



GLOBAL ATOMIC FUELS CORPORATION



ENVIRONMENTAL AND SOCIAL IMPACT STUDY "ADRAR EMOLES PROJECT"

FINAL REPORT

November 2020

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ABBREVIATIONS AND ACRONYMS

WB	: World Bank
BNEE	: Bureau National d’Evaluation Environnementale [National Office for Environmental Review]
BEEEI	: Bureau d’Evaluation Environnementale et des Etudes d’Impact [Office of Environmental Review and Impact Assessment]
CNEDD	: Conseil National de l’Environnement pour un Développement Durable [National Council for the Environment for Sustainable Development]
CNRP	: Centre National de Radioprotection [National Centre for Radiation Protection]
CSI	: Centre de Santé Intégré [Integrated Health Centre]
DGDD/NE	: Direction Générale du Développement Durable et des Normes Environnementales [Directorate-General for Sustainable Development and Environmental Standards]
DGSU/ACV	: Direction Générale de la Salubrité Urbaine et de l’Amélioration du Cadre de Vie [Directorate-General for Urban Health and Improvement of Living Conditions]
DRE/DD	: Direction Régionale de l’Environnement et du Développement Durable [Regional Directorate for the Environment and Sustainable Development]
EDII	: Etablissement Dangereux, Insalubre et Incommode [Unsafe, unsanitary and unsuitable establishment]
ESIA	: Environmental and Social Impact Assessment
PPE	: Personal Protective Equipment
EDF	: European Development Fund
INS	: Institut National des Statistique du Niger [Nigerien National Institute of Statistics]
MM	: Ministère des Mines [Ministry of Mines]
MP	: Ministère du Pétrole [Ministry of Oil]
STD	: Sexually Transmitted Disease
ME/SU/DD	: Ministère de l’Environnement, de la Salubrité Urbaine et du Développement Durable [Ministry of the Environment, Urban Health and Sustainable Development]
NGO	: Non-Governmental Organization
PAN-LCD/GRN	: Programme d’action national de lutte contre la désertification et de gestion des ressources naturelles [National action plan for combating desertification and managing natural resources]
PDC	: Plan de Développement Communal [Communal Development Plan]
PNEDD	: Plan National de l’Environnement pour un Développement Durable [National Plan for the Environment and Sustainable Development]
ESMP	: Environmental and Social Management Plan
PSE	: Plan de Surveillance et de suivi de l’Environnement [Environmental Surveillance and Monitoring Plan]
pH	: Potential of Hydrogen
ESIAR	: Environmental and Social Impact Assessment Report
RGP/H	: Recensement Général de la Population et de l’Habitat [General Census of Population and Housing]
SNASEM	: Stratégie National d’Accès aux Services Energétiques Modernes [National Strategy for Access to Modern Energy Services]
SDDCI	: Stratégie de Développement Durable et de Croissance Inclusive [Strategy for Sustainable Development and Inclusive Growth] - Niger 2035
IFC	: International Finance Corporation
TORs	: Terms of Reference

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NON-TECHNICAL SUMMARY

The following non-technical summary presents the main aspects of this Environmental and Social Impact Assessment (ESIA). It allows the reader to dispense with a number of documents and helps non-specialists better understand all of the issues raised by this ESIA. This summary will focus on the following topics:

The Proponent

Global Atomic Fuels Corporation is a company governed by Canadian law that holds six mining exploration permits for uranium and related substances. It has been present in Niger since 2007, where it conducts mining exploration activities in the Agadez region from its national office in Niamey and from its liaison office in Agadez.

The company's staff is essentially made up of Nigeriens trained in Earth Sciences (geology, prospecting, geophysics, hydrology, hydrogeology) and in the fields of logistics, accounting, labour law, etc. Throughout its years in Niger, the company has employed around fifty people under permanent contracts and several dozen under temporary contracts. The company's technical partners are mainly local companies providing services in the fields of drilling, geophysics, mechanical sample preparation, analyses, consulting, transport, transit, safety, audits, etc.

The concept of corporate social responsibility (CSR) is increasingly a concern in all development projects, particularly mining projects. Accordingly, Global Atomic Fuels Corporation has contributed significantly to local development since its installation in the Agadez region, by funding actions that benefit the people living around its exploration sites. The funds invested in these actions (construction and renovation of water supply infrastructures, food donations) in several rural communes, villages and nomadic camps amount to several tens of millions of CFA Francs. Global Atomic Fuels Corporation has also adopted seven principles representing its main values and responsibilities. These seven principles are:

- ✓ Social responsibility and respect for diversity,
- ✓ Responsible exploration and operation,
- ✓ Leadership,
- ✓ People are our true wealth,
- ✓ Ongoing staff training and safe and decent jobs,
- ✓ Environmental responsibility and innovation,
- ✓ Integrity and transparency.

Description of the Initial State of the Site and its Environment

The description of the initial state of the site and its environment focused on the following aspects:

- Location of the mining site

According to the site location map, over 90% of the proposed mining site is located in the urban commune of Tchirozérine. The site is accessible via paved albeit degraded Highway RN25 from Agadez to the village of Tagaza. Then, about two kilometres from the village of Tagaza, there is an intersection leading east to the Global Atomic Corporation Fuels camp after about eight kilometres. The site perimeter is bordered to the east by the communes of Gougaram and Arlit, to the west by the Urban Commune of Agadez, to the south by the communes of Dabaga and Tabelote and to the north by the commune of In-Gall.

- Perimeter of the impact assessment

To better understand the environmental impacts of the project, the data collection and analysis took account of the project's direct area of influence as well as the local and regional levels. The delineation of the impact areas took account of the environmental and social challenges associated with the project and the potential project impacts in relation to their areal influence. On this basis, the following areas were delineated:

- ✓ The direct area of influence corresponds to the area in which the mine's main infrastructures are concentrated. This area is dedicated to specific mining activities and constitutes a permanent danger zone with controlled access. It covers the vicinity of the new facilities and infrastructures to be built as part of the operation of the deposit. This is the area that will be most affected by direct environmental and social impacts during the construction, operating and rehabilitation phases. However, based on uranium mining practices and standards worldwide, it is considered that the area of influence lies within a radius of 7 km around the deposit. The perimeter of this area is considered to be the safety perimeter.
- ✓ The extended area of influence corresponds to a radius of 15 km around the deposit and takes into account the localities of Temilt, Egatarak and Tagaza.
- ✓ The area of regional influence primarily covers the localities of Tchirozérine, Arlit, Gougaram, Dabaga, Tabelote and In-Gall, which are the communes bordering the site. This area also includes the town and regional administrative centre of Agadez, whose inhabitants will be affected by the project's socio-economic impacts.

Methodological Approach

The methodological approach followed to determine the initial state of the environment in the project area consisted of the following steps:

- ✓ Development of data collection tools,
- ✓ Data collection and interviews,
- ✓ Field trips.

Physical Environment

- *Climate*

The Adrar Emoles 3 permit area is located in the desert climate regime of the Sahel-Saharan part of the Republic of Niger. This area is conducive to transhumance stockbreeding and is characterized by three seasons:

- ✓ A short rainy season lasting a maximum of two months (from July to August with maximum rainfall in August)
- ✓ A cold dry season of four to five months (from September-October to February);
- ✓ A long, dry and hot season of five to six months (February-March, April, May and June).

- *Rainfall and temperature*

The rainfall data for the past twenty years and the average monthly rainfall for 2019, obtained from the Direction de la Météorologie Nationale [Nigerien National Weather Office] for the Tchirozérine station, shows that in five of these twenty years less than 100 mm of rainfall was recorded, and in two of these twenty years the rainfall exceeded 300 mm. Thus, based on the annual rainfall data for the past twenty years, there is an average monthly rainfall of 9.15 mm, with the total annual rainfall recorded over the observation period ranging from 77.5 to 332.5 mm, for an average of 109.8 mm. The rainy season, which sees significant rainfall, lasts approximately two months, from July to August.

The project is located in the desert climate zone of the Sahara and is characterized by a hot and dry climate. Temperatures range between 31° and +50°C in the hot season and between 0° and 20°C in the cold season. In this zone, the average annual temperature is 37°C; the average annual maximum temperature is 45°C and the average annual minimum temperature is 11.13°C.

- *Wind*

The wind rose developed by the Imouraren project located approximately 30 km from the project (nearest weather station) shows that the “Adrar Emoles” permits are located in a zone in which there is little wind. It can be seen that the prevailing winds, which represent 12% of the wind, are those from the northeast followed by those from the north-northeast. These are the Harmattan winds.

- *Relief*

The regional relief in the permit area is marked by alternating outcrops and sandy plains in a desert landscape, traversed in places by koris with an average altitude of approximately 500 metres. The highest altitudes are found along the Air Mountains (where most of the waterways are sourced) and to the south of the permit area. The lowest altitudes are found in the Isouwarwar Valley, with an average of 460 metres. The deposit is located in a low altitude zone (470 m) in the west-south-west part of the permit area.

- *Soils*

The project area is located in a pedological context belonging to Quaternary deposits comprised of:

- ✓ Sand: these deposits are the result of water erosion in the Air Mountains and wind erosion in the Ténéré.
- ✓ Gravel: these are mainly the result of erosion in the Air Mountains. These deposits are generally found in kori beds.
- ✓ Detrital clay: these clays correspond in part to fine particles washed down by the koris and also result from erosion of Irhazer shale.

- *Geology*

Niger’s geological structure is that of a rigid peneplain which has not undergone any significant marine transgression since the Paleozoic Era. The geological bedrock is therefore essentially made up of a predominately granite Precambrian basement and of continental sandstone and clay sediments deposited from the lower Carboniferous to the Tertiary periods. This bedrock frequently disappears beneath the Quaternary alluviums of fossil valleys.

The basement is apparent in the far southwestern region of the country (Liptako Gourma), in the east (Damagaram-Mounio and south Maradi), in the Aïr Mountains and along the Djado Plateau. It consists of more or less metamorphized Precambrian sediments and intrusive granites that form eroded mountain ranges (Damagaram) or rejuvenated ones (Aïr). Recent volcanic activity with basaltic flows occurred in the Aïr at the end of the Tertiary and Quaternary periods.

The geology of the Agadez region is characterized by two large formations:

- A basement (the crystalline Aïr Mountains) in the eastern part of the region;
- A sedimentary basin (Tim Mersoï Basin) which roughly covers the western area of the region.

The basement known as the Aïr Mountains is part of the extensive Hoggar Mountain formation, of which it is an entity as is the Adrar des Iforas, its western counterpart. It is made up of Precambrian-era cristallophyllian bedrock and granite intrusions. The various volcanic phenomena and tectonic movements have led to a model whose characteristics result from the lithological nature of the land.

From a structural point of view, the Aïr Mountains and the Tim Mersoï Basin have been affected by tectonic deformations, with the main ones running NE, NNE-SSW, and NE-SW. It should be noted that the Arlit flexure-fault (trending N-S) is the major regional deformation visible from the south of Agadez to In Azawa in Algeria.

The structure of the Tim Mersoï Basin follows three major fault and/or flexure lines:

- ✓ Submeridian deformations: Arlit-In Assaouas fault and Tchizakaraten lineament
- ✓ N30-40 formations: Madaouela flexure, Adrar-Emoles flexure and Aouderer ridge
- ✓ N70-80 deformations: Ogba tectonic unit, Aguijir fault, Mehrérout fault and Azouza fault

The lithostratigraphic column of the Tim Mersoï basin is comprised of seven distinct series, namely: the Térada series, the Tagora series, the Izegouandane series, the Aguelal series (0-67 m); the Goufat series (0-120 m), the Wagadi series (0-176 m) and the Dabla series.

- *Hydrogeology*

There are four main aquifers in the region:

- ✓ The Tchirozérine 2 aquifer, dating to the Jurassic Period, which is a sandstone formation with uraniferous mineralizations;
- ✓ The Telaua aquifer, dating from the Triassic to the Jurassic Periods;
- ✓ The Tarat aquifer;
- ✓ The Guézouman aquifer.

The hydrogeological bodies in the permit area are mainly metamorphic-plutonic formations, Nubian sandstone-type formations and detrital formations (sandstone) (Bureau de recherches géologiques et minières [Office of Geological and Mining Research] ((BRGM)), 2016). It should be noted that the aquifer recharge rate in the project area is less than 5 mm/year.

- *Hydrographic network*

The project area does not have any permanent waterways. It nevertheless has a dense hydrographic network with large koris that drain off the rainwater. The largest of these koris are: Tagaza, Isouwarwar and Elagozan. The various waterways are sourced in the Air Mountains. The waters flow predominantly east to west.

The permit is located in the Agatara watershed which covers an area of approximately 1,170 km². However, the latter has two distinct subwatersheds: Isouwarwar and Elagozan-Tagaza.

The 292 km² Isouwarwar subwatershed (which is entirely within the Adrar Emoles 3 permit area) drains most of the water from the permit area to Agatarak which is directly connected to Sikiret. The 188 km² Elagozan-Tagaza subwatershed, part of which overlaps the Adrar Emoles 3 permit area, also drains a large amount of water to Agatara. It should be noted that the deposit is not in any of these Agatara subwatersheds.

- *Air quality*

The current sources of airborne emissions in the area are natural ones. This is windblown dust arising from the topsoil of the landscape and desert climate. Naturally dusty conditions prevail in the region due to the soil type, desert climate, strong and hot winds, and relatively flat topography. Anthropogenic emissions in the area are related to research work and uranium mining operations.

- *Noise*

The project area is free of noise pollution because the only operating industrial unit (SONICAR) is sufficiently far away to keep its activities from impacting the Adrar Emoles 3 exploration permit area. The main sources of noise at the site are therefore natural ones.

- *Radioactivity*

Establishing an initial radiological status prior to starting operations is essential to understanding the likely impact of uranium (U) mining on the natural and human environment. Its main purpose is to determine the current radiological level (baseline or initial radiological level) of the future mining site and its surroundings before starting to mine the uranium deposit. To do this, the following measurements were taken on the site and its surroundings in order to create a database

- ✓ Measurements of external exposure dose rates at several points in the zone of the uranium deposit and surrounding area as well as in two perpendicular directions running approximately through the centre of this area
- ✓ Measurements of surface sand samples taken at certain points
- ✓ Measurements of water samples from all supply sources (wells and boreholes) in the villages and camps within a 20 km radius around the uranium deposit

The resulting database would facilitate communication between the mine operator and its partners and would above all create and maintain a climate of trust and total adherence between them, which is key to the development of its activities.

Biological Environment

Field observations and surveys have made it possible to classify the vegetation in the project area according to the locations: along the koris where it is dense and varied, on the outcrops around the wadis or in a drainage area. The main woody species encountered are the following: *Acacia tortilis*, *Acacia erhembergiana*, *Balanites aegyptiaca*, *Zizyphus mauritiana*, *Maerua crassifolia*, *Boscia senegalensis*, *Leptadenia pyrotechnica*, *Salvadora persica*, *Acacia raddiana*.

According to the Direction Régionale de l'Environnement, de la Salubrité Urbaine et du Développement Durable [Regional Directorate for the Environment, Urban Health and Sustainable Development (DRE/SU/DD)], the following forest formations can be found in the Agadez region:

- ✓ 8,001,050 ha of classified State-owned forest;
- ✓ 1,050 ha of classified forests, now almost completely destroyed;
- ✓ 8,000,000 ha of wildlife reserves; the largest of these is the Réserve Naturelle Nationale du Ténéré [Ténéré National Nature Reserve (RNNAT)], which has been declared at-risk.

The herbaceous species in this area are mainly *Panicum turgidum* which is very dense in some places, *Cymbocogon shoenanthus*, *Maretia canescens*, *Schowra thebaica*, *Cynodon dactylon*, *Aristida sp.*, *Cassia tora* and *Brachiara spp.* The woody and herbaceous species essentially make up the food base for the livestock in the area. They are also used as a source of energy by the local communities, as well as for traditional pharmacopoeia and craftsmanship (sculpture and frames for traditional huts).

The 2012 survey conducted as part of the **COGERAT** project helped provide an estimate of the various wildlife populations. More specifically, the area is host to the following species:

✓ **Mammals:**

Several species of mammals are present in the area. These are mainly dorcas gazelles (*Gazella dorcas dorcas*), dama gazelles, also known as “biches Robert” [“Robert does”] (*Gazella dama dama*), primates such as olive baboons (*Papio cynocephalus*) and patas or red monkeys (*Erythrocebus patas*), common jackals (*Canis aureus*), palm squirrels (*Epixerus ebii*), fennecs (*Fennecus zerda*) and hares (*Lepus crawshayi*).

✓ **Birds:**

There are three groups of birds in the area:

- Sahelian birds: These birds mainly live in the most heavily-wooded habitats. These are grey woodpeckers (*Mesopicus goertae*), Vieillot's barbets (*Lybius vieilloti*), golden sparrows (*Passer luteus*), collared doves (*Streptopelia roseogrisea*), and common bulbuls (*Pycnonotus barbatus*) with much more extensive distribution areas.
- Sahelo-Saharan birds: This group includes Nubian bustards (*Neotis nuba*), dark chanting goshawks (*Melierax metabates*), and spotted sandgrouse (*Pterocles senegallus*).
- Saharo-mountain birds: This group is found mostly in the wadi and is mainly composed of Lichtenstein's sandgrouse (*Pterocles lichtensteinii*), white-crowned wheatears (*Oenanthe leucopyga*) and blackstarts (*Oenanthe melanura*).

✓ **Reptiles:**

Reptiles include horned vipers (*Cerastes*), spitting cobras (*Naja nigricollis*), sand boas (*Erycinae*), sand racers (*Psammophis schokari*), spiny-tailed lizards (*Uromastrix aethinurus*), desert tortoises (*Goechelane sulcata*) and desert monitors (*Varanus griseus*).

- ✓ **Invertebrates:** The most commonly-found invertebrates in the area are beetles, crickets, butterflies, ticks, caterpillars, ants, and preying mantis, as well as dangerous desert scorpions.

Human Environment

The population density in the project area is less than one inhabitant/km², with more than 70% of the population living in the administrative centres of the communes, departments and the region. The total population of the two communes, namely Tchirozérine and Dannel, is estimated to be 116,630 inhabitants, with, respectively, 80,000 inhabitants in the urban commune of Tchirozérine and 36,630 in that of Dannel.

This population is characterized by its large number of young people. According to the 2017 PDC for Tchirozérine, a quarter of the population of Tchirozérine is between 0 and 14 years of age and 36% is between 14 and 40 years of age. This population of Tuareg origin is made up of several tribes belonging to the Kel Ewey Confederation.

- *Social and land organization*

At the local level, social organization reveals two (2) distinct types of authority:

- Modern authority exercised by town councils headed by mayors
- Traditional authority exercised by traditional chiefs and religious leaders for conflict resolution

From a customary standpoint, governance is ensured by the traditional leadership which in the inhabitants' opinion is the institution that is most appropriate and closest to the people and to which they refer first for advice, arbitration and settlement of all disputes.

Traditionally, the land belongs to the village's founding family and is acquired by the households through inheritance, donation or extended families. However, the State is entitled to expropriate land if a public interest has been established, to regulate land use for urban or rural development needs and, when it is in the public interest, to establish easements.

- *Education and healthcare*

With regard to education, these two communes offer the following schools:

- ✓ Dannel: Six collèges d'enseignement général [middle schools dispensing general education programs (CEGs)] and 30 elementary schools with a total enrolment of 984 elementary school students comprising 536 boys and 448 girls.
- ✓ Tchirozérine: One collège d'enseignement secondaire [secondary school (CES)] and three CEGs with 1,071 students. This commune also has 91 elementary schools of which 67 are "conventional" schools; six "community" schools; two "bilingual" schools (French-Tamasheq); 15 Franco-Arabic schools and a private school. These schools have a total enrolment of 7,801 students, with 3,502 girls (i.e., 45% of the total) and 4,299 boys. With regard to literacy, the commune has 34 functional centres for a total of 850 learners. These centres operate with the support of certain partners such as UNICEF, AFRICAIRE, etc.

In terms of vocational training opportunities for young people, according to the Direction Régionale des Enseignements Professionnels et Techniques [Regional Directorate of Vocational and Technical Education (DREP/T)], the Agadez region has six information, career guidance and support platforms for young people, of which three are long-standing ones (Agadez, Arlit and Tchirozérine) and three were more recently-opened (Aderbissinat, Bilma and In-Gall).

With regard to healthcare, the facilities identified in the two communes are:

- ✓ Tchirozérine: The health district of Tchirozérine is based in Agadez. It has a hospital run by SONICHAR, a functional CSI, 13 functional health clinics, a public pharmacy, and a private pharmaceutical dispensary in the commune's administrative centre.
- ✓ Dannet: One CSI, 12 health clinics and three healthcare facilities with modern water supply connections. As can be seen, the healthcare services in the two communes are considered limited by the local authorities, with a lack of treatment products in the majority of cases.

The types of recurring illnesses seen at the CSIs in Tchirozérine and RTA (Dannet) are measles, respiratory infections (cough and colds, pneumonia, tuberculosis), vomiting, skin diseases, chickenpox, vector-borne diseases such as malaria and yellow fever, and food/water-borne diseases such as diarrhoea.

- *Water supply infrastructure*

The water supply system available to the people living in the area is based mainly on small-scale drinking water sources (boreholes) and cemented wells.

For human and animal consumption, the situation of the water supply infrastructures is as follows:

- ✓ Tchirozérine Commune has over 150 water extraction points in all categories. Dannet Commune has 83 équivalents points d'eau modernes [equivalent modern water extraction points (EPEMs)]: cemented wells - [puits cimentés (PCs)], modern wells - [puits modernes (PMEs)], small-scale drinking water extraction systems [adductions d'eau potable (AEPs)] and pastoral pumping stations [Stations de Pompage Pastorale (SPPs)].

