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1 Summary

1.1 Executive Summary

In June 2018, CSA Global Pty Ltd (CSA Global) was commissioned by Global Atomic Corporation (GAC) to update a Mineral Resource estimate and to prepare a NI 43-101 Technical Report for the DASA uranium deposit, located in the central part of the Republic of Niger, West Africa. The DASA project is 100% owned by GAC and forms part of a larger package of projects in Niger in which GAC has an interest.

The estimate update and report were commissioned by GAC to support the continued development of the project and fundraising activities, following results of the additional exploration drilling of 36 holes completed in 2017–2018. GAC is listed on the TSX Venture Exchange and as such this document will be published and available to third parties or the general public.

GAC has been investigating the DASA project since 2007 and has undertaken multiple phases of exploration and evaluation programs. These programs have included: exploration and resource evaluation drill programs, mapping, geophysical investigations, geotechnical analysis of drill core, metallurgical sampling and analysis, hydrological studies and baseline environmental work. However, this report will focus on the diamond drilling program commenced in late 2017 through to June 2018 and the impact it has had on the Mineral Resource estimates.

This recent diamond drilling program has been highly successful and delineating higher-grade mineralization within 300 m of the surface. The drilling was focused in areas of faulting associated with a graben structure – known as the Flank Zone – and has improved the understanding of the distribution of mineralization within the deposit and confidence in the geological model. This has resulted in an improved classification of resources in the Flank Zone from Inferred to Indicated.

This report contains information on all main phases and stages of the work to model and update the estimate of the deposit’s Mineral Resources and results of quality assurance/quality control (QAQC) analysis. At this time, more detailed studies of the project in terms of mining or project economics has not been undertaken.

Dmitry Pertel, Principal Geologist for CSA Global, visited the DASA project area in March–April 2017 at the request of GAC. The purpose of the visit was to examine resource definition drilling practices used at DASA, collect QAQC data, and to inspect the sample preparation laboratory in Niamey.

Review and analysis of both the historical and recent QAQC data, procedures and protocols indicate that the quality of data is acceptable to allow Mineral Resources to be reported in accordance with the CIM guidelines. The risk associated with the quality of the data is believed to be low.

The most recent exploration programs at the deposit were run by the GAC exploration team, including drilling in 2017–2018. GAC provided CSA Global with all exploration results completed to date and an updated project database. The databases included drillhole collar coordinates, lithological codes and analytical information for uranium. Most of uranium grades were calculated from the gamma-logging results. The topographic surface was also provided in form of digital terrain models (DTMs).

Geological interpretation and wireframing were updated and completed by CSA Global. It included interpretation of the main mineralized bodies based on a nominal cut-off grade of 100 ppm U₃O₈, and of the main faults that control mineralized bodies. Closed wireframe models were generated for each modelled mineralized body.
The Ordinary Kriging (OK) method was chosen to interpolate uranium grades into a block model. A dry bulk density value of 2.36 t/m$^3$ was calculated following exploration programs and directly assigned to the model.

The Mineral Resources have been classified and reported in accordance with the CIM guidelines. Mineral Resource classification is based on confidence in the adopted sampling methods, geological interpretation, drillhole spacing and geostatistical measures.

Mineral Resources were reported in two parts; those that have potential for extraction by open cut mining methods, and the deeper higher-grade material outside of the open pit that may be amenable to underground mining. The open pit Mineral Resources are the parts of the deposit above a cut-off grade of 320 ppm $eU_3O_8$ that fall within a conceptual optimized pit shell. Higher-grade material above a cut-off grade of 1,200 ppm $eU_3O_8$ outside of the optimized pit shell was considered for underground mining.

The Mineral Resource statement is shown in Table 1.

### Table 1: DASA Mineral Resources as at 1 June 2018

<table>
<thead>
<tr>
<th>Category</th>
<th>Tonnes (Mt)</th>
<th>$eU_3O_8$ (ppm)</th>
<th>Contained metal (Mlb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicated Open Pit</td>
<td>7.08</td>
<td>3,251</td>
<td>50.8</td>
</tr>
<tr>
<td>Indicated Underground</td>
<td>2.50</td>
<td>2,553</td>
<td>14.1</td>
</tr>
<tr>
<td><strong>Total Indicated</strong></td>
<td><strong>9.59</strong></td>
<td><strong>3,068</strong></td>
<td><strong>64.8</strong></td>
</tr>
<tr>
<td>Inferred Open Pit</td>
<td>0.26</td>
<td>1,135</td>
<td>0.7</td>
</tr>
<tr>
<td>Inferred Underground</td>
<td>8.18</td>
<td>2,647</td>
<td>47.7</td>
</tr>
<tr>
<td><strong>Total Inferred</strong></td>
<td><strong>8.44</strong></td>
<td><strong>2,600</strong></td>
<td><strong>48.4</strong></td>
</tr>
</tbody>
</table>

Notes:
- Mineral Resources are based on CIM definitions.
- Mineral Resources for open pit mining are estimated within the limits of an ultimate pit shell.
- Mineral Resources for underground mining are estimated outside the limits of ultimate pit shell.
- A cut-off grade of 320 ppm $eU_3O_8$ has been applied for open pit resources.
- A cut-off grade of 1,200 ppm $eU_3O_8$ has been applied for underground resources.
- A bulk density of 2.36 t/m$^3$ has been applied for all model cells.
- Rows and columns may not add up exactly due to rounding.

### 1.2 Conclusions

CSA Global concludes the following:

- The data and work completed to date is of a high standard, allowing the estimation of a reliable Mineral Resource for the project.
- The mineral resource model classified as Indicated is sufficiently reliable to support engineering and design studies to evaluate the economic viability of a mining project.
- Continued exploration and evaluation programs are warranted at the project, and completion of preliminary economic analysis study is warranted (leading to more detailed feasibility studies in the future).
- Significant upside exists to extend and upgrade the Mineral Resources at the DASA project. Mineralization is open to the north and south, and several sections of the deposit would benefit from infill drilling to improve the Mineral Resource classification.
- Infill drilling in critical areas would significantly reduce any potential risk in future Mineral Resource updates and further economic assessment of the project, particularly at the deeper parts of the deposit that may be amenable to underground mining.
1.3 Recommendations

CSA Global recommends the following be completed to support the exploration and evaluation effort:

• Current QAQC procedures should be maintained to ensure high quality data is available for subsequent Mineral Resource estimates.

• Further exploration is required to upgrade the confidence of the extent and quality of mineralization at the deeper parts of the DASA deposit (mainly inside the graben). This would include drilling, downhole logging and stratigraphy studies.

• It is recommended to consider some areas of the deposit for in-situ leaching techniques.

• The project should be the subject of preliminary economic assessment to assess the economic viability of both the open cut and underground Mineral Resource areas.

• The project would benefit from additional investigations to investigate the variability of radioactive equilibrium factor (REF) distribution. This would assist with upgrading Mineral Resource classification and the general understanding of uranium mineralization. CSA Global recommends sampling an assaying for radium using closed cans and uranium by x-ray fluorescence (XRF). Comparison of radium and uranium assays allows definition of the REF and comparison of radium assays and gamma logging allows to define radon degassing factor. This factor may also influence the definition of $\text{eU}_3\text{O}_8$ grades.

• Additional metallurgical tests are recommended to establish if any variability exists in the various domains of the deposit; that is, the low-grade blanket, the Flank Zone and deep mineralization.

More detailed recommendations are provided in the main body of the report.

1.4 Technical Summary

1.4.1 Property Description and Location

GAC’s exploration operations are located in the north central part of the Republic of Niger, West Africa, approximately 100 km north of the city of Agadez.

1.4.2 Land Tenure

The DASA project is located in the southwest of the Adrar Emoles 3 Permit which has a total area of 121.3 km². The centre of DASA is positioned at longitude 7.8° east and latitude 17.8° north. GAC has another tenement in Niger.

The Exploration Permit for Adrar Emoles 3 was granted on 8 February 2008 for the first three-year period on the perimeter defined to include approximately 488.7 km². On 16 August 2010, the Exploration Permits for all six Mining Agreements were extended by the Minister of Mines. The first three-year renewal of the Adrar Emoles 3 Exploration Permit was received on 17 January 2013, concurrent with the required 50% reduction in area to approximately 243.7 km². The second renewal was granted on 29 January 2016, reducing the area to approximately 121.4 km².

1.4.3 Existing Infrastructure

The project area is accessible by an all-weather road connecting Agadez, Niger’s second largest city, located 120 km south of the project with the mining town of Arlit, some 100 km north of the area of interest and the capital, Niamey some 1,000 km to the west.
There are two airports serving the general area: Agadez, Niger’s second largest city has a major airport, Mano Dayak, with a paved 3,000 m runway and recently significantly upgraded infrastructure. It is connected to the airport in Niamey, some 720 km to the west, via charter flights or daily scheduled connections and at one time also handled international tourist flights from Europe.

1.4.4  **History**

Systematic uranium exploration in the area started in 1959 after the first uranium mineralization was noted during geological reconnaissance missions on surface in the Air Mountains in 1956 by CEA. In the late 1960s, Cogema completed wide-spaced drilling spacing of several kilometres to test the stratigraphy of the area and to investigate how closely the geology resembled that of the Arlit area further north where uranium mineralization was already known since the mid-1960s.

The Japanese company, PNC, took over the landholdings in 1981 and worked on them till 1990, completing multiple drilling programs during this period along with mapping and geophysics. This work resulted in several discoveries, none of which were deemed as economic.

In September 2007, the Adrar Emoles 3 and 4 blocks were granted to GAC (then Global Atomic Fuels Corporation) totalling about 1,000 km² located some 50 km southeast of Orano’s proposed large Imouraren open pit. The Adrar Emoles 3 block includes the Daiy prospect where uranium mineralization was known within a 10 km long by 2 km wide zone. Daiy is situated along a northwest-southeast trending major lineament, the Azouza fault along which the Azelik deposit (37 Mlb) is situated, owned by CNNC, a Chinese government agency.

A NI 43-101 compliant Mineral Resource estimate by GEOEX in 2009 yielded 27.9 Mt of ore at a grade of 821 ppm eU$_3$O$_8$ or 50.5 Mlbs eU$_3$O$_8$ for Adrar Emoles concession (Isakanan area and Dajy).

In 2011, GAC announced new uranium discoveries at the Adrar Emoles 3 concession, on the current known DASA (Dajy Surface Anomaly) area named to differ from the known Dajy prospect.

In 2017–2018, GAC commenced a new drilling program targeting various parts of the deposit. Thirty-six holes from this program (completed up to 1 June) have been included in this resource update targeting the southern Flank Zone of the graben which previously had ambiguous interpretation. This additional drilling has allowed more confident interpretation in this area of the deposit and upgrading of its classification. Additional drilling is ongoing at the time of reporting and will be included in future updates at the project.

1.4.5  **Geology and Mineralization**

The rocks present within the GAC property range in age from Cambrian to lower Cretaceous age. They are mostly clastic sediments (sandstone, siltstone and shale) with some minor carbonates. They originated from the Air Massif which has been continuously eroded since at least the Mesozoic. The sediments were laid down in a continental setting and are generally the result of fluvial and deltaic deposition. In this environment, large shallow rivers meander across flat topography and create complex flow patterns where the coarse-grained sands and gravel are concentrated in the channels with the highest flow energies while low energy flow regimes on the floodplains and tidal areas create silt and mudstone type sediments.

Carboniferous sedimentary formations are the major host rocks for uranium mineralization, particularly in the northern part of the basin.

Uranium mineralization in Niger is located exclusively in sediments of the Tim Mersoï Basin and occurs in almost every important sandstone formation, however not always in economic concentrations and tonnage.
The uranium in many of the deposits of the Tim Mersoï Basin is generally oxidized. Among the primary tetravalent minerals, coffinite is dominant and accompanied by pitchblende and silico titanates of uranium. Uranium hexavalent minerals such as uranophane and meta-tyuyamunite are present in the Imouraren and TGT-Geleli deposits.

1.4.6 Exploration Status

In September 2007, the government of the Republic of Niger granted GAC the Adrar Emoles 3 and 4 permits. Ongoing exploration work and metallurgical studies have confirmed that most of the significant uranium mineralization is located around the DASA area within the Adrar Emoles 3 permit. Other uranium occurrences exist within the Adrar Emoles 3 and 4 permits.

GAC has undertaken exploration activities on the DASA project since 2010. The DASA project area covers an area measuring approximately 10 km along the strike of the Azouza graben by about 2 km. However, drilling has only focused on a small portion of this area.

In 2011, drilling efforts were realigned to achieve two goals: expand Mineral Resource, particularly the deeper higher-grade uranium mineralization, and to understand the geological controls on the distribution of the uranium mineralization.

In June 2012, the Dajy exploration camp was opened, enabling easier access to the entire concession area and drilling sites.

In 2017–2018, 36 additional holes were drilled by GAC.

1.4.7 Mineral Resources

The DASA deposit Mineral Resources were initially estimated and reported in April 2017 by CSA Global, and then updated in June 2018. The Mineral Resources were estimated by OK using a geological model and a 100 ppm U₃O₈ edge grade on the mineralized envelope. All mineralized intervals were flagged and composited to 0.5 m and estimated into 20 m x 20 m x 4 m blocks approximating half the drill density. The Mineral Resource is summarized in Table 1. The estimate has been completed by CSA Global's Principal Resource Geologist, Dmitry Pertel, who is the Qualified Person for this Report.
2 Introduction

2.1 Issuer

GAC is a TSX-V listed exploration and development company based in Toronto, Ontario, Canada. Founded in 2005, GAC has been successfully investigating the uranium potential of six permits covering approximately 1,500 km² in the Agadez region of central Niger.

GAC’s mineral assets in Niger occur in two project areas; Adrar Emoles and Tin Negouran. The most advanced investigation has occurred at the DASA project which forms part of the Adrar Emoles group of tenements. Exploration and evaluation programs completed to date are sufficient to estimate Mineral Resources. Other tenement areas have also been explored and have demonstrated potential for uranium mineralization which will likely result in additional Mineral Resources for the project over time.

GAC engaged CSA Global to prepare this independent Technical Report, on DASA, in accordance with Canadian National Instrument 43-101 (NI 43-101) requirements. This Technical Report is based on the outcomes of the exploration programs completed by GAC up to and including April 2018.

CSA Global is a geological, mining and management consulting company with more than 30 years’ experience in the international mining industry. Headquartered in Perth, Western Australia, the company has 10 offices located in Australia, Canada, the UK, South Africa, Indonesia, Singapore and Dubai. CSA Global services cover all aspects of the mining industry from project generation to exploration, evaluation, development, operations and corporate advice. CSA Global has undertaken the geological assessment and resource estimation for the DASA project, including the site inspection.

2.2 Terms of Reference

The primary purpose of this document (the “Report”) is an updated estimate of the Mineral Resources of the DASA project.

CSA Global acted independently as GAC’s consultant and was paid fees based on standard hourly rates for the services provided. The fee was commensurate with the work completed and was not contingent on the outcome of the work. Neither CSA Global, nor any of its staff rendering the services in connection with this Report, had any material, financial or pecuniary interest in GAC or its subsidiaries, or in the Project.

2.3 Qualified Person Property Inspection

The CSA Global Qualified Person, Dmitry Pertel, has undertaken a site visit to the DASA exploration camp and the deposit between 25 March 2017 and 6 April 2017. The Qualified Person inspected core logging and storage facilities, QAQC protocols and procedures, local geology of the deposit, reviewed sample preparation techniques, and visited the laboratory in Niamey.

2.4 Sources of Information

This Report partly relies on information provided by GAC and others, including documents, data and reports compiled by GAC management, consultants, contractors and their own technical staff (see Section 3).
3 Reliance on Other Experts

For the purpose of this Report, CSA Global has relied on ownership information provided by GAC. To the extent possible, CSA Global has reviewed the reliability of the data but has not researched property title or mineral rights for the mine and expresses no opinion as to the ownership status of the property.

CSA Global was supplied the results of previous work completed by GAC in the course of exploration and evaluation of the project. This included geological reports, the results of drilling in a digital database, geophysical surveys (surface and downhole) and the results of previous Mineral Resource estimates.

The primary dataset used to inform the Mineral Resource is the digital drillhole database provided by GAC at the commencement of CSA Global’s engagement. CSA Global has reviewed the data, completed relevant QAQC checks and is satisfied the data is adequate for estimation of Mineral Resources.

In Section 13 (Mineral Processing and Metallurgical Testing), CSA Global has relied on the work of Kerr 2011–2012 to provide the summary of work completed in this area.

These data have been used by CSA Global in the course of its work to estimate the Mineral Resources at the DASA project. Where possible, CSA Global has verified the work of others.
4 Property Description and Location

4.1 Location of Property

GAC’s exploration operations are located in the north central part of the Republic of Niger, West Africa (Figure 1), and approximately 100 km north of the city of Agadez. The country is bordered by Algeria and Libya in the north, Chad to the east, Nigeria and Benin to the south, and Burkina Faso and Mali to the west.

Figure 1: Location plan of the exploration projects of GAC

4.2 Mineral Tenure

GAC entered into six Mining Agreements in Niger: four Mining Agreements known as Tin Negouran 1, 2, 3, 4 on 22 January 2007, and two Mining Agreements named Adrar Emoles 3 and 4 on 25 September 2007 (Figure 2). Each agreement initially covered an area of approximately 500 km². Exploration Permits were then granted under each Mining Agreement. Over the intervening period, GAC has relinquished certain areas in compliance with the mining law of Niger. The agreements are held in the name of Global Atomic Fuels Corporation, which is the previous name of the company before listing and is a wholly-owned subsidiary of GAC.

The DASA project is located in the southwest of the Adrar Emoles 3 permit, which itself has a total area of 121.3 km². The centre of DASA is positioned at longitude 7.8° east and latitude 17.8° north.
Exploration Permits and Mining Permits are granted within the provisions of a Mining Agreement that is negotiated between the Ministry of Mines and the applicant. Such an agreement covers a period of up to 20 years, being the exploration period (three years plus two three-year renewals) and the first 10-year validity period of a Mining Permit. The Mining Agreement is then renegotiated at each renewal of a Mining Permit. The Mining Agreement can only be amended upon the mutual consent of both parties. The agreement must be approved by a Decree of the Council of Ministers and is then signed by the parties and stipulates rights and obligations of the parties during the validity period.

The Exploration Permit for Adrar Emoles 3 was granted on 8 February 2008 for the first three-year period on the perimeter defined to include approximately 488.7 km$^2$. On 16 August 2010, the Exploration Permits for all six Mining Agreements were extended by the Minister of Mines as a result of force majeure provisions. The first three-year renewal of the Adrar Emoles 3 Exploration Permit was received on 17 January 2013, concurrent with the required 50% reduction in area to approximately 243.7 km$^2$. The second renewal was granted on 29 January 2016, reducing the area to approximately 121.4 km$^2$.

Upon completion of a feasibility study, the holder of a Mining Agreement may apply for a Mining Permit. A separate Niger Mining Company must be established to hold each Mining Permit. The Republic of Niger is granted a 10% carried interest in the share capital of the Niger Mining Company at the time of its formation and is entitled to its share of dividends that may arise.
The cumulative expenditures incurred to the date of formation of the Niger Mining Company and granting of the Mining Permit are calculated and GAC must negotiate with the Republic of Niger the amount that is to be reimbursed to GAC by the Niger Mining Company and the mechanisms for such reimbursement.

On the establishment of the Niger Mining Company, the Republic of Niger has the option to subscribe to an additional 30% in the share capital of the Niger Mining Company. If the Republic of Niger fails to exercise the option at that time, then it permanently loses the option.

If the Republic of Niger exercises some or all of its option to the additional 30%, the Republic of Niger is obligated to contribute its proportionate share of cash, financial commitments, capital contributions, shareholder advances, bank and other loans for the duration of the Niger Mining Company.

A large-scale Mining Permit is valid for 10 years and may be renewed for five additional five-year periods. At the time of renewal of a Mining Permit, the Mine Agreement is also renegotiated.

The area and geographic coordinates for the Adrar Emoles 3 Exploration Permit and the adjacent Adrar Emoles 4 Exploration Permit are summarized in the Table 2.

<table>
<thead>
<tr>
<th>Point</th>
<th>Longitude east</th>
<th>Latitude north</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>7°40'00''</td>
<td>17°51'14''</td>
</tr>
<tr>
<td>B</td>
<td>7°46'28''</td>
<td>17°51'14''</td>
</tr>
<tr>
<td>C</td>
<td>7°46'28''</td>
<td>17°45'30''</td>
</tr>
<tr>
<td>D</td>
<td>7°40'00''</td>
<td>17°45'30''</td>
</tr>
</tbody>
</table>
5 Property Description and Location

5.1 Accessibility

The project area is accessible by an all-weather road connecting Agadez, Niger’s second largest city, and the final 10 km by unsealed sand piste. The mining town of Arlit is some 100 km north of the area of interest, and Niamey (the capital of Niger) is some 1,000 km to the west. The main sealed road N25 (Figure 3) is also known as the Routed Uranium (RTA) as it is here, where all the yellowcake from the two Orano uranium mines near Arlit is transported by truck to the port of Cotonou in Benin, West Africa.

The road continues north from Arlit as a sand piste to the Algerian border and from there as a bitumen road via Tamanrasset all the way to Algiers and the Mediterranean coast.

There are two airports serving the general area: Agadez, Niger’s second largest city has a major airport, Mano Dayak, with a paved 3,000 m runway and recently significantly upgraded infrastructure. It is connected to the airport in Niamey, some 720 km to the west, via charter flights or daily scheduled connections and at one time also handled international tourist flights from Europe.

Arlit also has an airport with an unpaved much shorter runway, however nearly all flights operating from here are charters for Orano’s mining operations.
The GAC exploration “Dajy” camp (Figure 4) is located some 100 km north of Agadez and 10 km straight east of the N25 highway, easily accessible via a sand piste. Its coordinates are 17°47’54”N and 7°43’33”E.

With a few exceptions of rough, rocky terrain, the whole project area is easily traversed by all-terrain vehicles or 4WD cars.

5.2 Climate

The region is characterized by an arid intermediate climate of the Sahalian desert type with two distinct main seasons: the dry season between October and May and the wet season from June to September.

The temperatures can vary between 0°C at night in January to more than 55°C in May or June during the day. The mean annual precipitation is less than 200 mm and up to 90% of it occurs during the wet season. The rainy season provides sufficient precipitation to allow local basic agricultural activities. Flash floods are frequent inside alluvial dry river beds originating in the Air Mountains and can quickly turn into torrential streams making local roads temporarily impassable. Much of the sparse vegetation grows around the riverbeds.

CSA Global believes that the climate of the project area presents no risk to the development of the project.

5.3 Physiography

The Exploration Permits are located between the western foreland of the Air Mountains and the N25 highway connecting Agadez to Arlit on the eastern edge of the Tim Mersoi Basin. The terrain is generally flat (Figure 5) monotonous sandy peneplain with an average elevation of some 500 m above sea level (ASL) with elevations decreasing to the west. The highest elevation is in the Azouza hills, 553 m ASL, whereas the Air Mountains, located some 30 km to the east may reach over 1,800 m ASL.
5.4 Local Resources and Infrastructure

The project is located in the department of Agadez which comprises 52% of the surface area of Niger but has only 322,000 inhabitants with a population density of 0.2/km².

The GAC project area is traversed by a 132 KV powerline connecting the Sonichar power plant – located some 40 km south of the project near the small city of Tchirezrène – with the two uranium mines near Arlit, 120 km to the north. The power plant runs two 16 MW generators and is fed by coal which was discovered during the uranium exploration phase in the early 1970s.

Sonichar also supplies electricity to the city of Agadez and has considerable excess capacity for any industrial development in the area.

There are no permanent surface water sources available, but several underground aquifers exist at depths between 300 m and 500 m.

A large pool of mostly unskilled labour is available on short notice within the immediate project area or from Agadez and Arlit. The Orano (ex Cogema) uranium operations have trained a local labour force over the years and able workers can be expected to be available. This includes technical personnel from supervisory levels upwards.

The labour code and the organization of labour are very much based upon the French system.

Mining equipment and most supplies need to be imported from outside Niger. Warehousing facilities exist to some extent in Agadez or Arlit.

