboriginal freehold land



EL application EL granted
Aboriginal freehold land

Figure 8. Mineral exploration licences and applications as of 30 June 2007, 2008 and 2009.

Significantly, the Northern Territory was the only jurisdiction to increase its expenditure in 2008/09 relative to the previous year. The next best performing state was Western Australia (down 1%), followed by NSW (down 8%), Queensland (down 12%), Victoria (down 34%), Tasmania (down 38%) and South Australia (down 38%).

The Northern Territory's share of Australian exploration expenditure has increased from 5.3% in 2007/08 to 6.6% in 2008/09, the best result since 2002/03.

The impacts of the global financial crisis began to severely impact on Australian mineral exploration expenditure in the first two quarters of 2009, with an Australia-wide fall of 30% in expenditure relative to the same quarter the previous year, including dramatic falls of 60% in Victoria, 55% in South Australia and 64% in Tasmania. Other competitor jurisdictions also has significant falls in expenditure relative to the same period of the previous year (31% in Queensland, 26% in NSW and 24% in Western Australia). In comparison, exploration expenditure in the Northern Territory has remained almost the same, with \$60.1 million being spent in the first half of 2009, compared with \$61.1 million in the first half of 2008, a drop of only 2%.

In summary, these figures suggest that the Territory has continued to maintain unprecedented levels of mineral exploration expenditure through the global resources downturn, and that the effects of the global financial crisis has impacted on exploration much more significantly in other states. It is noteworthy that the improvement in the Territory's performance has coincided with the introduction of strategies under the *Bringing Forward Discovery* initiative, such as the Geophysics and Drilling Collaborations program.

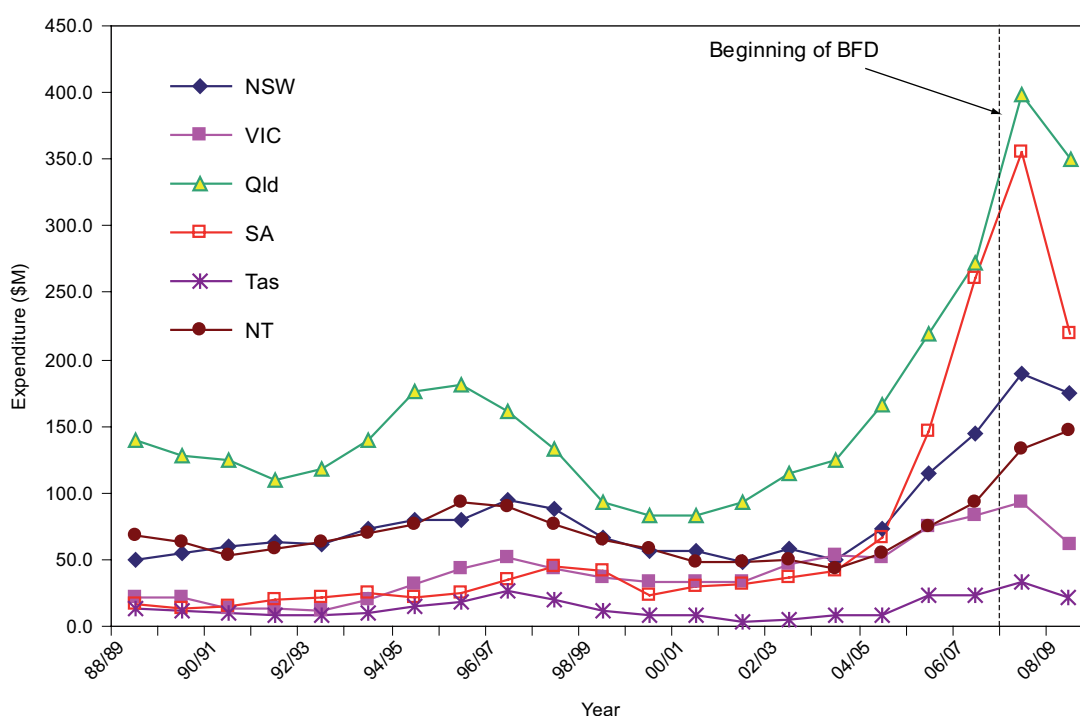


Figure 9. Exploration expenditure for all states except WA (which is off the scale) since 1988.