According to the local authorities, the coverage in both communes in terms of modern water extraction points remains limited (30% according to the mayor of Tchirozérine).

- *Socioeconomic activities*
- ✓ **Crop farming** is an activity that is carried out by a small number of men and women in both communes in the project intervention area. It is carried out in the main valleys of Elagozan, Inolamane, Mizzene, Oufoud, Sikiret and Issakanan. It is irrigation-based and takes place practically all year round. The market gardens are laid out on both sides of the koris. The exploitable potential is estimated at approximately 382 ha whereas the surface areas actually farmed are estimated at 22 ha for market gardening, 4 ha for fruit trees and 90 ha for other uses.
- ✓ **Stockbreeding** is the main economic activity in the project area, which is located in a pastoral area. It is carried out by all sectors of the population, irrespective of ethnic group, gender or social category. In general, family stock farming involves several species of animals: goats, sheep, donkeys, and camels. Cows are not kept everywhere, particularly in the mountainous areas of the commune. Stock farming remains highly vulnerable to climate hazards. It is still highly extensive and contemplative. Stock farmers have their traditional lands with which they have almost emotional relationships and to which they return at certain times of the year. Animal health issues in the communes of Tchirozérine and Dannet are characterized by respiratory infections, digestive and urogenital disorders, mastitis, traumatic wounds, internal and external parasitosis, pasteurellosis, foot-and-mouth disease, anthrax, blackleg, sheep pox/chickenpox and diarrhoea. However, the most critical and recurring problems for stock farmers are the losses caused by jackal predation of small ruminants and by certain diseases that the farmers attribute to the ingestion of *Prosopis juliflora* pods.
- ✓ *Trade, roads, and means of communication*

In the project area, trade is based on small-scale business activities, in particular the sale of products derived from livestock farming, market gardening and logging (woodcutting, charcoal production, etc.), and the sale of basic necessities. Each of the communes in the project area has a permanent market in its administrative centre. In addition to the larger markets, many villages host several weekly farmers' markets. The inhabitants of the communes regularly shop at markets in other communes depending on their accessibility.

The road infrastructures in the project area are structured around the Agadez-Arlit Highway (RN25-RTA) that runs between Agadez and Arlit, as well as two gravel roads and some undeveloped farm tracks enabling trade and other necessities. In this area, the road infrastructure network is relatively underdeveloped. The fleet is essentially made up of small passenger transport minibuses commonly called "J-Fives", old Land Rovers, and vans called "*A-kori kouras*" that run between the urban centres and the rural markets and are used to transport goods and animals. Motorcycle taxis called "*kabou-kabous*" are now becoming the most popular means of transport for young people due to their speed, particularly over the nearly impassable trails. Animals (donkeys and camels) are still used as a means of transport. However, they are increasingly being replaced by carts.

Regarding communications, a large part of the project area is covered by cell phone operator networks. The main operators in terms of coverage are AIRTEL, ORANGE and NIGER TELECOMS. The telephone operator MOOV provides service mainly in urban areas. National media reception (TELE SAHEL and VOIX DU SAHEL) is available within a wide radius around the communes' administrative centres.

✓ *Tourism, cultural and artisanal heritage:*

Tourism and culture in the project area offer a rich and varied local archaeological and cultural potential that is conducive to a very wide range of tourist services: travel agents, guides, and drivers. For example, Tchirozérine has the largest number of travel agents in the Agadez region. Artisanal work is mainly utilitarian and is rarely developed for sale because there are few or no markets for it. It is mostly carried out by men and women who are blacksmiths, tanners, leatherworkers, etc. The tourism and cultural potential of the communes of Tchirozérine and Dannel is: [sic: no further text]

Political, Institutional and Legal Framework

The Constitution of the 7th Republic of Niger, which was adopted on 25 November 2010, sets out in its Article 37 that "National and international companies shall comply with the legislation in force in environmental matters. They are required to protect human health and contribute to safeguarding and improving the environment", and in its Article 149: "The exploitation and management of natural resources and subsoils shall be carried out transparently and take into account the protection of the environment and of cultural heritage as well as the preservation of the interests of present and future generations". Law No. 2018-28 of 14 May 2018 establishing the fundamental principles of environmental review in Niger was adopted to enact the provisions set out in Articles 37 and 149 of the Constitution. This law repeals Ordinance No. 97-001 of 10 January 1997 on the institutionalization of impact assessments as well as the provisions to the contrary contained in Law No. 98-56 of 29 December 1998 on the framework law on environmental management.

This chapter will therefore summarize the national legal supputations, international legal obligations and international guidelines as well as the strategies and policies implemented in the context of this mining project.

- *With regard to the political framework, the main provisions include:*
 - ✓ The National Policy on the Environment and Sustainable Development, adopted by Decree No. 2016-522/PRN/ME/DD of 28 September 2016;
 - ✓ The National Plan for the Environment and Sustainable Development (PNEDD), drawn up in 1998 and serving as Agenda 21 for Niger;
 - ✓ The 2017-2021 Plan de Développement Economique et Social [Economic and Social Development Plan (PDES)];
 - ✓ The 2008-2012 Stratégie de Développement Minier [Strategic Plan for Mining Development (SDM)];
 - ✓ The 2001 Mining Policy Statement;
 - ✓ The National Social Protection Policy adopted in 2011;
 - ✓ Etc.

- *With regard to the institutional framework, the main institutions include:*
 - ✓ The National Council for the Environment for Sustainable Development, created by Decree No. 96-004/PM of 9 January 1996, as amended and supplemented by Decree No. 2000-272/PRN/PM of 4 August 2000;
 - ✓ The Ministry of the Environment;
 - ✓ The Ministry of Mines;
 - ✓ Initiative pour la Transparence dans les Industries Extractives [Initiative for Transparency in the Mining Industry (ITIE)];
 - ✓ The Haute Autorité Nigérienne à l’Energie Atomique [High Authority for Atomic Energy in Niger (HANEA)];
 - ✓ The Autorité de Régulation et de Sûreté Nucléaire [Nuclear Regulatory and Safety Authority (ARSN)];
 - ✓ Civil society organizations: the Réseau des Organisations pour la Transparence et l’Analyse Budgétaire [Network of Organizations for Transparency and Budget Analysis (ROTAB)]; Publish What You Pay Niger; the Association Nigérienne de Lutte contre la Corruption [Nigerien Association for the Fight Against Corruption (ANLC/TI)] - Nigerien Section for International Transparency, created in 2001 and recognized by Order No. 039/MI/AT/ DGAPJ/DLP of 2 February 2001; the Groupe de Réflexion sur les Industries Extractives au Niger [Group for Reflection on Mining Industries in Niger (GREN)], created in 2006; the Association des Femmes du Secteur des Industries Extractives du Niger [Nigerien Association of Women in the Mining Industry (AFSIEN)], created in October 2014; etc.

- *With regard to the legal framework, the main provisions include:*
 - ✓ The Mining Code (Ordinance No. 93-16 of 2 March 1993 supplemented by Ordinance No. 99-48 of 5 November 1999, as amended by Law No. 2006-26 of 9 August 2006);
 - ✓ Law No. 2018-28 of 14 May 2018;
 - ✓ Decree No. 2019-027/PRN/MESU/DD of 11 January 2019;
 - ✓ The Environmental Management Code (Law No. 98-56 of 29 December 1998);
 - ✓ Ordinance No. 97-001 of 10 January 1997;
 - ✓ Decree No. 2000-397/PRN/ME/LCD of 20 October 2000;
 - ✓ Etc.

Environmental and Social Impact Assessment

- *General methodology used in the assessment*

This project impact assessment was conducted by a multidisciplinary team that brought together environmental experts with significant experience in analyzing the impacts of large-scale projects on the environment. The main steps in the project impact assessment were as follows:

- ✓ Project description
 - ✓ Identification of the sources of impact
 - ✓ Identification of the Valued Environmental and Social Components (VESC)s
 - ✓ Creation of an interrelationship grid
 - ✓ Identification, description, analysis and assessment of the impacts
- Identification of the sources of impact
 - ✓ “Sources of impact” are the elements of the project (structures, work or activities) that are likely to generate an impact on the valued environmental and social components in the area under study. The project’s sources of impact were identified according to the project phases, namely, development and construction, operation, and closure.
- Identification of the environmental components likely to be affected

The valued environmental and social components (VESC)s that are likely to be influenced by the project are:

- ✓ Components of the physical environment likely to be affected:
 - Ambient air quality: Physicochemical properties of the air, including dust content
 - Soils: Characteristics of the surface deposits and vulnerability of the soils to erosion
 - Landscape:
 - Surface water: Physicochemical properties of the surface water; hydrological regime
 - Groundwater: Characteristics of the groundwater; amount
 - Ambient noise and vibration: Characteristics of the ambient noise level
- ✓ *Components of the biological environment likely to be affected:*
 - Vegetation: Land plant groups, including species with special status.
 - Wildlife: All land mammals, reptiles, birds and their habitats including species with special status, as well as biodiversity
- ✓ *Components of the human environment likely to be affected:*
 - Jobs and income
 - Local, regional and national economy
 - Safety and health;
 - Pastoral activities
 - Archaeological and cultural heritage;
 - Population and community changes or quality of life.

- Methodology used to assess the environmental and social impacts

After the likely impacts had been identified, the impact assessment was conducted. The methodology used in the impact assessment was based on the following parameters:

- ✓ Nature of the impact
- ✓ Intensity
- ✓ Scope and duration
- ✓ Significance or magnitude of the impact

- Project impact analysis

Although it focused on the mining and processing phase which had more significant impacts, the pooled analyses of the impacts of the three project phases revealed the following results:

- ✓ Impacts on the Biophysical Environment
 - **Air quality:** *The air quality impact is negative and high-intensity. It will be local in scope and long-term; therefore, this is a major impact.*
 - **Soil:** *The overall soil impact will be negative, moderate in intensity, local in scope and long-term. Its overall significance is considered moderate.*
 - **Ambient noise and vibrations:** *The noise and vibrations generated by the mining activities will have a localized impact with moderate intensity. The impact will be of moderate duration because it will be felt intermittently over time. The overall significance will therefore be moderate.*
 - **Landscape:** *The overall impact on the landscape will be negative, moderate in intensity, local in scope and long-term. Its overall significance is considered moderate.*
 - **Groundwater:** *The groundwater impact is considered high-intensity, local in scope and long-term. The value of the “water” component in the operating phase is considered high. The relative significance of the impact will therefore be major.*
 - **Surface water:** *The impact is considered to be low-intensity, local in scope and long-term. The relative significance of the impact on the surface water flow regime and on the water quality will therefore be moderate.*
 - **Vegetation:** *The intensity of the impact is considered moderate, local in scope and long-term. The value of the “vegetation” component is considered high. The relative significance of the impact on the vegetation will therefore be major.*
 - **Wildlife:** *The impact of the project on wildlife in the operating phase will be moderate in intensity, local in scope and long-term. Its overall significance will be moderate.*
- Impacts on the human environment:
 - ✓ **Jobs and income:** *The impact of the project on the economy will be positive, moderate in intensity, long-term and regional in scope. The overall significance of the impact will therefore be major.*
 - ✓ **Local, regional and national economy:** *The impact of the project on the economy will be positive, moderate in intensity, long-term and regional in scope. The overall significance of the impact will therefore be major.*
 - ✓ **Safety and health:** *The impact of the project on the “health and safety” component will be negative, moderate in intensity, local in scope and of moderate duration. The value is considered high. In short, the impact on health and safety will therefore be moderately significant.*

- ✓ **Archaeological and cultural heritage:** *The impact of the project on archaeological and cultural heritage will be low-intensity as, other than a few cemeteries, no major site has been found in the project area. The impact will be short-term and local in scope. The overall significance of the impact will therefore be minor.*
- ✓ **Population and community changes:** *These negative and positive impacts will be moderate in intensity, local in scope and long-term. The significance will therefore be moderate.*

Environmental and Social Management Plan (ESMP)

The various measures to improve, mitigate and/or eliminate the impacts in the three phases of construction, operation and closure (see ESIA document), as well as the implementation of other programs, have made it possible to estimate the costs of the ESMP.

The overall cost of implementing the ESMP is estimated at **four hundred fifty-six million (456,000,000) CFA Francs**

I. INTRODUCTION

A Sahelian country with a surface area of 1,267,000 km² and an estimated population of approximately 20 million inhabitants (INS, 2018), Niger is faced with multiple challenges in terms of socio-economic development. To address these challenges, several strategic documents have been developed and implemented. These include, in particular, the Nigerien Strategy for Sustainable Development and Inclusive Growth (SDDCI) for 2035, the PDES (2017-2021) the SDM, the Mining Policy adopted in 2020, etc.

It is in this context that Global Atomic Fuels Corporation (GAFC) is planning to mine the uranium deposit it discovered in the area of its “Adrar Emoles 3” exploration permit. Moreover, Nigerien legislation, and in particular Law No. 98-56 of 29 December 1998 on the framework law on environmental management and Law No. 2018-28 of 14 May 2018 setting out the fundamental principles of environmental review in Niger, requires the proponent of an activity, development project or program that, due to its implementation, may have an impact on the natural and human environment, to conduct an Environmental and Social Impact Assessment (ESIA) to be submitted to the Minister of the Environment.

Global Atomic Fuels Corporation is a Canadian company that has conducted mining exploration activities in Niger since 2007. It is planning to undertake mining operations on the uranium deposit it discovered in the Adrar Emoles 3 exploration permit area. This uranium deposit is located along the Agadez-Arlit highway and lies approximately 60 km north-northwest of the town of Tchirozérine, which hosts the Société Nigérienne du Charbon facilities in Anou-Araren. This location roughly corresponds to an area halfway between the town of Agadez and the mining town of Arlit. The objectives of the operation of this deposit are:

- ✓ To set up operating facilities and other temporary infrastructures such as access roads, laydown yards for machines and other equipment, drinking and industrial water sources, electricity network connections;
- ✓ To construct the base camp, i.e., staff accommodation, administrative offices, technical areas, sanitary facilities, etc.;
- ✓ To set up permanent facilities and infrastructures (crushers, processing plants, dykes, mine tailings facilities, waste rock and ore stockpiles, water treatment units, machinery and equipment parking lots or garages) as well as ancillary facilities such as input reception areas and facilities for handling and storing various products and equipment, etc.;
- ✓ To produce the uranate and pack it in drums prior to export.

It can be seen that to achieve these objectives, GAFC must undertake activities that will seriously impact the environment as a whole. Therefore, pursuant to the environmental management laws and regulations in force in Niger, GAFC was required to conduct an ESIA.

The methodological approach used included the following steps: Development of data collection tools (interview guide, field observation guide, stakeholder list ((institutions, resource persons, advocacy groups, communities, etc.)), list of quantitative data to be collected); data collection and meetings; field trips; data analysis and interpretation, and the drafting of this report structured around the following points:

- Full description of the project,
- Analysis of the initial state of the site and its environment,
- Overview of the political, legal and institutional framework,
- Assessment of likely changes,
- Analysis of alternatives,
- Impact mitigation and/or improvement measures
- Environmental and social management plan,

- Public consultation plan,
- Conclusion.

II FULL DESCRIPTION OF THE PROJECT

II.1 **The Proponent**

Global Atomic Fuels Corporation is a company governed by Canadian law that holds six mining exploration permits for uranium and related substances. It has been present in Niger since 2007, where it conducts mining exploration activities in the Agadez region from its national office in Niamey and from its liaison office in Agadez.

In accordance with the provisions of the Mining Code and the Acte Uniforme relatif aux droits des Sociétés et du Groupement d'Intérêt Economique [Uniform Act on the rights of Companies and Economic Interest Groups (GIEs)] of the Traité de l'Organisation pour l'Harmonisation du Droit des Affaires en Afrique [Treaty on the Organization for the Harmonisation of Corporate Law in Africa (OHADA)], the company's business operations in Niger are managed by Global Uranium Niger Inc., a company governed by Nigerien law incorporated in 2009. Global Uranium Niger Inc., whose registered office is in Niamey, is listed in the Trade and Personal Property Credit Register under number E: 1176/RCCM/2007/Niamey and has a share capital of ten million (10,000,000) CFA francs.

The company's staff is essentially made up of Nigeriens trained in Earth Sciences (geology, prospecting, geophysics, hydrology, hydrogeology) and in the fields of logistics, accounting, labour law, etc. Throughout its years in Niger, the company has employed around fifty people under permanent contracts and several dozen under temporary contracts. The company's technical partners are mainly local companies providing services in the fields of drilling, geophysics, mechanical sample preparation, analyses, consulting, transport, transit, safety, audits, etc.

Global Atomic Fuels Corporation has adopted seven principles representing its main values and responsibilities. These seven principles are:

- **Social responsibility and respect for diversity:**
 - ✓ Global Atomic Fuels Corporation believes that achieving the common good as a whole can be facilitated by a company that demonstrates, through its corporate citizenship practices, its support for human rights, social justice and good environmental management and is expected to thrive in an increasingly competitive market.
 - ✓ Global Atomic Fuels Corporation will undertake to support and enhance the capacities of the communities in the project intervention area.
 - ✓ Global Atomic Fuels Corporation will encourage and support partnerships and cooperation to strengthen social and economic resources.
 - ✓ Global Atomic Fuels Corporation will respect the multicultural diversity of local communities.
 - ✓ Global Atomic Fuels Corporation will involve the public and the leaders of the local communities in the planning and implementation of its project.
- **Responsible exploration and operation:** This statement of corporate values and responsibilities reflects the obligations and partnerships that naturally accompany the various authorizations that Global Atomic Fuels Corporation receives to operate in countries and communities with different levels of economic development. These authorizations are generally subject to reviews and renewals and must therefore be continuously warranted.
- **Leadership:** Global Atomic Fuels Corporation will strive to excel in good corporate citizenship towards governments, international agencies, partners, host communities, employees, contractors and stakeholders.

- **People are our true wealth:** Global Atomic Fuels Corporation will respect the dignity of each individual and the rights of all people to pursue their ambitions.
- **Ongoing staff training and safe and decent jobs:**
 - ✓ Global Atomic Fuels Corporation will commit to the principle that the people at its project sites and in its offices work in safe and healthy conditions and receive fair remuneration.
 - ✓ Global Atomic Fuels Corporation will give its staff the same chances, without discrimination, to improve their living conditions and gain knowledge, skills and experience.
- **Environmental responsibility and innovation:** Global Atomic Fuels Corporation believes that people are entitled to a clean environment, clean air and safe drinking water. Global Atomic Fuels Corporation is committed to implementing best environmental management practices in order to achieve internationally-recognized performance levels in environmental, health and safety matters.
- **Integrity and transparency:**
 - ✓ Global Atomic Fuels Corporation will commit to promoting honesty, integrity and responsibility in its business activities.
 - ✓ Global Atomic Fuels Corporation will require good professional and ethical conduct from its employees, agents and directors.
 - ✓ Global Atomic Fuels Corporation will make informing and communicating with all stakeholders its credo.

II.2 Project Background and Rationale

Niger, a Sahelian country with approximately 20 million inhabitants in 2017 (INS, 2017), has a wealth of major mining potential that has remained unexploited or underexploited: uranium, oil, gold, coal, cassiterite, etc. The uranium reserves, which are located in the Tim Mersoï basin covering more than 500,000 km², have been mined in Arlit since the 1970s by the companies in the French group ORANO, namely, SOMAÏR and COMINAK.

The mining sector occupies a special place in the planning of the country's economic and social development. The share of the mining sector in the Gross Domestic Product (GDP) decreased from 10.8% in 2013 to 6.2% in 2017. This decrease could be explained by the decline in mining production. In addition to the fall in volume, the uranium sector also recorded a sharp drop in prices, which fell from CFAF 73,000 in 2013 to CFAF 56,592 in 2014. This downward trend has continued to date. Although the sector, and particularly uranium, accounts for more than half of all exports, its share in the GDP is still around 6%. For the 2011-2015 period, it generated revenues of around 258 billion CFA Francs. To improve the mines' impact on poverty reduction, in 2006 the government amended the mining law to include a provision that devotes 15% of all mining revenues to the communes in the mining regions.

The government of Niger has also decided to facilitate and support any initiative aimed at opening new mines, with a view to diversifying its partners in the mining sector in general and ensuring the protection of the uranium sector in particular. As part of the implementation of this strategy, Global Atomic Fuels Corporation expects to launch production on its Adrar Emoles 3 project site by 2022-2023.

II.3 Location of the Project

Global Atomic Fuels Corporation, a Canadian company that has been conducting mining exploration operations in Niger since 2007, is planning to undertake mining operations on the uranium deposit discovered in the Adrar Emoles 3 exploration permit area.

This uranium deposit is located along the Agadez-Arlit highway and lies approximately 60 km north-northwest of the town of Tchirozérine, which hosts the Société Nigérienne du Charbon facilities in Anou-Araren. This location roughly corresponds to an area halfway between the town of Agadez and the mining town of Arlit.

This mining project provides for the implementation of several mining operations, as follows:

- Opening an underground mine with an average depth of 350 m,
- Processing the uranium ore by conventional methods,
- Extracting the uranium by the solid-liquid method,
- Purifying and precipitating the uranium,
- Drying the uranate and storing it in drums,
- Backfilling the mined areas with the waste rock.

The mining method that will be used generates little waste rock (approximately 10% of the material extracted from the mine) and this will be mixed with cement and pumped into the mine to fill in the mined galleries. The combined effects of these two techniques will undoubtedly ensure that the mining site is clean with little waste.