Niger has a long history of resource extraction and mining and exploration services are available on a local level reaching from drilling companies to environmental consultants and support services.
6 History

6.1 Introduction

Uranium exploration did not commence in Niger until the early 1950s, following up on indications from spotty surface mineralization. The exploration for uranium occurred over time in three phases dictated by the economics of the mineral at various times.

The following section is based on information sourced from the below reports:

- Périmètre In Adrar (1977)
- Rapport des activités de la champagne de prospection d’uranium, Association Onarem PNC (1983)
- Projet Sekiret, Programme des Travaux de la 3eme Campagne (1983–1984)
- Projet Sekiret, Programme des Travaux de la 4eme Campagne (1984–1985)
- Association Onarem PNC (1985)
- Projet Sekiret, Programme des Travaux de la 5eme Campagne (1985–1986)
- Association Onarem PNC (1986).


Systematic uranium exploration in the area started in 1959 after the first uranium mineralization was noted during geological reconnaissance missions in the Air Maintains in 1956 (J.R. Leconte mission) and in 1957–1958 near Azelik just west of the GAC property during an exploration program for copper in the Teguida n’Adrar-Assouas region.

The French Nuclear Energy Commission (Commissariat à l’Energie Atomique, “CEA”) was responsible for all the work. From 1957–1967, an intensive geological exploration program was implemented, which resulted in the discovery of the uranium deposits of Azelik (1960), Madaouela (1964), and finally Arlit-Akouta (1966–1967).

Airborne radiometric and magnetic surveys located a large number of surface anomalies which were quickly followed up on the ground. The CEA later merged into Cogema which became AREVA and is now called Orano.

In the late 1960s, Cogema completed wide-spaced drilling (several kilometres apart) to test the stratigraphy of the area and to investigate how closely the geology resembled that of the Arlit area further north where uranium mineralization was already known since the mid-1960s.

In addition to the drilling, other exploration techniques such as geological mapping, rock and water well sampling, ground radiometric surveys and airborne surveys such as magnetic, electromagnetic and radiometric were employed.

A 250 m line spaced airborne radiometric survey delineated a large number of anomalies which were confirmed on the ground and consequently drilled. At this stage, the drilling aimed at identifying the stratigraphy rather than mineralization. Much of this drilling was rotary, “wild cat” spaced at several kilometres. This was reduced to 800 m and 400 m in more encouraging areas. Core drilling was used to confirm the geology and lithology as needed.
The first holes were completed in 1960 and continued until 1972 within the “In Adrar” concession, including the Dajy area. A total of 652 holes were completed all over the concession, of which 12 were in the closer ranges of Dajy. No holes were drilled within the actual DASA area.

The drilling confirmed that the area was underlain by stratigraphy closely resembling that of the Arlit region. All holes were probed by radiometric and electric methods using Cogema’s own logging systems. Significant radiometric anomalies were discovered within the Aerar Emoles 3 permit in strata younger than the Upper Jurassic Imouraren world-class uranium deposit, located only some 40 km northwest of DASA.

6.3 Regional Exploration by PNC and Onarem (1981–1990)

In 1981, Cogema dropped major parts of their landholdings due to the suppressed uranium market at that time. A joint venture between Power Reactor and Nuclear Fuel Development Corporation (PNC) based in Japan and Onarem (Niger National Geological Survey) acquired a large Exploration Permit called Sekiret which covered an area of some 4,200 km². PNC conducted stratigraphic drilling on 800 m x 800 m and 400 m x 400 m centres.

In 1982, 4,686 m were drilled on several kilometre-wide spaced grids exploring a number of ground anomalies. A much larger program was completed in 1983, 36 holes totalling 11,000 m as a combination of rotary and cored drilling. Drillhole spacing was 2.5 km x 2.5 km over western and eastern sections of the property. All drillholes were probed for natural gamma, resistivity sonic and calliper using Japanese-made equipment.

In 1984, encouraging results were noted in 13 drillholes (6,266 m) in the Dajy area, 13 core holes (1,848 m) in the Sekiret area and five drillholes (2,672 m) near the Arlit fault in the west.

In 1985–1986, 27 drillholes (10,702 m) were completed, of which 7,808 m were core and 2,894 m were rotary. Some of the holes were over the northern sector while others were placed over Dajy and Isakanan. Additional drilling was done in 1987 (7,672 m), seven holes with 2,139 m in 1988 and 11 holes in 1988 totalling 3,505 m and finally 12 drillholes or 3,466 m in 1990.

PNC’s work confirmed that uranium was present in the Tarat, Madaouela and Guezouman formations and in a surface anomaly at DASA in the sandstones of the Tchirezrine 2 Formation.

The drilling was successful in expanding the Dajy prospect and discovering the Isakanan prospect. The joint venture terminated in 1988.

From 1990 to 2007, the Aerar Emoles 3 and 4 areas remained unexplored and no known exploration activity can be reported.

6.4 Exploration Activity from 2007 Onwards

In September 2007, the Adrar Emoles 3 and 4 blocks were granted to GAC (then Global Atomic Fuels Corporation) totalling about 1,000 km² located some 50 km east of Orano’s proposed large Imouraren open pit. Mineralization was known to exist within the lower Carboniferous Guezouman and Tarat sediments and the lower Cretaceous Tchirezrine 2 sandstone. The Adrar Emoles 3 block includes the Dajy prospect where uranium mineralization was known to occur within a 10 km long x 2 km wide zone. Dajy is situated along a northwest-southeast trending major lineament, the Azouza fault, along which the Azelik deposit (37 Mlb) is situated, owned by CNNC, a Chinese government agency.
The Tchirezrine 2 sandstone is outcropping in the Adrar Emoles 3 block over wide areas and these strata also hosts the very large (>300 Mlb Orano owned) Imouraren deposit.

A NI 43-101 compliant resource estimate by GEOEX in 2009 yielded 27.9 Mt of ore at a grade of 821 ppm eU₃O₈ or 50.5 Mlbs eU₃O₈ for Adrar Emoles concession (Isakanan area and Dajy).

In 2011, GAC announced new uranium discoveries at the Adrar Emoles 3 concession, on the current known DASA (Dajy Surface Anomaly) area named to differ from the known Dajy prospect. The discoveries are located along the Azouza fault and hosted in the Tchirozerine 2 lower Cretaceous sandstones which also hosts the proposed Orano Imouraren >300 Mlb open pit deposit. Imouraren is situated less than 50 km away. The mineralization is contained in a horst and graben environment with up-thrust blocks. Intersections at Dasa 1 were 0.26% U₃O₈ over 8.8 m; Dasa 2 were 0.11% U₃O₈ over 8.6 m; and Dasa 3 were 0.11%U₃O₈ over 76 m.

Additional exploration work located uranium grades from blowouts on surface as high as 30% U₃O₈ within the Tchirezrine 2 sandstone.

Later drilling confirmed that high-grade mineralization exists below the planned open pit with reported grades in hole ASDH-307 of 0.35% eU₃O₈ over 30 m and hole ASDH-248 of 0.21% eU₃O₈ over 25 m.

In June 2012, the Dajy exploration camp was opened which allows easier access to the whole concession area and the drill sites.

In 2017 to April 2018, GAC drilled an additional 36 holes targeting the southern Flank Zone of the graben.

### 6.5 Previous Mineral Resource Estimation

Mineral Resource estimation for the DASA project has previously been done by SRK Consulting (Canada) in September 2013 (Mineral Resource Evaluation, 2013) (Table 3).

<table>
<thead>
<tr>
<th>Category</th>
<th>‘000 tonnes</th>
<th>eU₃O₈ (ppm)</th>
<th>eU₃O₈ (Mlb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inferred (Open pit)**</td>
<td>4,713</td>
<td>579</td>
<td>6.01</td>
</tr>
<tr>
<td>Inferred (Underground)***</td>
<td>19,396</td>
<td>1,797</td>
<td>76.84</td>
</tr>
<tr>
<td>Inferred (Total)</td>
<td>24,109</td>
<td>1,559</td>
<td>82.86</td>
</tr>
</tbody>
</table>

* All figures rounded to reflect the relative accuracy of the estimates. Mineral Resources are not Mineral Reserves and have not demonstrated economic viability.

** Open pit Mineral Resources reported at a cut-off grade of 250 ppm of eU₃O₈ per tonne assuming: metal price of US$70/pound of U₃O₈, mining cost of US$5/tonne, processing and G&A cost of US$5/tonne, processing cost of US$24/tonne, process recovery of 90%, exchange rate of C$1.00 equal US$1.00, a mining rate of 10,000 tonnes per day and a pit slope angles of 45°.

*** Underground Mineral Resources reported at a cut-off grade of 600 ppm of eU₃O₈ per tonne assuming: metal price of US$70/pound of U₃O₈, mining cost of US$71/tonne, processing and G&A cost of US$5/tonne, processing cost of US$24/tonne, process recovery of 95%, exchange rate of C$1.00 equal US$1.00 and a mining rate of 5,000 tonnes per day.

CSA Global completed a Mineral Resource estimation for the DASA project in February 2017 (Table 4). Mineral Resources were reported using a cut-off grade of 250 ppm U₃O₈.
Table 4:  DASA Mineral Resources as at 1 January 2017, CSA Global

<table>
<thead>
<tr>
<th>Category</th>
<th>Tonnes (Mt)</th>
<th>eU₃O₈ (ppm)</th>
<th>Contained metal (Mlb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicated</td>
<td>3.7</td>
<td>2,608</td>
<td>21.4</td>
</tr>
<tr>
<td>Inferred</td>
<td>7.7</td>
<td>2,954</td>
<td>49.8</td>
</tr>
</tbody>
</table>

Notes:

- Mineral Resources are based on CIM definitions.
- A cut-off grade of 1,200 ppm eU₃O₈ has been applied.
- A bulk density of 2.36 t/m³ has been applied for all model cells.
- Rows and columns may not add up exactly due to rounding.

These earlier iterations of Mineral Resources differed in several ways; the numbers of drillholes available, the level confidence in the geological model at the deposits and the prevailing pricing environment for the uranium sector.

6.6 Production from the Property

No production from the property is known.
7 Geological Setting and Mineralization

7.1 Introduction

This section is prepared based on the following reports:

- Activation Lab (2007)
- Perimetre Tin Adrar; Dossier Technique (1977)
- Jean Martin von Siebenthal (2013)
- Cazoulat (1985)
- Gauthier (1972, 1974)
- Gerbaud (2006)
- https://www.uni-hohenheim.de/atlas308/startpages/page2/french/content_fr/conframe_fr.htm
- Guiraud (1981)
- Greigert and Pougnet (1967)
- Hirlemann and Faure (1978)
- Joulia (1957, 1959, 1963)
- Joulia and Obellianne (1976)
- Konaté et al. (2007)
- Lang et al. (1991)
- Molebale (2012)
- Sempéré (1981)
- Valsardieu (1971)
- Yahaya (1992)

7.2 Regional Geology

The GAC property is located in north-eastern Niger inside the Tim Mersoî sedimentary basin (Figure 6). The basin covers an area of some 114,000 km² and is part of the much larger Iullemeden Basin (Palaeozoic-Tertiary) that stretches into Mali, Algeria, Benin and Nigeria.

In the north and east, the Iullemeden Basin (including Tim Merso Basin) is bounded by the Hoggar Massif in Algeria and the Air Massif in Niger forming part of the Central Saharan Massif (Figure 7). The basin gets deeper to the south and west. During the early Palaeozoic, continental sediments were deposited into an open gulf to the south of the Central Saharan Massif. In the Mesozoic and Tertiary, marine transgressions invaded from time to time diminishing in thickness to the south and passing laterally into continental series. Uplifts commence in the mid Eocene, filling the basin with fluvial and lacustrine sediments.
All uranium deposits currently known in Niger are located within the Tim Mersoï Basin in several areas (Figure 6 and Figure 8):

- Near the city of Arlit, in the two Orano mines of SOMAIR – open pit (discovered in 1967) and COMINAK Akouta – underground mine (discovered in 1974), with historical production of over 110,000 tonnes of uranium. Production in 2015 was some 4,116 tonnes of uranium.
- In the Teguida area, Azelik – open pit (SOMINA/CNNC producing since 2011 but presently closed).
- At Imouraren (Imouraren SA/Orano) – construction started in 2009 and production was originally planned to commence in 2015), projected to be the largest open pit uranium mine in the world. This project is currently on standby.

**Figure 6:** Regional geology map after F. Julia printed by BRGM in 1963 at 1:500,000
To the east, the basin rests unconformably on the crystalline basement of the Air Massif, a Precambrian metamorphic terrain intruded by post-Mesozoic felsic and mafic intrusives and in the north and northwest on the basement rocks of the Hoggar in Algeria. The Air Massif extends north into Algeria where it becomes the Ouzzalian Craton also of Precambrian age. The Air Massif represents the source for all the clastic sediments that over time have filled the Tim Mersoï Basin and is probably also the source of at least some of the uranium found in the basin’s clastic sediments.

The sediments of the basin reach in age from Paleozoic to Cenozoic (Figure 8) and up to 1,500 m in total thickness deposited on a relatively stable platform.
There are a number of upward fining sedimentary cycles that have been identified, starting with coarse to conglomeratic sandstone at the base with minor intercalations of siltstone and clay fining upwards into fine-grained sandstone or argillite and clay before the next cycle starts. Each cycle is unique and reflects changes in climate, topography, tectonic events as well as changes in the source areas for the sediments.

The strata of the Tim Mersoi Basin have a shallow dip to the west caused by the uplift of the Air Massif (Figure 9). The basin deepens gradually to the west and north and shallows over the In Guezzam ridge in Mali. Since the lower Devonian, sedimentation is predominantly continental and marginal littoral comprising conglomerate, sandstone, siltstone and shale, deposited by large meandering rivers in fluvial and deltaic settings into a slowly subsiding foreland. Further to the west, a more marine environment existed (Joulia et al., 1959).
The general direction of transport is assumed to have been from the east to west and in the area of interest a more northeast to the southwest direction of transport would have prevailed.

In general, it can be said that the sedimentary strata become younger from north to south possibly a combination of uplift of the Air Massif and erosion and transport directions.

Obelliane et al. (1971) have identified three distinct sedimentary areas within the Tim Mersoï Basin, with the main depositional areas moving slowly north to south over time:

- A lower Carboniferous basin (the Tin Seririne synclinorium) of fluvial-deltaic marine and sediments. These strata are rich in organic matter and silicified trees are common in certain areas of the basin.
- A smaller Permo-Triassic basin with intercalations of volcano sedimentary and fluvial sediments.
- A lower Cretaceous basin with lacustrine deposits overlain by fluvial-deltaic sediments.

**7.3 Structural Setting**

The Tim Mersoï Basin occurs as a regional-scale syncline with a fold axis trending north-south, affected by a combination of brittle faults, mixed flexure-faults or low amplitude folds or flexures.

The Tin Seririne synclinorium was formed during the Pan African Orogenic event from 550 M onwards and forms the northern part of the Tim Mersoï Basin with sedimentation that began during the Cambrian (Joulia et al. 1959).

The structural development of the Tim Mersoï Basin commences at the end of the Pan African Orogen event (1000 Ma). The basin develops by north-south and east-west compression with northwest to west-northwest sinistral shears caused by anti-clockwise rotation in the northeast of the basin. With the widening and deepening of the basin, its centre and the north-eastern edges see the development of sinistral shear zones and conjugate structures trending northwest-southeast and northeast-southwest. The intersections between these structures contain rotational deformation causing dome and basin structures.
Major movements are related to north-south zones which strike parallel to the eastern and the western edges of the Air Massif. The compressional sinistral strike slip movements have caused three main structural directions which are north-south; 40–80°; and 90–135°. Where these structures intersect, ideal pathways for circulating uranium-bearing fluids to form deposits are created -S fault system and N30°E associated structures.

The fold-fault of In Azaoua-Arlit comprises a major regional-wide north-south fault system. This family of structures is related to ancient late pan-African transform events. Its frequent reactivation, depending on the epochs, translates into faults, flexures and flexure-faults in the sedimentary cover.

The N30° family of structures are the most evident on surface in the Tim Mersoï Basin. They appear in the Air basement in the east and stop at the In Azaoua-Arlit lineament in the west, where they are truncated. They are linked to the In Azaoua-Arlit history (Sempéré, 1981).

In the sedimentary cover, the deformation is characterized by flexures (Gauthier, 1972; Hirlemann et Robert, 1977, 1980), creating in some instances a substantial vertical displacement in the order of 100–200 m. According to Hirlemann and Robert (1977, 1980), these flexures are linked with sinistral reverse strike-slip faults activity of the basement structures in a compressive regime.

According to Guiraud et al. (1981), the compressive phase associated with the formation of the N30° flexures is of Upper Cretaceous age, with a shortening direction of N140°.

7.3.1  **N130–N140°E and N70–N80°E Conjugate Fault System**

A second grouping of faults occurs with orientations of N130–N140°E and N70–N80°. These brittle structures are the most important family in the Air Massif. They are of late-Panafrican origin according to Greigert and Pougnet (1967).

The N70–N80°E faults are conjugate to the N130–N140°E directions. They are mainly present in the southern half of the Tim Mersoï Basin. During the Carboniferous, these structures controlled the sedimentation in the basin (Wright et al., 1993). These faults played a major structural role in the regional context of the basin, by localizing large scale dextrous strike-slip faults (Gauthier, 1972; Hirlemann and Robert, 1980).

7.3.2  **Fold-Like Structures**

Fold-like structures are common within the sediments. According to geological drilling data, the thickness and dip variations in some strata from west to east are linked with synsedimentary tectonic activity (Gerbaud, 2006).

Two families of fold-like structures are distinguished:

- **Anticlines/synclines**, with fold axes roughly parallel to the N30°E structures
- **Closed structures (domes)**, which generally appear at the intersection of the N30°E structures and N70–N80°E.

In the south, near the Adrar Emoles 3 and 4 permits, the north-south, east-west and sinistral shears combine to develop folding, the most obvious being a syncline, in which the Asouza structure is an integral part. The stratigraphy is also folded on approximately layer parallel axis which gives wider exposures and repetition of units. The layers are thickened by layer parallel shortening and on echelon structures develop (Wright, 2010, 2012).
7.4 Property Geology

The rocks present within the GAC property range in age from Cambrian to lower Cretaceous age (Figure 10). The schematic geological map is shown in Figure 11 and on the schematic cross section in Figure 12.

They are mostly clastic sediments with minor carbonates. They originated from the Air Massif which has been continuously eroded since at least the Mesozoic. The sediments were laid down in a continental setting and are generally comprised of fluvial and deltaic settings. In this environment large shallow rivers meander across flat topography and create complex flow patterns where the coarse-grained sands and gravel are concentrated in the actual channels with the highest flow energies while low energy flow regimes on the floodplains and tidal areas create silt and mudstone type sediments.
## Stratigraphic Column DASA Area

**Tim Mersoi Basin, Rep. of Niger**

<table>
<thead>
<tr>
<th>Age (Ma)</th>
<th>Formation</th>
<th>Uranium Mineralization Project / Company</th>
<th>Lithology</th>
<th>Depositional Environment</th>
<th>Colour Code DHILogger</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tégama</td>
<td>Tim Neigeran / Global</td>
<td>Coarse sandstones, core to reddish colour with fine-grained lenses</td>
<td>Fluvial</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Conglomerates with white quartz pebbles</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Irhazer</td>
<td>Akbaran / China National Uranium Co</td>
<td>Alternating carbonaceous argillites, mesh and clast carbonates incl.</td>
<td>Lacustrine</td>
<td></td>
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<td></td>
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<td></td>
<td>dolomitic, greyish layers of silt, mainly reddish colours</td>
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<td></td>
<td>Assououas</td>
<td></td>
<td>Reddish argillites with intercalations of silt and sandstones</td>
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<tr>
<td></td>
<td>Tchirouine 2</td>
<td>Imouraran / Area Dasa / Global</td>
<td>Alternating of medium - coarse grained argillaceous sandstones with</td>
<td>Fluvial / lacustrine</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>aniomictic greenish to brownish colours, cross bedding, silty clay</td>
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<td></td>
<td>Abinky</td>
<td></td>
<td>Anioloclastic, very hard, red brown; massive bands;</td>
<td>Lacustrine / acid</td>
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<td></td>
<td></td>
<td></td>
<td>Argillites and aniomictic sandstones partly arkose, iron cement; medium</td>
<td>fossiliferous volcanism</td>
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<td></td>
<td>Tchirouine 1</td>
<td></td>
<td>coarse sandstones with microscopic feldspars, bands of altered</td>
<td>Fluvial and</td>
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<td></td>
<td></td>
<td>aniomictic, frequent silty clay in sandy layers</td>
<td>exhaustive volcanism</td>
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<td></td>
<td>Moussedan</td>
<td></td>
<td>Reddish argillites with aniomictic; aniomictic sandstones</td>
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<td></td>
<td>Téoua 2-3</td>
<td></td>
<td>Epicygranular sandstones with aniomictic and felsitic cement, carbonatic</td>
<td>Fluvial / lacustrine</td>
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<td></td>
<td>levels with reddish argillites and silts</td>
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<td></td>
<td>Téoua 1</td>
<td></td>
<td>Carbonatic cemented argillites</td>
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<td></td>
<td>Aokare</td>
<td></td>
<td>Epicygranular sandstones medium to coagglomeratic with iron stains</td>
<td>Lacustrine with</td>
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<td></td>
<td>reddish argillites and very fine grained sand lenses carbonatic cement</td>
<td>fluvial intercalations</td>
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<td></td>
<td>Moradi</td>
<td></td>
<td>Arthritic clasts; strongly modified</td>
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<td>Conglomerates with quartz sand clay pebbles</td>
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<td></td>
<td>Tamamait</td>
<td></td>
<td>Medium - fine grained sandstones; carbonate cement; silts and very fine granulated sandstones clayey matrix</td>
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<td></td>
<td>Téjia</td>
<td></td>
<td>Reddish argillites and very fine grained sand lenses</td>
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<td></td>
<td>Inzegouda</td>
<td></td>
<td>Aridoses and feldspathic sandstones with carbonate cement; reddish argillites lenses; coagglomeratic intercalations with pebbles of quartz, rhyolite, silty clay, cross bedding</td>
<td>Fluvial</td>
<td></td>
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<td></td>
<td>Madaouela</td>
<td>Madaouela / Giovex Iskanand &amp; Dasa / Global</td>
<td>Silts and very fine grained carbonatic sandstones; reduced faces</td>
<td>Estuary / wetlands/wetland</td>
<td></td>
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<td>Yarat</td>
<td>Somali / Area Dasa / Global</td>
<td>Alternating argillites and very fine grained sandstones rich in organic matter; medium to coarse grained sandstones with organic matter and pyrite</td>
<td>Fluvial-Deltoic</td>
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<td>Tchinozooge</td>
<td>Cominak / Area Dasa / Global</td>
<td>Alternating black argillites and sandstones, generally abundant organic matter; silt layers</td>
<td>Marine-epicontinental lacustrine</td>
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<td></td>
<td>Guezoumame</td>
<td>Cominak / Area Dasa / Global</td>
<td>Alternating very fine grained kaolinitic sandstones and medium-coarse grained sandstones rich in organic matter and pyrite</td>
<td>Fluvial-Estuary</td>
<td></td>
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<tr>
<td></td>
<td>Talak</td>
<td></td>
<td>Argillites dark brown to blue-green; cores in core structures</td>
<td>Continental marine platform</td>
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<td>Farazakat (Gale)</td>
<td></td>
<td>Coarse grained sandstones with argillic intercalations; well rounded distinct white quartz pebbles (jacent eppebe) at the base</td>
<td>Fluvial to fluvial-glacial</td>
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<td>Tindireen</td>
<td></td>
<td>Alternating medium and fine grained sandstones with blackish/greyish argillite lenses; microconglomeratic at the base with silty cement; horizontal strata</td>
<td>Fluvial/glacial / lacustrine</td>
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<td></td>
<td>Teragh</td>
<td></td>
<td>Sandstone coagglomeratic and feldspathic, kaolinitic</td>
<td></td>
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<td></td>
<td>Basement</td>
<td></td>
<td>Granitoids / Pink granite with biotite; some basic dykes</td>
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</table>

**Figure 10:** Stratigraphic column of the ASA project area
Figure 11: DASA structural map

Figure 12: DASA schematic geological section
The points below provide a brief summary of the lithologies of the project recorded in drilling, surface mapping and geophysical surveys of the project areas:

- **Precambrian**:
  - Metamorphic Basement is exposed in the Air Mountains to the east. Some of GAC’s drillholes inside the DASA graben terminated in altered and in fresh granite. Its position within the basement suites is unknown at this time.