	NSW	Vic	Qld	SA	WA	Tas	NT	Total
Expenditure 2007/08 (\$M)	189.9	93.7	397.9	355.2	1259.7	32.5	132.7	2461.6
Expenditure 2008/09 (\$M)	175.3	62.2	351.6	220.8	1246.8	20.3	146.2	2223.2
% change	-8	-34	-12	-38	-1	-38	10	-10
Expenditure Jan08-Jun08 (\$M)	103.6	50.7	213.1	174.5	652.6	16.5	61.1	1272.1
Expenditure Jan09-Jun09 (\$M)	76.5	20.3	147.2	77.8	499.0	6.0	60.1	887.0
% change	-26	-60	-31	-55	-24	-64	-2	-30

Table 4. Summary of mineral exploration expenditure in the 2007/08 and 2008/09 financial years, and a comparison of expenditure of the first two quarters in 2008 and 2009.

Fraser Institute survey

The Fraser Institute is a non-profit social and economic research organisation based in Canada, which carries out an annual anonymous survey of mineral exploration companies worldwide to rate the relative exploration attractiveness of 71 jurisdictions. The methodology of the survey is to assess the policy environment and perceived mineral potential in each jurisdiction. Eighteen geo-political, socio-economic, environmental and geological criteria are surveyed and synthesised into ratings of overall investment attractiveness. It is the only survey of its kind and is widely reported. However, survey findings are based on a relatively small sample (658 respondents out of 3000 in 2008/09) and the number of respondents with direct experience in the NT is unclear. The jurisdictions are a mixture of nations and sub-national provinces such as states, provinces and territories in Canada, Australia and the United States of America, with more jurisdictions included each year. Some comparisons may not be particularly meaningful and, although the Fraser survey is a useful tool, it should not be seen as the most reliable guide to exploration and mining company views of the NT's exploration attractiveness.

Table 5 summarises the NT's rankings for the past five annual surveys for five key indices:

- **Policy Potential Index** – measures the attractiveness of Governments' mining policies.
- **Current Mineral Potential Index** – measures whether mineral potential under a jurisdiction's current policy environment encourages or discourages exploration. The Fraser Institute believes this is the best measure of overall investment attractiveness.
- **"Best Practice" Mineral Potential Index** – measures "pure" mineral potential assuming a hypothetical "best practice" policy environment. This reflects on how explorers perceive the prospectivity of a jurisdiction.
- **Geological Database** – ranks the perceived quality, quantity and ease of obtaining geological and geophysical information supplied by Governments.
- **Native Title Claims** – measures the explorers' uncertainty concerning Native Title Claims.

Fraser Institute Survey Criteria	2004/05	2005/06	2006/07	2007/08	2008/09
Number of jurisdictions surveyed	64	64	65	68	71
Current mineral potential	8 th	24 th	6 th	21 st	19 th
Best practise mineral potential	11 th	19 th	8 th	25 th	7 th
Policy potential	25 th	20 th	15 th	21 st	20 th
Geological database	22 th	26 th	16 th	10 th	10 th
Uncertainty over Native Title	60 th	56 th	41 st	67 th	65 th

Table 5. Summary of rankings for the Northern Territory in the past five Fraser Institute surveys.

In summary, when all measures are taken together, it suggests that the relative overall attractiveness of the NT has increased from 2007/08 to 2008/09, although higher rankings were achieved for some key criteria in 2006/07. Land access remains the key issue in lifting industry perceptions of overall NT exploration attractiveness, as we are considered the seventh worst jurisdiction in the world when it comes to uncertainty in relation to Native Title claims. Our 'best practice' mineral potential index has improved significantly to seventh in the world and second in Australia, behind Western Australia, and is a positive reflection on NTGS's efforts under *Bringing Forward Discovery* to highlight the Territory's prospectivity. The Territory's improved performance in the Geological Database category during *Bringing Forward Discovery* is also encouraging, with Territory ranking third in Australia behind South Australia and New South Wales.