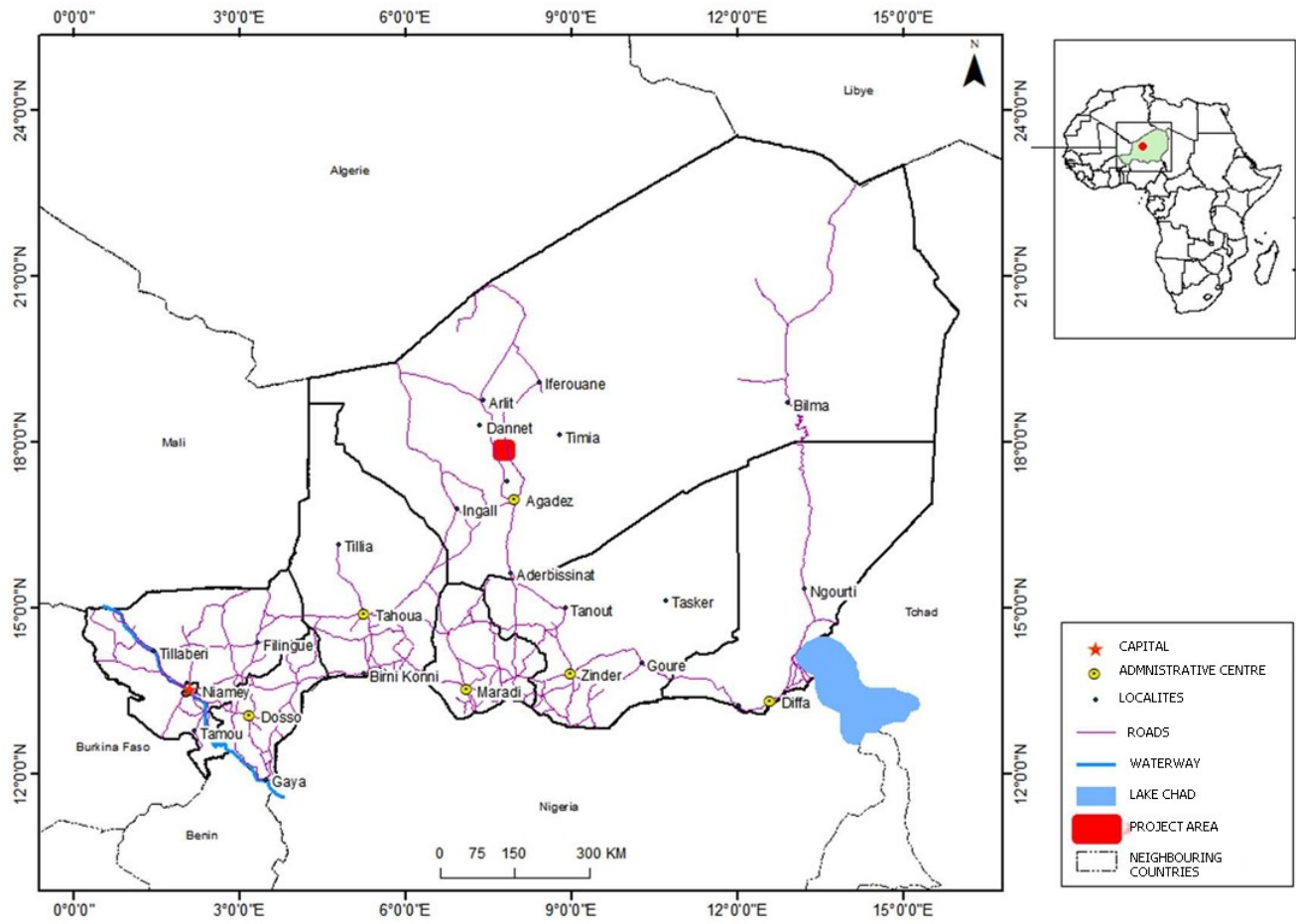
The mining operations will take place in two phases. The first phase will consist of mining the richest ore (approximately five million tonnes) and will last approximately twelve years.

The mining permit covers an area of 25.01 km². The coordinates (Latitude/Longitude, ADINDAN – Clarke 1880) of the permit's boundary monuments are:

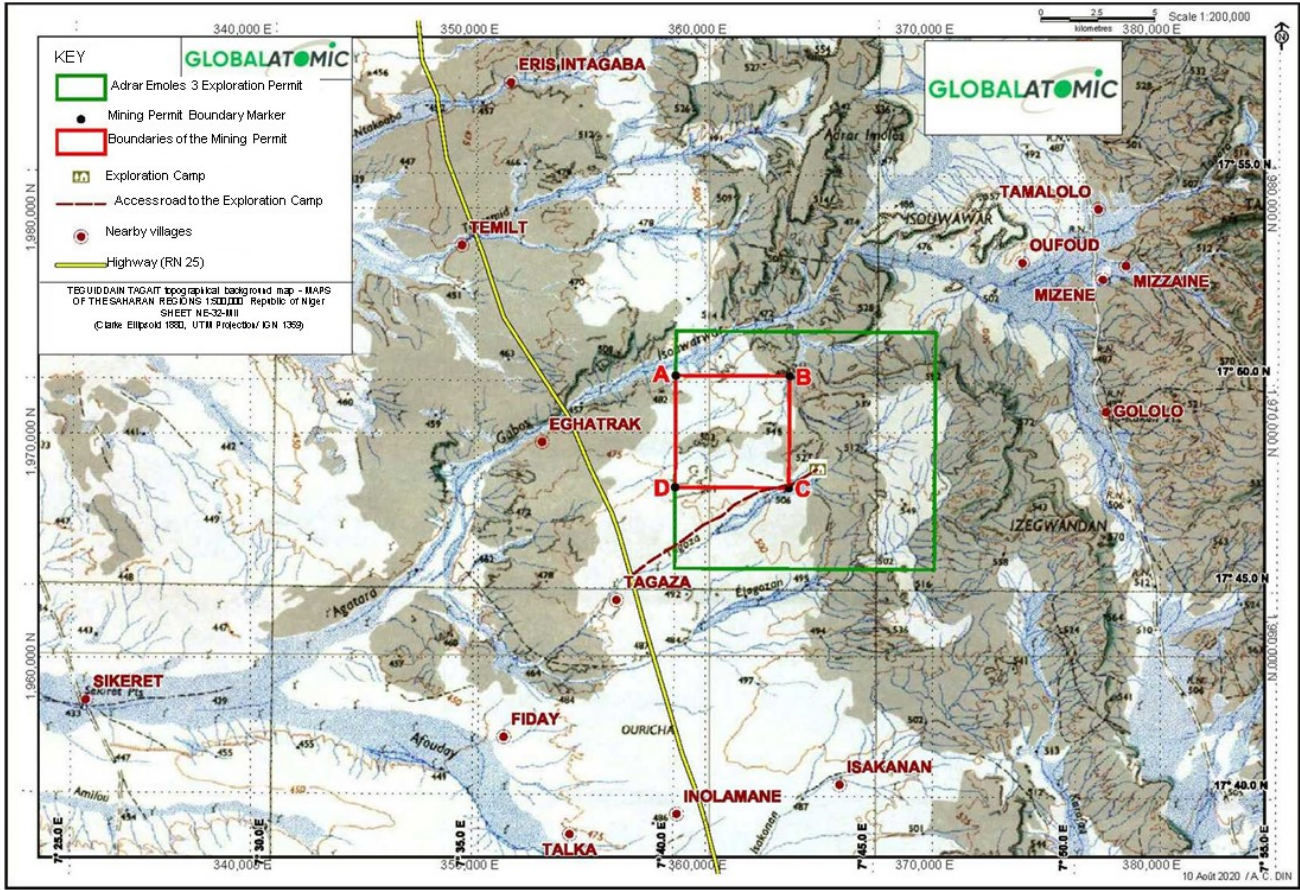
Monument	Longitude	Latitude
A	7° 40' 00"	17° 50' 08"
B	7° 42' 50"	17° 50' 08"
C	7° 42' 50"	17° 47' 26"
D	7° 40' 00"	17° 47' 26"

If an approximate line is drawn on this Map **No. 2** from the Tchirozérine-Dannet boundary marker located approximately 6 km away on Highway RN25 and indicated by a plate, to the village of Mizzaine, it can be seen that the mining permit is located in the communes of Tchirozérine and Dannet.

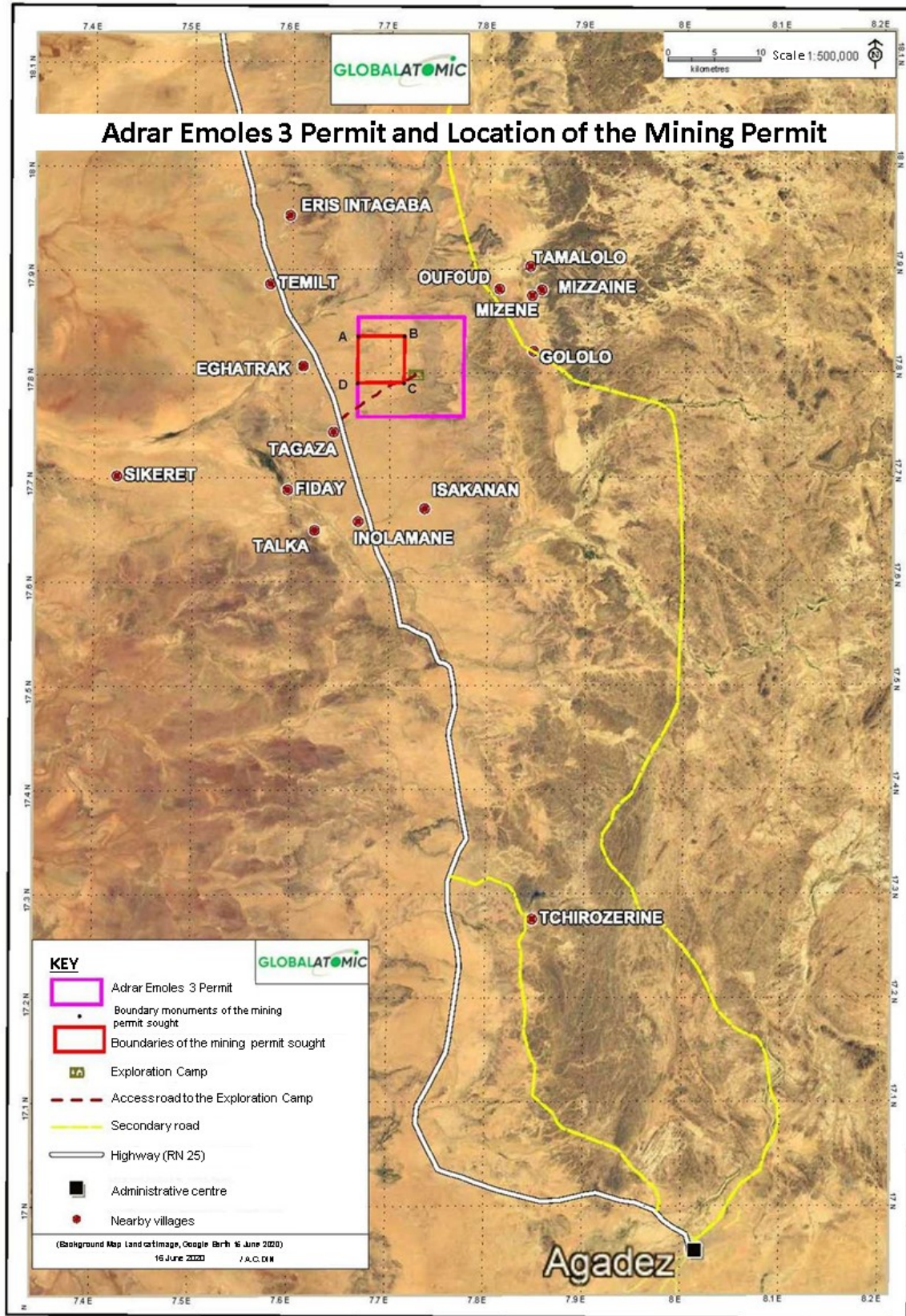
Maps No. 1, No. 2, No. 3a and No. 3b below, respectively locate the project area, the location of the mining permit on a topographical map for Téguida In Taggait (scale 1:200 000) and the location of the exploration and mining permits relative to Highway RN25.



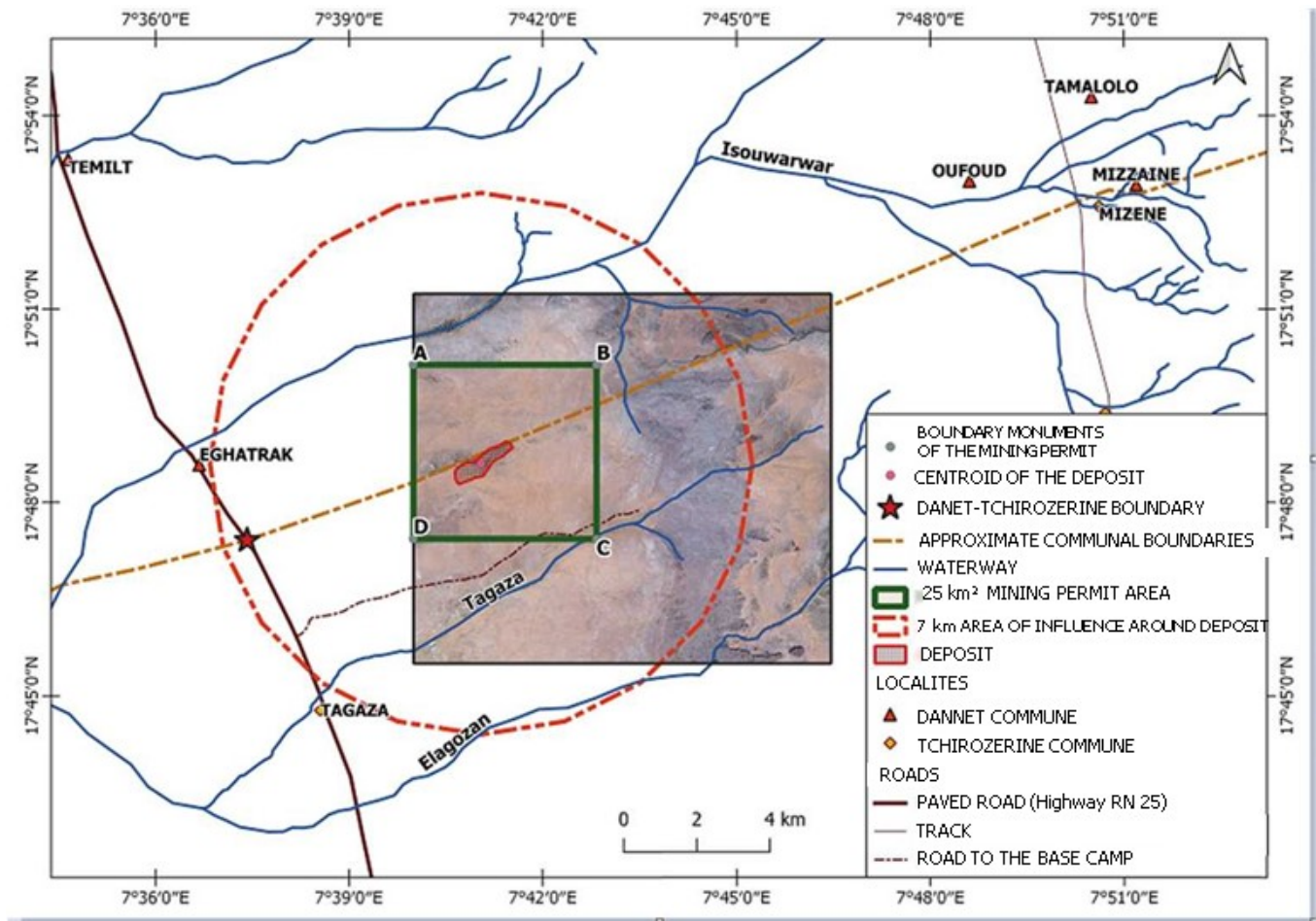
Map No. 1: Location of the project area in the Republic of Niger



Map No. 2: Location of the mining permit on topographical background: 1:200.000



Map No. 3a: Location of the exploration and mining permits in relation to Highway RN25



Map No. 3b: Location of the exploration and mining permits in relation to Highway RN25

II.4 Project Objectives

The overall project objective is the upcoming launch of mining operations on the uranium deposit discovered in the Adrar Emoles 3 exploration permit area. These mining operations will take place in accordance with the laws and regulations governing mining operations in Niger.

The specific objectives are:

- ✓ To set up operating facilities and other temporary infrastructures such as access roads, laydown yards for machines and other equipment, drinking and industrial water sources, electricity network connections;
- ✓ To construct the base camp, i.e., staff accommodation, administrative offices, technical areas, sanitary facilities;
- ✓ To set up permanent facilities and infrastructures (crushers, processing plants, dykes, mine tailings facilities, waste rock and ore stockpiles, water treatment units, machinery and equipment parking lots or garages) as well as ancillary facilities such as input reception areas and facilities for handling and storing various products and equipment and for domestic and industrial wastewater treatment. All wastewater from the activities will be treated in accordance with the water code in force before being released back into the environment. This involves domestic wastewater generated by the base camp consumption and industrial wastewater from the mine. Regarding this wastewater treatment, depending on the volume produced domestic wastewater will be treated by appropriate treatment systems (such as natural lagoons, aerated lagoons, biofilm beds, activated sludge or bio-filtration

systems). For industrial wastewater, the most appropriate treatment method will be natural lagoons because the area is characterized by a high degree of evapotranspiration and there is no problem with space.

- ✓ To produce the uranate and pack it in drums prior to export.
- ✓ To transport the uranate to the port

II.5 Expected Results

The expected results are:

- ✓ The operating facilities and other temporary infrastructures (access roads, machinery laydown yards, drinking and industrial water connections, electricity network connections) have been set up;
- ✓ The base camp, administrative and social services buildings have been completed;
- ✓ The permanent facilities and infrastructures as well as the ancillary facilities have been completed;
- ✓ Uranate has been produced and packed in drums prior to export.

II.6 Description of the Project Components and Related Activities

The main activities of the project are:

- ✓ Development work:
 - Constructing access roads such as tracks and ramps,
 - Stripping or removing the overburden,
 - Stockpiling the waste rock,
 - Stockpiling the ore,
 - Setting up an ore sorting facility,
 - Constructing the ponds (effluents, mine water, production fluids),
 - Installing the stockpile facilities and decline; opening up vents,
- ✓ Mining operations:
 - Drilling;
 - Blasting;
 - Sorting;
 - Hauling the ore;
- ✓ Processing the ore;
 - Crushing, grinding and pulverizing;
 - Attack, impregnation, curing and disintegration;
 - Precipitation;
 - Purifying and drying;
 - Storing the uranate and transporting it to the port;
- ✓ Closure of the mine;
- ✓ Site restoration and monitoring project.

II.7 Main Project Infrastructure / Capital and Operating Expenses

The investment and operating costs of the development plan were estimated on the basis of the detailed design of the mine and the corresponding schedule for the mining life cycle. The summary capital expenditures (CAPEX) and operating expenditures (OPEX) for the development plan and a breakdown of the operating costs of the processes are shown, respectively, in **Tables No. 1 and No. 2 and in Figure no. 1.**

Table1: Summary CAPEX for the Development Plan

Investment costs	Initial (MM USD)	Sustaining capital (MM USD)	Mining life cycle (MM USD)	USD/lb U ₃ O ₈	USD/tonne of load
Mining	55	43	97	2.21	24.18
Processing	67	4	71	1.61	17.58
Infrastructure	39	0	39	0.88	9.66
Total direct investment costs	161	47	207	4.70	51.42
Indirect and ownership costs	12	4	16	0.37	4.07
Total (including indirect costs)	173	51	223	5.07	55.49
Contingency	30	13	43	0.97	10.65
Recovery	0	10	10	0.23	2.48
TOTAL CAPITAL	203	73	276	6.27	68.62

Due to rounding, some columns and lines may not show exactly the same total as indicated.

The mine development phase includes a ramp 2,545 m long x 5.0 m wide x 5.0 m high to provide the main access to the mine and the operations sites. The ramp has been sized to be able to bear a potential increase in haulage capacity using larger mining trucks of up to 40 tonnes. In addition to transport, the main ramp will serve as an inlet that will provide fresh air for the mine at a rate of 80 m³/s, increased by a Fresh Air Raise (FAR) unit to provide a total of 185 m³/s of fresh air to the mine.

Electricity will be supplied by the existing production infrastructures. A cost of USD 4.5 million is planned for the connection to the electricity grid that supplies power to the Orano mines in Arlit and whose transmission line runs next to the project site. A substation and switching facility will be installed at a cost of approximately USD 1.2 million (two emergency diesel generators of 1 MW each) to provide backup power to the mine, processing plant and camp facilities on site in the event of a mains outage. The emergency power supply units will safely stop the processing plant's pumps to avoid any overflow and will keep the dewatering pumps running, along with minimal ventilation, communications and amenities inside the camp.

The other surface infrastructures include the base camp, access roads, water storage and modular treatment plant, offices, communications network, depot and storage facility, maintenance workshop, hydrocarbon and fuel storage facility, workshop where the mixture required for filling the tunnels will be prepared, cement storage silos, compressors, and changing rooms, as well as the mine's surface infrastructure, site services and access control gate.

The total construction costs for the project's standalone underground mining scenario amount to USD 203 million, including unforeseen expenses.

The USD 73.41 million in sustaining capital was added in provision of the costs of mining development, replacement and renovation of major equipment. This includes the mechanical mining equipment and major components of the processing plant equipment.

The main elements in the CAPEX list are the processing plant (USD 67.0 million), initial development (USD 34.0 million), start-up mining equipment (USD 3.6 million), surface operations infrastructure (USD 38.9 million), underground operations infrastructure (USD 8.5 million) and indirect costs (freight, mobilisation, engineering, procurement, construction and management - EPCM) (USD 12.1 million).

A 25% rate for unforeseen expenses (USD 16.1 million) was added to the costs of the underground and surface operations infrastructure. A 20% rate for unforeseen expenses (USD 14.2 million) was added to the costs of the processing infrastructure.