- **Cambro-Ordovician undifferentiated**:
  - Cambrian to Devonian rocks exist in this part of the Tim Mersoï Basin, however they have not been positively identified yet by GAC’s work. A major discordance near the Air Massif’s western boundary separates the basement from conglomerates and tillites of the Timesgueur Formation followed by In Azawa sandstone followed by another major discordance.

- **Upper Ordovician**:
  - The Upper Ordovician consists of fine-grained sandstones with quartz pebbles and calcite.

- **Silurian**:
  - The Silurian consists of graptolite schists.

- **Devonian**:
  - The Lower Devonian starts with an unconformity followed by conglomerate with pebbles of schists and basalt, Idekel sandstone with silicified wood and is overlain by Middle Devonian Touaret sandstone, fossiliferous beds and the Akara schist. The Devonian is completed by Upper Devonian Amesgueuer sandstone.

- **Carboniferous**:
  - Carboniferous formations are major host rocks for uranium mineralization particularly in the northern part of the basin. The Carboniferous–Lower Visean begins with fossiliferous marine argillites which are overlain by the clastic terrestrial Terada Series which may reach thicknesses of up to 290 m. The Terada itself is made up of the Teragh Formation consisting of coarse-grained sandstones, which can contain coal beds, and is overlain by the siltstones and sandstones of the Aoulingen Formation. This passes laterally to the north into the marine Talach argillites.
  - The Carboniferous–Upper Visean continues with the important fluvio-deltaic Tagora Series which hosts uranium in the wider Arlit region of the basin. The Tagora is made up of two cycles: the lower Tagora up to 180 m thick, starting with the conglomerates of the Teleflak and continuing into the sandstones making up the Guezouman Formation. This is a major host for uranium mineralization in the Akouta area (Cominak underground mine–Orano) and which is overlain by the siltstones of the Lower Tchinezogue Formation which is a mega-sequence comprised of the whitish sandstones of the Middle and Upper Tchinezoguë.
  - The second cycle of the Tagora (0–140 m thickness) often is marked with a thin layer of conglomerate overlain by the sandstone of the Tarat Formation with intercalations of siltstone and argillite in an upward fining sequence. The uranium at Arlit (Somair open pit mines – Orano) is hosted in this second cycle. The top of the Carboniferous is completed by sandstones and siltstones of the Madaouela Formation (GOVIEX Madaouela project).
  - The Carboniferous in the whole basin is characterized by reducing conditions displayed in predominantly greyish colours, pyrite and organic matter providing ideal conditions for the precipitation of uranium.
• **Permian:**
  o During the Permian, a major change in climatic conditions occurred and this is reflected in the rocks of that period. The Permian sediments are generally characterized by an abundance of arkosic sandstones containing significant volcanic debris. Reddish colours and abundant calcite are dominant for the Permian strata indicating oxidizing conditions. The sedimentation occurred mostly in interwoven channels with frequent and abrupt facies changes. Within the project area the thickness of the Permian strata can vary considerably and reach a thickness of some 300 m.
  o The Lower Izegouandane Series begins with coarse grained sandstones containing pebbles of rhyolite and quartzite. It is overlain by 5–10 m of a red clastic stone (equivalent to the Teja Formation) and followed by the sandstones of the Tamamait Formation. Further up in the sequence, the red siltstone of the Moradi Formation is common. The latter two formations belong to the Upper Izegouande Series.

• **Triassic:**
  o Initially the Triassic shows a continuation of the Permian conditions beginning with the conglomerates of Anou Melie that contain many pebbles shaped by aeolian actions (windkanter).
  o These are covered by fluvio-deltaic sandstones belonging to the Teloua 1 Formation. This package may reach 60 m in thickness and belongs to the Aguelal Series. In some areas the Teloua 1 displays as re-worked sediment with well sorted and rounded quartz pebbles reflecting the local paleo topography.
  o The following sediments of the Goufat Series contain masses of volcanic debris (origin volcanic tuffs?) and are called the Teloua 2 (some 70 m thick). The Teloua 2 appears as distinct poorly sorted sand lenses of the original sedimentation cycle. Analcimolite begins to appear as well. It is followed by the Teloua 3 Formation generally less than 80 m thick consisting of coarse-grained to conglomeratic sandstone with frequent rhyolite pebbles. This can be intercalated with analcimolite beds and lenses. These sediments were deposited by very high energy torrential floods. Massive analcimolite intercalated with sandstone layers follows on top as the Mousseden Formation reflecting a very active eruptive volcanic phase. This formation is generally around 80 m thick but may reach up to 150 m.

• **Jurassic:**
  o The Jurassic consists of the Wagadi Series with a thickness of 80–110 m. It commences with the Tchirezrine 1 Formation (Figure 14) representing the channel sedimentation of a large river flowing from north to south. Coarse-grained sandstones are intercalated with finer-grained portions or with siltstones containing much analcimolite. Graben synsedimentary tectonics have caused the variations in thickness as known from the drilling. In general, the Tchirezrine 1 is quite similar to the higher following Tchirezrine 2 except that it does not contain uranium mineralization.
  o The top of Tchirezrine 1 is marked by the Abinky Formation (Figure 14) below a massive sequence of analcimolite partly silicified or sandy. It is testimony to a period of active volcanism. The formation can be strongly altered and mineralized with copper.
  o The Dabla Series, up to 350 m thick, begins with the Tchirezrine 2 Formation which can reach thicknesses of 40–200 m in some parts. It lies unconformable on the Abinky Formation showing local scouring. It was laid down in a fluvial-deltaic and lacustrine environment. The sediments are mostly coarse-grained sandstones and micro conglomerates with cross-bedding at the base and with angular detritus pointing to a short and high energy transport path. This is also documented in local erosion of older sediments. The formation contains the Orano Imouraren uranium deposit and much of the
uranium discovered on the GAC property. It is the most important target for uranium exploration at this time in this area.

- In general, the Tchirezrine 2 displays particular sedimentary conditions. Massive sandstone banks at the bottom of the formation with poor grain sorting, erosion laid down in a high energy flow regime. The remaining, stratigraphically higher, parts are made up of fine-grained well sorted sandstone with analcimolite on the top and in lenses within the sandstone. This sequence is repeated several times. The analcimolites are considered to represent a similar environment and occupy a similar position to the shale in the lower Carboniferous strata. The sandstone generally consists of over 80% quartz, 4–5% feldspar and rock fragments of the Abinky or reworked sandstone.

- The sandstones are generally poorly cemented. The analcimolite appears in two forms; blue, grey or green within a chloritic matrix or massive brownish in a hematite matrix. The formation was affected by syn-sedimentary tectonics and later shearing. This has contributed to the several hundred metre thickness reporting in the drilling. The sediments are rich in organic matter which may include coal beds, providing a favourable environment for uranium precipitation.

- Cretaceous:
  - The Cretaceous starts with the Assaouas Formation (Figure 18), a transition facies to the more argillitic rocks stratigraphically above. The Assaouas reaching a thickness of up to 30 m consists of reworked older quartz-rich sediments and is overlain by fine-grained sandstones and argillites.
  - Overlying the Assaouas Formation is the Irhazer (Figure 19), which covers much of the basin and is a testament to a period of little tectonic activity and low erosional regime. It is confined to the Asouza Graben. It represents a lacustrine transgression probably originating in the south or southeast and covering a vast plain affected by subsidence of fine grained sediments.
  - Uranium exists here and is being mined at the Abkorun property by China National Uranium Corporation just to the west of the GAC property.
  - The stratigraphic column of the project area culminates in the sandstones of the Tegama Series which lie with a marked unconformity on the Irhazer sediments. Tegama sandstone is present in two bigger hills inside the Asouza Graben. The lithology here are sandstones which are cross-bedded and coarse to micro conglomeratic. The formation displays heavy quartz veining related to the faults and fractures bisecting it (Figure 20, Figure 21).
Figure 13: Cross-beds in coarse-grained to micro conglomeratic sandstone, Tchirezine 1 Formation

Figure 14: Massive analcimolite, Abinky Formation
Figure 15: Tchirezrine 1 sandstone covered in the foreground by analcimolite of the Abinky Formation

Figure 16: Cross-bed figures in the Tchirezrine 2, northern outcrops at DASA

Figure 17: North-south structures in sandstone, Tchirezrine 2 unit, eastern outcrops DASA
Figure 18:  Siltstone outcrop, Assaouas Formation, southern outcrops

Figure 19:  Irhazer Formation, limestone strata within argilite, crosscut by east-west transform faults, north-eastern outcrops
Figure 20:  Heavily quartz veined Tegama sandstone; mount inside the Assouza Graben

Figure 21:  Conjugate fracture veined in quartz in coarse cross-bed Tegama sandstone
7.5 Structural Geology of the Property

Structural control is important in the formation of most uranium deposits and the DASA area is no exception. The arid climate has prepared and well preserved structural features, many of which can be observed at surface.

The DASA site corresponds to a major structural intersection of the Adrar-Emoles flexure and the Asouza fault which resulted in the doming and creation of the Asouza Graben (Siebenthal, 2013). These are features that characterize other major uranium deposits in the Tim Mersoi Basin as well.

7.5.1 Adrar Emoles Flexure

The Adrar Emoles flexure-fault, one of the major northeast-southwest structures, intersects the Asouza fault at DASA. This intersection formed a dome, the opening of which created the Asouza Graben (Figure 22) moving the Cretaceous formations to the same topographic elevation as the surrounding Jurassic sandstones.

7.5.2 Asouza Fault

Major northeast-southwest vertical faults are associated with the Asouza Graben and characterized by significant vertical displacement of several hundred metres.

The creation of the graben preserved the Tegama and Irhazer Formations at depth, elsewhere found much farther to the west in the deeper areas of the Tim Mersoi Basin. It also preserved the rocks of the Tchirezrine 2 Formation which are much eroded on the sides of the graben.

This vertical displacement has had a major impact in the continuation of potential host rock geometry and has also provided feeder faults and mineralization traps for mineralizing fluids as evidenced by veining within the sandstones.

7.5.3 North-Northwest to South-Southeast Faults and Folds

Of key interest are the north-northwest to south-southeast faults observed northwest of the graben. They cut the sandstone formations of the Tchirezrine 2 unit, inducing vertical displacement, with evidence of fluid circulation, enacting localized alteration and copper mineralization in analcimolite formation of the Tchirezrine 2 unit.

7.5.4 Shearing Fractures and Veins

Shearing fractures and veins appear in the limestone, particularly of Jurassic age, near the major faults that have a strike-slip component similar to the Asouza and its branches, and the east-west strike-slip faults.

7.5.5 East-West Strike-Slip Faults

Within the upper, northern termination of the Asouza Graben and elevated from the surrounding plain a limestone outcrop of the Irhazer Formation displays strike-slip faults evidence. A closer examination of the satellite imagery reveals a set of roughly east-west oriented structures on both sides of the graben. These are most likely conjugate to the Asouza fault.
7.6 Uranium Mineralization

Uranium mineralization in Niger is located in sediments of the Tim Mersoï Basin and occurs in most of the thicker sandstone units described earlier, however not always in economic concentrations and tonnage. Uranium is known in the Carboniferous Terada series, in the Carboniferous Tarat and Guezouman formations (Arlit mines), in the Permian Izegouande, the Jurassic Tchirezrine 2 Formation (Imouraren, DASA, Azelik) and the Cretaceous Dabla Series as well as in the Tegama Series.

There are three areas in eastern Niger where uranium is presently being mined or could be mined in the near future:

- Arlit-Akokan (Akouta) hosting the Somair open pit and the Cominak underground mines (both mainly owned by Orano) which have produced so far over 110,000 tonnes of uranium since the early 1980s with considerable reserves remaining.
- Azelik (Teguida open pit/underground mine) operated by CNNC, 160 km southwest of Arlit, however presently not producing.
- Orano’s Imouraren deposit some 80 km south of Arlit where an open pit mine is planned to be developed.

The uranium in many of the deposits of the Tim Mersoï Basin is oxidized. Among the primary tetravalent minerals, coffinite is dominant and accompanied by pitchblende and silico titanates of uranium. Uranium hexavalent minerals such as uranophane and meta-tyuyamunite are present in the Imouraren and TGT-Geleli deposits.

The gangue is composed of quartz, feldspar, analcime and often illite, kaolinite and chlorite; with accessories such as some zircon, ilmenite, magnetite, tourmaline, garnet, anatase and leucoxene.

The uranium minerals are frequently associated with copper minerals (native copper chalcocite, chalcopyrite, malachite, chrysocolla) and also with iron minerals such as pyrite, hematite and goethite. The organic plant substances are generally plentiful in un-oxidized facies of greyish-greenish colour.

The geometry and the distribution of the uranium mineralization as seen in the DASA drill core is to a large extent comparable with what has been reported from the uranium mines in the Arlit and Imouraren areas:

- There is a strong control by stratigraphy and lithology – with mineralization mainly hosted within the Tchirezrine 2 sandstones, particularly in the coarser-grained micro conglomeratic facies of greyish-greenish colour containing frequent sulphides and organic matter such as plant remains.
• The mineralized lenses are contained within northeast-southwest trending channels. The thickness of the mineralization may vary considerably between drillholes most likely an indication that channel stacking of favourable lithologies has increased the normal thickness of the sediment pile.

• There are strong indications that the mineralization is influenced by a tectonic control along late northeast and southwest faults where some leaching has been observed.

• Uranium mineralization is controlled by zones of oxidation – from surface (ground oxidation) and local/regional zones on depth (Figure 22).

• Groundwater circulation has created over time discontinuities in the mineralization as a result of tectonic movements.

Figure 23: Uranium mineralization controlled by zones of formation of oxidation (Section 360000mE, looking west)

Thin section work and petrographic studies by Activation Lab (2007) on DASA samples has revealed that the uranium host rocks are sandstone and wacke which are variably oxidized. The main component is angular quartz, some plagioclase and lesser orthoclase. They are cemented by goethite, amorphous Fe-hydroxides and various secondary U-rich minerals.

The original cement between the grains of quartz and feldspar consisted of sericite and carbonate which were replaced during later stages by goethite and the amorphous Fe-hydroxides. The quartz and the feldspar contain micro fractures partly filled with U-rich oxide. The latter also rim some of the silicates. Uranophane in form of radiating aggregates forms cement between the silicates and partly replaces them.

GAC initiated a mineralogical study of the uranium mineralization on its property (Molebale, 2012). Five drill samples and five residue samples were submitted for analysis. The samples were from drillholes ASDH-351, ASDH-353, ASDH-354(1), ASDH-354(2) and one DADH sample. The samples were split into representative portions and polished sections were prepared. Subsamples were pulverized for x-ray diffraction (XRD).
Five uranium-bearing minerals have been identified in DASA samples (Molebale, 2012):

- Carnotite $K_2(UO_2)_2(VO_4)_2 \times 3H_2O$
- Uranophane $Ca(UO_2)_2SiO_3(OH)_2 \times 5H_2O$
- U-rich titanite $(U,Ca,Ce)(Ti,Fe)O_6$
- Coffinite $U(SiO_4)_{3-x}(OH)_{4x}$
- Torbernite $Cu(UO_2)_2(PO_4)_2 \times 11H_2O$
- Autunite $Ca(UO_2)_2(PO_4)_2 \times 12H_2O$.

The majority of the mineralization is comprised of Carnotite, Uranophane and U rich titanite and contribute to most of the uranium in the ASDH samples in terms of mass %, while torbernite is dominant in the DADH sample. The average grain size for the observed uranium-bearing minerals is -38 μm.

The source of the uranium is very likely leaching of the frequent volcanic tuff and ash blankets and intercalations now altered to analcimolite within the Wagadi and Dabla sediment packages. This has occurred over time in the geological history of the area and probably began as pre-U concentrations during the early sedimentation in favourable reducing environments such as organic matter rich lower flow regimes and in favourable lithologies. The first stratiform mineralized bodies would have been formed during the early digenesis. Later, structural deformation and ground water movement within coarser grained organic rich sediments aided by fluid movements and influenced by faults and tectonic activity initiated rollfront-like redistribution of the uranium, thus giving the mineralized bodies their present shape.
8 Deposit Type

All known uranium occurrences and deposits in Niger are located in sandstones and conglomerates within the Tim Mersoi Basin. They are all classified to belong to the sedimentary tabular, paleo channel and rollfront or sandstone types.

Sandstone-hosted uranium deposits are marked by epigenetic concentrations of uranium in fluvial/lacustrine or deltaic sandstones deposited in fluvial continental environments frequently in the transition areas of higher to lower flow regimes such as along paleo ridges or domes. Rollfront type deposits contain impermeable shale or mudstones often capping or underlying or separating the mineralized sandstones and ensure that fluids move along within the sandstone bodies, thus imitating rollfront systems in Wyoming and Colorado in the western USA.

In the sandstone-type deposits, uranium was typically precipitated from oxidizing fluids by reducing agents such as plant matter, amorphous humate, sulphides, Fe minerals and hydrocarbons. The oxidation and reducing facies display typical colours and can assist in exploration target selection. The fluid migrations and deposition of uranium leaves behind a distinct colour change from red hematitic (oxidized) to grey-green (reduced). The primary uranium minerals in most sandstone-type deposits are uraninite, pitchblende, coffinite and some secondaries.

Uranium deposits hosted in sandstone make up some 30% of the world’s known uranium resources and contain up to 500,000 tonnes of uranium with average grades between 0.1% and 0.5% U.

In general, it can be noted that in eastern Niger from north to south, the uranium mineralization seems to occur in younger and younger strata. This is most likely a combination of a change in source areas and delivery of uranium over time as well as the fact that to the south the younger strata are exposed on surface, necessitating deeper and deeper drilling in southern areas to explore (e.g. for the Carboniferous-aged targets).

In the DASA deposit, characteristics more consistent with the paleo channel tabular type seem to prevail.

The best uranium grade and tonnage on GAC’s property found so far is hosted in sandstones of the Tchirezrine 2 Formation, the same formation that also contains the huge 300,000 tonnes U Imouraren deposit of Orano, located just 40 km to the northwest (Cazoula, 1985). It has already been proven by GAC’s exploration work that many of the characteristics of Imouraren exist also within the GAC’s tenure. These include:

- Stratigraphy and sedimentology: Uranium is primarily found in the Tchirezrine 2, especially in heterogranular sandstones with analcimolite pebbles.
- Palaeography: Mineralization is found in the vicinity of the main channel, the formation of which was partly controlled by post and synsedimentary tectonics while the Tchirezrine 2 was laid down.
- Tectonics: Some remobilization of uranium along faults is known along east-northeast directions, which are post Tchirezrine 2 faults.
- Paleohydrology: Ground watercirculation has affected an earlier concentration stage and has dissolved U in some parts of the deposit and re-concentrated it in other parts.
- Uranium mineralogy: Contrary to the Carboniferous mineralization in the Arlit area, the uranium in the Tchirezrine 2 appears mainly as uranium hexavalent minerals in an oxidized environment. Uranophane is the most abundant mineral. It may form small aggregates or appear as continuous coating parallel to the stratification.
Uranophane is commonly associated with chrysocolla and in small quantity also associated with boltwoodite. Metatyuyamunite has also been found. Some coffinite exists in residual reduced zones along with chalcocite and native copper. Pitchblende was noted in small amounts.

The uranium mineralization occurs in two main types: Interstitial within the sandstones and massive ore associated with sulphides in micro fissures with galena and blende.

Few other minerals have been found, however calcite seems to appear only at the periphery of the mineralized body.
9 Exploration

GAC acquired the Tin Negouran 1, 2, 3 and 4 Exploration Permits in January 2007. Exploration work was initiated by resampling material residual from historical PNC exploration activities. This resampling confirmed high uranium values in the material.

In September 2007, the government of the Republic of Niger granted GAC the Adrar Emoles 3 and 4 permits. Ongoing exploration work and metallurgical studies have confirmed that significant uranium mineralization is located around the DASA area within the Adrar Emoles 3 permit. Other uranium occurrences exist within the Adrar Emoles 3 and 4 permits.

GAC has undertaken exploration and evaluation activities on the DASA project since 2010. The DASA project area covers an area measuring approximately 10 km along the strike of the Azouza graben by about 2 km. However, drilling has only focused on a small portion of this area.

In 2012, drilling efforts were realigned to achieve two goals:
- Expand the Mineral Resource, particularly the deeper higher-grade uranium mineralization
- Understand the geological controls on the distribution of the uranium mineralization.

In 2017–2018, additional drilling was completed mostly in the central part of the deposit. Infill drilling in 2017–2018 targeted the southern Flank Zone of the graben to improve confidence in the geological model in this area. Additional drilling allowed more confident interpretation of that section of the deposit and upgrading of its classification.

9.1 Data Compilation and Old Drillhole Locations

In 2008, GAC started data compilation to physically locate historical drillholes, mainly from the previous operations of the Japanese company, PNC. This work was successful at locating many holes at the Azouza North East prospect (holes G030, G094, G097, G130...) and the Dajy prospect (G120 to G136) located south of the DASA deposit. Only peak radiometric values recording was available (Table 5).

<table>
<thead>
<tr>
<th>Hole-id</th>
<th>Location X (UTM WGS84 / 32N)</th>
<th>Location Y (UTM WGS84 / 32N)</th>
<th>Peak radiometric value (CPS)</th>
<th>Depth (m)</th>
<th>Prospect</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>G030</td>
<td>368591</td>
<td>1972277</td>
<td>6600</td>
<td>174</td>
<td>AZOUZA NORTH-EAST</td>
<td>North-East of actual DASA deposit</td>
</tr>
<tr>
<td>G034</td>
<td>361739</td>
<td>1968205</td>
<td>2150</td>
<td>438</td>
<td>DAJY</td>
<td>South of actual DASA deposit</td>
</tr>
<tr>
<td>G067</td>
<td>361746</td>
<td>1970731</td>
<td>2000</td>
<td>581.45</td>
<td>DAJY</td>
<td>South of actual DASA deposit</td>
</tr>
<tr>
<td>G094</td>
<td>364216</td>
<td>1971980</td>
<td>5899</td>
<td>528.3</td>
<td>AZOUZA NORTH-EAST</td>
<td>North-East of actual DASA deposit</td>
</tr>
<tr>
<td>G096</td>
<td>361165</td>
<td>1969340</td>
<td>4467</td>
<td>412</td>
<td>DAJY</td>
<td>South of actual DASA deposit</td>
</tr>
<tr>
<td>G097</td>
<td>362183</td>
<td>1971953</td>
<td>2811</td>
<td>474.7</td>
<td>AZOUZA NORTH-EAST</td>
<td>North-East of actual DASA deposit</td>
</tr>
<tr>
<td>G120</td>
<td>361256</td>
<td>1969305</td>
<td>5417</td>
<td>428</td>
<td>DAJY</td>
<td>South of actual DASA deposit</td>
</tr>
<tr>
<td>G129</td>
<td>360957</td>
<td>1970250</td>
<td>2360</td>
<td>420.95</td>
<td>AZOUZA NORTH-EAST</td>
<td>North-East of actual DASA deposit</td>
</tr>
<tr>
<td>G130</td>
<td>360943</td>
<td>1972550</td>
<td>2327</td>
<td>275.5</td>
<td>AZOUZA NORTH-EAST</td>
<td>North-East of actual DASA deposit</td>
</tr>
<tr>
<td>G132</td>
<td>361735</td>
<td>1969110</td>
<td>1547</td>
<td>407.7</td>
<td>DAJY</td>
<td>South of actual DASA deposit</td>
</tr>
<tr>
<td>G133</td>
<td>361436</td>
<td>1969235</td>
<td>3542</td>
<td>428</td>
<td>DAJY</td>
<td>South of actual DASA deposit</td>
</tr>
<tr>
<td>G134</td>
<td>361720</td>
<td>1970070</td>
<td>4461</td>
<td>398</td>
<td>DAJY</td>
<td>South of actual DASA deposit</td>
</tr>
<tr>
<td>G135</td>
<td>360989</td>
<td>1969449</td>
<td>5727</td>
<td>427.7</td>
<td>DAJY</td>
<td>South of actual DASA deposit</td>
</tr>
<tr>
<td>G136</td>
<td>360825</td>
<td>1968195</td>
<td>1000</td>
<td>453</td>
<td>DAJY</td>
<td>South of actual DASA deposit</td>
</tr>
</tbody>
</table>
GAC’s first exploration activities were then concentrated on the above areas, and included:

- Radiometric ground survey
- Geology and structural studies
- Topographic 3D survey
- Drilling.