PLAN FOR THE FINAL TWO YEARS OF *BRINGING FORWARD DISCOVERY*

In the final two years of *Bringing Forward Discovery*, planned highlights include:

- All NTGS reports and historical exploration company reports will be made available online, through development of appropriate online delivery systems, and the continuing digital capture of petroleum reports
- NTGS's flagship publication, *The geology and mineral resources of the NT* will be released as hardcopy, CD and online versions during 2010.
- A major new industry collaboration will be undertaken with CSIRO in the Ngalia Basin to study uranium mineral systems. This collaboration will involve four exploration companies, and the Exploration and Mining Division of CSIRO, as part of the Joint Surveys Uranium Modelling project. The projects will involve modeling of uranium mineral systems, 3D modelling of basin architecture, and predictive modelling of uranium mineralisation. NTGS will provide gravity data, expertise, and possibly drilling funding to the project.
- \$1.8 million will be invested in collaborative drilling and geophysics in greenfields areas as part of Round 2 of the *Geophysics and Drilling Collaborations*.
- Scanning of drillcore and online availability of images and mineral maps of NTGS's drill core collection will commence, following delivery of the Hylogger to the Farrell Crescent core facility, as part of the AuScope National Virtual Core Library project.
- Regional geoscience projects will be finalised with numerous maps and reports released. This will include the release of all products from the Quartz 1:100 000 sheet (Eastern Arunta project), Alcoota 1:250 000 sheet (Central Arunta project), four mapsheets in the Georgina Basin, and all products from the Oenpelli and Howship 1:100 000 map and Pine Creek 1:250 000 sheet (Pine Creek Orogen).
- A new project to study and document the Cenozoic basins of the Territory will commence.
- A further 11% of the Territory will be covered with new gravity data, including completion of coverage over the Arunta Region, and the Barkly B gravity survey.
- International promotion and investment attraction campaigns will be refocused, following a review of the success of the program to date. Campaigns are likely to continue in China and Japan, with annual visits to PDAC to promote the territory in North America. The Annual Geoscience Exploration Seminar (AGES) will continue to be a flagship event for *Bringing Forward Discovery* in March of 2010 and 2011.

APPENDIX 1 - PUBLICATIONS AND PRODUCTS RELEASED JULY 2007 TO JUNE 2009

NEW PRODUCTS

1:250 000 Explanatory Notes series

Donnellan N, 2008. *Mount Peake-Lander River, Northern Territory (Second Edition)*. (12 DEC 08)
Kruse PD and Radke BM, 2008. *Ranken-Avon Downs, Northern Territory (Second Edition)*. (05 MAR 08)
Rawlings DJ, Sweet IP and Kruse PD, 2008. *Mount Drummond, Northern Territory (Second Edition)*. (22 APR 08)

1:100 000 Explanatory Notes series

Haines PW and Scrimgeour IR, 2007. *Woodgreen, Northern Territory (First Edition)*. (24 AUG 07)

Digital Information Package (DIP) series

DIP 007. Dunster JN, Kruse PD, Duffett ML and Ambrose GJ. Geology and resource potential of the southern Georgina Basin. (31 OCT 07)

DIP 008. STRIKE offline. (18 MAR 08)

NTGS Record series

2007-002. Orth K. Geology and volcanology of the Ware Group and Winnecke Granophyre, northern Tanami Region, Northern Territory. (09 AUG 07)

2007-003. Khan M, Ferenczi PA, Ahmad M and Kruse PD. Phosphate testing of waterbores and diamond drillcore in the Georgina, Wiso and Daly basins, Northern Territory. (18 OCT 07)

2007-004. Beardsmore G. Geothermal energy potential of the Northern Territory. (14 NOV 07)