The cost of the project's mining operations has been estimated at USD 4.12/lb U₃O₈ (USD 45.06/t processed) according to an owner-operator model. The development of the ramp and access roads will be provided for in capital prior to ore production and their costs will then be carried forward to the operating costs.

Average process operating costs over the mining life cycle have been calculated at USD 4.97/lb on the basis of USD 54.42/t of processed ore, with the greatest amounts of consumables being acid and other reagents. The processing plant will be operated and maintained by a team of 80 people who will work in three eight-hour shifts, 365 days/year. A breakdown of the operating costs is provided in **Error! Reference source not found.**

General and administrative expenses (G&A) include a camp and facilities for 350 people, camp staff and head office expenses. Off-site G&A and cash operating costs amount to USD 4.43 /lb U₃O₈ (USD 48.54 /t processed). When the sustaining capital and royalties are included, the all-in sustaining cost (AISC) amounts to USD 18.39/lb U₃O₈ (USD 201.27/t processed) and the all-in-cost (AIC), including unsustained capital, is estimated at USD 22.82/lb U₃O₈ (USD 249.72/t processed).

Table2: Summary operating expenses (OPEX)

Operating costs	Mining life cycle (MM USD)	USD/lb U ₃ O ₈	USD/t charge
Mining costs	181	4.12	45
Process cost	219	4.97	54
G&A	71	1.62	18
Off-site cost	124	2.82	31
Subtotal - operating cash flow costs	596	13.52	148
Royalties (9.14% NSR [net operating yield on participation])	141	3.20	35
Transport and refining	-	-	-
Total - operating cash flow costs	737	16.72	183
Sustaining capital	73	1.67	18
AISC	811	18.39	201
Sustaining cost (includes sustaining capital, but not initial CAPEX)			

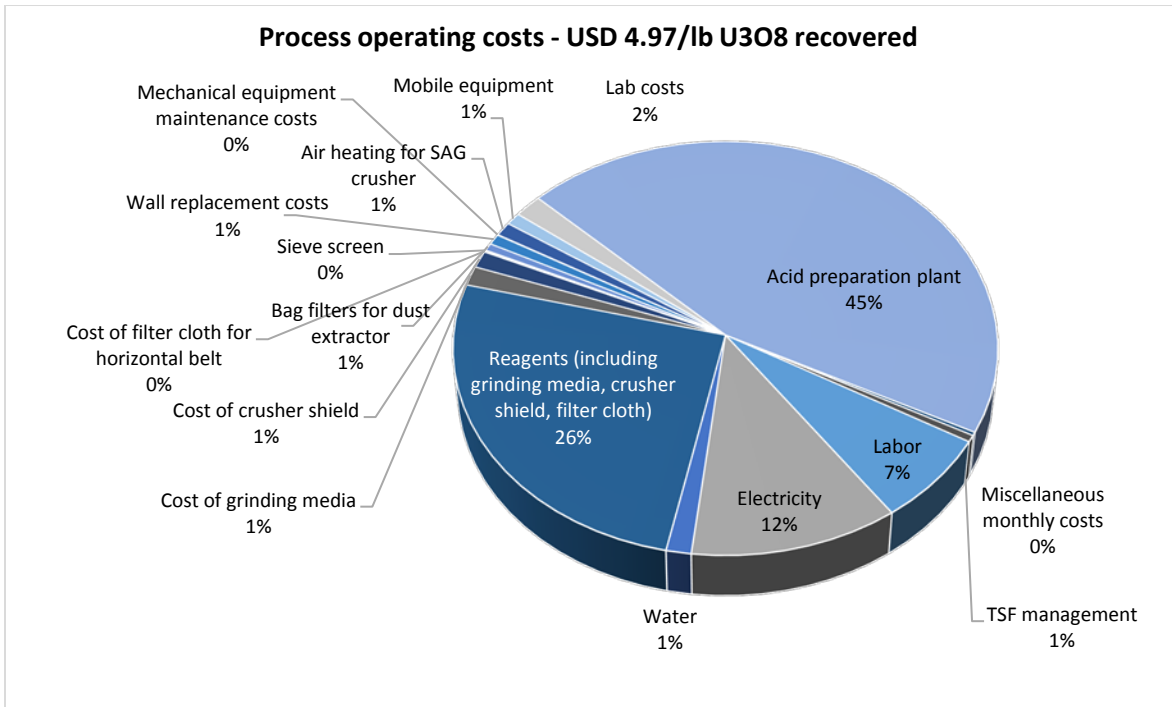
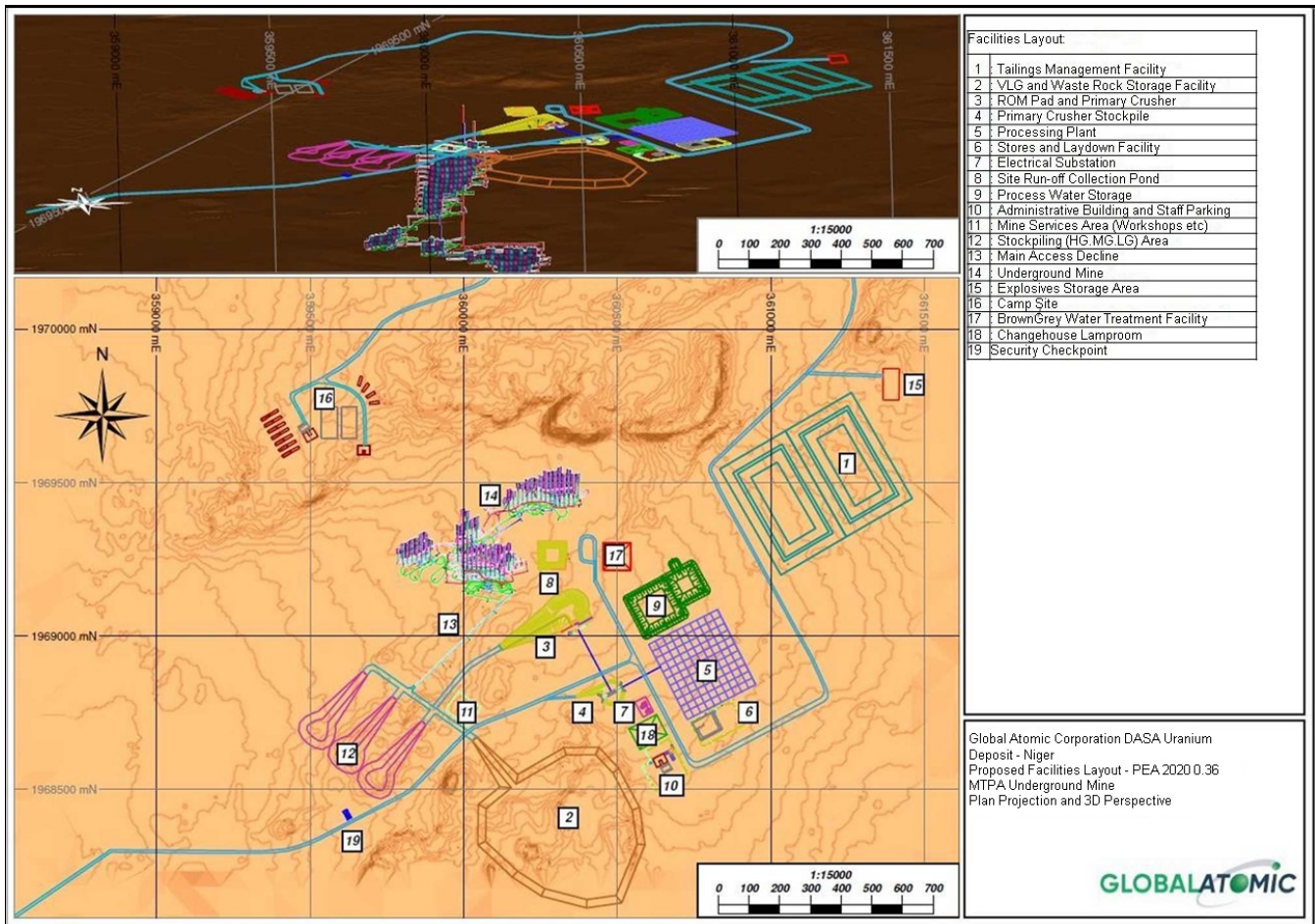


Figure 1: Breakdown of the process operating costs

Map No. 4 below shows the main project facilities. The choice of these installation sites took account of three factors, namely: the preferential prevailing wind direction which is North-East (**see the wind rose in Figures No. 1 and No. 2**), the relief of the permit area (**see Map No. 9** below), as well as the preferential direction of the watersheds (**see Map No. 15**) and the nature of the soil. It should be noted that the current Global Atomic Fuels Corporation camp will be moved. The reason for this move is because the camp is less than 5 km from the mine.



II.8 Project Equipment and Human Resources

Map No. 4: Facilities Layout

II.8.1 Project Equipment and Materials

The estimated number of required machines is shown in **Error! Reference source not found.**

Table3: Estimated number of required machines

Type of equipment	Year 1	Year 3	Year 6	Year 9	Total requirement
Drilling rigs – short hole	0	2	2	1	2
Drilling rigs – long hole	2	3	3	2	4
Drilling rigs – support	1	2	2	2	2
LHD	1	5	5	4	5
Trucks	1	5	6	5	7
Loaders	1	4	4	3	4
Support vehicles	7	9	9	9	9
LDV	4	4	4	4	4
TOTAL	17	34	35	30	37

II.8.2 Human Resources

Mine planning is based on the assumption that the mines are operated 24/7, 360 days/year. The proposed shift plan will be based on two 11-hour shifts for the miners (effective working time on the rock face of approximately 7.4 hours per shift), with a third rotating shift (during holidays). The processing plant will operate on the same basis as the mining operations. The management, administrative and technical services will operate in 11-hour shifts throughout a fortnight, with holidays and leave covered by junior and/or support staff. Table No. 4 provides an estimate of the staffing needs.

Table4: Estimated staffing needs

Estimated workforce	Average number of employees (360 kt/year)
Miners	91
Short-hole drilling	5
Long-hole drilling	11
Blasting	11
Primary loading	11
Haulage	16
Support	6
Logistics	24
Backfilling of voids	7
Engineering	75

Estimated workforce	Average number of employees (360 kt/year)
Equipment maintenance	62
Equipment support	2
Technical supervision	2
Surface operations	6
Ramp operations	3
Mining services	32
Security	7
Technical services	8
SHERQ	1
Human resources	2
Finance and administration	7
Production management	3
Production monitoring	4
Unavailable staff	19
Substitute miners	11
Substitute artisans	4
Semi-qualified substitutes	4
TOTAL WORKFORCE	217

II.9 Water Supply

The project's water management plan is essential to maintaining an appropriate environmental and operational output. Net consumption rates are based on the processing plant's consumption of 0.76 m³/tonne and an underground/surface infrastructure consumption of 5,500 m³/month (0.18 m³/tonne). The proposed water storage facility will have a capacity of 100,000 m³ (approximately 330% of the monthly consumption for a consumption of 1.00 m³/tonne processed). A preliminary hydrological survey showed that the annual rainfall can vary considerably between 10 mm and a maximum of 175 mm/year. Given the ambient temperature, humidity and soils within the mining site, it is unlikely that surface water sources fed by rainfall can be relied on as a source of water for the mining and processing operations. In light of the above, it is expected that the project will have a negative annual water balance every [sic: missing word] and will require additional sources of make-up water to supplement the inflow of groundwater into the mine and the amount of surface runoff.

Additional water needs should be supplied from a wellfield within the boundaries of the mining concession. The average deficit was estimated at 30,000 m³/month, corresponding to a required replenishment of 42 m³/hour.

The hydrogeologic surveys conducted by the Proponent in the permit area have revealed the possibility of exploiting the Telaua, Guézouman and Tarat groundwater tables to meet the water needs of the mining site.

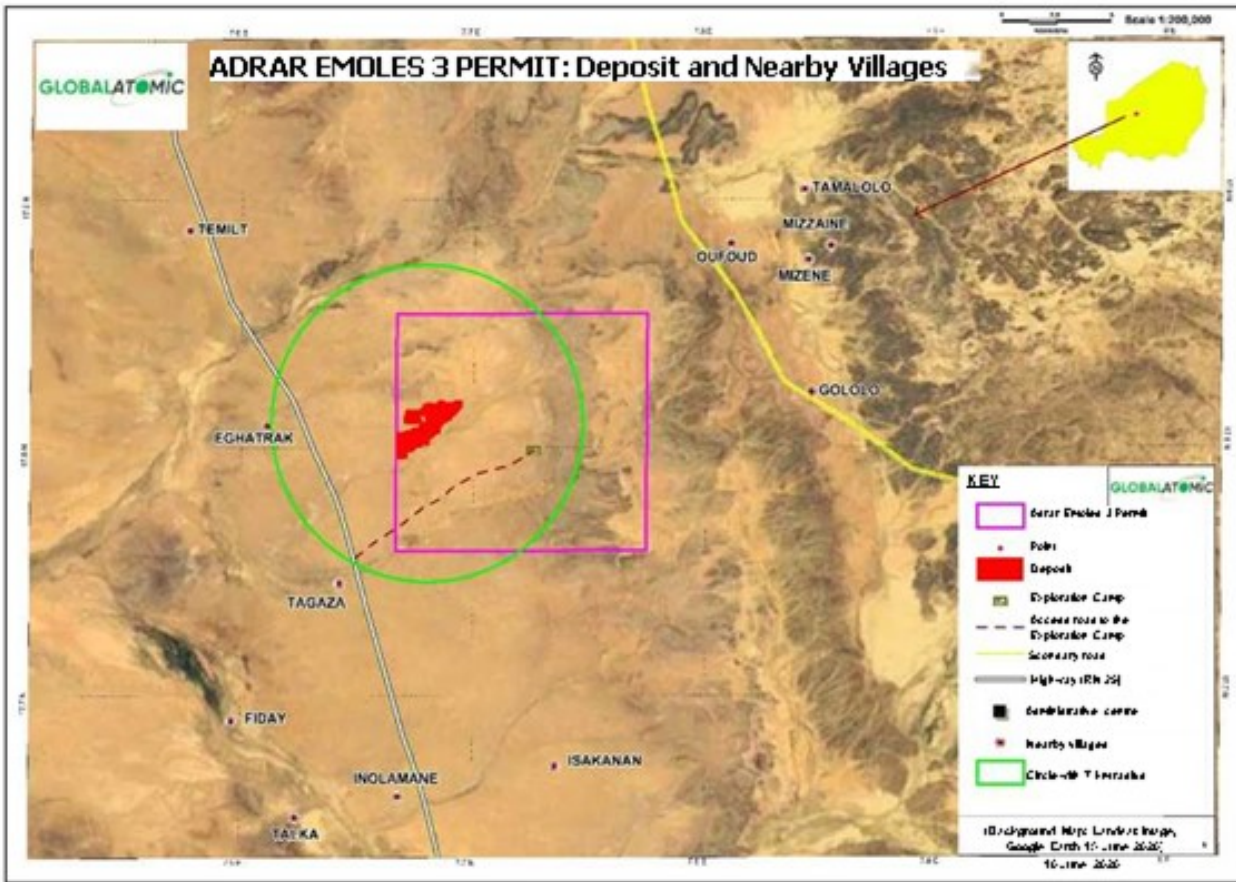
It should be noted that the Tchirozérine II groundwater table has not been the subject of a thorough study in this sector due to its low flow rate of 0.5 m³/h. No pumping test was performed on this groundwater table. The boreholes that showed flow rates of 15 m³/h and 25 m³/h had depths of around 180 m. All of these boreholes tapped into the Téloua groundwater table in the permit area.

II.10 Perimeter of the Impact Assessment

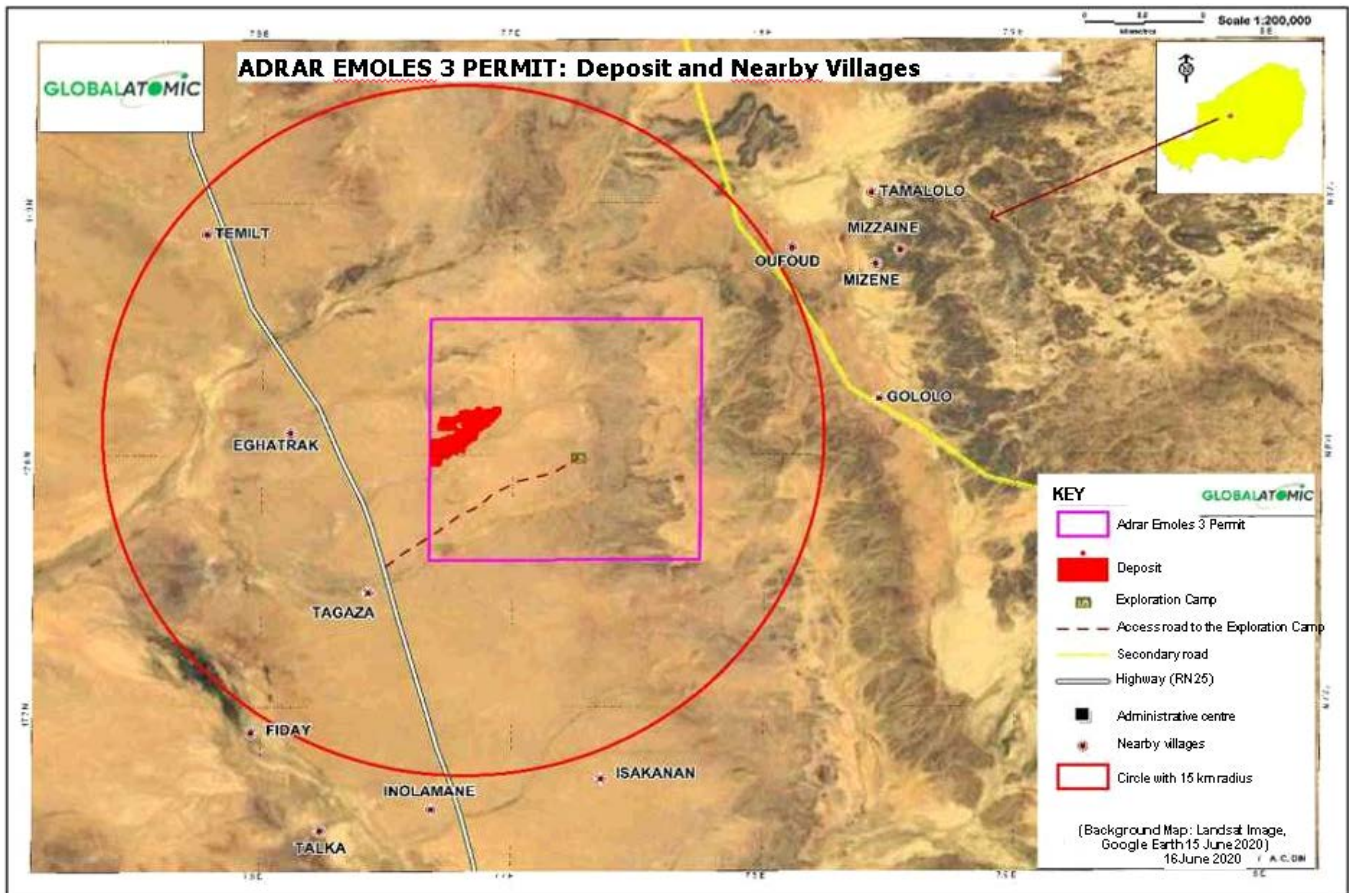
To better take the environmental stakes into account, the main field investigations were conducted within a radius of 15 km around the deposit. The surface area of this zone can be considered as the potential area of influence of the activities associated with the operation of the deposit. Nevertheless, this area has been expanded to take into account certain villages in the vicinity of the permit area, in particular RTA (Anou-Makarène), Elagozan, Tamalolo, Mizzaine and Gololo.

However, based on uranium mining practices and standards worldwide, it was considered that the area of influence lies within a radius of 7 km around the deposit. The perimeter of this area is considered to be the safety perimeter. **Map No. 5** below clearly illustrates this perimeter.

Map No. 6 below shows the potential area of influence as well as the localities under study.



Map No. 5: Map of the 7 km safety perimeter around the deposit



Map No. 6: Potential zone of influence 15 km around the deposit

II.11 Description of the Deposit

All known uranium deposits in Niger are located in sandstone and conglomerates in the Tim Mersoï basin. They are all classified as belonging to the sedimentary tabular types. Sandstone-hosted uranium deposits are marked by epigenetic uranium concentrations in river/lake or deltaic sandstone deposited in continental fluvial environments, frequently in higher-to-lower flow regime transition areas such as along paleo-ridges or domes. Roll-front deposits contain impermeable shale or mudstones that often cover or underlie or separate the mineralized sandstone and guarantee that fluids move along the sandstone bodies.

In sandstone-type deposits, uranium is generally precipitated by the oxidizing fluids of reducing agents such as vegetable matter, amorphous humate, sulphides, iron minerals and hydrocarbons. The oxidation and reduction facies display typical colours and can be useful in selecting targets for exploration. Fluid migrations and uranium depositions leave behind a colour change ranging from red (oxidized) to grey-green (reduced) hematite. The main uranium minerals in most sandstone deposits are uraninite (also known as pitchblende), and coffinite.

In general, it should be noted that from the north to the south to the east of Niger, uranium mineralization seems to occur in increasingly more recent strata. This is most likely due to a combination of a change in the source areas and to the contribution of uranium over time as well as to the fact that in the south the most recent layers are exposed to the surface, which requires increasingly deeper drilling in the southern areas (for example, for the older Carboniferous targets).

The best uranium content and tonnage in the Adrar Emoles 3 deposit are found in the sandstone in the Tchirozérine 2 formation, the same formation which also contains the large ORANO Imouraren deposit, located approximately 40 km north-west of the Adrar Emoles 3.