### 9.2 Radiometric Ground Survey and Geo-Structural Mapping

GAC did ground scintillometer survey on DASA area (DASA1, 2, 3 prospect) covering about 4 km² using a SAIC Exploranium GR-135 Plus radioisotope identification device. Natural gamma peak value was recorded for each sampling station.

The DASA 1 prospect was covered at a sampling density of 100 m x 100 m; 100 m x 50 m; to 25 m x 25 m locally for a total area of 1.5 km² covered and 105 points surveyed. The objective was to delineate the surface anomaly of this area’s Tchirezrine 2 sandstone.

The DASA 2 prospect was covered at a sampling mesh of 100 m x 100 m; 50 m x 50 m; to 25 m x 25 m locally for a total area of 1.39 km² covered and 124 points surveyed.

Thirteen points were surveyed on the DASA 3 prospect at regular sampling mesh of 100 m x 100 m covering a total area of 2.4 km².

A total of 15 rock samples were collected on the highest radiometric count survey point for assays (Table 6).

<table>
<thead>
<tr>
<th>Rock Sample</th>
<th>Location X (UTM WGS84 / 32N)</th>
<th>Location Y (UTM WGS84 / 32N)</th>
<th>Peak radiometric value (CPS)</th>
<th>Prospect</th>
<th>Assay Sample #</th>
<th>%U3O8</th>
<th>PPM</th>
<th>lbs/tonne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dasa-1-001</td>
<td>360978</td>
<td>1970418</td>
<td>4218</td>
<td>DASA 1</td>
<td>D1 - 1</td>
<td>0.447</td>
<td>4,470</td>
<td>9.85</td>
</tr>
<tr>
<td>Dasa-1-002</td>
<td>361078</td>
<td>1970393</td>
<td>4800</td>
<td>DASA 1</td>
<td>D1 - 2</td>
<td>0.554</td>
<td>5,540</td>
<td>12.21</td>
</tr>
<tr>
<td>Dasa-1-003</td>
<td>361178</td>
<td>1970368</td>
<td>4700</td>
<td>DASA 1</td>
<td>D1 - 3</td>
<td>0.025</td>
<td>250</td>
<td>0.55</td>
</tr>
<tr>
<td>Dasa-1-004</td>
<td>361178</td>
<td>1970343</td>
<td>3850</td>
<td>DASA 1</td>
<td>D1 - 4</td>
<td>1.92</td>
<td>19,200</td>
<td>42.32</td>
</tr>
<tr>
<td>Dasa-1-005</td>
<td>362033</td>
<td>1970368</td>
<td>65535</td>
<td>DASA 1</td>
<td>D1 - 5</td>
<td>24.3</td>
<td>243,000</td>
<td>535.57</td>
</tr>
<tr>
<td>Dasa-2-001</td>
<td>360440</td>
<td>1970280</td>
<td>57200</td>
<td>DASA 2</td>
<td>D2 - 1</td>
<td>1.43</td>
<td>14,300</td>
<td>31.52</td>
</tr>
<tr>
<td>Dasa-2-002</td>
<td>360415</td>
<td>1970280</td>
<td>3617</td>
<td>DASA 2</td>
<td>D2 - 2</td>
<td>0.042</td>
<td>420</td>
<td>0.93</td>
</tr>
<tr>
<td>Dasa-2-003</td>
<td>360465</td>
<td>1970280</td>
<td>21542</td>
<td>DASA 2</td>
<td>D2 - 3</td>
<td>0.056</td>
<td>560</td>
<td>1.23</td>
</tr>
<tr>
<td>Dasa-2-004</td>
<td>360490</td>
<td>1970280</td>
<td>3434</td>
<td>DASA 2</td>
<td>D2 - 4</td>
<td>0.01</td>
<td>100</td>
<td>0.22</td>
</tr>
<tr>
<td>Dasa-2-005</td>
<td>360515</td>
<td>1970255</td>
<td>3870</td>
<td>DASA 2</td>
<td>D2 - 5</td>
<td>0.013</td>
<td>130</td>
<td>0.28</td>
</tr>
<tr>
<td>Dasa-3-001</td>
<td>360360</td>
<td>1969241</td>
<td>1500</td>
<td>DASA 3</td>
<td>D3 - 1</td>
<td>0.028</td>
<td>280</td>
<td>0.62</td>
</tr>
<tr>
<td>Dasa-3-002</td>
<td>360160</td>
<td>1969110</td>
<td>1800</td>
<td>DASA 3</td>
<td>D3 - 2</td>
<td>0.008</td>
<td>80</td>
<td>0.18</td>
</tr>
<tr>
<td>Dasa-3-003</td>
<td>360060</td>
<td>1969080</td>
<td>1800</td>
<td>DASA 3</td>
<td>D3 - 3</td>
<td>0.012</td>
<td>120</td>
<td>0.26</td>
</tr>
<tr>
<td>Dasa-3-004</td>
<td>359964</td>
<td>1969031</td>
<td>33000</td>
<td>DASA 3</td>
<td>D3 - 4</td>
<td>0.836</td>
<td>8,360</td>
<td>18.43</td>
</tr>
<tr>
<td>Dasa-3-005</td>
<td>359848</td>
<td>1968998</td>
<td>1720</td>
<td>DASA 3</td>
<td>D3 - 5</td>
<td>0.003</td>
<td>30</td>
<td>0.07</td>
</tr>
</tbody>
</table>

The highest radiometric peak survey points were designated to be the first drill points in the year 2010 (Figure 24).
Figure 24: Radiometric sampling points
Following this survey, Dr Leslie Wright from NewMines Management Services Ltd was hired to complete a study of the mineral potential of the concession. This led Dr Leslie to conduct an Interpretation of the tectonic structures, their age and influence in the control of the uranium mineralization using the initial radiometric survey results and the earlier drilling results as mineralization evidence.

The study took place during May 2010, concluding that the DASA area was affected by a main N010 fault system crosscut by the N075 (Azouza fault). The intersection of the first N010 and N075 with the N090-110 structures appears to be key to creating higher grades which are strongly focused at the location of the prospect but are concentrated also at two areas to the south in this area and pretty much along the line of the main north-south UTM grid coordinate. DASA 1 and 2 prospects are affected by a rotated continuation of the 120° trending faults axial planar to the dome structure which hosts the mineralization. DASA 3 shows a slightly different picture in terms of the definition of targets with the fold/fault repetition of the mineralized layer appearing likely with the structure being faulted by a 160° trending fault set.

The O10° fault in the east of DASA 3 area is only marginally deformed but the rotational interaction between the N045 (Adrar Emoles regional fault) and N010 in the middle of the prospect area creates a compressional environment which may focus mineral deposition.

9.3 Topographic Survey

In order to better define the topographic level of the DASA area, GAC hired Terrascan Airborne for the LiDAR survey and aerial photography totalling approximately 120 km². The detailed aerial survey was conducted in December 2013 by CK Aerial Surveys (CKAS) appointed as a sub-consultant on behalf of Terrascan Airborne. The survey was conducted from a fixed-wing platform and consisted of 3D laser scanning (LiDAR) and high resolution aerial photography.

9.3.1 Ground Control

Ground control points were surveyed throughout the site using surveying grade global positioning system (GPS) receivers. The surveying was done by means of baseline post-processing. All surveyed baselines had resolved integer ambiguities and therefore none of the surveyed baselines were rejected.

9.3.2 Aerial Survey

Following is a summary of the aerial data capturing dates and equipment:

- The survey was done on 31 December 2013 using Diamond DA42 MPP aircraft equipped with a Leica ALS50-II Laser scanner and a 39-megapixel Leica RCD105, 60 mm lens camera.
- During the execution of the aerial survey, a GPS base station was operated in order to enable accurate differential processing of the aircraft trajectories. In addition to the position of the aircraft being determined along the flight trajectory, its orientation angles were determined at every point along the trajectory through the use of a state-of-the-art inertial measurement unit (IMU).
- Using the orientations and GPS-based positions of the aircraft, an accurate point cloud was generated from the continuous laser scanning and aerial photographs were also captured throughout the flight. The laser scanning data was fitted onto the ground control survey. Thereafter, the points were thinned to only include ground points in order to generate a DTM. The pixels from each individual photograph were projected onto the DTM to create rectified photos. Corresponding pixels on overlapping photographs were identified as so-called tie-points.
• The ground control points were also added as tie-points on the photos and the image orientations were adjusted by means of a statistical least-squares adjustment in order to fit onto ground control and each other. Finally, the individual photos were adjusted to match seamlessly onto each other to form an orthophoto mosaic.

• The final DTM is used as the topographic surface on which all the drillholes are now pressed to get the homogenized elevation (Z).
10 Drilling

10.1 Geological Exploratory Drilling

GAC started drilling on the Adrar Emoles 3 property in 2010. To date, 1,006 holes (Figure 25), including 870 rotary holes and 136 diamond drillholes, were drilled for total of about 134,600 m on the project delineating the DASA deposit. Drilling of these holes were executed by local drilling companies including TIDIT, ENYSA, ESAFOR, LEGENI (owned and managed by Nigerians), ULC (a small French geo-consulting company) and finally the West African branch of the French drilling company, FORACO. The drilling with detailed statistics is summarized in Table 7.

Table 7: GAC DASA project drilling statistics (21 May 2015 statement)

<table>
<thead>
<tr>
<th>Year</th>
<th>Rotary drillholes</th>
<th>Diamond drillholes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Holes</td>
<td>m</td>
<td>Holes</td>
</tr>
<tr>
<td>2010</td>
<td>46</td>
<td>1,142</td>
<td>3</td>
</tr>
<tr>
<td>2011</td>
<td>607</td>
<td>38,381</td>
<td>18</td>
</tr>
<tr>
<td>2012</td>
<td>197</td>
<td>36,504</td>
<td>41</td>
</tr>
<tr>
<td>2013</td>
<td>17</td>
<td>10,734</td>
<td>28</td>
</tr>
<tr>
<td>2014</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>2015</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2017–2018</td>
<td>3</td>
<td>2,134</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>870</td>
<td>88,895</td>
<td>136</td>
</tr>
</tbody>
</table>

The earlier drilling was concentrated on the DASA surface anomalies with drill depths less than 300 m and mostly drilled by rotary (653 rotary drillholes for 21 diamond drillholes between 2010 and 2011). These led to the discovery of the surface mineralization of DASA 1, 2, 3 hosted in Tchirezrine 2 sandstone.

In 2012 during a deeper drilling campaign (up to 754 m), GAC discovered the graben main deposit at DASA. Drilling in this area below 350 m of Irhazer mudstone targeted the Triassic-Jurassic sandstones (Tchirezrine 2 [hosting Orano’s huge Imouraren deposit] and the Teloua formations) and even deeper, the Carboniferous formations hosting the Orano Cominak and Somair deposits at Arlit. Figure 25 shows the drillhole locations.

For the 2017–2018 drilling targeting the high-grade Flank Zone of the graben, the average drilling depth was 415 m.
10.1.1 Drilling Procedures

The drilling process through to the sampling is guided by the company procedures validated by the Qualified Person. The drill programs were designed by GAC staff in Toronto and implemented by the company Exploration Manager based in Niger with the contribution of the Niger exploration team.

The planned holes locations were pegged by a surveying crew using appropriate surveying tools (Leica DGPS when available or simple GPS). The geologist in charge of drilling checks the hole location before the drilling commences. A subset of the drillhole collars were verified by CSA Global’s Qualified Person during site visit and were found in the appropriate locations.

Each new drill set up on a hole requires a geologist to be present. The geologist checks the rig settings: azimuth and dip of the mast, before leaving the drill monitoring technician to follow-up on the drilling.

10.1.2 Drilling Monitoring

All drilling is monitored by a GAC technician or geologist recording the drill time of each rod and notes any technical issue occurred during the drilling.

During diamond drilling, a GAC geologist supervises the drilling being physically present on drilling site.
**Rotary Drilling**

On a rotary drill rig, the rock chips come out with the mud. The drill company workers collect the drill chips from the drill pipe at the hole collar every metre and arrange them in individual piles for the lithological logging. Since 2014, part of the chips of each 1 m run are washed and put in the chip tray for further description and archives in the core shed at the GAC base camp.

Each metre run is tested with the handheld radiometric scanner by GAC workers. The depth and the radiometric counts are recorded. For earlier holes, these records were not always kept for use in further depth corrections (lithology versus gamma probe depth). Comments are recorded on recovery and suspected contamination.

**Diamond Drilling**

For diamond drilling, it is GAC procedure to have a geologist physically present for the drill supervision with at least one technician. For each run, the GAC technician collects the core from the drillers. The core is cleaned and laid down in the core box on which the technician has prior written the hole ID and box number. Cores are arranged as they would be in situ. A wooden or plastic block is placed at the end of each run recording the depth. The recovered core is measured to state the recovery percentage. Any detected core loss is recorded marked with a tag indicating the length of core loss. The core depth is then marked on the core at 1 m intervals.

When an orientation survey is done, the core is marked by the geologist using a solid line with arrows pointing downhole as orientation survey marks. When the core orientation is not reliable, the core is marked using a broken line with arrows pointing downhole. All diamond drillholes from 2012 were oriented using an ACT II Reflex tool when ground conditions allowed it.

Each core run is scanned using a Thermo Scientific RADEye PRD–ER to record the radiometric response in counts per second (Cps). Measurements are taken at 10 cm intervals for 5 to 10 seconds duration. The exposure time can vary up to 10 seconds when the count rate is over 200 Cps.

The core is collected daily and transported to the core storage facility for detailed geological logging and photographed (Figure 26) at the dedicated core photography facility.

![Figure 26: Diamond core photograph example](image)
10.2 Downhole Survey

During investigation of uranium projects, the following list of downhole geophysical surveys are commonly used to help refine the geology of the deposit:

- Gamma-ray (GR) logging
- Electrical methods (resistivity logging (RL) and spontaneous polarization (SP) logging)
- Directional survey (DS)
- Calliper logging (CL)
- Prompt fission neutron (PFN) logging.

During exploration and evaluation, GAC has used some of these methods. The results and methods are discussed in the following sections.

10.2.1 Gamma-Ray Logging

GR logging was done routinely in the open hole conditions. In most holes (rotary or diamond core), the holes were filled with water or mud. In areas of problematic ground conditions, the logging was done inside the drill string or casing. It is very important this method done is routinely and with precision with strong QAQC procedures, as it is used to derive the equivalent uranium oxide (eU$_3$O$_8$) values used in Mineral Resource estimation.

Several probes were used on the project for the GR logging. The parameters of each used before 2017 are summarized in the Table 8. Four probes were used in 2017-2018 program: DGGG1307, DGGG1734, DIL801 and DIL1125.

Holes DADH-081 and DADH-011 were used as calibration holes. Each hole was logged once a week to calibrate the gamma tool.

The majority (97%) of downhole logs were interpreted in Germany by Terratec Geophysics Services; the remaining 3% of holes were interpreted by Semm Logging in France. The logging companies were based at the GAC base camp and all logging was started within 30–60 minutes of completion of the drillhole.

<table>
<thead>
<tr>
<th>PROBE ID</th>
<th>Probe K factor (U)</th>
<th>Probe diameter (mm)</th>
<th>Mud shielding factor (mm-1)</th>
<th>Probe dead-time (s)</th>
<th>Casing shielding factor (mm-1)</th>
<th>Probe_length (mm)</th>
<th>CRISTAL reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIL38 #1125</td>
<td>0.1305</td>
<td>38</td>
<td>0.0047</td>
<td>0.000004</td>
<td>0.043</td>
<td>2120</td>
<td>1”x 2” NaI crystal</td>
</tr>
<tr>
<td>DIL38 #1126</td>
<td>0.1305</td>
<td>38</td>
<td>0.0047</td>
<td>0.000004</td>
<td>0.043</td>
<td>2120</td>
<td>1”x 2” NaI crystal</td>
</tr>
<tr>
<td>DIL38 #1250</td>
<td>0.1362</td>
<td>38</td>
<td>0.0047</td>
<td>0.000004</td>
<td>0.043</td>
<td>2120</td>
<td>1”x 2” NaI crystal</td>
</tr>
<tr>
<td>DIL38#801</td>
<td>0.126</td>
<td>39</td>
<td>0.0047</td>
<td>0.000004</td>
<td>0.043</td>
<td>140</td>
<td>1”x 2” NaI crystal</td>
</tr>
<tr>
<td>BDVG #735</td>
<td>0.1119</td>
<td>42</td>
<td>0.0047</td>
<td>0.000004</td>
<td>0.043</td>
<td>140</td>
<td>1”x 2” NaI crystal</td>
</tr>
<tr>
<td>DGGG1307, PM</td>
<td>0.8089</td>
<td>42</td>
<td>0.0047</td>
<td>0.000004</td>
<td>0.043</td>
<td>150</td>
<td>2cmx5cm NaI</td>
</tr>
<tr>
<td>DGGG1304, PM</td>
<td>0.8089</td>
<td>42</td>
<td>0.0047</td>
<td>0.000004</td>
<td>0.043</td>
<td>150</td>
<td>2cmx5cm NaI</td>
</tr>
<tr>
<td>DGGG9354, PM</td>
<td>0.8089</td>
<td>42</td>
<td>0.0047</td>
<td>0.000004</td>
<td>0.043</td>
<td>150</td>
<td>2cmx5cm NaI</td>
</tr>
</tbody>
</table>

Prior to 2014, a logging protocol was not clearly defined. Based on investigation by CSA Global most work comprised dual induction and gamma log measurements (DIL). The logging speed has been estimated at 3 m to 4 m per minute, which was deduced from the time spent on hole logging. Sampling intervals varied from 0.01 m; 0.05 m or 0.1 m.
Starting in 2014, Terratec geophysical services used the following logging methods:

- Dual induction and gamma log measurements of the rock conductivity; total count gamma was used for the determination of the equivalent radiometric grades of $\text{eU}_3\text{O}_8$.

- Combination tool including verticality/focused electric resistivity/natural gamma (DGGG).

- The first measurement run was performed inside the fully cased borehole or drill string with the DGGG or DIL probe with an approximate logging speed of 4–6 m per minute and a sampling rate of 0.1 m.

- After the rods were removed, the drillhole was filled with water and re-logged using the combined verticality/focused electric resistivity/gamma probe (as long as the drillhole was still open). The measurement speed of approximately 5.00 m per minute was used in unmineralized intervals at a sampling rate of 0.1 m. Within the mineralized zones, the logging speed was decreased to approximately 1.5 m/minute. One metre beneath the mineralized zones, the logging speed was increased again to 5 m per minute.

All the $\text{eU}_3\text{O}_8$ was determined by GAC consultants taking into account a steel correction factor when the logging was completed inside the casing or drill rods. A report in *.LAS format was sent to GAC including the radiometric survey and the calculated $\text{eU}_3\text{O}_8$.

For quality and calibration control, the calibration holes were tested at least twice a month and always just before probing a new drillhole. Records are kept by the contractor and delivered to GAC.

Terratec has indicated that all probes used on the project are properly calibrated to a defined U-Standard. One calibration U-Standard that was used is located in Saskatoon-Saskatchewan/Canada and a second one in Straz Pod Ralskem/Czech Republic. The calibration report from Terratec is from September 2013 returned good results and the calibration was performed at the Saskatchewan Research Council Uranium Test Pits in Canada.

CSA Global also received calibration certificates for the logging tools used or work completed in 2017 to 2018. These were tested at Oranos’ calibration facilities in Niger. The calibrations for the instruments used were performing within specifications prior to commencing the work on site. CSA Global reviewed the calibration results and was satisfied.

More detail discussion about $\text{eU}_3\text{O}_8$ and radioactive equilibrium factor (REF) is provided in the Section 11.

10.2.2 Radiometric Determination

The basic analysis that supports the uranium grade reported in the DASA database of uranium grades and thickness of drill intercepts is the downhole gamma log created by the downhole radiometric probe. That data is gathered as digital data and composited to 10 cm data as the radiometric probe is extracted from a drillhole.

The downhole radiometric probe measures total gamma radiation from all-natural sources, including potassium (K) and thorium (Th) in addition to uranium-bearing minerals. In most uranium deposits, K and Th provide a minimal component to the total radioactivity, measured by the instrument as Cps. At the DASA project, the uranium content is high enough that the component of natural radiation that is contributed by K from feldspars in sandstone, and minor Th minerals is expected to be negligible. The conversion of Cps to equivalent uranium concentrations is therefore considered a reasonable representation of the in-situ uranium grade. Thus, determined equivalent uranium analyses are typically expressed as ppm $\text{eU}_3\text{O}_8$ (“e” for equivalent) and should not be confused with U determination by standard XRF or induced coupled plasma.
(ICP) analytical procedures. The conversion process can involve one or more data corrections; therefore, the process used for DASA is described here.

The gamma probes are either 42 mm (GM) or 38 mm (DIL) in diameter and about 1.5 m in length. The PM probe has a standard sodium iodide (NaI) crystal that is common to both handheld and downhole gamma scintillation counters. GAC constructed GM probes include the scintillation counter and the Geiger-Muller, both of which function similarly to count natural radiometric emanation from uranium and its daughter products (the uranium decay series). GAC used initially only PM DIL probe readings for uranium grade determinations. However, due to the high uranium grades encountered in this program they have also used a GM probe which is considered more reliable at higher grades. The DIL probe and GM probe have been correlated to derive uranium grades using the GM probe. The correlation will need to be validated using conventional wet chemistry values when assay sample results are available.

The logging system consists of the winch mechanism (which controls the movement of the probe in and out of the hole) and the digital data collection device (which interfaces with a portable computer and collects the radiometric data as Cps at defined intervals in the hole). Radiometric readings are collected digitally into WellCad software for correlation with geology and resistivity. Subsequently, data are transferred to Utimine software for conversion to eU grade data (G), along with thickness (T), and accumulation (GT; Grade-thickness product).

Raw data can be viewed and plotted graphically from WellCad software, to provide a graphic downhole plot of Cps. The Cps radiometric data may need corrections prior to conversion to eU or eU$_3$O$_8$ data. Those corrections include: accounting for water in the hole (water factor) which depresses the gamma response, hole diameter variations, the instrumentation lag time in counting (dead time factor), and corrections for reduced signatures when the readings are taken inside casing (steel casing factor). The water factor and casing factor account for the reduction in Cps that the probe reads while in water or inside casing, as the probes are typically calibrated for use in air-filled drillholes without casing. Water factor, and dead time factor corrections are made to the data at DASA; all instances of mineralization of core holes are inside casing at DASA.

Conversion of Cps to eU or eU$_3$O$_8$ was done by calibration of the probe against a source of known uranium (and thorium) concentration. Conversion was also done by determining the relationship of core to radiometric data for a set of core-hole sample intercepts and developing a correlation curve.

The procedure used by GAC at DASA is to convert Cps per anomalous interval using a correlation curve developed by comparing core intervals with gamma-log intervals for the core hole intervals of 36 holes drilled at DASA. The process involved repositioning the core pieces for the whole-core interval of mineralization and determining the contacts and peak radiometric reading with a handheld scintillometer on the core. This is then matched with the radiometric curve developed from a downhole plot of Cps. The core was cut and analyzed for uranium content for the same interval as the radiometric indicate. A best-fit line defines the relationship of GT as follows:

$$GT_{core} = U_{core} \times T_{core} = Factor( \text{CPS} \times T_{probe}) = GT_{probe}$$

The same can be done on composited grade (U%) versus (Cps) at a given composite interval for each; the relationships have been found to be like that for GT. The factor is then used to convert Cps to eU grade as parts per million stated as either ppm U or kg/t (‰) U. Database conversions at to U rather than U$_3$O$_8$; however, resource tabulations are converted to U$_3$O$_8$ as the international standard for which uranium is reported and sold.