2007-005. ACIL Tasman Pty Ltd. Bring forward discovery. Review of NT exploration investment attraction programs 1999–2007 and recommendations for future strategies and work. (web download AUG 07, CD release 14 NOV 07)

2008-001. Kruse PD. Georgina Basin stratigraphic drilling 2002–2006 and petrography 2000–2007. (04 July 08)

2008-002. Northern Territory Geological Survey. Annual Geoscience Exploration Seminar (AGES) 2008. Record of abstracts. (17 MAR 08)

2008-003. Worden KE, Carson CJ, Close DF, Donnellan N and Scrimgeour IR. Summary of results. Joint NTGS-GA geochronology project: Tanami Region, Arunta Region, Pine Creek Orogen and Halls Creek Orogen correlatives, January 2005–March 2007. (30 SEP 08)

2008-004. Wygralak AS and Mernagh TP. Composition, provenance and timing of hydrothermal fluids in the Tanami–Arunta regions. (30 JUN 08)

2008-005. Hussey KJ. Report on NBDH37, a cored diamond drillhole at Nolans Bore P-REE-Th-U deposit, Reynolds Range, Arunta Region. (04 JUL 08)

2009-002. Northern Territory Geological Survey. Annual Geoscience Exploration Seminar (AGES) 2009. Record of abstracts. (23 MAR 09)

Special publications

Munson TJ and Ambrose GJ (editors), 2007. *'Proceedings of the Central Australian Basins Symposium (CABS), Alice Springs, Northern Territory, 16–18 August, 2005.'* Northern Territory Geological Survey, Special Publication 2.

Contains 24 papers, including 13 with NTGS authors (20 DEC 07)

NTGS geophysical datasets

Central Arunta Gravity Survey 2008 (final version) (23 JAN 09)

Tanumbirini Airborne Magnetic and Radiometric Survey 2007 (6 FEB 08)

1:250 000 Geological Map Series

Lander River (23 APR 08)

Lake McKay (25 JUN 08)

1:250 000 Interpreted Geology Map Series

Lander River (30 OCT 08)

Lake McKay (25 JUN 09)

Territory-wide maps (1:2 500 000 scale)

NT Metallogenic Map (14 MAR 09)

1:250 000 Geology GIS datasets

Avon Downs 250k (14 MAR 08)
Highland Rocks 250k (14 MAR 08)
Lake Mackay 250k (07 NOV 08)
Lander River 250k (26 JUN 08)
Mount Drummond 250k (14 MAR 08)
Mount Peake 250k (14 MAR 08)
Ranken 250k (14 MAR 08)

1:250 000 Interpreted Geology GIS datasets

Highland Rocks (10 APR 08)
Lake Mackay (29 JUN 09)
Lander River (30 OCT 08)
Mount Doreen (10 APR 08)
Mount Liebig (29 JUN 09)
Mount Peake (19 MAR 08)
Mount Solitaire (19 MAR 08)
Mount Theo (19 MAR 08)
Tennant Creek (26 JUN 08)

1:100 000 Geology GIS datasets

McKinlay River (10 NOV 08)
Pine Creek (07 NOV 08)
Tipperary (25 JUN 09)
Woodgreen (12 MAY 08)