Unlike the Carboniferous mineralization in the Arlit region, the uranium in the Tchirozérine 2 formation appears mainly in the form of hexavalent uranium minerals in an oxidized environment. Uranophane is the most abundant of these minerals. It can form small clumps or appear as a continuous coating parallel to the stratification. Uranophane is commonly associated with chrysocolla and in smaller amounts with boltwoodite. Metatyuyamunite has also been found. There is some coffinite in residual reduced areas, as well as chalcocite and native copper. Pitchblende was observed in small amounts. This mineralization appears in two main forms: interstitial in sandstone and as massive mineralization in association with sulphides in the microcracks with galena and blende.

II.11.1 Estimated Mineral Resources and Reserves

The deposit's mineral resources were estimated according to the planned operating method: underground mining. They are summarized as follows in Table No. 5.

Table5: Breakdown of Mineral Resources, by Category

Estimated mineral resources (MRE), extracted from the report published in July 2019				
Cut	Category	Tonnes	eU ₃ O ₈	Metal content
eU ₃ O ₈ pm		Mt	ppm	Mlb
100	Proven	81.6	718	129.1
	Likely	96.1	606	128.4
300	Proven	34.4	1,146	109.6
	Likely	37.6	1,260	104.6
1,000	Proven	9.6	3,885	82.1
	Likely	10.2	3,308	74.2
2000	Proven	4.6	6,624	66.8
	Likely	4.5	5,713	56.8
2,500	Proven	3.6	7,849	61.9
	Likely	3.4	6,838	51.4
5,000	Proven	1.6	13,186	46.8
	Likely	1.6	10,805	37.2
10,000	Proven	0.6	24,401	31.1
	Likely	0.8	14,598	25.3
15,000	Proven	0.3	34,236	24.3
	Likely	0.1	21,493	4.0

II.11.2 Main Production Data

The main production data are presented in Table No. 6.

Table6: Main Production Data

Production profile		
Mining life cycle	Years	12
Total ore production	Million tonnes	4.13
Total processing plant	Million tonnes	4.03
Total waste rock production	Million tonnes	0.99
Average content	ppm	5,396
Overall mill recovery	%	92
Resources consumed	Drinking water	0.55 m ³ /h
	Process water	55 m ³ /h
	Electricity	10 MW
	Fuel	2,000 l/day
	Processing reagents	93 t/day
Jobs	Direct	307
	Indirect	500

The total number of direct and indirect jobs during the mining operation will be 307 and 500, respectively, irrespective of the category.

However, it should be noted that in the mine construction phase, the project will generate approximately 450 direct and indirect jobs.

II.11.3 Financial and Economic Impacts of the Project

The implementation of this project will generate tax revenues, mining royalties, job and training opportunities, indirect activities, and service provision (intellectual, supplies and work). Already during its exploration activities, Global Atomic Fuels Corporation regularly called upon local service providers, including ENYSA, LEGENI, ESAFOR, SAHEL LAB SA, EMIG, and EMAIR to mention only a few. The project could generate the following financial flows, expressed in millions of US dollars:

- Tax revenue 92
- Mining royalties 141
- Nigerien payroll costs 64
- Expenses relating to Corporate Social Responsibility (CSR) 1.2

II.11.4 The Various Project Phases

The project can be divided into three main phases, namely: development, construction, operation and closure of the mine.

II.11.4.1 Development Phase

The main aspects of the construction [sic] phase are:

- Construction of the base camp:
 - ✓ Installation of the water production and distribution systems: During the construction phase, water will be used for consumption, dust control, sanitary facilities and engineering work. This water will come from the boreholes drilled by GAFC in the project

area. This base camp will be equipped with sanitary facilities and a wastewater treatment plant.

- ✓ Electricity will be provided by diesel generator sets, including for the water supply systems, until the site's power lines and substation have been built. The diesel fuel for the generator sets will be stored in a protected area equipped with cleaning kits in case of any accidental spills and with associated oil/water separators.
 - ✓ Waste management and disposal: during construction, stripped material will be reused insofar as possible as backfill or stored. Other sources of waste such as industrial waste (for example, used oil, used filters, aerosol cans and gas cylinders), plastic packaging and biological waste will be separated at the source. Appropriate recycling and disposal sites will be identified for each waste stream.
- Preparation of waste storage areas;
 - Construction of access roads: access roads will be built to accommodate light vehicle (LV) and heavy goods vehicle (HGV) traffic. The sizing and construction of these roads will be done according to the industry standards and the standards in force in Niger.

II.11.4.2 Operating Phase

The mine will be operated using the underground room-and-pillar method. This method will make it possible to carry out the mining operations under profitable economic conditions while ensuring maximum employee safety. It will also make it possible to use most of the high-content mineral resources contained in the deposit.

II.11.4.3 Closure Phase

Nigerien mining law, as set out in Decree No. 2006-265/PRN/MME of 18 August 2006 implementing Law No. 2018-21 of 27 April 2018 on the safe, secure and peaceful use of atomic energy (Section 4.1.2), sets out the requirement that the ESIA report submitted to the Ministry of Mines as part of an application for a mining permit include two key elements:

- An environmental protection program and the framework of the Environmental and Social Management Plan. (ESMP)
- A conceptual strategy for closing the mine developed during the ESIA procedure.

III. DESCRIPTION OF THE INITIAL STATE OF THE SITE AND ITS ENVIRONMENT

III.1 Location of the Site

The “Adrar Emoles” project site is located in the Agadez Region, more specifically straddling the urban commune of Tchirozérine in the department of the same name and the rural commune of Dannet in the department of Arlit.

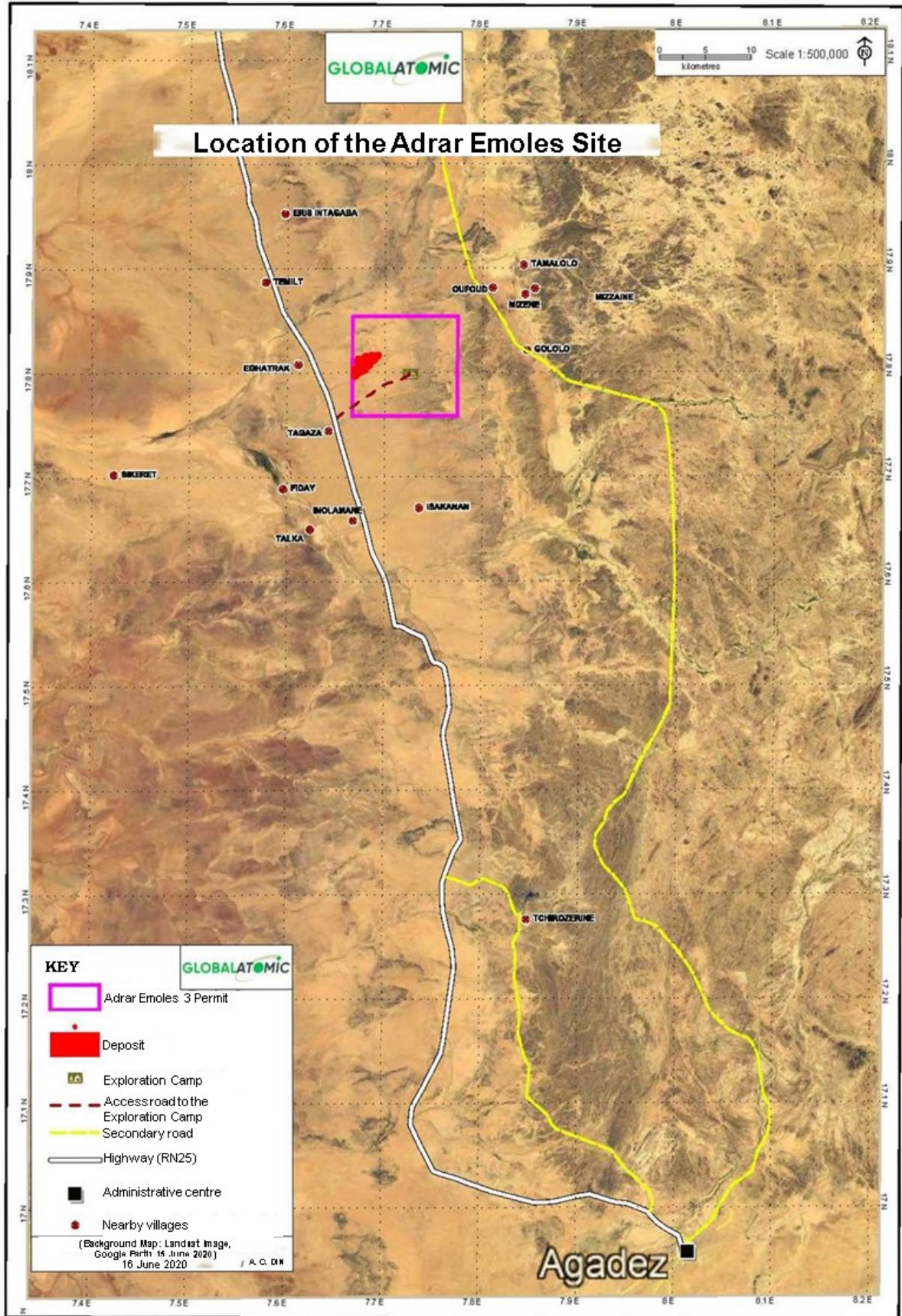
The site is an approximately 100 km drive via paved (but degraded) Highway RN25 from Agadez to the village of Tagaza. Then, about two kilometres from Tagaza, there is an intersection leading east to the base camp after about eight kilometres.

The site perimeter is bordered to the east by the communes of Gougaram and Arlit, to the west by the Urban Commune of Agadez, to the south by the communes of Dabaga and Tabelote and to the north by the commune of In-Gall.

There are three main valleys in the permit area, namely:

- ✓ The Ilogozan valley that runs through the communes of Tchirozérine and Dannet
- ✓ The Tagaza valley shared by the communes of Tchirozérine and Dannet
- ✓ the Isouwarwar valley which also runs through both communes (Tchirozérine and Dannet)

Map No. 7 below shows the location of the site in relation to the locations of the communes of Tchirozérine and Dannet.



Map No. 7: Location of the site relative to the communes of Tchirozérine and Dannel

III.2: Perimeter of the impact assessment

To better understand the environmental impacts of the project, the data collection and analysis took account of the project's direct area of influence as well as the local and regional levels. The delineation of the impact areas took account of the environmental and social challenges associated with the project and the potential project impacts in relation to their areal influence. On this basis, the following areas were delineated:

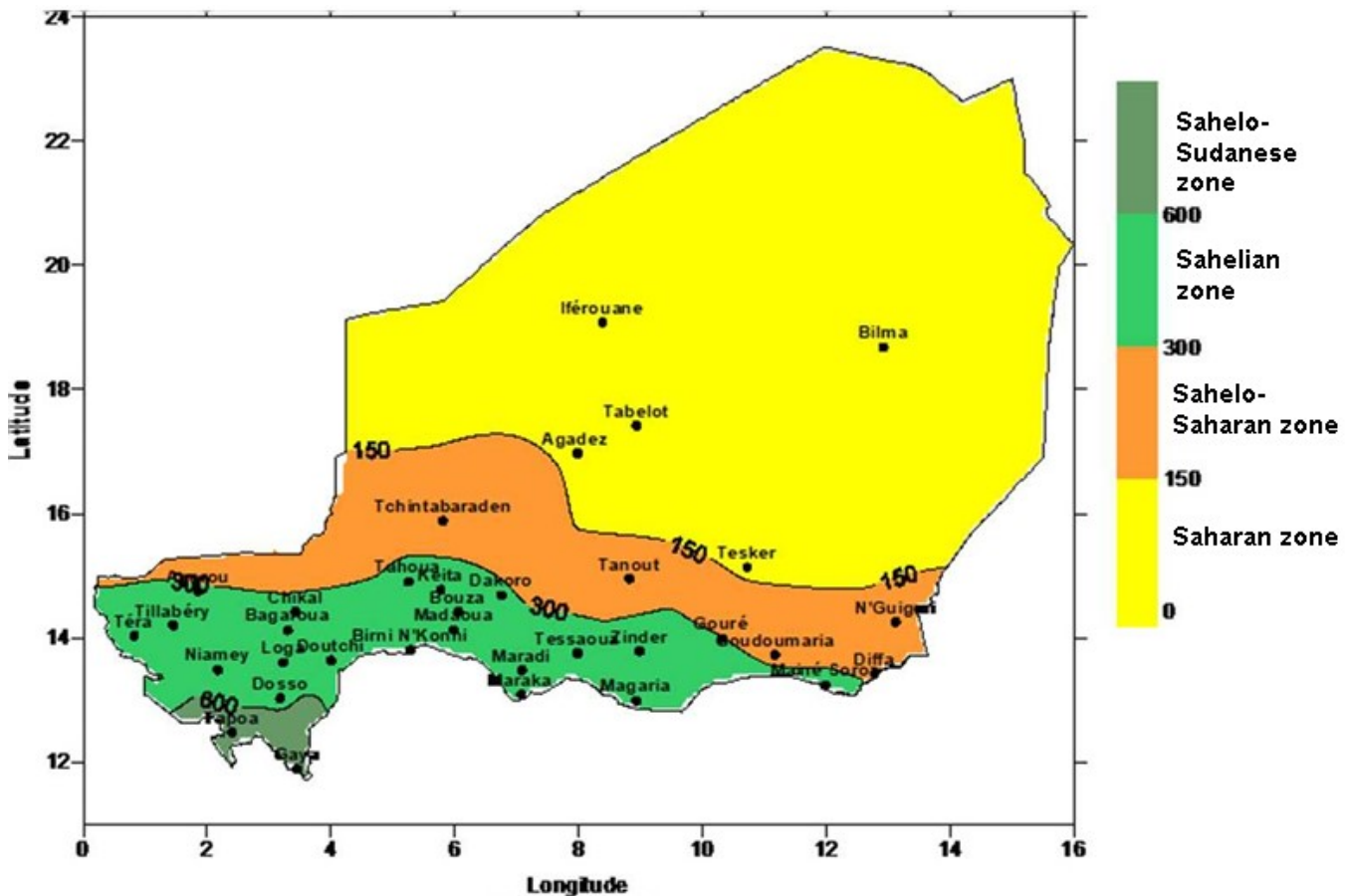
- ✓ The direct area of influence corresponds to the area in which the main infrastructures associated with the mine are concentrated. This area is dedicated to specific mining activities and constitutes a permanent danger zone with controlled access. It covers the vicinity of the new facilities and infrastructures to be built as part of the operation of the deposit. This is the area that will be most affected by direct environmental and social impacts during the construction, operating and rehabilitation phases. The natural resources will undergo major disruptions during the construction and mining operations. However, based on uranium mining practices and standards worldwide, it was considered that the area of influence lies within a radius of 7 km around the deposit. The perimeter of this area is considered to be the safety perimeter.
- ✓ The extended area of influence expands to a radius of 15 km around the deposit and takes into account the localities of Temilt, Egatarak and Tagaza.
- ✓ The area of regional influence primarily covers the localities of Tchirozérine, Arlit, Gougaram, Dabaga, Tabelote and In-Gall, which are the communes bordering the site. This area also includes the town and regional administrative centre of Agadez, whose inhabitants will be affected by the project's socio-economic impacts.

Maps No. 5 and No. 6 above illustrate the zones of direct and expanded influence of the assessment perimeter.

III.3: Physical Environment

III.3.1: Climate

With regard to its climate, Niger is located in the heart of the Sahelian zone of the African continent. There are four climate zones: the Saharan zone (northern Agadez and the far northern parts of the Diffa region) with its desert climate; the Sahel-Saharan zone (southern Agadez and northern parts of the Diffa, Zinder, Maradi, and Tahoua regions and the far northern area of the Tillabéry region); the Sahel-Soudan zone (southern areas of the Diffa, Zinder and Tahoua regions and extending over a large part of the northern and central areas of the Dosso and Tillabéry regions); and a rainier Sudanese climate further to the south (extreme southern part of the Dosso region: departments of Dioundiou and Gaya). **Map No. 8** below shows the distribution of the major climate stages in Niger.



Map No. 8: Nigerien Climate Stages (Source: Nigerien National Weather Office (2005 edition))

The Adrar Emoles 3 permit area is located in the desert climate regime of the Sahel-Saharan part of the Republic of Niger. This area is conducive to transhumance stockbreeding and is characterized by three seasons:

- ✓ A short rainy season lasting a maximum of three months (June, July and August with maximum rainfall in August);
- ✓ A cold dry season of four to five months (from September-October to February);
- ✓ A long, dry and hot season of five to six months (February-March, April, May and June).

III.3.2: Rainfall

Tables No. 7 and No. 8 respectively show the rainfall recorded over the past twenty (20) years and the average monthly rainfall for 2019, obtained from the National Weather Office for the Tchirozérine station. It can be seen from this table that in five of these twenty years less than 100 mm of rainfall was recorded, and in two of these twenty years the rainfall exceeded 300 mm.

Thus, based on the annual rainfall data for the past twenty years, there is an average monthly rainfall of 9.15 mm, with the total annual rainfall recorded over the observation period ranging from 77.5 to 332.5 mm, for a monthly average of 109.8 mm.

The rainy season, which sees significant rainfall, lasts approximately three months: June, July and August.

Table7: Annual rainfall (mm) from 2000 to 2019

Year	Total rainfall
2000	83.3
2001	97.2
2002	90.6
2003	212.5
2004	119.5
2005	169.6
2006	77.5
2007	198.7
2008	215.6
2009	178.8
2010	232.4
2011	82.9
2012	306.8
2013	119.2
2014	130.2
2015	238.5
2016	289.5
2017	278.3
2018	151.1
2019	332.5
TOTAL	3,604.7
Average	180.2

Source: Nigerien National Weather Office (2019)

Table8: Monthly average rainfall in 2019

Month	J	F	M	A	M	J	J	A	S	O	N	D
Rain	0.0	0.0	0.0	0.0	2.7	10.7	36.1	51.8	8.3	0.2	0.0	0.0

Source: Nigerien National Weather Office (2019)

III.3.3 Temperature

The project is located in a climate zone characterized by high temperatures and a hot and dry climate, with a six-month warm season (April to September) and a six-month cold season (October to March). In the warm season, the temperature varies between 31° and 50°C; in the cold season it varies between 0° and 20°C. In this zone, the average annual temperature is 37°C; the average annual maximum temperature is 45°C and the average annual minimum temperature is 11.13°C (Source: National Weather Office)

III.3.4 Wind

Wind is defined by its force or speed (m/s) and the direction from which it comes. A wind rose summarizes the wind regime, i.e., the way it blows at a given place and over a given period.

The wind rose required to understand how the wind blows each month or each season at this station is the one drawn up for the IMOU project site located approximately 30 km away, which is considered to be the nearest station.

Based on the data obtained from this wind rose, the measurements of the force and prevailing direction of the winds (wind rose) in each season are shown in **Figures No. 2 and No. 3**.

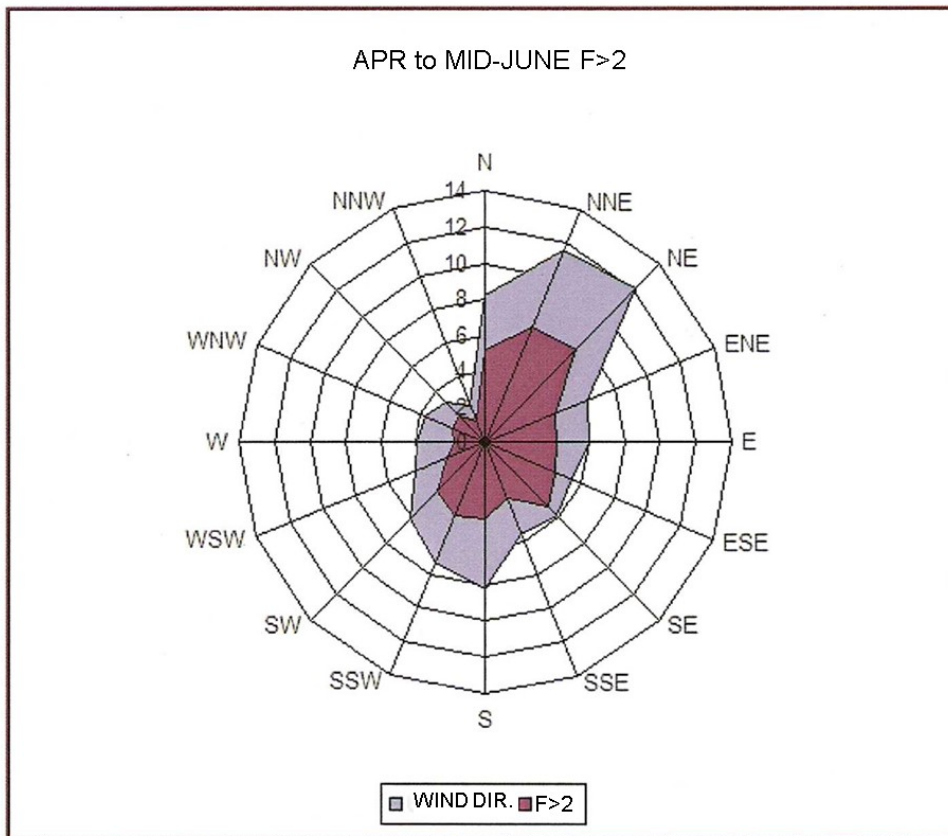


Figure 2: Wind rose for the dry season, April-Juin (Source: EIA, Imouraren Niger 2008, AREVA)

This figure represents winds with a force greater than zero on the Beaufort scale (in blue) and winds with forces greater than 2 (9 km/h) in purple.