GAC has found that the coefficient of correlation between GTcore and GTprobe is 0.968, with a 2-sigma precision on the mean of 8.1%; a relatively close clustering of data along a linear relationship.
10.2.3 **Downhole Survey**

Prior to 2012, GAC was drilling shallow vertical holes, and no deviation surveys were completed. Since 2012, all the holes drilled, especially in the graben area, were systematically measured for deviation (if the hole remained open).

Both Terratec and SemmLogging recorded the azimuth and the dip of the drillhole at the same time as gamma logging using a combination tool.

GAC also owns a Ranger Explorer Mark II wireless magnetic multi-functional survey system that was used to measure azimuth and inclination for drillholes not surveyed during downhole logging.

GAC also rented a Reflex tool EZTRAC (same system as the RANGER Explorer), operated by its rig monitoring technicians. Some holes were surveyed using this tool.

Each completed drillhole was marked on surface using a heavy cement concrete slab containing:

- The project company name: GAC
- The hole name/number
- The hole type (DD, RD...)
- Total length (core length or the reconciled depth after comparing probe and handheld radiometric scanner depth when rotary drilling)
- The azimuth and dip
- The drill date (year).

The hole was then surveyed using the Leica differential GPS or Total station by the surveying crew or appointed technician geologist.

10.2.4 **Drillhole Diameter Measurements**

Calliper logging was not routinely done. CSA Global recommends that all future downhole logging include this feature to improve the gamma-logging interpretation. The interpretation of uranium grades from gamma-logging includes hole diameter. The cavities could also influence the interpretation results and ultimately the calculated uranium grades.

10.2.5 **Prompt Fission Neutron Logging**

PFN logging was not done. CSA Global recommends a selection of future drillholes to try this method to assess radiological disequilibrium.

10.3 **Rotary Chips and Core Logging**

GAC uses CAE Mining’s commercial data management software called Fusion. GAC uses four main modules of Fusion for data capture and storage:

- Fusion Administrator: To manage user rights and data transfer instructions.
- DHLLogger: For logging the geology, structure and geotechnical aspects; for both core and chip logging. It is also used to merge downholes logging and assay import and depth correction.
- Fusion Client: To facilitate data transfer from the field to the office server (intermediate based in Niger and called Fusion Remote, and Central based in Toronto).
- Query Builder: To export stored data for external use.
The workflow for this system is summarized in Figure 27.

![Figure 27: GAC data collection and handling system/CAE Mining Fusion](image)

10.3.1 **Rotary Chip Logging**

All rotary drillholes have been geologically logged based on 1 m subsamples. Initially these were based on piles of chips presented by the drillers or the GAC technicians at the logging facility. However, more recently GAC has collected washed reference samples into chip trays for logging and future reference. Initially logging was completed on paper logs, but since the implementation of Fusion all data capture has been done digitally.

10.3.2 **Core Logging**

More detailed logging procedure were implemented by GAC for core logging to ensure the more detailed data was captured. The information below outlines the procedures used:

- A geologist remained at the rig at all times during coring.
- All core was processed at site depth measurement, recovery and core cleaning.
- Core was then transported to the logging facility on a daily basis.
• A core library has been established at the base camp to aid in the identification of lithology and rock type aiming to ensure consistent descriptions by the logging crews.

• Special procedures were in place for the handling of radioactive core for logging and sampling. The procedures are available in hard copy in the logging facility.

• Radioactive core was hand scanned with a personal radiation detector to allow comparison with the downhole probing. The radiometric core was taken from the box and hand scanned every 10 cm on a table inside the core shed. Measurements were recorded in a Microsoft Excel spreadsheet.

• The core boxes were laid down on the logging table at the core shed and geologically logged using DHLogger. When geological logging was complete, the core was marked for geotechnical logs when the core was oriented.

• Each hole was then marked up for sampling by the geologist.

• All core was photographed wet and dry in a dedicated facility and transferred to the commercial TEC-CORIM software allowing image manipulation including transfer to the Fusion database.

• Geological logging was completed for the following attributes:
  o Geological formations (Table 9)
  o Colour (Table 10), which is important for definition of initial reduced sediments and epigenetic oxidized rocks
  o Sediments/rocks (Table 11)
  o Alteration and mineralization (Table 12).

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<th>Code</th>
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<table>
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<td>White</td>
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<tr>
<td>Yellow</td>
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Table 11: Codes of sediments/rocks

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<thead>
<tr>
<th>Code</th>
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<tr>
<td>1</td>
<td>Sand</td>
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<tr>
<td>2</td>
<td>Alluvium</td>
</tr>
<tr>
<td>3</td>
<td>Clay</td>
</tr>
<tr>
<td>4</td>
<td>Mudstone</td>
</tr>
<tr>
<td>5</td>
<td>Siltstone</td>
</tr>
<tr>
<td>6</td>
<td>Fine sandstone</td>
</tr>
<tr>
<td>7</td>
<td>Medium-grain sandstone</td>
</tr>
<tr>
<td>8</td>
<td>Coarse-grain sandstone</td>
</tr>
<tr>
<td>9</td>
<td>Very coarse-grain sandstone</td>
</tr>
<tr>
<td>10</td>
<td>Micro conglomerate</td>
</tr>
<tr>
<td>11</td>
<td>Conglomerate</td>
</tr>
<tr>
<td>12</td>
<td>Limestone</td>
</tr>
<tr>
<td>13</td>
<td>Marl</td>
</tr>
<tr>
<td>14</td>
<td>Mudy sandstone</td>
</tr>
<tr>
<td>15</td>
<td>Sandy mudstone</td>
</tr>
<tr>
<td>16</td>
<td>Calcareous sandstone</td>
</tr>
<tr>
<td>17</td>
<td>Carbonate mudstone</td>
</tr>
<tr>
<td>18</td>
<td>Arkosic sandstone</td>
</tr>
<tr>
<td>19</td>
<td>Analcimolite</td>
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<tr>
<td>20</td>
<td>Dolomite</td>
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<td>Mudy siltstone</td>
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<td>Diorite</td>
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<td>Amphibolite</td>
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<td>25</td>
<td>Gneiss</td>
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<tr>
<td>26</td>
<td>Schist</td>
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<tr>
<td>27</td>
<td>Organic matter sandstone</td>
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<tr>
<td>28</td>
<td>Pyritic sandstone</td>
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<tr>
<td>29</td>
<td>Coal</td>
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<tr>
<td>30</td>
<td>Graywacke</td>
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<tr>
<td>31</td>
<td>Analcimolitic sandstone</td>
</tr>
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</table>

Table 12: Codes of alteration and mineralization

<table>
<thead>
<tr>
<th>Alteration</th>
<th>Mineralization</th>
</tr>
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<tbody>
<tr>
<td>Carbonate: Ca</td>
<td>Uranium</td>
</tr>
<tr>
<td>Iron: Fe</td>
<td>Pechblende: Pe</td>
</tr>
<tr>
<td>Chlorite: Cl</td>
<td>Uraninite: Ur</td>
</tr>
<tr>
<td>Sulphides: Su</td>
<td>Coffinite: Co</td>
</tr>
<tr>
<td>Manganese: Mn</td>
<td>Carnotite: Ct</td>
</tr>
<tr>
<td>Clay: Cy</td>
<td>Yellow products: Pj</td>
</tr>
<tr>
<td></td>
<td>Others</td>
</tr>
<tr>
<td></td>
<td>Pyrite: Py</td>
</tr>
<tr>
<td></td>
<td>Organic material: Om</td>
</tr>
</tbody>
</table>

10.4 Sampling

No rotary chips were sampled for assaying.

For core sampling, a mineralized interval was established from the downhole logging. Prior to 2014 drilling, the eU₃O₈ results were composited at 100 ppm cut-off (allowing 3 m internal dilution of grade lower than 100 ppm). The mineralized interval was sampled from 1 m above and below the interval. Starting in 2014, the cut-off grade was changed to 300 ppm from the downhole gamma logging and proceeding the same way as the 100 ppm cut-off.

After geological and geotechnical logging of the core, the designated mineralized interval was marked for sampling. Sampling was done to reflect the lithological contacts and then routinely at 1 m intervals and during the most recent program holes this was reduced to 0.5 m intervals.

Sampling was lithological facies related: samples were taken in same lithological unit (each texture of sandstone should be considered as separate lithological unit, mudstone etc).

The sample number was written on each core sample using red marker pen. The marked cores were sent to the splitting facility in the base camp where and half core was sampled, bagged and sealed for mechanical preparation at the ISO 17025 certified Sahel Lab facility in Niamey. The remaining half core was kept in the core boxes at the base camp. Pulp was shipped from Sahel Lab to an assay facility in Canada.
According to Niger mining legislation, half of any core collected on mining/exploration projects is dedicated to the Ministry of Mines, unless you get a special authorization to use the entire core. GAC has sought such authorization for some of their sampling. Subject to the Ministry of Mines’ authorization, the full core of each marked length was broken and sampled.

A 5 cm to 10 cm piece of sample was taken for specific gravity test prior to bagging and sealing the to-be assayed sample.

Each sample was packed in a dedicated plastic bag on which the sample number was marked on both sides. A GAC designed sample tag with the sample number printed on it was also inserted into the bag and sealed.

The sample numbering was designed to include 10% quality control material:

- Certified reference materials (from ORE Research & Exploration Pty Ltd, Australia) were inserted in the sampling at a rate of 5:100 samples
- Certified blank material (from ORE Research & Exploration Pty Ltd, Australia) was inserted at a rate of 2%
- Blank material sourced from rocks near Niamey was inserted at a rate of 1:100 samples
- Pulp duplicate samples taken from the same half core sample were made for two out of every 100 samples and submitted for analysis.
11 Sample Preparation, Analyses and Security

11.1 Sample Preparation and Analyses

Core sampling was undertaken by GAC staff. Samples were collected from quarter (before 2013)/half core and appropriately bagged and labelled. Samples were sent by truck to the Sahel Laboratory in Niamey for preparation. Until April 2013, pulps prepared by the Sahel Laboratory were sent to ALS Geochemistry in Johannesburg, South Africa for analyses. From April 2013 onwards, pulps have been sent to ALS Geochemistry in North Vancouver, Canada for analyses.

The Sahel Laboratory in Niamey is accredited ISO 17025:2005 by Universal Registrars, Bangalore, India for sample preparation. Both ALS Minerals laboratories in Johannesburg and in North Vancouver are also accredited ISO-9001:2000 by QMI Management Systems and to ISO/IEC Guideline 17025:2005 by the Standards Council of Canada for conducting certain testing procedures. The scope of accreditation includes the procedures used for assaying of the samples submitted by GAC. ALS laboratories also participates in a number of international proficiency tests, such as those managed by CANMET and Geostats.

At Sahel Laboratory samples were prepared using a standard rock preparation procedure. Quarter or half core was ground using a jaw crusher until 95% of the material passed a 2 mm mesh. One eighth of this was taken and pulverized until 90% of the material passed through a 75-micron mesh. One hundred grams of the resulting pulp is sent to the ALS laboratory for assay. The remaining rejects were returned to GAC and transported back to the field camp for storage.

Up until April 2013, prepared pulp samples were sent to ALS Geochemistry in Johannesburg and were assayed for a suite of elements (including uranium) using ICP-atomic emission spectroscopy (ICP-AES) (ME-ICP61) and XRF spectroscopy (ME-XRF05).

In April 2013, prepared pulp samples were sent to ALS Geochemistry in North Vancouver, where samples were assayed for uranium using XRF spectroscopy (ME-XRF05; ME-XRF10).

The switch between ALS laboratories was made primarily to gain access to the XRF10 method of assaying, which can measure more accurately the concentration of uranium exceeding 10,000 parts per million (ppm). The XRF05 method used in South Africa is accurate to concentrations of uranium up to 10,000 ppm.

The SGS Lakefield laboratory in Lakefield, Canada was used as an umpire laboratory. The SGS laboratory in Lakefield, and Mintek laboratories in Randburg, South Africa were also used to conduct metallurgical testing on surface and core samples representative of the uranium mineralization found on the DASA project. The SGS Lakefield and Mintek laboratories are accredited ISO-9001 and to ISO Guideline 17025 for the testing procedures undertaken on material from the DASA project.

11.2 Specific Gravity Data

During the 2012–2015 drilling campaigns, GAC hired the ISO 17025 certified laboratory SAHEL Lab in Niger to perform specific gravity test on core samples. A total of 3,594 core samples sizing about 5 cm each were submitted during the concerned period; this gives an average specific gravity value of 2.36 t/m$^3$. The density of 2.36 was thus used for the current study.

The SAHEL Lab specific gravity test of these samples was determined by the method of water displacement. This method consists of weighing the sample in air after covering it with wax, and then measuring its apparent
volume through water displacement. The specific gravity is thus calculated by the quotient of the mass of the sample over the volume.

The water displacement is noted, and the sample apparent volume determined (v). The specific gravity is then calculated by \( SG = \frac{m}{v} \). A relative error (E) is also calculated by Sahel Lab using this formula:

\[
E = \left| \frac{dm}{m} - \frac{dv}{v} \right|
\]

Where:
- \( dm \) – the precision of the weighing scale used (0.001 g)
- \( dv \) – the precision of the cylinder used (1 ml).

**Figure 28:** Average density determination from core samples

### 11.3 Quality Assurance and Quality Control Programs

Quality assurance (QA) and quality control (QC) measures are typically set in place to ensure the reliability and trustworthiness of exploration data. The QA measures include written field procedures to ensure reliable and systematic performance during logging, drilling, surveying, sampling and, data management and database integrity. These QA procedures are just as important as the QC protocol to test the precision and accuracy of the data collected. Appropriate documentation of QA and QC measures and regular analysis of QC data are important as a safeguard to ensure the data collected during exploration is reliable and fit for purpose.

QC for analytical data typically involve internal and external laboratory control measures implemented to monitor the precision and accuracy of the sampling, preparation and assaying. They are also important to prevent sample mix-up and to monitor the voluntary or inadvertent contamination of samples.

Five different reference materials are employed and sent blind to the assay laboratory for analysis. Field duplicate and blank samples are also inserted into the assay stream. The quality control programs also include
a small check assaying program at the SGS laboratory in Lakefield, Canada, which is ISO/IEC 17025 accredited. The check assaying program is not undertaken on an ongoing basis.

Comparison of ordinary assays of certified reference material samples with control limit parameters is shown in the Table 13. Results show that quality of sampling and assaying is acceptable. Comparison of ordinary samples and duplicates is provided in the QAQC reports on DASA Project (2012, 2013) (Figure 29).

Table 13: Comparison of ordinary assays of certified reference material samples with passport parameters

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<th>Parameters of CRM</th>
<th>Ordinary assays of CRM samples</th>
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<tr>
<td></td>
<td>LL</td>
<td>Nom</td>
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<tr>
<td>ALS Johannesburg</td>
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<td>AMIS0028</td>
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<td>220</td>
</tr>
<tr>
<td>BL-1</td>
<td>1,241</td>
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</table>
Review of 2017–2018 Quality Assurance and Quality Control Programs

GAC provided detailed information on how the QAQC protocol was followed during the 2017–2018 exploration program. CSA Global reviewed the procedures and summarizes them below:

• The probing (data collection) was done by a third party, using its own equipment. The equivalent $U_3O_8$ was determined by another third party, different from the probing company.

• During the exploration campaign, all holes were to be probed using the following equipment:
  o A Geiger Muller (GM) probe
  o A DIL probe
  o The Gyro probe for downhole deviation.

• The probing started immediately at the end of drilling of each hole. There was minimal time gap between the completion of drilling and commencement probing. At the end of the last drilled metre, the drill fluid was renewed, and the hole was cleaned for about one hour before leaving the hole for the probing. The probing duration depended on the hole length: run in of DIL and GM is at 5–6 m/mn and pull out is at 3 m/mn for DIL while the GM is 3 m/mn with speed reduced to 1 m/mn in the mineralized sections. The Gyro could go up to 20 m/mn.

• Raw data were sent after preprocessing (depth matching) to the external consultant for equivalent $eU_3O_8$ determination. The necessary steel and mud correction were made by the consultant before returning grades based on the data provided by the probing contractor.

• QAQC logging included the following:
  o At the program beginning, the probes were calibrated on a certified calibration pit.
  o The probes were run on third party external test pit (reference pit on ORANO Niger project in Arlit); operation repeated once in the Quarter year.
  o The first hole of the program and some chosen holes were probed with all the available probes on the project for correlation between probes.
All the project probes pass once a week on two standard holes. These standard holes of the project were found to be lower grade with regards to the first hole’s results, thus two high grade test holes were built for that purpose.

Third party is allowed to test the project test pits for more comparison, if required.

CSA Global was satisfied with the applied protocol.

11.5 Radioactive Equilibrium Factor

Geophysical gamma logging data is the primary information source used for uranium resources estimation. From these data, it is then possible to determine:

- Mineralized intervals based on gamma logging data
- Conversion of radium grade to uranium based on REF.

Radioactive Equilibrium Factor (REF) = \(\frac{C_{\text{radium}}}{C_{\text{uranium}}}\) should be estimated based on uranium assays and radium assays sampled into closed cans. At this time radium grades have not been determined. In this situation comparison of the \(e\text{U}_3\text{O}_8\) based on gamma logging and actual \(\text{U}_3\text{O}_8\) based on assays may be used for determination of REF. This is possible by using the scintillometer readings made on the core to compare and correct gamma logging data.

The average grade of potassium is 1.91% (0.01–6.39%) and thorium is 25 ppm (0.6–417 ppm), equals 25 ppm of uranium.

In practical experience grade-thickness is a more convenient parameter for REF definition:

\[\text{REF} = \frac{\text{GT}(\text{radium})}{\text{GT}(\text{uranium})}.\]

The total grade-thickness \(e\text{U}_3\text{O}_8\) based on gamma logging is 171 m% and \(\text{aU}_3\text{O}_8\) based on assays is 175 m%, \(\text{REF} = 0.97\).

Comparison of \(e\text{U}_3\text{O}_8\) based on gamma logging and \(\text{aU}_3\text{O}_8\) based on assays shows acceptable correlation close to 1 (Figure 30), coefficient of correlation is 0.96, precision is 100%.

Generally, mineralization on the DASA project is close to equilibrium, but this does vary of the project area (Figure 31).
Figure 30: Comparison of grade-thickness eU$_3$O$_8$ defined by gamma logging and grade-thickness U$_3$O$_8$ defined by assays
11.6 CSA Global Comments

In the opinion of CSA Global, the sampling preparation, security and analytical procedures used by GAC are consistent with generally accepted industry best practices and are therefore adequate for the purpose of Mineral Resource estimation.

However, more work is required to define the radiological parameters such as REF more reliably. Some additional investigations are required for definition of REF distribution as well as some additional drilling for converting Mineral Resources to Measured and upgrading Inferred category to Indicated.

CSA Global recommends assaying of radium in closed cans and uranium by XRF. Comparison of radium and uranium assays allow more reliable definition of the REF and comparison of radium assays and gamma logging allows to define radon degassing factor. This factor may also influence the definition of eU₃O₈ grades.
12 Data Verification

Dmitry Pertel visited the project site from 20 March 2017 through to 6 April 2017. During the visit, Dmitry Pertel reviewed geological reports, drilling procedures and surveys, logging facilities and overall deposit geology. Geological exploration drilling procedure, core recovery methods and documentation and geophysical logging have been analysed from the provided reports.

During the site visit, the Qualified Person observed a number of drill collars, took photographs and geographic coordinates. The measured coordinates were compared with those reported in the provided database. The difference between the measured and reported coordinates were within the acceptable limits.

From 2 March 2017 to 4 April 2017, Dmitry Pertel visited the Sahel Laboratory in Niamey, and had an opportunity to interview the personnel there. The laboratory was in the middle of the relocation process, and therefore it was not possible to observe the working equipment which was all dismantled at the time of the inspection.

CSA Global has reviewed the drill logs, cross-sections, plan maps for the DASA geological database.

All work relating to geological exploration and leach testing was found to be of a high quality. The data is considered suitable for Mineral Resource estimation.

Caution should be exercised when estimating Mineral Resources based on geophysical data due to the complex radiology of the deposits.
13 Mineral Processing and Metallurgical Testing

Mineral processing and metallurgical testing has been conducted by GAC from 2011 to 2014. A summary was prepared by Fergus P Kerr, P.Eng.

Testing was conducted on samples obtained from the DASA project by the GAC at various stages of the Mineral Resource development. The samples were located as representative of the Mineral Resource known at that time. Samples were obtained from diamond drillholes by GAC personnel and shipped in core boxes or in rice bags secured with security seals to SGS Mineral Services, Lakefield, Ontario, Canada and Mintek, Randburg, South Africa.

SRK Consulting (UK), SRK Consulting (Australia) and Hatch (Mississauga) have provided technical support and review of the mineral processing and metallurgical testwork.

Three separate investigations were conducted:

1. Characterization studies: In 2011, samples were obtained from diamond drillholes in various portions of the upper mineralization to determine variability and metallurgical characteristics of the DASA 1 and DASA 3 areas. SGS conducted testing on five samples from five different holes in the DASA 1 and DASA 3 areas, including comminution studies, variability leach testing, precipitation, uranium recovery and mineralogy. The head analysis of these samples was approximately 600 ppm U$_3$O$_8$.

2. Heap leach study: Samples were obtained as representative of the low-grade near surface material with potential for heap leaching. Five samples were obtained for a total of 878 kg and shipped in 2012 to Mintek, South Africa by DHL Courier services. The head analysis of the samples was 250 ppm U$_3$O$_8$ which was close to the anticipated grade of the heap leach material. Testwork conducted by Mintek included mineralogical analysis, bottle roll testing, scrubbing investigation, small and large diameter column leach tests and geomechanical testwork.

3. Agitated leach testing: Samples were selected to represent the higher-grade mineralization in the DASA 3 area. A total of eight samples from three drillholes, for a total weight of 110 kg, were shipped to SGS for additional leach testing of the higher-grade material and additional Bond Work Index (BWI) testing to confirm the grindability from previous comminution studies. The head analysis of these samples was from 1,200 ppm to 1,900 ppm U$_3$O$_8$.

No testing has been conducted on the potential high-grade underground mineralization.

13.1 Comminution

SGS conducted testwork on two samples from the DASA project – one composite sample from DASA 1 and DASA 3 drillholes and one composite sample from DASA 3 area.

The first samples were tested for the entire suite of comminution tests including abrasion test, BWI tests, high pressure grinding roll test, JK drop-weight, SAG mill comminution test, SAG power index, static pressure test and derivation of Comminution Economic Evaluation Tool (CEET).

The second samples were tested for BWI to confirm results from the lower grade testing. The results were consistent with other BWI results.
Test results indicate the material is categorized as soft to very soft, except for the Crusher Work Index which is categorized as moderately hard. Results include the following:

- Crusher Work Index: 11.5 kWh/t
- BWI: 16.1 kWh/t
- Abrasion Index: 0.096 g
- Static Pressure Test: 1.42 HPI (9.9 kWh/t)
- CEET: 15.9 Cl.

### 13.2 Leaching

Extensive leach testing was conducted at SGS Mineral Services and Mintek including bottle roll, agitated leach, two-stage leaching, scrubbing and column leach testing with both acid and alkaline leach conditions. Intent of the testing was to understand the leach kinetics of the samples and develop potential leach flowsheets.

Bottle roll testing showed uranium extraction of 78% to 86% for tests run at 20 g per litre free acidity.

Bottle roll testing to determine variability of the leach kinetics of 30 separate samples showed uranium extractions of 30% to 95% with an average of 73% and acid consumption of 33 kg/t to a high of 273.3 kg/t and average of 115 kg/t. It was noted that samples with extraction below 50% had low uranium concentration.

Lower acidity testing showed comparable extraction over longer time.