External publications

- Ambrose GJ, Scardigno M and Hill AJ, 2007. Petroleum geology of Middle-Late Triassic and Early Jurassic sequences in the Simpson Basin and northern Eromanga Basin of central Australia. *APPEA Journal* 47, 125-141 (2007)
- Carson CJ, Worden KE, Scrimgeour IR and Stern RA, 2008. The Palaeoproterozoic evolution of the Litchfield Province, western Pine Creek Orogen, northern Australia: insight from SHRIMP U/Pb zircon and in situ monazite geochronology. *Precambrian Research* 166(1-4), 145-167 (OCT 08)
- Claoue-Long J and Edgoose CJ, 2008. The age and significance of the Ngadarunga Granite in Proterozoic central Australia. *Precambrian Research* 166(1-4), 219-229 (OCT 08)
- Claoue-Long JC, Maidment D and Donnellan N, 2008. Stratigraphic timing constraints in the Davenport Province, central Australia: a basis for Palaeoproterozoic correlations. *Precambrian Research* 166(1-4), 204-218 (OCT 08)
- Claoue-Long J, Edgoose CJ, Worden K, 2008. A correlation of Aileron Province stratigraphy in central Australia. *Precambrian Research* 166(1-4), 230-245 (OCT 08)
- Clifton R, 2007. Uranium occurrences on geophysical images in Exploration and beyond: 19th International Geophysical Conference & Exhibition, 18-22 November 2007, Perth Convention & Exhibition Centre, Western Australia, ASEG-PESA- FESAus. Conference Handbook. *Preview* 131, 71 (DEC 07) [abstract]
- Clifton R, 2007. Depth estimation using the magnetic power spectrum in Exploration and beyond: 19th International Geophysical Conference & Exhibition, 18-22 November 2007, Perth Convention & Exhibition Centre, Western Australia, ASEG-PESA- FESAus. Conference Handbook. *Preview* 131, 100 (DEC 07) [abstract]
- Clifton R, 2008. It's time to make our metadata machine-readable – let's go to GDF. *Preview* 134, 121 (JUN 08)
- Potma W, Fairclough M, Scrimgeour I and Skirrow R, 2008. Numerical modelling of basin-related uranium ore systems - a co-funded national research initiative. *AusIMM International Uranium Conference 2008, Abstracts Volume*, 29-30. (JUN 08).
- Scrimgeour I, 2008. Emerging uranium provinces in the Northern Territory. *AusIMM International Uranium Conference 2008, Abstracts Volume*, 31 (JUN 08).
- Scrimgeour I, Hollis J and Clifton R, 2009. New insights into the distribution of uranium mineralisation in the Northern territory. *AusIMM International Uranium Conference 2009, Abstracts Volume*, 9-10. (JUN 09)
- Wade WP, Hand M, Maidment DW, Close DF and Scrimgeour IR, 2008. Origin of metasedimentary and igneous rocks from the Entia Dome, eastern Arunta region, central Australia: a U-Pb LA-ICPMS, SHRIMP and Sm-Nd isotope study. *Australian Journal of Earth Sciences* 55(5), 703-719 (JUN 08).
- Worden KE, Carson CJ, Scrimgeour IR, Lally JH and Doyle N, 2008. A revised Palaeoproterozoic chronostratigraphy for the Pine Creek Orogen, northern Australia: evidence from SHRIMP U-Pb zircon geochronology. *Precambrian Research* 166(1-4), 122-144 (OCT 08)

CONVERSION OR UPGRADE OF EXISTING PRODUCTS

1:250 000 Explanatory Notes series

Various authors and dates. Digitally reformatted 1:250k explanatory notes. 8 titles in searchable pdf including Ayers Rock, Delamere, Helen Springs, Limbunya, Sandover River, Roper River-Urupunga, Tobermory, Victoria River Downs (CD-ROM - 2 MAY 08)

Various authors and dates. Scanned 1:250k explanatory notes. 20 titles in image-only pdf including Arnhem Bay-Gove, Auvergne, Barrow Creek, Bauhinia Downs, Blue Mud Bay, Bonney Well, Calvert Hills (Metallogenic Map Series Explanatory Notes), Darwin, Elkedra, Frew River, Groote Eylandt Region, Huckitta, Katherine, Kulgera, Mililingimbi, Mount Doreen, Mount Marumba, Mount Young, Petermann Ranges, Tennant Creek. (CD-ROM – 02 MAY 08)

NTGS Report series

Reports 1–11 scanned to pdf (15 AUG 07)

Reports 12 and 14 converted to linked pdf (15 AUG 07)

Digital Information Package (DIP) series

Updated releases

DIP 001. Northern Territory Geochemical Datasets. (SEP 07, MAR 08, JUN 08, DEC 08, MAR 09)