This wind rose also shows that the Adrar Emoles permit is located in an area with little wind. It can be seen that the prevailing winds, which represent 12% of the wind, are those from the northeast followed by those from the north-northeast. These are the Harmattan winds.

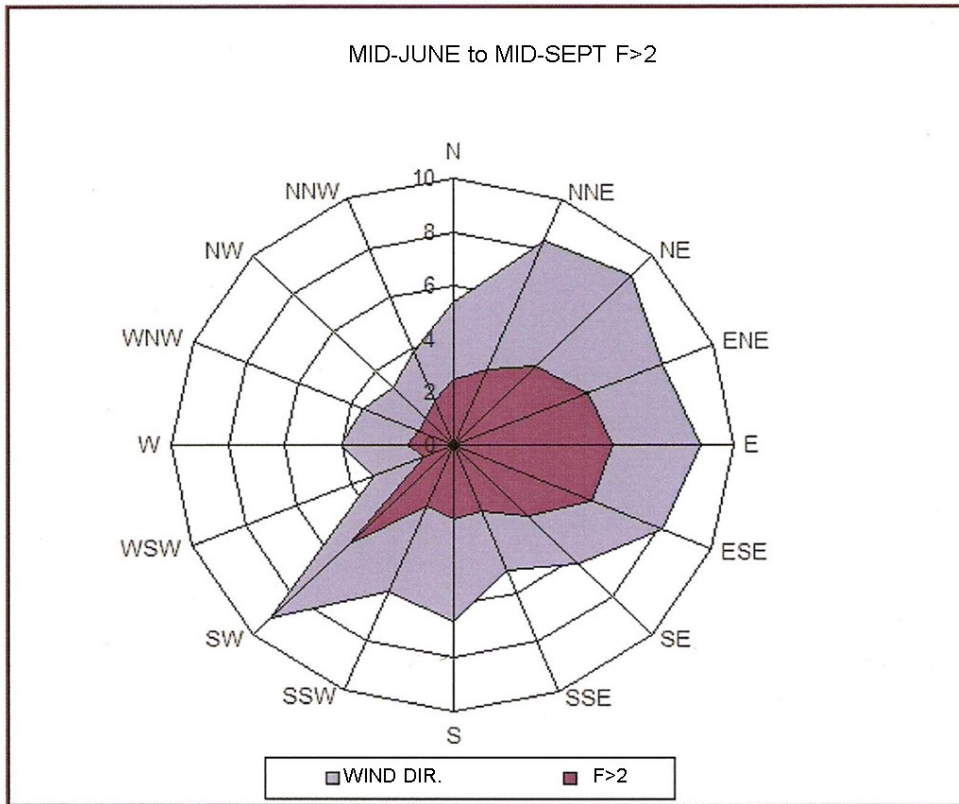


Figure 3: Wind rose for the rainy season, June-September
(Source: EIA, Imouraren Niger 2008, AREVA)

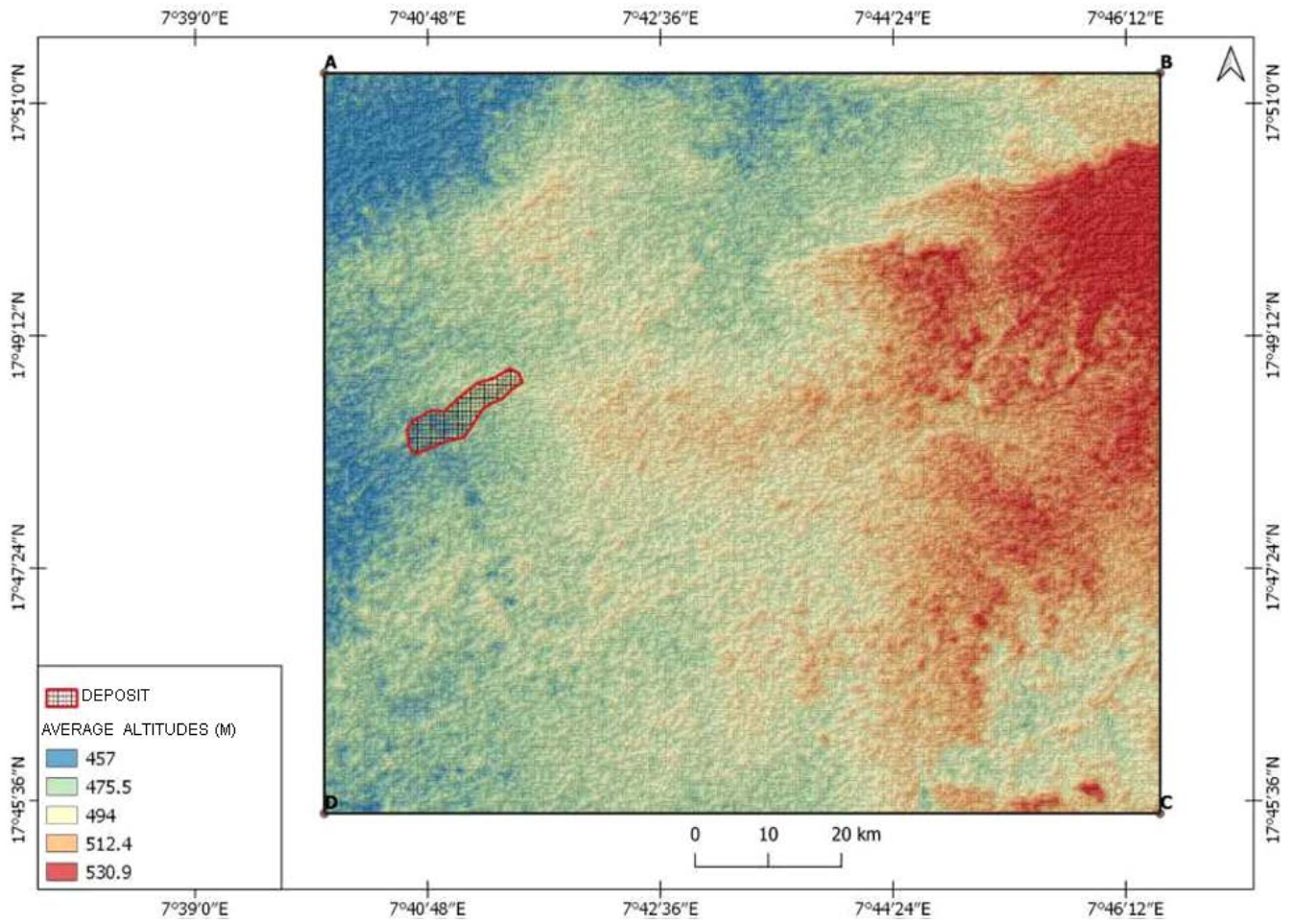
This figure shows that the prevailing winds in the rainy season come from the southwest and represent 9% of the winds. It can also be seen that 50% of the winds blow at over 9 km/h with a maximum of 35 km/h.

III.3.5: Relief

The relief in the area under study is heterogeneous and is characterized by outcrops, plains watered by koris, mountain ranges traversed by koris (Air Mountains) and vast stretches of sand to the east.

Like elsewhere in the region, the relief in the permit area is marked by alternating outcrops and sandy plains in a desert landscape, traversed in places by koris with an average altitude of approximately 500 metres. The highest altitudes are found along the Air Mountains (where most of the waterways are sourced) and to the south of the permit area. The lowest altitudes are found in the Isouwarwar Valley, with an average of 460 metres. The deposit is located in a low altitude zone (470 m) in the west-south-west part of the permit area.

Maps No. 9 and photos No. 1 to No. 4 below respectively provide a map of the relief and illustrations of sandy plains and rocky outcrops in the permit area.



Map No. 9: Relief of the permit area



Photo No. 1: View of the sandy plains and rocky outcrops in the permit area



Photo No. 2: View of the rocky outcrops in the permit area



Photo No. 3: View of the rocky outcrops in the permit area



Photo No. 4: View of the rocky outcrops in the permit area

III. 3.6 Soils

According to the descriptive analysis by Franck Grazzi (1996), there are two main classes of soils in the Air on which the various species of flowers can thrive: undeveloped mineral soils and slightly developed soils:

- ✓ The undeveloped mineral soils consist of lithosols,
- ✓ The slightly developed soils are generally composed of humus, organic matter and elements with coarse and medium structures. However, more or less clayey stringers can be found with gravel or elements deposited by wind erosion.

The project area is located in a pedological context belonging to Quaternary deposits comprised of:

- ✓ Sand: these deposits are the result of water and wind erosion
- ✓ Gravel: these deposits are mainly the result of detrital erosion. These deposits are generally found in kori beds.
- ✓ Detrital clay: these clays correspond in part to fine particles washed down by the koris and also result from water and wind erosion.

The mineral composition of these soils, which can be considered similar to that of the soils in the Imouraren concession (30 km from the permit area), is given in **Table No. 9** below.

Table9: Mineral composition of the soils

Metals	Concentrations	Metals	Concentrations
Cu	Between 3 and 55 mg/kg solids	Cr	Between 10 and 50 mg/kg solids
Fe	Between 10,000 and 40,000 mg/kg solids	Mo	< 5 mg/kg solids
S	< 500 mg/kg solids	Va	Between 12 and 76 mg/kg solids
Mg	Between 100 and 780 mg/kg solids	Cd	< 0.5 mg/kg solids
Pb	Between 100 and 780 mg/kg solids	Hg	Between 0.02 and 0.09 mg/kg solids
Zn	Between 10 and 42 mg/kg solids	Al	Between 2 and 40 mg/kg solids
As	< 5 mg/kg solids	Co	Between 4 and 14 mg/kg solids
Ni	Between 3 and 26 mg/kg solids		

Source: (Source: EIA, Imouraren Niger 2008, AREVA)

With regard to the soils, only a limited number have agropastoral potential and these are located along the koris and their tributaries. In fact, the geomorphology of the relief and the nature of the soils are not conducive to large-scale crop farming or stockbreeding. However, the existence of grazing areas in certain places is noted, particularly in the koris and on the plains. **Photo No. 5** provides a view of the soils at the project site.



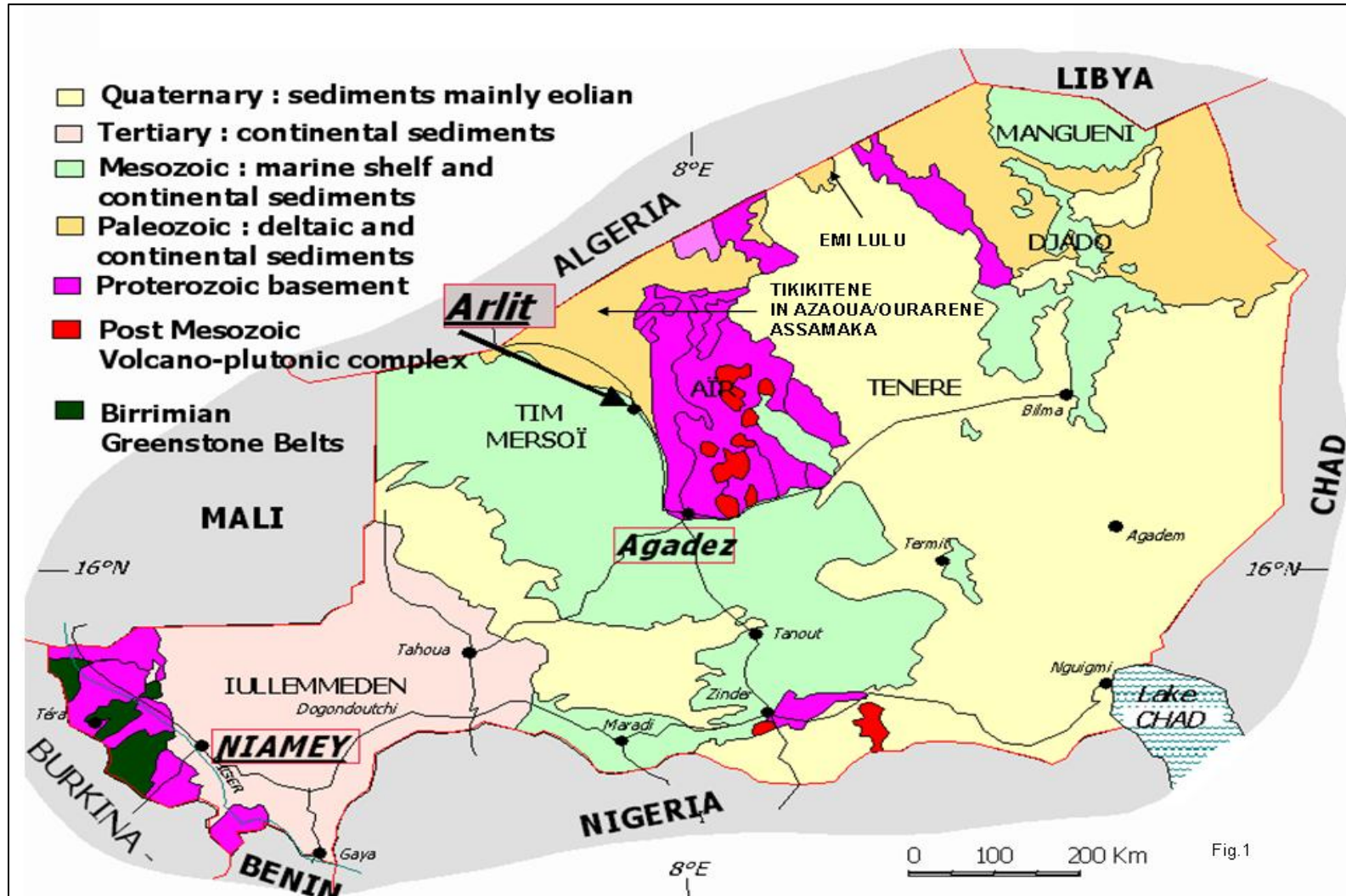
Photo No. 5: View of the lateritic and loamy soils at the project site

III.3.7 Geology

III.3.7.1 National Geological Context

Niger's geological structure is that of a rigid peneplain (**Map No. 10**) which has not undergone any significant marine transgression since the Paleozoic Era. The geological bedrock is therefore essentially made up of a predominately granite Precambrian basement and of continental sandstone and clay sediments deposited from the Lower Carboniferous to the Tertiary periods. This bedrock frequently disappears beneath the Quaternary alluviums of fossil valleys.

The basement is apparent in the far southwestern region of the country (Liptako Gourma), in the east (Damagaram-Mounio and south Maradi), in the Air Mountains and along the Djado Plateau. It consists of more or less metamorphized Precambrian sediments and intrusive granites that form eroded mountain ranges (Damagaram) or rejuvenated ones (Air). Recent volcanic activity with basaltic flows occurred in the Air at the end of the Tertiary and Quaternary periods.

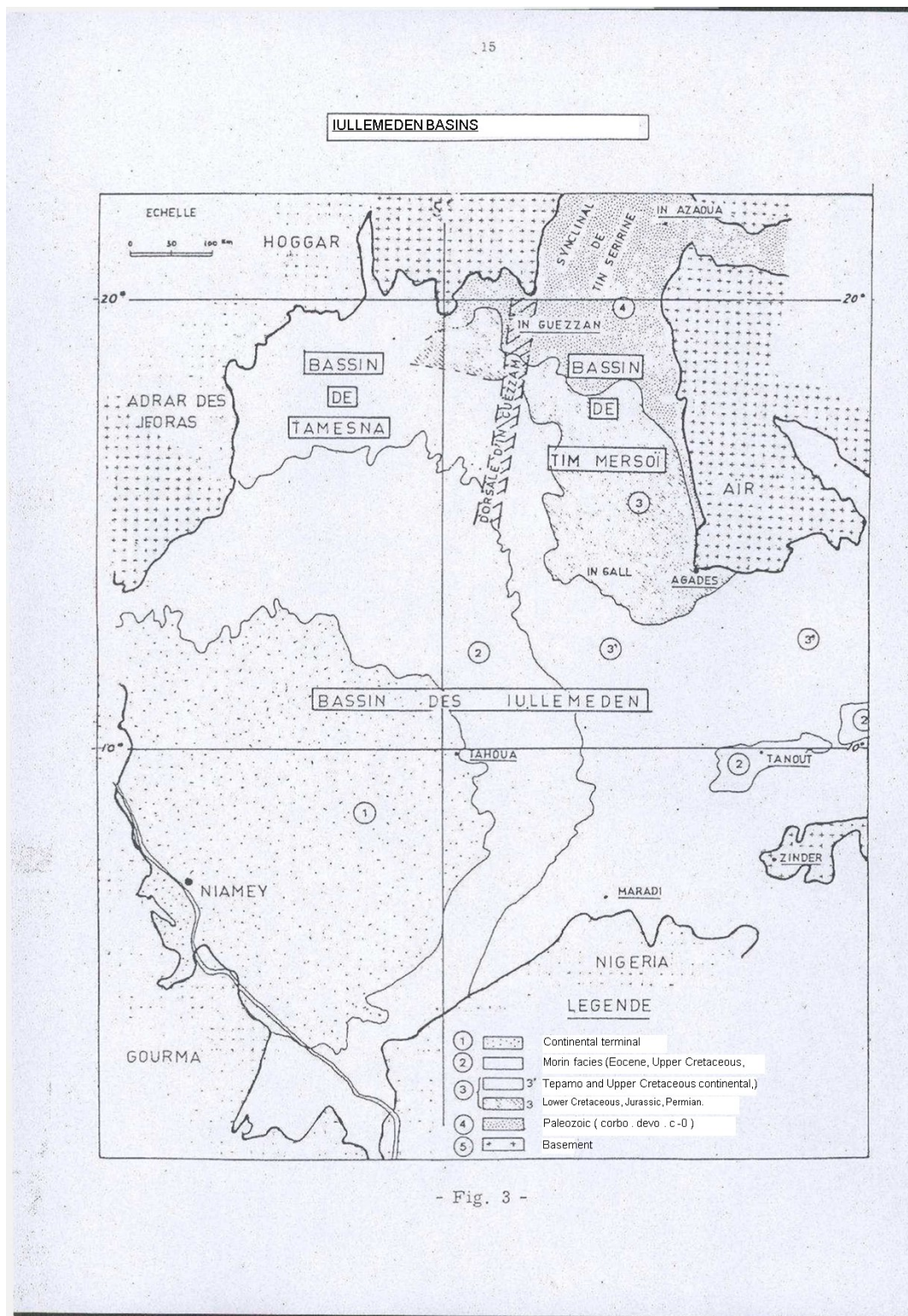


Map No. 10: National Geological Context

III.3.7.2. Regional Geological Context

The geology of the Agadez region is characterized by two large formations (**Map No. 11**):

- A basement (the crystalline Air Mountains) in the eastern part of the region;
- A sedimentary basin (Tim Mersoï Basin) which roughly covers the western area of the region.



Map No. 11: Regional geological context in the Tim Mersoï basin

- ✓ **Basement** The basement known as the Aïr Mountains is part of the extensive Hoggar Mountain formation, of which it is an entity as is the Adrar des Iforas, its western counterpart. It is made up of Precambrian-era cristallophyllian bedrock and granite intrusions. The various volcanic phenomena and tectonic movements have led to a model whose characteristics result from the lithological nature of the land.

- ✓ **Tim Mersoï Basin**

This basin is essentially made up of clay, clay-sandstone and sandstone sequences dating to between the Carboniferous and the Lower Cretaceous. It is a subset of the Lullemeden Basin. The Lullemeden Basin is an immense basin located in the southern part of the Hoggar range and bordered on the north by the Adrar des Iforas, Hoggar and Aïr basements. To the south, it extends up to where the basement rises near the major cities in Niger: Niamey, Maradi and Zinder. The northern part of this vast structural basin is divided by the In Guezzam submeridian ridge into two basins: the Tamesna basin (to the west) and the Tim Mersoï basin (to the east). The following stratigraphic column (**Figure No. 3**) summarizes the characteristics of the main geological formations.

The different series dating from the lower Visean to the lower Cretaceous are in shown in the chronological order of the deposits: the Térada series, the Tagora series, the Izegouandane series, the Aguelal series, the Goufat series, the Wagadi series, the Dabla series, and the Tégama group.

From a structural point of view, the Aïr Mountains and the Tim Mersoï Basin have been affected by tectonic deformations, with the main ones running NE, NNE-SSW, and NE-SW. It should be noted that the Arlit flexure-fault (trending N-S) is the major regional deformation visible from the south of Agadez to In Azawa in Algeria.

The structure of the Tim Mersoï Basin follows three major fault and/or flexure lines:

- ✓ Submeridian deformations: Arlit-In Assaouas fault and Tchizakaraten lineament
- ✓ N30-40 formations: Madaouela flexure, Adrar-Emoles flexure and Aouderer ridge
- ✓ N70-80 deformations: Ogba tectonic unit, Aguijir fault, Mehrérout fault and Azouza fault

The lithostratigraphic column of the Tim Mersoï basin is comprised of seven distinct series, namely: the Térada series, the Tagora series, the Izegouandane series, the Aguelal series (0-67 m); the Goufat series (0-120 m), the Wagadi series (0-176 m) and the Dabla series.