The best uranium extraction was achieved with high acid and high temperature—80 g per litre sulphuric acid and 90°C gave extractions over 97%.

Carbonate leaching gave poor extraction of 68%.

Two-stage countercurrent leach reduced acid consumption by half at 90% extraction.

Grinding of the ore was not required to achieve high uranium extractions: <10 mesh (1.7 mm) ore leached under high acid and temperature gave extraction at or better than 95%.

Work at Mintek indicated scrubbing was not effective on the very low-grade samples. Bottle roll tests showed that acid-in-agglomeration and curing had a positive effect on the initial kinetics and extent of overall uranium dissolution in acidic conditions.

An alkaline leach test at Mintek indicated only 62% recovery after 73 days of leaching, similar to results at SGS.

Heap leach test results showed an 80% recovery with acid consumption of 50 kg acid per ton was achievable after 17 days. Stacking tests and hydraulic conductivity testwork indicated stacking heights of the leach material of 5 m to 7 m were achievable.

Agitated leach testing at SGS showed uranium recovery of 93% was achievable for the higher-grade samples at a pH of 1.5, 44°C, and a grind P80 of 170 μm after 24 hours and sulphuric acid addition of 53 kg/t. An additional higher-grade sample showed a uranium recovery of 90% at 70°C and acid consumption as high as 250 kg/t. Leach kinetics indicates no significant increase in extraction after 8 hours.

Using two-stage leaching to utilise excess free acid and averaging the results from the two composite samples suggests a recovery of 95% at an acid consumption of 180 kg/t would be a conservative estimate of leach recovery.

The pregnant leach solutions had no significant levels of impurities (<0.6 mg/L Mo, <10 mg/L V).
13.3  Solid-Liquid Separation

A bulk leach sample was generated from the uranium leach tests and subjected to flocculent selection, CCD modelling, vacuum filtration thickener and washed thickener underflow testing.

The optimum flocculent was Ciba Magnafloc 333 (a non-ionic flocculent) at a dose rate of 60 ppm and produced a 48% w/w solids underflow from a 6% w/w solids thickener feed. The resulting supernatant was clear after 10 minutes settling time. Settling rates of 1,135 m$^3$ to 1,219 m$^3$ per m$^2$ per day were measured.

Rheology testing indicated critical solids density was approximately 55% weight corresponding to 60 Pa yield stress value (unsheared) for the bulk leach pulp at -30 mesh.

CCD scenario testing resulted in a water requirement of 1.59 m$^3$ to 3.21 m$^3$ fresh water per tonne of dry feed depending on the number of stages (5–7) and the wash efficiency required. The final stage discharge varied between 0.001 g and 0.007 g uranium per litre.

The direct filtration scoping tests conducted with, and without, a filter aid indicate the sample was not amenable to direct filtration.

13.4  Solvent Extraction and Ion Exchange

Uranium was recovered from solution effectively using commercial tertiary amine extractant. When aggressive leach conditions were used, the phase separation and clarity of phases suffered but efficient extraction was achieved. Countercurrent stripping of loaded organic with 400 g per litre H$_2$SO$_4$ was performed at O/A of 10/1 producing strip liquor containing 31 g uranium per litre.

Several strong base anionic exchange resins were found to effectively absorb uranium from the leach solution, achieving loadings upwards of 50 g uranium per litre.

Ambersep 920U was effectively stripped with 160 g per litre H$_2$SO$_4$ resulting in a strong eluate of 6 g uranium per litre.

Resin in pulp (RIP) was tested as an alternative to leaching followed by solid-liquid separation. A660 resin performed well, loading to 40 g per litre and achieving 99.7% uranium recovery from solution after four contacts of 2 hours each.

Selection of uranium extraction methods will depend on the tenor and characteristics of the pregnant leach solution. At lower grade feed Ion Exchange will be used for uranium recovery.

13.5  Uranium Precipitation

Strip liquors from SX testing were used for uranium precipitation testing. The strip liquors were neutralized with hydrated lime and advanced to precipitation using hydrogen peroxide. The final precipitate (yellowcake) contained 64.3% uranium, equivalent to 91% uranyl peroxide.

13.6  Tailings Characterization

The tailings from the leach process were neutralized in two stages with limestone and lime to a pH of 9. Samples of the tailings were taken for multi-element and radium analysis with both below effluent standards.
13.7 Metallurgical Testing — Conclusion and Recommendations

Results of the metallurgical testwork shows the mineralogy and metallurgy of the DASA mineralization is readily amenable to acid leaching with conventional uranium recovery — similar to the Orano operation at Arlit, Niger.

Fine grinding is not required for acceptable uranium recovery; a grind to P80 of 170 μm is adequate.

Two-stage leaching with pre-leaching of the fresh ore with strong acid reduces acid consumption and will recover over 90% of the uranium, recovery will improve with higher temperatures and grades. Acid consumption is related to head grade.

Leach slurries can be separated effectively using conventional thickeners and flocculants.

Depending on the head grade and tenor of the pregnant leach solution IX or SX would be used for uranium recoveries achieving over 99% recovery of the uranium.

Hydrogen peroxide precipitation is effective. No impurities have been detected in either the final precipitate or in the tailings.

Based on the results the following recommendations are made:

- Leaching testwork is required on the high-grade underground resource.
- Mineralogical and metallurgical testing is required of the Tchirezine 2 and Tarat hosted mineralization.
- The discharge slurries from the leach tests should be subjected to solid liquid separation testing. Rheology testing of the slurries is required to determine maximum pulp density of the leach.
- Mass balance modelling of the two-stage leach is required to better quantify acid consumption.
- At higher head grades, uranium recovery testing is required.
- Further environmental characterization of the leach residue and neutralization products should be conducted.

The testing recommended is bench-scale testing and would require 40–50 kg of fresh material.

Pre-concentration methods should be investigated; radiometric sorting or ablation could dramatically reduce the mass pull to the processing facility with significant reduction in capital and operating costs.
14  Mineral Resource Estimates

14.1  Software Used

The DASA uranium deposit Mineral Resources were updated by CSA Global geologists using Micromine version 2018.1 software.

14.2  Database Compilation

GAC supplied CSA Global with the updated database in Text CSV format. The database included all the exploration results for all exploration stages, including 36 holes drilled in 2017–2018.

The main analytical database comprises estimated uranium equivalent grades (eU₃O₈) based on the gamma-logging of the drillholes. As well actual uranium analytical results.

The uranium oxide equivalent grades were calculated from the LAS files (gamma-logging results). LAS files included Cps values, which were converted to uranium oxide grades using standard corrections and coefficients that account for the probe type (K-factor), casing steel thickness, presence of water and other factors. All other correction factors and parameters are shown in Table 8.

The uranium equivalent grades were calculated for each 10 cm interval using LAS files. Some historical holes were however not gamma-logged to the total depth but had results of the chemical assays which were also used for interpretation and modelling. The available data is summarized in Table 14.

<table>
<thead>
<tr>
<th>Category</th>
<th>Pre-2017 holes</th>
<th>2017–2018 holes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drillholes</td>
<td>970</td>
<td>36</td>
<td>1,006</td>
</tr>
<tr>
<td>Metres drilled</td>
<td>123,914</td>
<td>14,951</td>
<td>138,865</td>
</tr>
<tr>
<td>Survey records</td>
<td>6,435</td>
<td>2,899</td>
<td>9,334</td>
</tr>
<tr>
<td>Records in assay data file, including:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assayed intervals for U₃O₈ (combined chemical assays and deconvolved grades)</td>
<td>2,199,933</td>
<td>147,827</td>
<td>2,347,760</td>
</tr>
<tr>
<td>Records in geology logging file</td>
<td>3,465</td>
<td>5,574</td>
<td>9,039</td>
</tr>
</tbody>
</table>

The databases consisted of several parts:

- Analytical database, including:
  - Drillhole collar coordinates
  - Drillhole survey data
  - Drillhole sampling database (combined chemical assays and deconvolved uranium grades from gamma logging)
  - Drillhole geological logging and codes.

- Topography data in the form of a DTM (supplied as a DXF file).

Import of the various datasets into Micromine proceeded without incident.
14.3 Data Validation

The analytical database was checked using macros and processes designed to detect the following errors:

- Duplicate drillhole names
- One or more drillhole collar coordinates missing in the collar file
- FROM or TO missing or absent in the assay file
- FROM > TO in the assay file
- Sample intervals are not contiguous in the assay file (gaps exist between the assays)
- Sample intervals overlap in the assay file
- First sample is not equal to 0 m in the assay file
- First depth is not equal to 0 m in the survey file
- Several downhole survey records exist for the same depth
- Azimuth is not between 0 and 360° in the survey file
- Dip is not between 0 and 90° in the survey file
- Azimuth or dip is missing in survey file
- Total depth of the holes is less than the depth of the last sample.

It was found that 10 historical holes do not have analytical information. All these holes were excluded from the resource estimation process.

Some historical holes had negative FROM values (gamma-logging started above hole collars). All those intervals were excluded from the database.

Validation of the 2017–2018 drillhole database did not return any errors.

No other errors have been identified in the databases, and no corrections were introduced to the database.

14.4 Exploratory Data Analysis – Statistical Analysis

Classical statistical analysis was updated twice for the deposit. The first study was carried out to determine the distribution parameters of uranium grades.

Figure 32 summarise the statistical properties of the unrestricted assay databases for uranium. The statistical parameters for all uranium grades are shown in Table 15.

The histogram for unrestricted uranium grade population has a positively skewed log distribution and demonstrates that there is no apparent mixing of grade populations. The histogram does not show an obvious cut-off grade that could be used for interpretation of uranium mineralization. A decision was made to employ the nominal cut-off grade of 100 ppm for the subsequent update of interpretation of mineralized bodies. The adoption of 100 ppm cut-off grade also reduces the residual effect of any radium halos by their exclusion.

Once the uranium mineralization was interpreted for all mineralized lenses and wireframed, classical statistical analysis was repeated for the composited samples within the interpreted envelopes to meet the following objectives:

- To estimate the mixing effect of grade populations for uranium within the interpreted mineralized bodies
- To estimate the necessity of separation of grade populations if more than one population was observed
- To reveal the possible top-cut grades for uranium for grade interpolation.
The input sample file was flagged to exclude those intervals that appeared outside the wireframed mineralized envelopes for uranium. The modelled histogram for the uranium grades restricted within mineralized envelopes does not demonstrate apparent mixing of grade populations for uranium (Figure 33).

The lognormal histograms and cumulative probability plots were analyzed to determine the top-cut grades to be applied to the input analytical data before the geostatistical analysis. The majority of the input intervals with uranium grades were determined from the gamma logging results for 10 cm intervals. Thus, a decision was made that no top-cut grade values are applied on the analyzed intervals because deconvolving of uranium grades from gamma-logging results usually takes into account abnormally high grades and, therefore, top-cutting is not required.

Figure 32: Log histogram for unrestricted uranium grades

Figure 33: Log histogram for uranium grades within mineralized envelopes
The coefficient of variation for the compositing uranium grades is relatively high, which indicates that the possibility of modelling robust semi-variograms is relatively poor.

### Table 15: Classical statistics for uranium grades (weighted on length)

<table>
<thead>
<tr>
<th>Element</th>
<th>Minimum (ppm)</th>
<th>Maximum (ppm)</th>
<th>No. of points</th>
<th>Mean (ppm)</th>
<th>Variance</th>
<th>Standard deviation</th>
<th>Coefficient of variation</th>
<th>Median (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>eU_3O_8</td>
<td>0</td>
<td>259,140</td>
<td>2,316,935</td>
<td>123.8</td>
<td>2,230,842</td>
<td>1,493</td>
<td>14.2</td>
<td>16.5</td>
</tr>
<tr>
<td><strong>Unrestricted sample intervals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>259,140</td>
<td>220,921</td>
<td>762.8</td>
<td>16,034,002</td>
<td>4,004</td>
<td>5.7</td>
<td>186.3</td>
</tr>
<tr>
<td><strong>Intervals within mineralized bodies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>238,188</td>
<td>34,636</td>
<td>762.9</td>
<td>15,555,553</td>
<td>3,944</td>
<td>5.2</td>
<td>185.2</td>
</tr>
<tr>
<td><strong>0.5 m composites within mineralized intervals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 14.5 Interpretation of Mineralized Bodies

The grade compositing process was employed to calculate the mineralized intervals using 100 ppm cut-off grade. The calculated grade composites were displayed along the drillhole traces to assist with interpretation only. The interpretation process involved correlation of identified mineralized intervals between the holes along exploration lines and also between the sections to make sure that the correct lens numbers would subsequently be assigned to the analytical data file. The grade compositing process employed the following input parameters:

- **Cut-off value** 100 ppm eU_3O_8
- **Minimum composite length** 1 m
- **Minimum grade of final composite** 100 ppm eU_3O_8
- **Maximum consecutive length of internal waste** 0.5 m
- **Minimum grade * length** 200 ppm*m eU_3O_8

Interpretation was updated interactively for 56 SN cross sections which were 50 m apart. When uranium grades were interpreted, each section was displayed in Micromine’s Vizex display environment together with drillhole traces, grade composites and interval grade values. A total number of 184 individual mineralized lenses, which were previously modelled, were reviewed and updated where necessary, and 20 new mineralized lenses were interpreted for the deposit.

The following techniques were employed while interpreting and updating the uranium mineralization:

- Each cross section was displayed on screen with a clipping window equal to a half distance from the adjacent sections.
- All interpreted strings were snapped to the corresponding drillhole composited intervals, i.e. the interpretation was constrained in the third dimension.
- Internal waste within the mineralized envelopes was not interpreted and modelled. It was initially included in the composited grade intervals used for the resource estimation.
- The interpretation was extended perpendicular to the corresponding first and last interpreted cross section to the distance equal to a half distance between the adjacent exploration lines. In this case, the interpretation honoured the general direction of the structure and the tendency for changes of the form of the geological body.
• If a mineralized envelope did not extend to the adjacent drillhole section, it was projected halfway to the next section keeping its thickness and terminated. The general direction and dip of the envelopes was maintained.

• If a mineralized envelope did not extend to the next drillhole within the interpreted exploration line, it was interpolated halfway to the next drillhole keeping its thickness and terminated. The general direction and dip of the envelopes was maintained.

• If a mineralized envelope was at the topographic surface, it was extended above the topographic base. This was done to make sure there would be no gaps between the block model and the topographic base when the block model was built.

• When faults were interpreted along with the mineralized envelopes, mineralization was truncated by interpreted fault planes.

Drillhole traces were also colour coded for the main lithological types to assist with the interpretation. This coding helped to review and to interpret major fault systems and mineralized bodies displacements and the edges of the graben, where it was appropriate.

An example of an interpreted and updated section is shown in the Figure 34, where: thick red lines along drillhole traces – grade composites; traces are colour coded according to lithology; red strings – interpreted mineralized bodies; purple lines – faults. Recent (2017–2018) drillholes are shown as brown traces.
Figure 34: Schematic example of interpretation of the DASA deposit (Section 360,000mE)

Note: Pink = faults; red = mineralized envelopes; black = drillhole trace with red hatches on the left – grade composites.
14.6 Wireframing

The interpreted strings were used to update 3D solid wireframes for the mineralized envelopes. Every cross section was displayed on the screen along with the closest interpreted section. If the corresponding envelope did not appear on the next cross section, the former was projected halfway to the next section, where it was terminated. Every mineralized envelope was reviewed and, where necessary, wireframed or updated separately and individually. Mineralized bodies were extended and projected to the interpreted sub-vertical fault planes, where it was possible, and then terminated. Internal waste was included within the interpretations where continuity would be improved by doing so.

Figure 35 is a 3D view of the modelled mineralized bodies. A total number of 184 previously modelled wireframes were reviewed and updated, where it was necessary, and 20 new wireframes were modelled for the deposit. Each wireframed lens had a different colour, and steeply dipping faults are shown with dark red colour on the figure. The modelled mineralized bodies between the faults or steeply dipping bodies generally represent the graben structure, while all other bodies outside the graben are generally flat and relatively shallow mineralized lenses.

![Figure 35: Oblique view of the wireframed uranium mineralized envelopes and fault planes for the DASA deposit (looking northwest)](image)

All wireframe models were validated so that they are all solids (closed) and that they do not contain intersecting triangles.

<table>
<thead>
<tr>
<th>Number of wireframes</th>
<th>Volume (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>204</td>
<td>59,011,054</td>
</tr>
</tbody>
</table>

Table 16: Number of interpreted wireframes at the DASA deposit
14.7 Drillhole Data Selection and Compositing

Drillhole data selection is a standard procedure which ensures that the correct samples are used in classical statistical and geostatistical analyses and grade interpolation processes. For this purpose, the solid wireframes for each mineralized envelope were subsequently used to select the drillhole sample intervals. Samples were selected for individual envelopes and flagged accordingly for each modelled mineralized envelope.

Visual validation of the flagged samples was carried out to make sure the correct samples were selected by the wireframes.

Classical statistical analysis was then repeated for those uranium grades within the mineralized envelopes.

The majority of intervals in the analytical data file were 10 cm based on gamma-logging. It was decided to composite all intervals to 0.5 m. Thus, the selected samples within each mineralized envelope were separately composited over 0.5 m intervals, starting at the drillhole collar and progressing downhole. Compositing was stopped and restarted at all boundaries between mineralized envelopes and waste material.

14.8 Dynamic Search

The previous Mineral Resource estimate was based on the assumption that there are several parallel close to vertical faults that form the graben walls, and that all mineralized lenses between the faults form a “step-like” structures but having a sub-horizontal internal distribution of uranium grades. Thus, previous modelling methodology involved block model and samples unfolding or flattening to a horizontal plane.

Recent drilling confirmed that the Flank Zone is a steeply dipping mineralized body with variable northeast dipping without any apparent “steps”. This improved interpretation was used to update the model. However, the flattening methodology used previously is not applicable for the steeply dipping mineralized bodies.

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Figure 36: Strings along the deposit strike (plan view)
It was therefore decided that a dynamic search would deliver more robust results for the deposit. To set up the dynamic search, it was necessary to assign azimuth, plunge and dip values to each cell in the block model. That was achieved using the following methodology:

1. A set of strings was digitized along the deposit strike in plan view as shown in Figure 36 (red lines).
2. A set of strings was digitized for every 50 m spaced section approximately parallel to the deposit strike. All strings were digitized through the central parts of the wireframe slices. These strings (Figure 37) represented general plunge for each modelled lens (purple lines).
3. A set of strings was digitized for every 50 m spaced section approximately perpendicular to the deposit strike. All strings were digitized through the central parts of the wireframe slices. These strings (Figure 38) represented general dip for each modelled lens (purple lines).
4. When all strings for azimuth, plunge and dip were digitized, they were “normalized”, i.e. points were inserted in such a way that the distance between points along strings would not be greater than 10 m.
5. Azimuth for each pair of points along strings was calculated and recorded in the string file which was digitized for the deposit strike.
6. Inclination for each pair of points along strings was calculated and recorded in the string file which was digitized for the lenses plunge.
7. Inclination for each pair of points along strings was calculated and recorded in the string file which was digitized for the lenses dip.
8. All calculated values for strings were checked to have correct positive or negative values and corrected if it was necessary.
9. The resultant strings were used to interpolate azimuth, plunge and dip values into each cell of the block model. Spherical search was employed for this process.

The resultant block model had assigned azimuth, dip and plunge values for each cell, which represented the general directions of mineralized lenses.

Figure 37: Strings for the plunge of the bodies (section view looking northwest)
Geostatistical Analysis

The new analytical data was merged with the historical data, and the geostatistical analysis was repeated for the model update. It was found that the previously modelled semi-variograms did not change their characteristics.

Downhole experimental variogram was modelled to estimate the expected nugget effect for uranium grades (Figure 39). The estimated nugget effect was then applied to model directional semi-variogram models.

Figure 38: Strings for the dip of the bodies (section view looking northeast)

Figure 39: Downhole absolute semi-variogram model for uranium
A semi-variogram map was then generated in plan view to establish the direction of maximum grade continuity (Figure 40). The map clearly demonstrated that the azimuth of maximum continuity is 55° which generally matches with the overall strike of the mineralized bodies. The directions for semi-variogram models were established as 55° azimuth, 0° dip; 145° azimuth, 0° dip; and vertical; but the grade interpolator with dynamic search applied variable directions to the semi-variogram models in line with the parameters estimated for each model cell.

It was found that robust absolute semi-variograms are difficult to model most likely due to the high coefficient of variation of uranium grades. Therefore, relative semi-variogram models were calculated and modelled for the composited uranium sample file without applied top-cut grades (Figure 41).

*Figure 40: Semi-variogram map (plan view)*
Figure 41: Relative semi-variogram models for uranium (three main directions)
All modelled experimental semi-variograms were exponential and spherical with three nested structures. The obtained semi-variogram ranges were used to determine the search radii. The latter were used in the grade interpolation processes.

<table>
<thead>
<tr>
<th>Element</th>
<th>Type</th>
<th>Axis</th>
<th>Azimuth</th>
<th>Dip</th>
<th>Nugget</th>
<th>Partial sills</th>
<th>Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>U₃O₈</td>
<td>Rel. Exp. and Spherical</td>
<td>Main</td>
<td>55</td>
<td>0</td>
<td>0.053</td>
<td>0.075, 0.241 and 0.255</td>
<td>4, 9.3 and 103.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Second</td>
<td>145</td>
<td>0</td>
<td></td>
<td></td>
<td>14.5, 36.5 and 91.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Third</td>
<td>145</td>
<td>90</td>
<td></td>
<td></td>
<td>1.52, 4.65 and 49.13</td>
</tr>
</tbody>
</table>

**14.10 Block Modelling**

An empty block model was created within the closed wireframe models for the mineralized envelopes. Each modelled lens was assigned a unique code in the model file. The block model was then restricted below the topography surface, i.e. all the model cells above the surface were deleted from the model file.

Block model parameters are shown in Table 18.

The initial filling with a corresponding parent cell size was followed by subcelling where necessary. The subcelling occurred near the boundaries of the mineralization or where model was truncated with the topographic surface. The parent cell size was chosen on the basis of the exploration grid and general morphology of the mineralized bodies and in order to avoid the generation of excessively large block model. The subcelling size was chosen to maintain the resolution of the mineralized bodies. The subcells were optimized in the model where possible to form larger cells.

**14.11 Grade Interpolation**

Uranium equivalent (eU₃O₈) grades were interpolated into the empty block model using the OK interpolation method. This was then rerun using the Inverse Distance Weighted (IDW) method with the powers of two and three as cross-checks. The search ellipse and semi-variogram models were oriented by the interpolator using the azimuth, plunge and dip values for each model cell accordingly.

The OK and IDW processes were performed at different search radii until all model cells were interpolated. The search radii were determined by means of the evaluation of the semi-variogram parameters. Each mineralized lens was estimated separately.

The first search radii for all lenses were selected to be equal to one-third of the semi-variogram long ranges in all directions. Model cells that did not receive a grade estimate from the first interpolation run were used in the next interpolation with greater search radii equal to two-thirds of semi-variogram long ranges in all directions. The third interpolation run employed radii equal to full semi-variogram ranges. The model cells...
that did not receive grades from the first three interpolation runs were then estimated using radii incremented by the full semi-variogram ranges until all model cells were informed with uranium grade.

When model cells were estimated using radii not exceeding full semi-variogram ranges, a restriction of at least three samples from at least two drillholes was applied to increase the reliability of the estimates. The general definition of the interpolation strategy is presented in Table 19 below.

“Parent estimation technique” was employed, i.e. all subcells within each parent cell were informed by the same grade.

Each modelled lens was estimated individually without mixing of data points between lenses. To do that, all lenses were separated vertically from each other by 1,000 m. The vertical search was reduced from 20 m to 10 m to honour better the vertical variability of grades.

Declustering was performed during the interpolation process by using four sectors within the search neighbourhood. Each sector was restricted to a maximum of four points for all the lenses, and the search neighbourhood was restricted to an overall minimum of three points from at least two drillholes for the interpolation runs using radii within the semi-variogram ranges. The maximum combined number of points allowable for the interpolation was therefore 16. Change of support was honoured by discretising to 5-points x 5-points x 5-points. These point estimates are simple averages of the block estimates. The general definition of the interpolation strategy is presented in Table 19.