DIP 003. MODAT mineral occurrence database. (SEP 07, MAR 08, JUN 08, DEC 08, MAR 09)

DIP 004. Geoscience maps in PDF.
(APR 08)

DIP 005. Industry reports management system database. (JUL 07, SEP 07, MAR 08 – now discontinued)

DIP 008. STRIKE offline. (updated - MAR 09)

NTGS Record series

Re-release in digital form

Smith J, 2001. Summary of results. Joint NTGS – AGSO age determination program 1999-2001. *Northern Territory Geological Survey, Record 2001-007*. (CD-ROM, 18 OCT 07)

NTGS geophysical datasets

Updated dataset releases incorporating new survey data

NT gravity stitch (8 MAR 09)

NT radiometric stitch (JUL 08, 10 FEB 09)

NT magnetic stitch (APR 08)

Territory-wide maps (1:2 500 000 scale)

Updated editions

NT Radiometric Map (12 MAR 08, 20 MAR 09)

NT Gravity Map (20 MAR 09)

NT Magnetic Map (12 MAR 08)

Magnetic Depths of the NT (APR 08)

1:250 000 Geology GIS data sets

Re-released with latest data dictionary

Arnhem Bay (11 DEC 08)

Auvergne (14 MAR 08)

Blue Mud Bay (11 DEC 08)

Darwin (11 DEC 08)

Delamere (8 DEC 08)

Limbunya (8 DEC 08)

Milingimbi (11 DEC 08)

Mount Solitaire (14 MAR 08)

Mount Theo (14 MAR 08)

Robinson River (11 APR 08)

Sandover River (14 MAR 08)

Tobermory (14 MAR 08)

Victoria River Downs (8 DEC 08)

Wave Hill (8 DEC 08)

APPENDIX 2 - CHINA MINERALS INVESTMENT ATTRACTION STRATEGY 2007-2011

Report Card November 2006-June 2009

	Total results to date
Active Contacts (no. of companies)	322 companies
Out-bound Visits	6 visits in total Nov 06 Beijing + Hunan * May 07 Beijing, Baotou, Harbin Nov 07 Beijing * May 08 Hunan, Beijing Nov 08 Beijing * May 09 Shanghai + Nanjing* & Hunan * Minister attended
In-bound Visits	67 visits by 37 companies
NT project submission	53 projects submitted
EL Applications	43 EL Applications China Australia Mining (1) Legend International (5), Sinosteel (8), Tianda (15) Zhenxing Mining (14)
EL Applications Granted	19 ELs Granted Legend International (3), Tianda (10) Sinosteel (6)
Exploration programs	3 programs Legend International, Sinosteel Australia, Sinosteel Mining
Agreements MoU, Joint ventures, Acquisitions, Off-take	9 Agreements
Service Sector Support	10 service sector supporters

APPENDIX 3 - JAPAN MINERALS INVESTMENT ATTRACTION STRATEGY

Report Card Feb 08-June 2009

	Total results to date
Active Contacts (no. of companies)	30 companies
Out-bound Visits	5 visits Team Australia Visit – Feb 2008 & 2009 Department – May 2008 & 2009 CE Visit – October 2008 Also Executive Director met with JOGMEC in Sydney (March 09) at the NT Investment Seminar held by Japan Consul General and Chief Minister's Office. CE met with JOGMEC in Sydney March 2008
In-bound Visits	8 visits by 4 companies
Joint ventures	3 Joint Ventures 1. JOGMEC & Mincor (June 2008) \$4.5 million over 3 years to earn 40% in Georgina Basin base metal project 2. JOGMEC & Bondi Mining (Dec 2008) \$3 million over 4 years to earn 51% in Murphy uranium project. 3. Itochu and Western Desert (Dec 2008) \$17 Million to develop Roper Bar Iron Project
Service Sector Support	Clayton Utz attended and provided presentation - May Visit 2008 & 2009