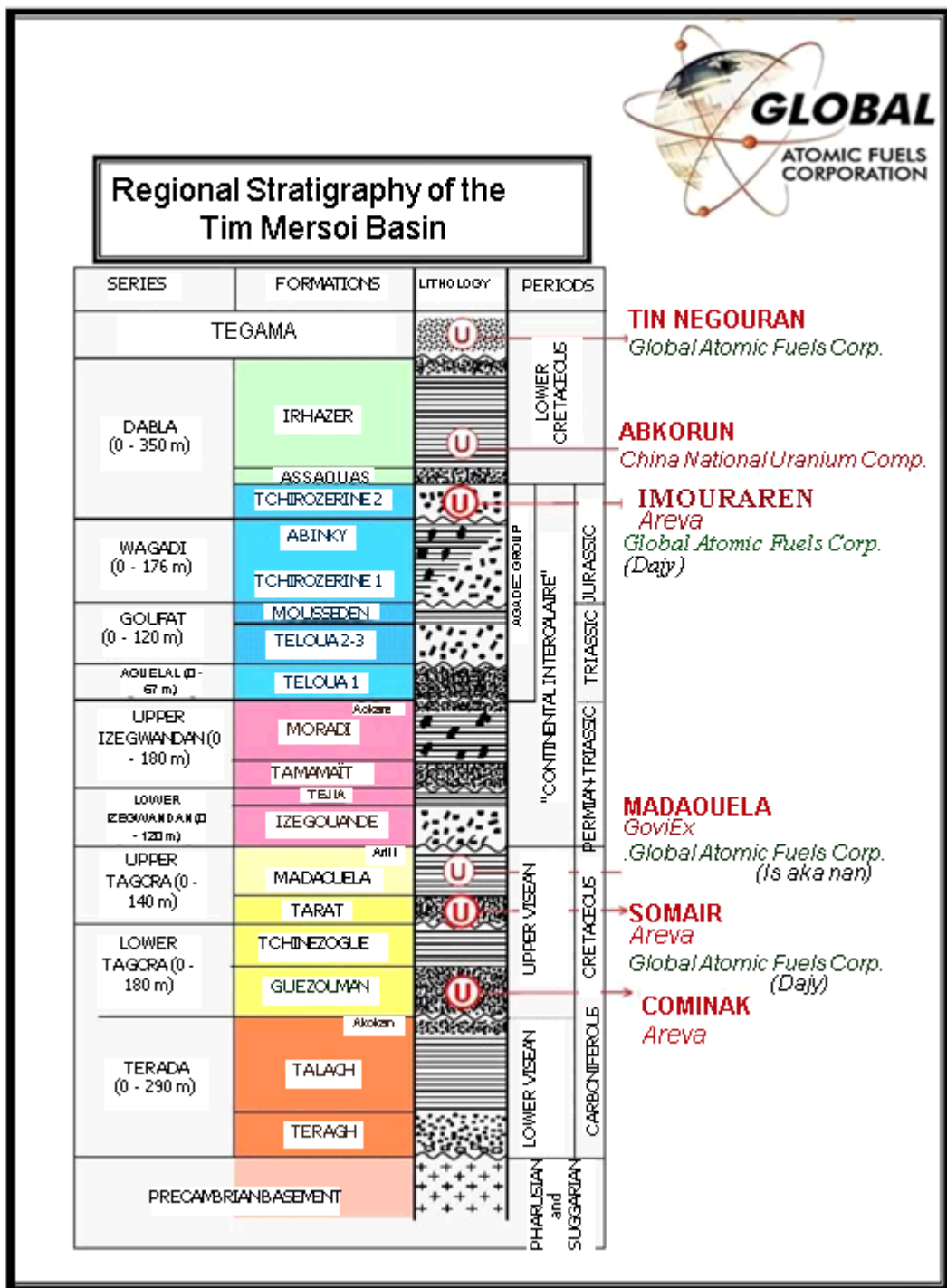
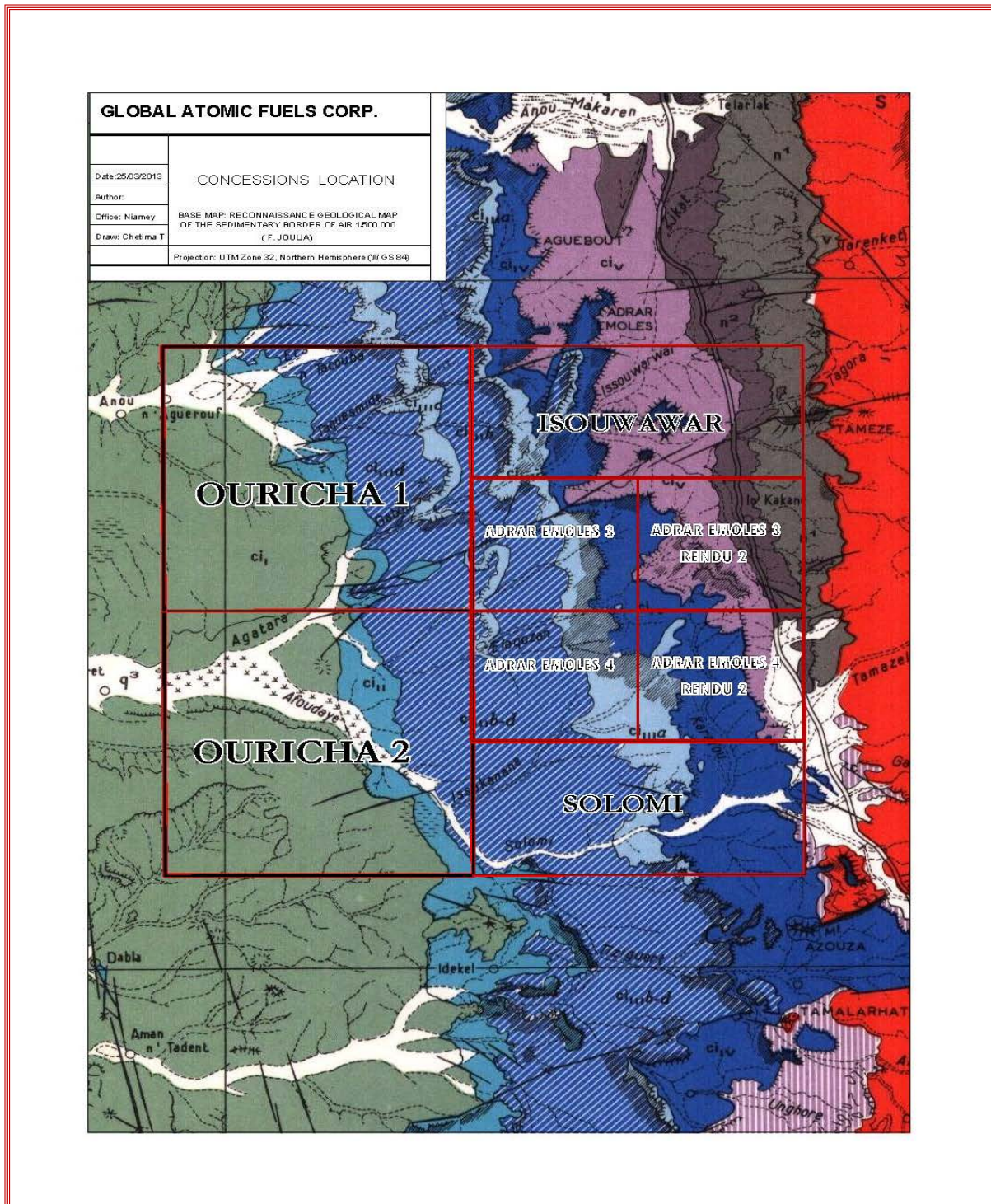


Figure 4: Overall stratigraphic column of the eastern part of the Tim Mersoï Basin (Global)

Within the perimeter of the permit area, there are essentially Carboniferous and Permo-Triassic sedimentary formations. These are mainly Carboniferous formations containing the uraniferous mineralizations of the Akouta and Arlit deposits. These geological formations make up bands running roughly north to south with a slight dip towards the south-west.

At the structural level, the perimeter of the Adrar Emoles 3 exploration permit is characterized by its location on the eastern side of the Arlit flexure-fault. The major tectonic formations that cut through it are the regional Azouza fault trending NE-SW (where the Azelik uranium deposit is found) and the Adrar Emoles flexure trending mostly NNE-SSW.

Map No. 12 illustrates the litho-structural framework of the permit area.



Map No. 12: Litho-structural framework of the site and neighbouring permits (Extract from the Joulia geological map)

III.3.8: Hydrogeology of the Permit Area

The hydrogeology of the area is characterized by the presence of five aquifers distributed as follows:

- ✓ The Tchirozérine II aquifer, which is not very productive in the sector as its flow rates fluctuate around 0.5 m³/h. It cannot be exploited in the sector due to this low flow rate.
- ✓ The Téloua aquifer, which includes the Tchirozérine I groundwater table and the tables in the three Téloua formations (Téloua 1, 2, and 3). This is a very productive aquifer with flow rates that vary from 15 to 25 m³/h, depending on the borehole, relative to the structures in the zone, which sometimes constitute screens for the groundwater run-off in the sector.
- ✓ The Izégouandan aquifer, which includes the Tamamaït and Upper Izégouandan groundwater tables whose lithology is not very interesting from a hydrogeological point of view due to flow rates of around 2 to 3 m³/h.
- ✓ The Tarat aquifer with its single, highly productive groundwater table (Tarat) in the sector that has a flow rate of more than 30 m³/h. Its use is very limited in the region due to its extreme depth.
- ✓ The Guézouman aquifer is composed of the groundwater table in the Guézouman formation, which is located at very great depths in the area (500 m).

III.3.8.1 Characteristics of the Various Aquifers

The characteristics of the different aquifers are summarized in Table No. 10.

Table10: Characteristics of the various aquifers

Hydrodynamic characteristics of the aquifers in the assessment area							
Reference	Aquifer	Groundwater table captured	Depth (m)	Ns (m)	Q (m ³ /h)	Transmissivity T (m ² /s)	Permeability K (m/s)
1	Tchirozérine II	Tchirozérine 2	95	30-60	0.5	1.05.10 ⁻⁶	2.10 ⁻⁷
2	Telaua	Tchi. 1 and Téloua 1, 2 and 3	180	40-55	15-25	2.10 ⁻⁴	5.10 ⁻⁶
3	Izégouandan	Izégouandan	231	30-45	1-3	3.10 ⁻⁵	1.4.10 ⁻⁶
4	Tarat	Tarat	330	25-40	>30	1.02.10 ⁻⁴	3.10 ⁻⁶
5	Guézouman	Guézouman	500				

III.3.8.2 Results of the Proponent's Hydrogeologic Survey

The hydrogeologic surveys conducted in the sector, the results of which are summarized in Tables Nos. 11, 12 and 13, made it possible to identify five aquifers.

- The Tchirozérine 2 aquifer, which captures the groundwater table with the same name. It is not very productive in the sector and has not been the subject of a thorough study.
- The Telaua aquifer which drains the water from four groundwater tables (Tchi 1 and Telua 1, 2, and 3)

Table11: Results of the hydrogeologic surveys of the Téloua aquifer

Item	Unit	Value
Borehole flow rate	m ³ /h	20
Maximum drawdown	m	43.31
Specific flow rate	m ³ /h/m	0.46
Static level	m	59.05
Pumping time	H	24
Transmissivity (T)	m ² /s	2.10 ⁻⁴
Permeability (K)	m/s	0.5.10 ⁻⁵
Storage coefficient (S)	%	

- Izegouandan aquifer

Table12: Results of the hydrogeologic surveys of the Izéguandan aquifer

Item	Unit	Value
Borehole flow rate	m ³ /h	3
Maximum drawdown	m	137.3
Specific flow rate	m ³ /h/m	0.022
Static level	m	36.78
Pumping time	H	12
Transmissivity (T)	m ² /s	3.3.10 ⁻⁵
Permeability (K)	m/s	1.4.10 ⁻⁶
Storage coefficient (S)	%	1.5.10 ⁻⁵

- Tarat aquifer

Table13: Results of the hydrogeologic surveys of the Tarat aquifer

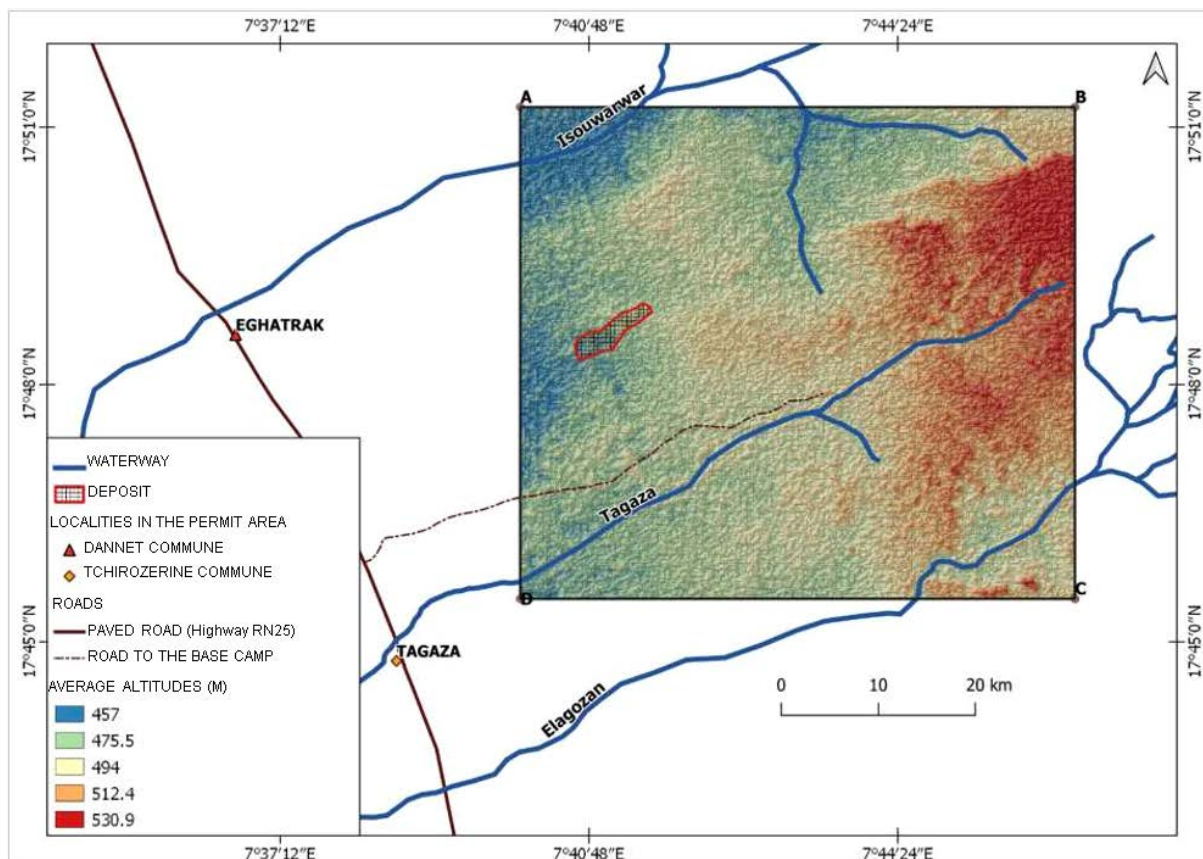
Item	Unit	Value
Borehole flow rate	m ³ /h	27
Maximum drawdown	m	32.77

Specific flow rate	m ³ /h/m	0.82
Static level	m	27.93
Pumping time	H	24
Transmissivity (T)	m ² /s	1.02.10-4
Permeability (K)	m/s	3.10-6
Storage coefficient (S)	%	4.10-4

- The survey of the Guézouman aquifer, which includes the Guézouman groundwater table, was not completed due to its depth.

III.3.9: Hydrographic Network in the Permit Area

The project area does not contain any permanent waterways. It nevertheless has a dense hydrographic network with large koris and their tributaries that drain off the rainwater. The largest of these koris are: Tagaza, Isouwarwar and Elagozan. The various waterways are sourced in the Air Mountains. The waters flow predominantly east to west. **Map No. 13** below illustrates the hydrographic network in the permit area.



Map No. 13: Hydrographic network in the permit area

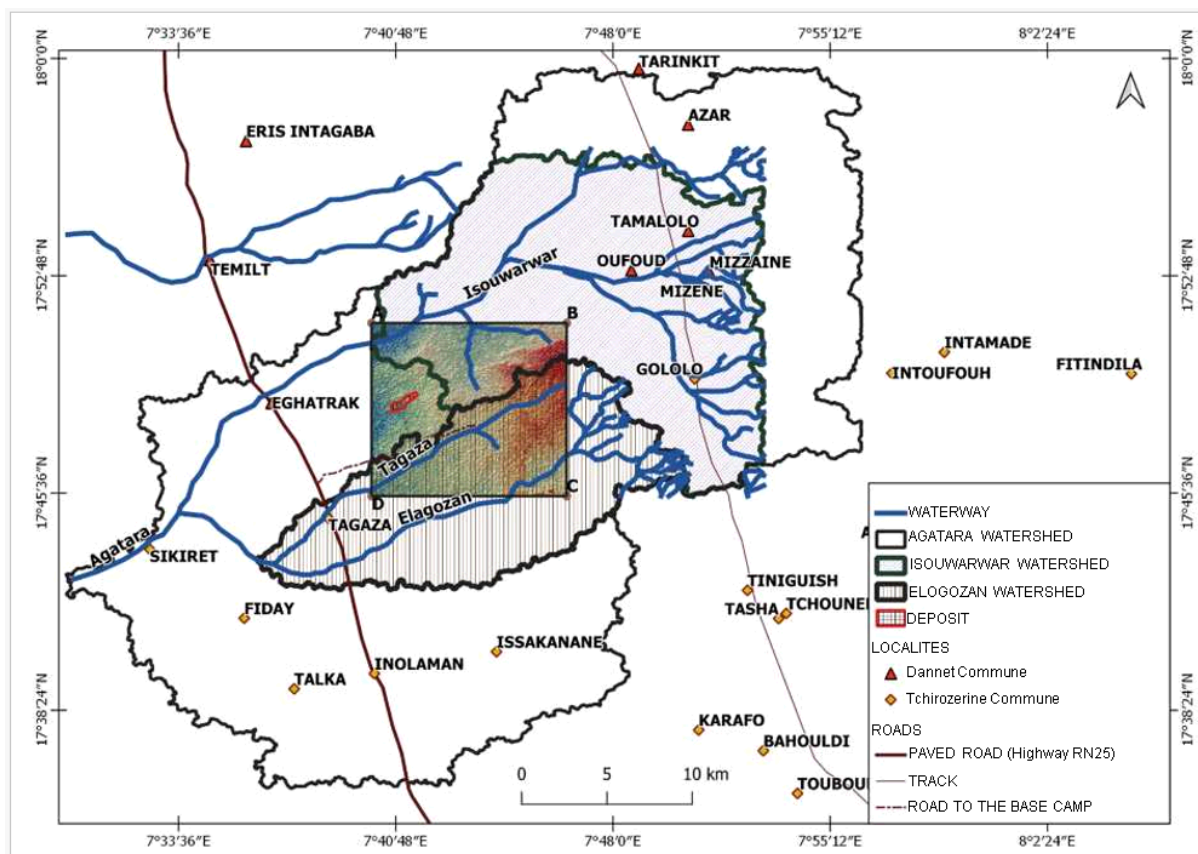
III.3 .10 Location of the Watersheds in the Permit Area

The Adrar permit area is located in the Agatara watershed (**Map No. 14**) which covers an area of approximately 1,170 km². However, the latter has two distinct subwatersheds: Isouwarwar and Elagozan-Tagaza.

The 292 km² Isouwarwar subwatershed (which is entirely within the Adrar Emoles 3 permit area) drains most of the water from the permit area to Agatara which is directly connected to Sikiret. The 188 km² Elagozan-Tagaza subwatershed, part of which is within the Adrar Emoles 3 permit area, also drains a large amount of water to Agatara. It should be noted that the deposit is not in any of these Agatara subwatersheds.

Consequently, the mining activities are not likely to contaminate these subwatersheds.

Map No. 15 shows the watersheds in the permit area and the major watersheds in the permit area.



Map No. 14: Watersheds in the permit area

III.3.11 Bacterial and Mineralogical Analyses of the Water

To determine the bacteriological and mineralogical characteristics of the groundwater, 12 water samples were taken within an average radius of 15 km around the deposit (see **Map No. 15 for the sampling points and Tables No. 7 and No. 8 for the coordinates and codes**). The results of the analyses are shown in **Appendices No. 1 and No. 2** and highlight the following:

- Bacteriological characteristics: All of these waters contain total coliforms and common germs which make their bacteriological quality unfit for human consumption. They will therefore need to be disinfected before any use. It should also be noted that their pH is above 8.5.
- Mineral characteristics: All the waters have an average mineralization rate, and all parameters analyzed within the WHO standards. Physicochemically, they are suitable for human consumption.

Table No. 14 lists the characteristics of the structures from which the samples were taken.

Table14: Characteristics of the structures sampled

Characteristics of the structures sampled					
Location or structure	Type of structure	X	Y	Depth (m)	Groundwater table captured
In Kakan	PC1_In Kakan	378010	1971055		Tarat
In Kakan	PC2_In Kakan	377983	1971038		Tarat
In Kakan	PC3_In Kakan	377916	1971081		Tarat
In Kakan	PC4_In Kakan	377574	1971044		Tarat
Mizené	PEA	378521	1977557		Tarat
Oufoudou	PC1	372184	1976082		Izégouandan
Oufoudou	Simple MINI AEP	370038	1976921	200.00	Tarat
Elagozan market garden sites	13 cemented wells	365120	1963562	13.5	Alluvium
Teragan	Well	369277	1965506	???	???
Taden_Sekiret	Borehole	342822	1959424	110	Teloua
Tilkin	Well	350281	1963089	32.50	Teloua
Gani	Well	346950	1961916	20.00	Teloua
Guifayen Digui	Borehole	352514	1955531	20.00	Teloua
Adaley	Well	354592	1950913	32.50	Teloua
Belatan	Well	351429	1953108	30.00	Teloua
Tziliyaman	Well	356137	1949834	37.50	Teloua
Inalaman	Borehole	359125	1951762	97	Teloua
Tagaza	Borehole	356044	1962722	186	Teloua
Garden_Elogozan	Well	364311	1963373	14.12	Alluvium
Global base camp_Camp Dajy	Borehole	364950	1968322	175	Teloua
Borehole and tank storage	Borehole	359420	1968508	175	Teloua
Foraco Camp	Borehole	365450	1968322	180	Teloua
GHF1	GHF1 borehole	360101	1970600	175	Teloua
HDYRO3	Borehole	359988	1969080	205	Teloua
Agatara Village	Borehole	352588	1969202	200	Teloua
Borehole on Camp Dajy road	Borehole			96	Teloua

III.3.12 Air quality

The current sources of airborne emissions in the area are natural ones. This is windblown dust arising from the topsoil of the landscape and desert climate. Naturally dusty conditions prevail in the region due to the soil type, desert climate, strong and hot winds, and flat topography. Anthropogenic emissions in the area are related to research work and uranium mining operations. However, the LEGENI design office conducted two programs to monitor the initial air quality and ambient air quality in the area under study (which includes the project area and the surrounding communities). Monitoring of the initial condition focused solely on air pollutants by establishing air

quality and/or quantity limits. These limits should increase with the emissions from the proposed operations. The sample parameters included sulphur dioxide (SO₂), nitrogen dioxide (NO₂), dust flows, suspended particles (particulate matter "PM") 1, heavy metals in PMs, radionuclides, short- and long-term gamma dose rates, as well as radon concentrations.