<table>
<thead>
<tr>
<th>Interpolation method</th>
<th>Ordinary kriging</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Search radii</strong></td>
<td></td>
</tr>
<tr>
<td>Less or equal to 1/3 of semi-variogram ranges</td>
<td>Less or equal to 2/3 of semi-variogram ranges</td>
</tr>
<tr>
<td>Minimum no. of points</td>
<td>4</td>
</tr>
<tr>
<td>Maximum no. of points</td>
<td>16</td>
</tr>
<tr>
<td>Minimum no. of drillholes</td>
<td>3</td>
</tr>
</tbody>
</table>

### 14.12 Density Values

Dry density values were obtained by previous and recent exploration programs on the deposit and direct measurements of 3,594 core samples taken and processed by GAC. More information is provided in the previous sections of this report (Section 11.2).

Density values can be assigned to block model cells using the following methods:

- Direct assignment of the values to block model cells
- Calculation of values for each cell using regression formulas
- Interpolation of values
- Use of geological model to assign values into each model cell.

CSA Global used the first method, i.e. the density values were assigned to each model cell based on the average value from the density data set collected and provided by GAC.

Each model cell was assigned a density value of 2.36 t/m³.
14.13 Mineral Resource Classification Strategy

No changes were made to the previously adopted classification strategy. The classification of the model was updated for those areas of the deposit, where the confidence in geological continuity of the mineralized bodies was upgraded with additional drilling, and where the exploration grid density was increased.

The Mineral Resource classification strategy utilized in this Report is based primarily on; geological confidence, search and interpolation parameters, and exploration drillhole density. Kriging variance was also used to assist with the classification. The specific requirements concerning the minimum number of samples and minimum number of drillholes used for grade interpolation for each block were applied and are tabulated in Table 19.

The block model was displayed in Micromine’s Vizex environment and colour coded according to interpolation runs. After visual inspection, it was decided that the classification of Mineral Resources could be based on exploration drillhole density and interpolation runs which were based on modelled semi-variogram ranges. It was decided that the exploration grid of at least 50 m x 50 m would support the Indicated Resource category if blocks were estimated from at least two drillholes by search ellipse not exceeding semi-variogram ranges. All the remaining model cells were classified as Inferred. No Measured Mineral Resource category was applied to the DASA model.

The resource classification strategy is illustrated below in Figure 42.

![Figure 42: Resource classification strategy (section 360100mE)](image)

Note: Green = Indicated; blue = Inferred.

A summary diagram showing the distribution of Indicated and Inferred blocks is shown in Figure 43.
Figure 43: Summary diagram of Indicated and Inferred blocks in relation to the optimized open pit (looking southeast)
14.14  Block Model Validation

Validation of the grade estimates was completed by:

- Visual checks on screen in cross section and plan view to ensure that block model grades honour the grade of sample composites
- Statistical comparison of sample and block grades
- Alternative interpolation using IDW methods
- Generation of swath plots to compare input and output grades in a semi-local sense, by easting, northing and elevation.

14.14.1  Visual Validation

The block model with interpolated grades was displayed on screen along with the sample grades and colour coded. Visual validation demonstrated close correlation between modelled grades and composited samples (Figure 44).

![Visual comparison of eU3O8 grades in the model versus assays (section 360,000 mE, looking west)](image)

14.14.2  Statistical Validation

The average eU3O8 grades in the model were compared with the average grades in the composited sample files. It was found that the modelled grades were 1.6% relative lower than the grades in the composites (589.6 ppm eU3O8 in the composite file versus 580 ppm eU3O8 in the block model) for the combined categories.

14.14.3  Comparison with Alternative Interpolation Methods

All grades were also interpolated using the IDW method with the power of two and three and then compared to the grades estimated by OK method. A comparison of the grades and metal tonnage using OK versus IDW method at various cut-off grades is given in Table 20. Kriging returned generally more conservative grades and lower metal, but overall the grades differ within acceptable limits.
### Table 20: Comparison of grades between OK and IDW method

<table>
<thead>
<tr>
<th>Cut-off (U₃O₈, ppm)</th>
<th>Kriged model</th>
<th>IDWx2 model</th>
<th>IDWx3 model</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U₃O₈ (ppm)</td>
<td>Metal (Mlb)</td>
<td>U₃O₈ (ppm)</td>
<td>Metal (Mlb)</td>
</tr>
<tr>
<td>0</td>
<td>635</td>
<td>195</td>
<td>651</td>
<td>200</td>
</tr>
<tr>
<td>100</td>
<td>664</td>
<td>193</td>
<td>690</td>
<td>198</td>
</tr>
<tr>
<td>200</td>
<td>930</td>
<td>178</td>
<td>973</td>
<td>183</td>
</tr>
<tr>
<td>300</td>
<td>1,093</td>
<td>170</td>
<td>1,145</td>
<td>176</td>
</tr>
<tr>
<td>400</td>
<td>1,252</td>
<td>163</td>
<td>1,308</td>
<td>169</td>
</tr>
<tr>
<td>500</td>
<td>1,554</td>
<td>152</td>
<td>1,614</td>
<td>158</td>
</tr>
<tr>
<td>600</td>
<td>1,840</td>
<td>143</td>
<td>1,911</td>
<td>149</td>
</tr>
<tr>
<td>700</td>
<td>2,107</td>
<td>136</td>
<td>2,176</td>
<td>142</td>
</tr>
<tr>
<td>800</td>
<td>2,351</td>
<td>130</td>
<td>2,423</td>
<td>136</td>
</tr>
<tr>
<td>900</td>
<td>2,585</td>
<td>125</td>
<td>2,653</td>
<td>131</td>
</tr>
<tr>
<td>1,000</td>
<td>2,799</td>
<td>120</td>
<td>2,876</td>
<td>127</td>
</tr>
<tr>
<td>1,100</td>
<td>3,030</td>
<td>116</td>
<td>3,086</td>
<td>123</td>
</tr>
<tr>
<td>1,200</td>
<td>3,217</td>
<td>112</td>
<td>3,314</td>
<td>118</td>
</tr>
<tr>
<td>1,300</td>
<td>3,451</td>
<td>108</td>
<td>3,541</td>
<td>115</td>
</tr>
<tr>
<td>1,400</td>
<td>3,649</td>
<td>105</td>
<td>3,752</td>
<td>111</td>
</tr>
<tr>
<td>1,500</td>
<td>3,871</td>
<td>102</td>
<td>3,986</td>
<td>108</td>
</tr>
</tbody>
</table>

#### 14.14.4 Swath Plots

Swath plots were generated for each 20 m bench and each 50 m vertical section in east-west and north-south directions. The results of this validation are shown from Figure 45 to Figure 47. The plots demonstrate close correlation between the modelled uranium grades and sample composites. It is apparent that the model has smoothed the composite grades, which is to be expected due to the volume variance effect.
Figure 45: Swath plot for 50 m easting sections

Figure 46: Swath plot for 50 m northing sections
14.15 Conceptual Pit Optimization Study

14.15.1 Summary

To provide support for assessing the eventual economic extraction of the DASA deposit by open pit mining, a preliminary pit optimization study was completed.

The optimization was completed on the block model for the deposit developed by CSA Global in May 2018 and the existing topographic surface was provided by the GAC. The input economic parameters for the pit optimization process were developed using CSA Global database of mining costs and in consultation with GAC.

Basic pit optimization produces the following information about each block in the block model:

- It determines whether the block is inside or outside the optimal (ultimate) pit
- It determines whether the block should be processed as ore (and if so, by what processing method if several methods could be used) or sent to the waste dump.

CSA Global did not estimate Mineral Reserves for the deposit. The optimization study was for the sole purpose of providing information to GAC about the potential economic extraction of the deposit at this stage of evaluation only. The optimization work is entirely conceptual in nature and is based on both Inferred and Indicated Mineral Resources, it is not a mining study and it should in no way be considered a Mineral Reserve estimate. This work should not be sued to assess if this project is economically viable now or in the future.

Figure 47: Swath plot for 20 m flitches
14.15.2 Input Parameters

The pit optimization study was based on the following information, provided by the GAC or generated by CSA Global:

- Classified block model generated by CSA Global
- Topographic surface (GAC)
- Input economic parameters (provided by GAC and CSA Global).

The input parameters for the base case are shown in Table 21 (all costs and prices are in US$). The costs are considered reasonable estimates for a project of this type and scale but have not been informed by any kind of formal mining study at the project. CSA Global has elected to use a higher uranium price than is in place today to reflect the uncertainty over when the project will be developed and the likely pricing scenarios that could be in play in the future.

![Table 21: Pit optimization parameters](image)

14.15.3 Pit Optimization Process

The pit optimization was carried out using the Mining module of the Micromine version 18.0 software application using the Lerch-Grossman algorithm.

The Lerch-Grossman algorithm is an industry-standard optimization technique used in mining and exploration. It is based on graph theory and is one of the widely used methods that guarantees the detection of the true optimum pit.

In the Lerch-Grossmann algorithm, directed arcs indicate which blocks need to be removed before a block can either be mined and processed, or be dumped as waste. Each block in the model is assigned a revenue value based on the grade of that block and metal price, and then all associated costs are subtracted from the revenue, so that all blocks are assigned a positive or negative dollar value. If the dollar value is positive, that block could potentially be mined profitably providing that all the blocks above do not make a loss if mined.
The model pit slopes are specified in terms of the blocks that must be removed to provide access to each block within the block model.

Pit optimization requires that a fixed cost/value be associated with each block. The value of a waste block usually defines the cost of mining and disposal (dumping, reclaiming, etc). A negative value indicates a loss. The value of an ore block is usually defined by the profit from the mineral sale, minus the costs associated with mining and processing. A block will have a negative value if the costs are greater than the profit. It makes sense to consider it an “ore” block if the loss is less than it would be if it was treated as a waste block. In general, the pit optimization process treats negative blocks as waste, and positive blocks as ore.

The pit optimization process determines the ultimate pit. The “ultimate pit” is a pit that gives the highest possible undiscounted surplus between revenue and summary of operating costs but does not consider some scheduling constraints and discounting. Capital costs are also not considered for the ultimate undiscounted pit.

The “optimal pit” gives the highest possible net present value (NPV), considering all operational scheduling constraints (annual mining and processing productivity), discounting and capital costs.

The ultimate pit can be considered as the optimal pit, but only for a deposit with a short mining life (two to three years); if the life-of-mine (LOM) is longer, it is necessary to generate nested pit shells and do an analysis of optimal pit shells.

For an Ore Reserve estimation (mineable reserve in the ultimate/optimal pit), only Measured and Indicated Mineral Resources can be used. However, Inferred material was also used in the conceptual pit optimization exercise.

Note: Pit optimization using uncategorized model or using Inferred material does not comply with CIM requirements for assessing the economic potential of deposit. Only Measured and Indicated Mineral Resources can be converted to Reserves, and that if Inferred material is used for optimization, the results obtained cannot be used for market announcements and the overall estimation of the project economics.

The pit optimization process involves the following steps:

- No waste model was generated as Micromine can process without such a model and uses a defaulted 0-grade waste material. A density value of 2.36 t/m$^3$ was defaulted to the waste blocks for the waste material.
- Pit optimizer set up. All provided economic parameters and output data files were set up in the process.
- Reporting for the base case and alternative scenarios to test the model for different uranium prices.

14.15.4 Pit Optimization Results

CSA Global generated the ultimate undiscounted pit shell and calculated economic parameters for the base case using US $45/lb U$_3$O$_8$ price. Results of the analysis are presented in Table 22. This work was complete for the sole purpose of assessing the potential for economic extraction. It is not a reserve or mining study.

Mineralization tonnage, metal and all other parameters are presented in-situ without taking into consideration the influence of mining dilution and mining losses.

The results below show the various results using difference uranium pricing scenarios, but with the same input costs, all of them produce an open pit mining scenario but with a fluctuating lower cut-off grade. Given the relatively early stage of investigation for the project, the author believes selecting a higher price scenario is warranted.
Table 22: Pit optimization results – base case US $45/lb

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Indicated</th>
<th>Inferred</th>
<th>Waste</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ore weight</td>
<td>Mt</td>
<td>7.0</td>
<td>0.3</td>
<td>0</td>
<td>7.3</td>
</tr>
<tr>
<td>Waste weight</td>
<td>Mt</td>
<td>6.4</td>
<td>1.0</td>
<td>88</td>
<td>95</td>
</tr>
<tr>
<td>U₃O₈ quantity</td>
<td>Mlb</td>
<td>46</td>
<td>0.6</td>
<td>0</td>
<td>46</td>
</tr>
<tr>
<td>U₃O₈ revenue</td>
<td>$M</td>
<td>2,060</td>
<td>26</td>
<td>0</td>
<td>2,087</td>
</tr>
<tr>
<td>Mining cost</td>
<td>$M</td>
<td>34</td>
<td>3.3</td>
<td>220</td>
<td>257</td>
</tr>
<tr>
<td>Processing cost</td>
<td>$M</td>
<td>168</td>
<td>6.2</td>
<td>0</td>
<td>174</td>
</tr>
<tr>
<td>General and administration cost</td>
<td>$M</td>
<td>35</td>
<td>1.3</td>
<td>0</td>
<td>36</td>
</tr>
<tr>
<td>Minimum U₃O₈ grade processed</td>
<td>ppm</td>
<td>323</td>
<td>323</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strip ratio</td>
<td>t/t</td>
<td></td>
<td></td>
<td></td>
<td>13.1</td>
</tr>
</tbody>
</table>

Three alternative U₃O₈ prices were used to test the model sensitivity to the uranium price (US $) – $25/lb, $30/lb, and $40/lb. Results are shown in Table 23 to Table 25.

Table 23: Pit optimization results – alternative case $25/lb

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Indicated</th>
<th>Inferred</th>
<th>Waste</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ore weight</td>
<td>Mt</td>
<td>4</td>
<td>0.03</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Waste weight</td>
<td>Mt</td>
<td>7</td>
<td>1</td>
<td>47</td>
<td>54</td>
</tr>
<tr>
<td>U₃O₈ quantity</td>
<td>Mlb</td>
<td>40</td>
<td>0.1</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>U₃O₈ revenue</td>
<td>$M</td>
<td>1,004</td>
<td>3</td>
<td>0</td>
<td>1,006</td>
</tr>
<tr>
<td>Mining cost</td>
<td>$M</td>
<td>28</td>
<td>2</td>
<td>117</td>
<td>147</td>
</tr>
<tr>
<td>Processing cost</td>
<td>$M</td>
<td>101</td>
<td>1</td>
<td>0</td>
<td>102</td>
</tr>
<tr>
<td>General and administration cost</td>
<td>$M</td>
<td>21</td>
<td>0.2</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>Minimum U₃O₈ grade processed</td>
<td>ppm</td>
<td>582</td>
<td>582</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strip ratio</td>
<td>t/t</td>
<td></td>
<td></td>
<td></td>
<td>12.8</td>
</tr>
</tbody>
</table>

Table 24: Pit optimization results – alternative case $30/lb

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Indicated</th>
<th>Inferred</th>
<th>Waste</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ore weight</td>
<td>Mt</td>
<td>5</td>
<td>0.04</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Waste weight</td>
<td>Mt</td>
<td>7</td>
<td>1</td>
<td>53</td>
<td>60</td>
</tr>
<tr>
<td>U₃O₈ quantity</td>
<td>Mlb</td>
<td>41</td>
<td>0.1</td>
<td>0</td>
<td>41</td>
</tr>
<tr>
<td>U₃O₈ revenue</td>
<td>$M</td>
<td>1,241</td>
<td>4</td>
<td>0</td>
<td>1,244</td>
</tr>
<tr>
<td>Mining cost</td>
<td>$M</td>
<td>29</td>
<td>2</td>
<td>131</td>
<td>162</td>
</tr>
<tr>
<td>Processing cost</td>
<td>$M</td>
<td>115</td>
<td>1</td>
<td>0</td>
<td>116</td>
</tr>
<tr>
<td>General and administration cost</td>
<td>$M</td>
<td>24</td>
<td>0.2</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>Minimum U₃O₈ grade processed</td>
<td>ppm</td>
<td>485</td>
<td>488</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strip ratio</td>
<td>t/t</td>
<td></td>
<td></td>
<td></td>
<td>12.3</td>
</tr>
</tbody>
</table>
14.15.5 Pit Optimization Results

The undiscounted pit shell for the base case scenario (U_3O_8 price US $45/lb) demonstrated positive economic potential of the project, generating a positive undiscounted NPV using the economic parameters shown in Table 21 and without considering total capital costs.

The optimal discounted pit shell for the base case scenario was 740 m long x 550 m wide and approximately 260 m deep. It demonstrates that there may be viable open pit option but also there are significant resources outside of the open pit that may be suitable for underground mining (Figure 48).

![Figure 48: Ultimate pit shell and mineralization wireframes (looking southeast)](image)

The pit optimization in this study was carried out to support the case for eventual economic extraction of deposit via open pit mining. The deposit appears to have reasonable prospects of eventual economic extraction under a realistic set of criteria.
14.16 Reasonable Prospects Hurdle

The Qualified Person deems that there are reasonable prospects for eventual economic extraction on the following basis:

- There is substantial mineralization that is close to surface and therefore amenable to lower cost open pit mining
- The cut-off grades adopted for reporting (320 ppm for open cut mining and 1,200 ppm for underground method mining) are considered reasonable, given the Mineral Resource is likely to be exploited by combined open cut and underground mining methods and processed using leaching techniques
- Preliminary open pit optimization tests and conceptual estimation of underground potential confirmed that the deposit has potentially positive NPV.

14.17 Mineral Resource Statement

Mineral Resources for the DASA deposit were estimated assuming that parts would be exploited by open cut mining and the deeper, higher-grade parts via underground mining.

Open pit Mineral Resources were estimated within the limits of conceptual ultimate pit shell and above the cut-off grade of 320 ppm U₃O₈. The cut-off was chosen based on the economic parameters in the Table 21 and U₃O₈ price of 45 $/lb.

The Mineral Resources for open pit mining are shown in the Table 26.

Mineral Resources for underground mining were estimated outside of the limits of pit shell and above the cut-off grade of 1,200 ppm U₃O₈. The cut-off grade was calculated using the economic parameters in the Table 27 and U₃O₈ price of $45/lb.

### Table 26: DASA Mineral Resources for open pit mining as at 1 June 2018

<table>
<thead>
<tr>
<th>Category</th>
<th>Tonnes (Mt)</th>
<th>eU₃O₈ (ppm)</th>
<th>Contained metal (Mlb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicated</td>
<td>7.08</td>
<td>3,251</td>
<td>50.8</td>
</tr>
<tr>
<td>Inferred</td>
<td>0.26</td>
<td>1,135</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Notes:
- Mineral Resources are based on CIM definitions.
- Mineral Resources for open pit mining are estimated within the limits of ultimate pit shell.
- A cut-off grade of 320 ppm eU₃O₈ has been applied.
- A bulk density of 2.36 t/m³ has been applied for all model cells.
- Rows and columns may not add up exactly due to rounding.
Table 27: Input parameters for underground mining

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Units</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mining</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mining cost</td>
<td>$/t</td>
<td>71.0</td>
</tr>
<tr>
<td>Mining losses</td>
<td>%</td>
<td>10</td>
</tr>
<tr>
<td>Mining dilution</td>
<td>%</td>
<td>15</td>
</tr>
<tr>
<td>2. Processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Processing cost</td>
<td>$/t</td>
<td>24</td>
</tr>
<tr>
<td>General and administration costs</td>
<td>$/t</td>
<td>5</td>
</tr>
<tr>
<td>Processing recovery:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U₃O₈ %</td>
<td>%</td>
<td>95</td>
</tr>
<tr>
<td>3. Pricing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elements price for U₃O₈ $/lb</td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>Selling cost $/unit</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>4. Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SG parameters t/m³</td>
<td></td>
<td>2.36</td>
</tr>
</tbody>
</table>

The Mineral Resources for underground mining are shown in Table 28, and for combined open pit and underground mining are shown in Table 29.

Table 28: DASA Mineral Resources for underground mining as at 1 June 2018

<table>
<thead>
<tr>
<th>Category</th>
<th>Tonnes (Mt)</th>
<th>eU₃O₈ (ppm)</th>
<th>Contained metal (Mlb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicated</td>
<td>2.50</td>
<td>2,553</td>
<td>14.1</td>
</tr>
<tr>
<td>Inferred</td>
<td>8.18</td>
<td>2,647</td>
<td>47.7</td>
</tr>
</tbody>
</table>

Notes:
- Mineral Resources are based on CIM definitions.
- Mineral Resources for underground mining are estimated outside the limits of ultimate pit shell.
- A cut-off grade of 1,200 ppm eU₃O₈ has been applied.
- A bulk density of 2.36 t/m³ has been applied for all model cells.
- Rows and columns may not add up exactly due to rounding.

Table 29: DASA Mineral Resources for open pit and underground mining as at 1 June 2018

<table>
<thead>
<tr>
<th>Category</th>
<th>Tonnes (Mt)</th>
<th>eU₃O₈ (ppm)</th>
<th>Contained metal (Mlb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicated Open Pit</td>
<td>7.08</td>
<td>3,251</td>
<td>50.8</td>
</tr>
<tr>
<td>Indicated Underground</td>
<td>2.50</td>
<td>2,553</td>
<td>14.1</td>
</tr>
<tr>
<td>Total Indicated</td>
<td>9.59</td>
<td>3,068</td>
<td>64.8</td>
</tr>
<tr>
<td>Inferred Open Pit</td>
<td>0.26</td>
<td>1,135</td>
<td>0.7</td>
</tr>
<tr>
<td>Inferred Underground</td>
<td>8.18</td>
<td>2,647</td>
<td>47.7</td>
</tr>
<tr>
<td>Total Inferred</td>
<td>8.44</td>
<td>2,600</td>
<td>48.4</td>
</tr>
</tbody>
</table>

Notes:
- Mineral Resources are classified according to the CIM Definition Standards for Mineral Resources and Mineral Reserves (November 2010) by Dmitry Pertel, MAIG.
- Mineral Resources for open pit mining are estimated within the limits of ultimate pit shell.
- Mineral Resources for underground mining are estimated outside the limits of ultimate pit shell.
- A cut-off grade of 320 ppm eU₃O₈ has been applied for open pit resources.
- A cut-off grade of 1,200 ppm eU₃O₈ has been applied for underground resources.
- A bulk density of 2.36 t/m³ has been applied for all model cells.
- Rows and columns may not add up exactly due to rounding.

The distribution of the Mineral Resources is displayed in Figure 49. It shows the material that occurs within the conceptual optimized pit and the distribution of potential underground resources outside of the constraining pit shell above the corresponding cut-offs (320 ppm and 1,200 ppm U₃O₈).
Figure 49: Distribution of open cut and underground Mineral Resources above the selected cut-offs (looking southeast)
14.18 Grade-Tonnage Report

The grade-tonnage report for the DASA deposit is given in Table 30 at a range of cut-off grades between 0 ppm $\text{eU}_3\text{O}_8$ and 15,000 ppm $\text{eU}_3\text{O}_8$ and subdivided by adopted resource classification. The cut-off grades were applied to the $\text{eU}_3\text{O}_8$ values in the block model.

The grade-tonnage curves for all the resource categories separately for Indicated and Inferred for $\text{eU}_3\text{O}_8$ grades and contained metal are shown in Figure 50 to Figure 53.

Table 30: DASA grade-tonnage report

<table>
<thead>
<tr>
<th>Cut-off ($\text{eU}_3\text{O}_8$, ppm)</th>
<th>Category</th>
<th>Volume (Mm$^3$)</th>
<th>Tonnes (Mt)</th>
<th>Density (t/m$^3$)</th>
<th>$\text{eU}_3\text{O}_8$ (ppm)</th>
<th>Contained metal (Mb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Indicated</td>
<td>16.9</td>
<td>39.9</td>
<td>2.36</td>
<td>962</td>
<td>84.6</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>39.1</td>
<td>92.2</td>
<td>2.36</td>
<td>536</td>
<td>108.8</td>
</tr>
<tr>
<td>200</td>
<td>Indicated</td>
<td>11.3</td>
<td>26.7</td>
<td>2.36</td>
<td>1,364</td>
<td>80.2</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>25.6</td>
<td>60.4</td>
<td>2.36</td>
<td>738</td>
<td>98.3</td>
</tr>
<tr>
<td>250</td>
<td>Indicated</td>
<td>9.2</td>
<td>21.8</td>
<td>2.36</td>
<td>1,620</td>
<td>77.8</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>20.7</td>
<td>48.9</td>
<td>2.36</td>
<td>859</td>
<td>92.6</td>
</tr>
<tr>
<td>300</td>
<td>Indicated</td>
<td>7.9</td>
<td>18.7</td>
<td>2.36</td>
<td>1,841</td>
<td>75.9</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>17.2</td>
<td>40.5</td>
<td>2.36</td>
<td>980</td>
<td>87.5</td>
</tr>
<tr>
<td>400</td>
<td>Indicated</td>
<td>6.2</td>
<td>14.7</td>
<td>2.36</td>
<td>2,252</td>
<td>72.9</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>12.6</td>
<td>29.7</td>
<td>2.36</td>
<td>1,210</td>
<td>79.3</td>
</tr>
<tr>
<td>500</td>
<td>Indicated</td>
<td>5.2</td>
<td>12.2</td>
<td>2.36</td>
<td>2,619</td>
<td>70.5</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>9.8</td>
<td>23.1</td>
<td>2.36</td>
<td>1,428</td>
<td>72.8</td>
</tr>
<tr>
<td>600</td>
<td>Indicated</td>
<td>4.4</td>
<td>10.5</td>
<td>2.36</td>
<td>2,956</td>
<td>68.4</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>8.0</td>
<td>18.8</td>
<td>2.36</td>
<td>1,632</td>
<td>67.5</td>
</tr>
<tr>
<td>700</td>
<td>Indicated</td>
<td>3.9</td>
<td>9.3</td>
<td>2.36</td>
<td>3,251</td>
<td>66.7</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>6.7</td>
<td>15.8</td>
<td>2.36</td>
<td>1,820</td>
<td>63.3</td>
</tr>
<tr>
<td>800</td>
<td>Indicated</td>
<td>3.5</td>
<td>8.4</td>
<td>2.36</td>
<td>3,537</td>
<td>65.1</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>5.7</td>
<td>13.5</td>
<td>2.36</td>
<td>1,997</td>
<td>59.6</td>
</tr>
<tr>
<td>900</td>
<td>Indicated</td>
<td>3.2</td>
<td>7.6</td>
<td>2.36</td>
<td>3,812</td>
<td>63.7</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>5.0</td>
<td>11.9</td>
<td>2.36</td>
<td>2,154</td>
<td>56.5</td>
</tr>
<tr>
<td>1,000</td>
<td>Indicated</td>
<td>2.9</td>
<td>6.9</td>
<td>2.36</td>
<td>4,077</td>
<td>62.3</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>4.4</td>
<td>10.4</td>
<td>2.36</td>
<td>2,331</td>
<td>53.4</td>
</tr>
<tr>
<td>1,100</td>
<td>Indicated</td>
<td>2.7</td>
<td>6.5</td>
<td>2.36</td>
<td>4,295</td>
<td>61.3</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>4.0</td>
<td>9.4</td>
<td>2.36</td>
<td>2,472</td>
<td>51.0</td>
</tr>
<tr>
<td>1,200</td>
<td>Indicated</td>
<td>2.5</td>
<td>6.0</td>
<td>2.36</td>
<td>4,552</td>
<td>60.0</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>3.5</td>
<td>8.2</td>
<td>2.36</td>
<td>2,651</td>
<td>48.1</td>
</tr>
<tr>
<td>1,300</td>
<td>Indicated</td>
<td>2.4</td>
<td>5.6</td>
<td>2.36</td>
<td>4,771</td>
<td>59.0</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>3.2</td>
<td>7.4</td>
<td>2.36</td>
<td>2,802</td>
<td>45.9</td>
</tr>
<tr>
<td>1,400</td>
<td>Indicated</td>
<td>2.2</td>
<td>5.2</td>
<td>2.36</td>
<td>5,047</td>
<td>57.8</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>2.8</td>
<td>6.7</td>
<td>2.36</td>
<td>2,961</td>
<td>43.8</td>
</tr>
<tr>
<td>1,500</td>
<td>Indicated</td>
<td>2.1</td>
<td>4.9</td>
<td>2.36</td>
<td>5,266</td>
<td>56.8</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>2.6</td>
<td>6.0</td>
<td>2.36</td>
<td>3,130</td>
<td>41.6</td>
</tr>
<tr>
<td>2,000</td>
<td>Indicated</td>
<td>1.6</td>
<td>3.8</td>
<td>2.36</td>
<td>6,326</td>
<td>52.5</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>1.7</td>
<td>4.1</td>
<td>2.36</td>
<td>3,801</td>
<td>34.2</td>
</tr>
<tr>
<td>2,500</td>
<td>Indicated</td>
<td>1.3</td>
<td>3.1</td>
<td>2.36</td>
<td>7,244</td>
<td>49.1</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>1.2</td>
<td>2.9</td>
<td>2.36</td>
<td>4,430</td>
<td>28.4</td>
</tr>
</tbody>
</table>
### DASA Uranium Project Mineral Resource Update, Central Niger

**Note:** Rows and columns may not add up exactly due to rounding.

<table>
<thead>
<tr>
<th>Cut-off (eU₃O₈, ppm)</th>
<th>Category</th>
<th>Volume (Mm³)</th>
<th>Tonnes (Mt)</th>
<th>Density (t/m³)</th>
<th>eU₃O₈ (ppm)</th>
<th>Contained metal (Mb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,000</td>
<td>Indicated</td>
<td>1.1</td>
<td>2.5</td>
<td>2.36</td>
<td>8,294</td>
<td>45.6</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>0.9</td>
<td>2.1</td>
<td>2.36</td>
<td>5,034</td>
<td>23.8</td>
</tr>
<tr>
<td>3,500</td>
<td>Indicated</td>
<td>0.9</td>
<td>2.1</td>
<td>2.36</td>
<td>9,239</td>
<td>42.8</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>0.7</td>
<td>1.7</td>
<td>2.36</td>
<td>5,510</td>
<td>20.6</td>
</tr>
<tr>
<td>5,000</td>
<td>Indicated</td>
<td>0.6</td>
<td>1.3</td>
<td>2.36</td>
<td>12,332</td>
<td>35.4</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>0.3</td>
<td>0.8</td>
<td>2.36</td>
<td>7,121</td>
<td>12.2</td>
</tr>
<tr>
<td>10,000</td>
<td>Indicated</td>
<td>0.1</td>
<td>0.3</td>
<td>2.36</td>
<td>27,982</td>
<td>20.4</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>0.0</td>
<td>0.1</td>
<td>2.36</td>
<td>11,615</td>
<td>1.8</td>
</tr>
<tr>
<td>15,000</td>
<td>Indicated</td>
<td>0.1</td>
<td>0.1</td>
<td>2.36</td>
<td>50,037</td>
<td>15.5</td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td>0.0</td>
<td>0.0</td>
<td>2.36</td>
<td>32,326</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**Figure 50:** Grade-tonnage curve for DASA showing eU₃O₈ grades – Indicated category
Figure 51: Grade-tonnage curve for DASA showing $\text{eU}_3\text{O}_8$ grades – Inferred category

Figure 52: Grade-tonnage curve for DASA showing $\text{eU}_3\text{O}_8$ metal – Indicated category
14.19 Difference from Previous Resource Estimate

The Mineral Resource reported here differs from the previous resources in 2017 in several ways. The key difference has resulted from the successful drilling of the Flank Zone which intersected thick high-grade mineralization within the graben fault zone relatively close to surface (<300 m). This new zone of new near surface high-grade mineralization has resulted in a change of thinking in relation to how to develop the project. In 2017 it was perceived to be mostly an underground mining scenario whereas in this iteration it is more likely that the majority of material can be exploited by open cut mining methods.

The change in thinking on mining scenarios has meant that different cut-off grades scenarios are required to better reflect the two different styles and costs for open cut versus underground mining.

In addition, the improved understanding of the geology provided by the drilling has improved the confidence in the interpretation (and the grade continuity) which has allowed an upgrade in classification from Inferred to Indicated in the Flank Zone.

These changes have resulted in both increased tonnages and improved grades for the deposit.
15 Mineral Reserve Estimates

This section is not applicable to the current report.
16 Mining Methods

This section is not applicable to the current report.
17 Recovery Methods

This section is not applicable to the current report.
18 Project Infrastructure

This section is not applicable to the current report.
19 Market Studies and Contracts

CSA Global notes that the market for uranium has fluctuated during the past five years. Figure 54, copied from the Ux Consulting Company LLC (UxC) website, shows the trend in uranium pricing over the past two years.

The spot price quote listed by UxC on 23 December 2016 was US$20.38/lb $U_3O_8$, and the spot price published by MiningNews on 22 June 2018 was US$22.9/lb $U_3O_8$.


Metal prices used for Mineral Resources are based on consensus, long-term forecasts from banks, financial institutions and other sources.

Figure 54: UxC $U_3O_8$ historical uranium prices

Figure 55: Nymex $U_3O_8$ uranium prices for 2017–2018
20 Environmental Studies, Permitting and Social or Community Impact

GAC has engaged local environmental consultants to do baseline studies and collect data on the project area to support the development of the project. The area is remote with few permanent residents. The area is very arid with limited quantity or diversity of flora and fauna. As such, the impact of mining is likely to be limited.

As the project develops, GAC will need to undertake more detailed studies to support mining studies and the mine permitting process.
21 Capital and Operating Costs

This section is not applicable to the current report.
22 Economic Analysis

This section is not applicable to the current report.
23 Adjacent Properties

GAC has six exploration licences (including Adrar Emoles 3) located in Niger, as outlined in the tenure section of this report. GAC has been conducting exploration and evaluation programs across all of these project areas, resulting in the delineation of several prospects and deposits.

The most advanced of these is the Isakanan uranium prospect, located about 125 km north from Agadez and about 15 km southeast from the DASA uranium project. Uranium mineralization at the Isakanan prospect occurs mainly within the series of Carboniferous sediments, predominantly within the reduced Madaouela formation that occurs as silts and fine-grained sandstones. Mineralized bodies form flat sub-horizontal lenses with an average thickness of about 2 m to 3 m. The average depth of the main mineralized body is about 250 m from the surface. Preliminary estimate of the Isakanan deposit returned about 18–22 Mt at 450–550 ppm U₃O₈ (180–220 Mlb of metal oxide).

CAFC also runs exploration programs within the Tin Negouran permits, which are located about 150 km west from the town of Agadez and about 160 km southwest from the DASA deposit (Figure 56). Three mineralized areas have been identified within the permits with the following intersections:

- **Tagadamat Central**: Hole TDH-12 with 1,557 ppm U₃O₈ over 14 m from 1 m to 15 m depth
- **Ershanf**: Hole TDH-129 with 290 ppm U₃O₈ over 5 m from 35 m to 40 m depth
- **Tagadamat East**: Hole TDH-179 with 115 ppm U₃O₈ over 7.5 m from 7.5 m to 15 m depth.

![Figure 56: Location of the Tin Negouran uranium permits](image)

All other adjacent properties to DASA deposit area are third party properties, at a very early exploration stage and no relevant public data was published for inclusion within this study.
24 Other Relevant Data and Information

No additional information or explanation is necessary to make this Technical Report understandable and not misleading.
25 Interpretation and Conclusions

This Report was initiated by GAC for CSA Global to update Mineral Resources for the DASA project located in Niger to incorporate recent 2017–2018 drilling results. The Report describes previous work and the work done by CSA Global to estimate Mineral Resources at the DASA project as well as updated modelling methodology and results. The work interpretation and modelling work has resulted in CSA Global updating a Mineral Resource for the project in the Indicated and Inferred categories. The results of this Mineral Resource are summarized in Table 31 below.

Table 31: DASA Mineral Resources

<table>
<thead>
<tr>
<th>Category</th>
<th>Tonnes (Mt)</th>
<th>eU₃O₈ (ppm)</th>
<th>Contained metal (Mlb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicated Open Pit</td>
<td>7.08</td>
<td>3,251</td>
<td>50.8</td>
</tr>
<tr>
<td>Indicated Underground</td>
<td>2.50</td>
<td>2,553</td>
<td>14.1</td>
</tr>
<tr>
<td>Total Indicated</td>
<td>9.59</td>
<td>3,068</td>
<td>64.8</td>
</tr>
<tr>
<td>Inferred Open Pit</td>
<td>0.26</td>
<td>1,135</td>
<td>0.7</td>
</tr>
<tr>
<td>Inferred Underground</td>
<td>8.18</td>
<td>2,647</td>
<td>47.7</td>
</tr>
<tr>
<td>Total Inferred</td>
<td>8.44</td>
<td>2,600</td>
<td>48.4</td>
</tr>
</tbody>
</table>

CSA Global believes this Mineral Resource is a reliable estimate of the mineralization present at the DASA. The data used as inputs to the model have been collected and compiled at high standard and indicate that the project is a high quality mineral asset. Additionally, mineralization potential exists within the project along strike to the north and south, as well as within the graben providing significant upside potential. As such, CSA Global recommends that additional exploration work be conducted at the project to enlarge the resource and improve the classification of the current Mineral Resource to a higher classification, particularly for areas suitable for the underground mining method.

Initial conceptual optimization analysis indicates that parts of the Mineral Resource could potentially be extracted economically using open cut methods, and the remaining areas could be mined by underground method. The results of the analysis indicate the potential economic benefits are highly dependent on uranium pricing.

A review of the project risks identified the following:

- **Initial data**: REF was defined based on comparison of assays with gamma logging. There is no investigation of radon degassing factor which may influence significantly the gamma activity. Comparison of gamma logging with radium assays in closed cans as well as radium assays in closed cans with uranium assays allows to define reliably the radiological factors. The effect of this issue on the entire project is not likely to be material to the project but may have localise effects.

- **Mineral Resource**: The mineral resource model documented herein is sufficiently reliable to support engineering and design studies to evaluate the viability of a mining project at a preliminary economic analysis level and for the indicated resources a higher study such as a preliminary feasibility level. The Project’s economic viability is sensitive to the estimated uranium grade of the resource and the uranium market price. Infill drilling in critical areas would significantly reduce any potential risk in the resource estimation.

- **Mining**: It is expected that a significant part of the deposit will be mined using industry standard open pit mining techniques utilising modern technology with proven success, with no requirement for untried or
untested technology. However, some areas of the deposit could also be mined using underground methods, and some areas could also be considered for in-situ uranium leaching. However, this has not been assessed in this Report.

- **Processing**: Results of the metallurgical testwork shows the mineralogy and metallurgy of the DASA mineralization is readily amenable to acid leaching with conventional uranium recovery – similar to the Orano operation at Arlit, Niger.

- **Environmental and social**: Baseline studies have been commenced by GAC. However, the deposit is located in a very deserted area with very limited population. The environment is very arid with limited flora and fauna. These conditions may be favourable for mine development.

- **Economic outcomes**: Economic studies were not part of the project scope. However, the conceptual pit optimization study demonstrated that the key driver of project value is the uranium price.

- **Permitting**: The Exploration Permit granted to GAC was renewed two times. The most recent renewal occurred in 2016 resulting in an area of 121.3 km² from the initial area of 488.7 km² granted in 2007. GAC needs to apply for the Exploitation Permit again within three years.
26 Recommendations

CSA Global recommends the following are completed to support the exploration and evaluation efforts:

- Current QAQC procedures should be maintained to ensure high-quality data is available for subsequent Mineral Resource estimates.

- Further exploration and evaluation programs are required to upgrade the confidence of the extent and quality of mineralization at the deeper parts of the DASA deposit (inside the graben). Key programs include:
  - Additional diamond core drilling to test the morphology of the mineralization at the deeper parts of the graben as well as to study the distribution of the uranium disequilibrium factor at the deposit.
  - Step-out drilling to the north and south should be considered to enlarge the resources.
  - Infill drilling will be required within the Inferred and Indicated Resource areas if a higher classification is sought by GAC. CSA Global would recommend a similar drill density to that in place in the Indicated Resources areas reported herein.
  - Consider logging the drillholes using a PFN tool to assist in mapping any disequilibrium within the deposit.
  - Complete a stratigraphic study within the DASA project area to assess where other targets may exist and host similar deep mineralization.

- It is recommended to consider some areas of the deposit for in-situ leaching techniques.

- Complete an integrated assessment of the geometallurgy of the deposit to better define Mineral Resource domains and for improved metallurgical recovery should the project proceed to mining.

- At a conceptual level, the project demonstrates economic potential (based on preliminary pit optimization), further study in this area is recommended to assess the economic viability. Initially the project should be subject to preliminary economic assessment to assess the economics and areas that require more detailed study. Should this be successful, more detailed feasibility studies should be considered.

- Some additional investigations are required for definition of REF distribution to upgrade resource categories and understanding of uranium mineralization. CSA Global recommends assaying of radium in closed cans and uranium by XRF. Comparison of radium and uranium assays allows the reliable assessment of the REF and comparison of radium assays and gamma logging allows to define radon degassing factor. This factor may also influence the definition of eU₃O₈ grades.

- Additional metallurgical tests are recommended to assess the recovery of uranium of the deeper mineralization within the graben structure and the new high-grade Flank Zone.

- More detailed assessment of the impacts of hydrology and hydrogeology for mining both open cut and underground.

- A geotechnical study to better understand the rock mechanics of the various lithologies within the deposit to support mine design (and mining).

- Commence more detailed environmental studies to support more detailed feasibility studies at the project.

- Generate nested pit shells for a subsequent analysis of the pit shells, i.e. to find the discounted optimal pit. Nested pit shells can be useful for metal price sensitivity analysis, which shows how the metal prices affects pit shells values (ore, waste, etc).
References

Périmètre In Adrar, Dossier technique, Cogema internal report; 1977

Rapport des activités de la champagne de prospection d’uranium, projet Sekiret, Document 1-6, Association Onarem PNC, Annual technical report, 1983


Activation Lab., 2007. Petrographic study of rocks from a uranium prospect; Internal study for Global Atomic Fuels Corporation

Perimetre Tin Adradar; Dossier Technique, Cogema Internal Report, 1977

Jean Martin von Siebenthal: DASA Geology and structure, Global internal report, unpublished; 2013


Cazoulat, M. (1985); Geologic environment of the uranium deposits in the carboniferous and Jurassic sandstones of the western margin of the Air Mountains in the Republic of Niger; IARE TECDOC-328, p.247-263
28 Dates and Signatures
## Appendix 1: Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>%</td>
<td>percent</td>
</tr>
<tr>
<td>°</td>
<td>degrees</td>
</tr>
<tr>
<td>°C</td>
<td>degrees Celsius</td>
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<tr>
<td>2D</td>
<td>two-dimensional</td>
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<tr>
<td>3D</td>
<td>three-dimensional</td>
</tr>
<tr>
<td>ASL</td>
<td>above sea level</td>
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<tr>
<td>BWI</td>
<td>Bond Work Index</td>
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<tr>
<td>CEET</td>
<td>Commination Economic Evaluation Tool</td>
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<tr>
<td>CKAS</td>
<td>CK Aerial Surveys</td>
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<tr>
<td>cm</td>
<td>centimetres</td>
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<tr>
<td>Cps</td>
<td>counts per second</td>
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<tr>
<td>CSA Global</td>
<td>CSA Global Pty Ltd</td>
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<tr>
<td>DS</td>
<td>directional survey</td>
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<tr>
<td>DTM</td>
<td>digital terrain model</td>
</tr>
<tr>
<td>eU</td>
<td>equivalent uranium</td>
</tr>
<tr>
<td>eU₃O₈</td>
<td>equivalent uranium oxide</td>
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<tr>
<td>GAC</td>
<td>Global Atomic Corporation</td>
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<tr>
<td>GM</td>
<td>Geiger Muller</td>
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<tr>
<td>GPS</td>
<td>global positioning system</td>
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<tr>
<td>GR</td>
<td>gamma-ray</td>
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<tr>
<td>ICP</td>
<td>induced coupled plasma</td>
</tr>
<tr>
<td>ICP-AES</td>
<td>induced coupled plasma-atomic emission spectroscopy</td>
</tr>
<tr>
<td>IDW</td>
<td>inverse distance weighting</td>
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<tr>
<td>IMV</td>
<td>inertial measurement unit</td>
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<tr>
<td>km</td>
<td>kilometre(s)</td>
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<tr>
<td>km²</td>
<td>square kilometre(s)</td>
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<tr>
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<td>pound(s)</td>
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<td>life of mine</td>
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<td>m</td>
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<tr>
<td>mm</td>
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<td>Mt</td>
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<td>NI 43-101</td>
<td>National Instrument 43-101</td>
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<tr>
<td>NPV</td>
<td>net present value</td>
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<td>OK</td>
<td>ordinary kriging</td>
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<tr>
<td>PFN</td>
<td>prompt fission neutron</td>
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<td>PNC</td>
<td>Power Reactor and Nuclear Fuel Development Corporation</td>
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<td>ppm</td>
<td>parts per million</td>
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<td>QA</td>
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<td>REF</td>
<td>radioactive equilibrium factor</td>
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<td>t</td>
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<td>XRD</td>
<td>x-ray diffraction</td>
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<td>XRF</td>
<td>x-ray fluorescence</td>
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Appendix 2: Certificates of Qualified Persons

Certificate of Qualified Person – Dmitry Pertel

I, Dmitry Pertel, Geologist, as an author of this report entitled NI 43-101 Technical Report for the DASA Uranium Project, Niger, prepared for Global Atomic Corporation and dated 30 June 2018, do hereby certify that:

1. I am a Principal Geologist with CSA Global Pty Ltd. My office address is Level 2, 3 Ord Street, West Perth, Western Australia 6005.
2. I am a graduate of the Saint Petersburg Mining University in 1986 with a Master’s Degree in Geology.
3. I am a Member of Australian Institute of Geoscientists (AIG) and registered as a Professional Geoscientist, Certificate #2248. I have worked as a Geologist for a total of 31 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Development and reporting of Mineral Resource models
   - Review and report quality assurance and quality control procedures and protocols, site visits and laboratory inspections
   - Principal Geologist on a number of Mineral Resource studies and development of block models in the uranium industry in Africa, Australia and Asia.
4. I have read the definition of ‘Qualified Person’ set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a ‘qualified person’ for the purposes of NI 43-101.
5. I have visited the DASA Project in March-April 2017.
7. I am independent of the Issuer applying the test set out in Section 1.5.(4) of NI 43-101.
8. I have not been involved in any previous Technical Report on the DASA uranium Project.
10. To the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated this 30 June 2018

Dmitry Pertel
CSA Global Principal Geologist
Certificate of Qualified Person – Maxim Seredkin

I, Maxim Seredkin, Geologist, as an author of this report entitled NI 43-101 Technical Report for the DASA Uranium Project, Niger, prepared for Global Atomic Corporation and dated 30 June 2018, do hereby certify that:

1. I am a Principal Geologist with CSA Global Pty Ltd. My office address is Level 2, 3 Ord Street, West Perth, Western Australia 6005.
2. I am a professional geologist having graduated with a BSc (Geology), 1997, from the Moscow State University, Russia and a PhD from the Moscow State University, Russia, majoring in petrology and volcanology in 2001.
3. I am a Fellow of Australasian Institute of Mining and Metallurgy (FAusIMM), and Member of the Australian Institute of Geoscientists (MAIG), expert of NAEN. I have worked as a geologist for a total of 19 years since my graduation from university including 11 years at uranium deposits in Kazakhstan, Russia and Africa.
4. I have read the definition of ‘Qualified Person’ set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a ‘Qualified Person’ for the purposes of NI 43-101.
5. I have not visited the DASA Project.
6. I am responsible for all of preparation of Item Numbers: 1 (subsections: 2, 3, 4), 4, 5, 6, 7, 8, 9, 10, 11 and 12 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5.(4) of NI 43-101.
8. I have not been involved in any previous Technical Report on the DASA uranium Project.
10. To the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated this 30 June 2018

Dr Maxim Seredkin
CSA Global Principal Geologist