III.3 .13 Noise Levels

There are two industrial units in project area:

- ✓ The Société Nigérienne du Charbon d'Anou-Araren (SONICHAR), located approximately fifty kilometres from the project area,
- ✓ The Société des Mines d'Azélik (SOMINA), located approximately one hundred fifty kilometres from the project area,

Thus, in light of the above, we can affirm that the project area is free of noise pollution because the only industrial unit in production (SONICHAR) is located far enough away that its activities do not impact the permit area. The main sources of noise at the site are therefore natural ones.

III.3 .14 Radioactivity

Establishing an initial radiological status prior to starting operations is essential to understanding the likely impact of uranium (U) mining on the natural and human environment. Its main purpose is to determine the current radiological level (baseline or initial radiological level) of the mining site and its surroundings before starting the mining operations.

The initial radiological state of the site and its surroundings is very important for the future monitoring of the radiological impacts of the mining, haulage and processing of the uranium ore that will be carried out by Global Atomic Fuels Corporation. The resulting database would facilitate communication between the mine operator and its partners and would above all create and maintain a climate of trust and total adherence between them, which is key to the development of its activities.

When evaluating the doses for workers and inhabitants, the three main causes of radiation exposure are:

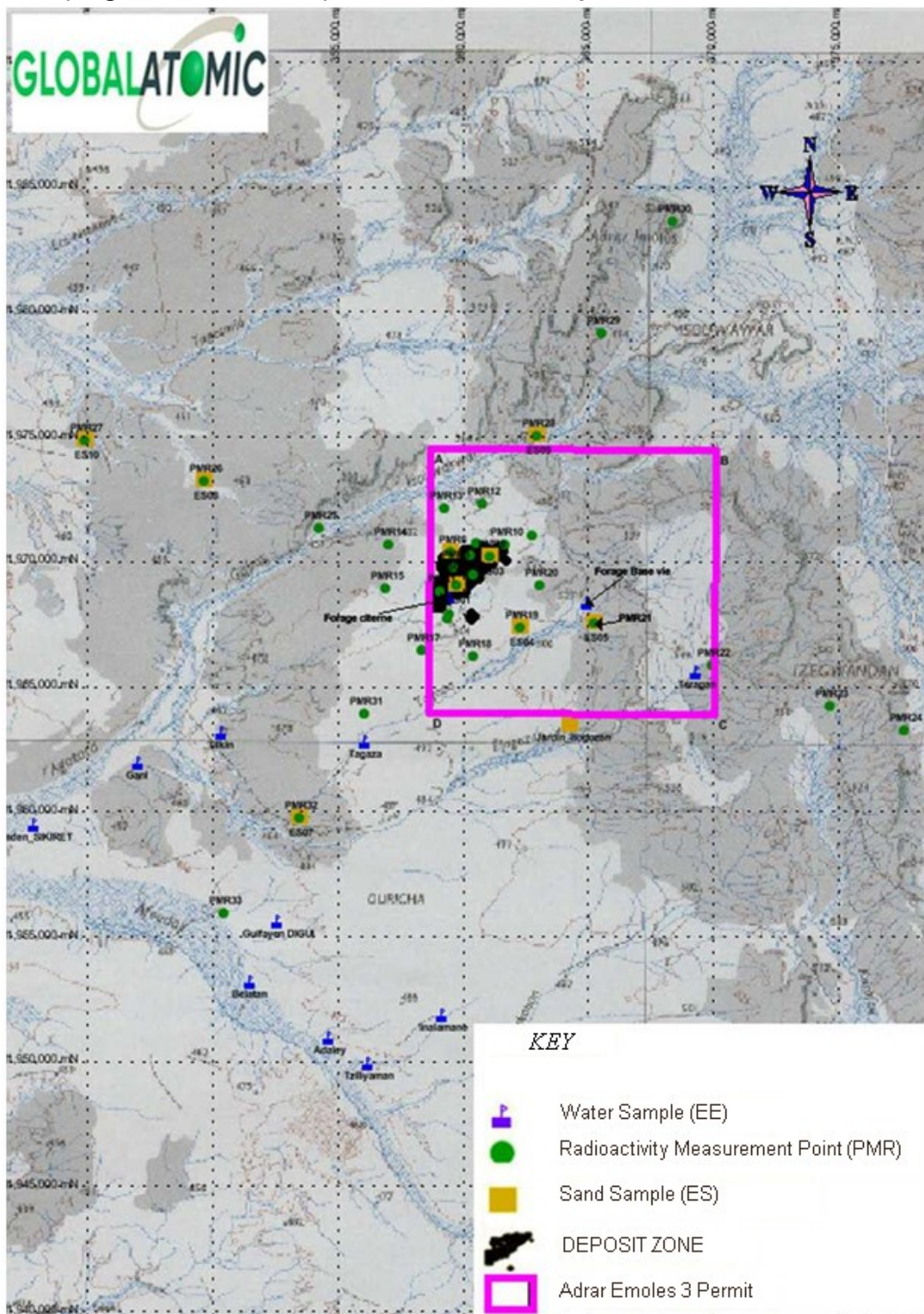
- External exposure to energetic gamma and beta radiation,
- Internal exposure due to the inhalation of radon-222 gas and radioactive dust containing 238 uranium and its long-life progeny.
- Internal exposure due to the ingestion of water and food containing natural radioelements.

With regard to the future mining site, there is currently no farming activity and the houses in the area are traditional, open and aerated, with no possibility for radon gas or dust to accumulate. Therefore, for the ad hoc measurements, the only interesting parameter is the dose rate of external exposure to ambient radiation. This is why we will focus on:

- ✓ the measurements of the external exposure dose rates at several points in the area of the uranium deposit, its surroundings and in two perpendicular directions that pass approximately through the centre of this area;
- ✓ the measurements of uranium 238 concentrations in soil samples taken at certain points;

- ✓ the measurements of the global alpha and global beta volumetric activity in the water samples from the water supply sources (wells and boreholes) in the villages and camps within a 20 km radius around the uranium deposit

All sampling and measurement points are shown on **Map No. 15**



Map No. 15: Distribution of radiological measurement and sampling points in relation to the deposit

III.3.14.1 Measuring the External Exposure Dose Rates

The devices used were a GPS (GARMIN etrex 10) to find the points using the geographic coordinates, a radiameter (ATOMTEX AT6130, S/N serial number: 20378) and a radiation detector (RadEye, model PRD-ER, serial number S/N: 01653) to measure, respectively, the external exposure dose rates and counts per second, at about one meter from the ground. The results are shown in **Tables No. 15, No. 16 and No 17.**

Table15: Measuring points of external exposure dose rates and counts per second on the left-hand deposits and their surroundings

Point number		1	2	3	4	5	6	7
Geographic coordinates in UTM	X	359149	359803	360453	359496	359642	359557	360303
	Y	1968752	1969047	1969452	1967989	1969763	1970370	1970248
Dose rates at ambient temperature at 1 m, in nSv/h		110	140	130	N/G	130	80	320
Number of counts per second (cps)		30	31	37	N/G	31	30	114
Point number		8	9	10	11	12	13	14
Geographic coordinates in UTM	X	361086	360596	361709	362810	360841	359275	357049
	Y	1970166	1970741	1970680	1971022	1972270	1972099	1970668
Dose rates at ambient temperature at 1 m, in nSv/h		100	130	60	80	70	80	130
Number of counts per second (cps)		40	21	20	19	15	21	25
Point number		15	16	17	18	19	20	
Geographic coordinates in UTM	X	356964	359441	358370	360462	362345	363104	
	Y	1968919	1967671	1966411	1966154	1967353	1969041	
Dose rates at ambient temperature at 1 m, in nSv/h		160	90	160	200	120	140	
Number of counts per second (cps)		34	42	26	30	27	24	

Table16: Measuring points of external exposure dose rates and counts per second on the right-hand deposits and their surroundings

Item	[Deposit, south-east [[Deposit, north-west [
Point number	21	22	23	24	25	26	27	
Geographic coordinates in UTM	X	365300	370000	374700	377703	354300	349700	344900
	Y	1967500	1965800	1963206	1962500	1971300	1973200	1974800
Dose rates at ambient temperature at 1 m, in nSv/h	100	70	110	100	170	110	130	
Number of counts per second (cps)	40	20	36	41	50	35	34	
Item	[Deposit, north-east [[Deposit, south-west [
Point number	28	29	30	31	32	33		
Geographic coordinates in UTM	X	363000	365600	368400	365100	353500	350500	
	Y	1975000	1979100	1983600	1963900	1959700	1955900	
Dose rates at ambient temperature at 1 m, in nSv/h	240	XXXXX	XXXXXXXXX	250	160	180		
Number of counts per second (cps)	41	XXXXX	XXXXXXXXX	31	32	42		

In addition to the initially-planned points, external exposure dose rate measurements were taken at other points where water samples were taken. The coordinates of these points and the measurement results are presented in the next two tables:

Table17: Additional measurement points and water sampling

Village or camp	Tilkin	Taden	Guifayen Digi	Adaley	Belaten	Tegazaou Tziliyaman	
Geographic coordinates in UTM	X	350281	342822	352314	354592	351429	356137
	Y	1963089	1959424	1955531	1950913	1953108	1949834

Dose rates at ambient temperature at 1 m, in nSv/h	110	230	100	110	80	70
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Teragan	Gani	Inolamane	Tagaza	Elagozan "Jardins"	Global Atomic Camp	Water supply borehole
369277	346950	359125	356044	364311	364950	359420
1965506	1961916	1951762	1962722	1963373	1968322	1968508
100	110	110	140	160	100	130

Finding: Based on the measurement results of the external exposure dose rates recorded, the annual natural external exposure dose received by a member of the general public living in the area varies between 2.80 milli Sieverts (mSv) at a continuous dose rate of 320 nSv/h and 0.53 milli Sieverts (mSv) at a continuous dose rate of 60 nSv/h.

III.3.14.2 Measuring the Radiation in the Soils

Samples of the topsoil were taken at a thickness comprised between 0 and 5 mm, using a small shovel and plastic sample holders, at certain points in the deposit area and surrounding environment. These samples were taken for radiological analyses specifically to determine the mass concentrations or mass activities of uranium-238 and radium-226. Sampling was done in the gardens in Elagozan (7.94 km), at points PMR21 (5 km), PMR26 (10 km), PMR27 (15 km), PMR28 (5 km), PMR32 (10 km), PMR2, PMR6 and PMR8 on the deposit and PMR19 which is in its immediate vicinity. Table No. 18 lists the sampling points and the assigned codes.

Table18: Soil sampling points and sand sample codes

Sampling point	PMR2	PMR6	PMR8	PMR19	PMR21	Elagozan "Jardins"
Sample code	ES01	ES02	ES03	ES04	ES05	ES06

Sampling point	PMR32	PMR26	PMR28	PMR27
Sample code	ES07	ES08	ES09	ES10

Results of the radiological analyses of the soils

The analyses results are attached to the report (**Appendix No. 4**).

III.3.14.3 Measuring the Radiation Level at the Water Supply Points (Wells and Boreholes)

All nomadic villages or camps in the area that were less than 20 km from the perimeter of the uranium deposit were visited and water samples were taken from the wells and boreholes. To do this, plastic bottles with a capacity of 1.5 litres were used. Thirteen samples were collected for radiological analyses to determine the volume concentrations of alpha and beta activity and the total indicative dose (TID).

The geographical coordinates of the wells and boreholes where samples were taken are given in Tables No. 16 and No. 17. Table No. 18 lists the sampling points and the assigned codes.

Table19: Sampling points and water sample codes (village and type of source)

Village or camp	Tilkin	Taden Sekiret	Guifayen Digui	Adaley	Belatan	Tegazaou Tziliyaman
Source	Well	Borehole	Borehole	Well	Well	Well
Sample code	EE03	EE02	EE05	EE06	EE13	EE07
Teragan	Gani	Inolaman e	Tagaza	Elagozan “Jardins”	Global Atomic Camp	Water supply borehole
Well	Well	Borehole	Borehole	Well	Borehole	Borehole
EE01	EE04	EE08	EE09	EE11	EE10	EE12

Results of the radiological analyses of the water

The analyses results are attached to the report (**Appendix No. 3**).

III.3.14.4 Recommendations

The results of the ambient dose rate measurements are highly variable and reflect the heterogeneous nature of the land. They provide a good reference database but to be able to supplement them and still comply with the requirements for radiological monitoring of the environment, *it would be necessary to implement a program over a period of twelve consecutive months, divided into four monitoring periods of three months each. This is very important since the maximum regulatory doses of ionizing radiation exposure are set out in the national regulations and international standards for a period of one year.*

III.3.14.5 Installation of Environmental Monitoring Stations

Before starting the mining activities, environmental monitoring stations will be installed in the area to:

- take air samples over periods of three consecutive months to determine the average volume concentrations in the air of the potential alpha energies of the radon222 and of the alpha activities of long-life emitters of the progeny of uranium 238.
- take measurements of the annual external exposure dose using passive dosimeters, over periods of three consecutive months.

III.3.14.6 Food Chain

Since no food is produced in the area aside from milk and cheese, samples of these foods will be collected and analyzed in order to have their radiological reference levels, before the construction phase of the mine.

Due to uranium's chemical toxicity when ingested, the results of the radiological analyses of the drinking water will be supplemented by those from analyses carried out to determine the uranium content in the water.

III.3.14.7 Calculation of Cumulative Public Dose

The people we met in the ADRAR EMOLES project area are nomads. A realistic exposure scenario that takes their lifestyle into account will be defined with the relevant state institutions in order to establish a formula for calculating the cumulative exposure doses that these populations are likely to receive in a year and that can be attributed to the uranium mining operations.

III.4 Biological Environment

III.4.1 Vegetation

Based on the observations and on the data collected in the field and in the two communes (Tchirozérine and Dannet), the vegetation in the project area can be classified according to its locations: along the koris where it is dense and varied, on the outcrops around the wadis or in drainage areas. The main woody species encountered are the following: *Acacia tortilis*, *Acacia erhembergiana*, *Balanites aegyptiaca*, *Zizyphus mauritiana*, *Maerua crassifolia*, *Boscia senegalensis*, *Leptadenia pyrotechnica*, *Salvadora persica*, *Acacia raddiana*.

Palm trees (*Hyphaen tebeica*) can also be found in certain valleys and other lowland areas.

Nowadays, an exotic species, *Prosopis juliflora* is colonizing the koris and bottomlands as its seeds are spread ever further by ruminants and runoff water.

In terms of forests, it should be recalled that according to the DRE/SU/DD report, the Agadez region has:

- 8,001,050 ha of classified State-owned forest;
- 1,050 ha of classified forests, now almost completely destroyed;
- 7,736,000 ha of wildlife reserves; the largest of these is the Réserve Naturelle Nationale du Ténéré [Ténéré National Nature Reserve (RNNAT)], which has been declared at-risk.

The herbaceous species in this area include *Panicum turgidum* which is very dense in some places, *Cymbocogon shoenanthus*, *Maretia canescens*, *Schowra thebaica*, *Cynodon dactylon*, *Aristida sp.*, *Cassia tora* and *Brachiara spp.* The woody and herbaceous species essentially make up the food base for the livestock in the area. They are also used as a source of energy by the local communities, as well as for traditional pharmacopoeia and craftsmanship (sculpture and frames for traditional huts).

Traditionally, the stock farmers, who make up the largest part of the communities in the area, move into the valleys in the dry season in search of available pasture and water for their herds. They move up the outcrops and onto land that does not flood in the winter.



Photo No. 6: View of the vegetation (stands of *Clotropiss proera*) in the project area



Photo No. 7: View of the vegetation (*Acacia radiana*) in the project area



Photo No. 8: View of the vegetation (*Panicum turgidum* and *Acacia radiana*) in the project area



Photo No. 9: View of the vegetation (*Calotropis procera* and *Panicum turgidum*) in the project area

III.4.2 Wildlife

The Agadez region has a wealth of different wildlife species, particularly in the Air and Ténéré National Nature Reserve (RNNAT), which was classified as a biosphere reserve in 1998. Some species like ostriches (*Struthio camelus*), addax (*Addax nasomaculatus*), oryx (*Oryx dammah*), dama gazelles (*Gazella dama*), and cheetahs (*Acinonyx jubatus*) are becoming increasingly rare. This rarefaction is due to several forms of poaching and to the destruction of the plant cover. This phenomenon has intensified since 1991 and the onset of insecurity in the area, which has made it difficult for the environmental officers to carry out their monitoring missions.

The 2012 survey conducted as part of the COGERAT project helped provide an estimate of the various wildlife populations and to take appropriate action. More specifically, the area is host to the following species:

✓ **Mammals:**

Several species of mammals are present in the area. This essentially involves:

- ✓ Dorcas gazelles (*Gazella dorcas dorcas*);
- ✓ Dama gazelles, also known as “Robert does” (*Gazella dama dama*);
- ✓ Primates such as olive baboons (*Papio cynocephalus*) and patas or red monkeys (*Erythrocebus patas*)
- ✓ Common jackals (*Canis aureus*),
- ✓ Palm squirrels (*Epixerus ebii*);
- ✓ Fennecs (*Fennecus zerda*);
- ✓ Hares (*Lepus crawshayi*), which are present almost everywhere.

✓ **Birds**

There are three groups of birds in the area:

- Sahelian birds

These birds mainly live in the most heavily-wooded habitats. These are grey woodpeckers (*Mesopicus goertae*), Vieillot's barbets (*Lybius vieillotii*), golden sparrows (*Passer luteus*), collared doves (*Streptopelia roseogrisea*), and common bulbuls (*Pycnonotus barbatus*) with much more extensive distribution areas.

- Sahelo-Saharan birds

This group includes Nubian bustards (*Neotis nuba*), dark chanting goshawks (*Melierax metabates*), and spotted sandgrouse (*Pterocles senegallus*).

- Saharo-mountain birds

This group is found mostly in the wadi and is mainly composed of Lichtenstein's sandgrouse (*Pterocles lichtensteinii*), white-crowned wheatears (*Oenanthe leucopyga*) and blackstarts (*Oenanthe melanura*).

In addition to native birds, there is a diversity of Afrotropical and Palearctic species that migrate from Europe or Asia, including Abyssinian rollers (*Corassinus abyssinicus*), crested larks (*Galerida cristata*), white-throated bee-eaters (*Merops albicollis*), Abdim's storks (*Ciconia abdimii*), Jacobin cuckoos (*Clamator jacobinus*), sand martins, and white wagtails (*Motacilla alba*), to only name a few. There are also other species such as Nubian vultures (*Torgos tracheliotos*) and storks.

✓ Reptiles

Reptiles include:

- Horned vipers (*Cerasts*);
- Spitting cobras (*Naja nigricollis*);
- Sand boas (*Eryx*);
- Sand racers (*Psammophis schokari*);
- Spiny-tailed lizard (*Uromastrix acathinurus*);
- Desert tortoises (*Goechelane sulcata*);
- Desert monitor lizards (*Varanus griseurs*);
- And several other species such as Agamas.

✓ Invertebrates

The most commonly-found invertebrates in the area are beetles, crickets, butterflies, ticks, caterpillars, ants, and preying mantis, as well as dangerous desert scorpions.

III.4.3 Protected Areas of the Region

There is no legally-protected or priority biodiversity site within a radius of 25 km. The project site is located approximately 170 km southwest of the Addax Sanctuary which is part of the Aïr Mountains, and from the Ténéré National Nature Reserve (RNNAT), a UNESCO World Heritage site located approximately 130 km southwest of the project area.

The Project area is located near the UNESCO-MAB Aïr and Ténéré Biosphere Reserve. This reserve covers 24 million hectares in the Agadez region, which is characterized by an arid Saharan climate. The area is one of the driest in the country and extends over two geographic regions. The Aïr is a mountain range composed of crystalline and volcanic rock and is acknowledged as one of the first areas in which prehistoric metalworking took place.

The Ténéré is composed of Quaternary sands (fine alluvium, sand in ridges blown into the shape of a windmill, and moving sand dunes). The reserve probably contains some of the last viable populations of large ungulates in the eco-region. The vegetation of this reserve is composed of approximately 300 large plants. It is also famous for its many archaeological and prehistoric sites with petroglyphs indicating ancient human populations. Depending on the season, around 39,000 people live in the Biosphere Reserve (1997); their livelihoods are based on camel, goat and sheep farming, crop farming and crafts.

III.4.4 Human Environment

III.4.4.1 Geopolitical Context

Niger is subdivided into eight administrative regions, 63 departments, eight cities, 15 communal districts, 37 urban communes and 214 rural communes. Each region is subdivided into departments, communes, cantons and groups. The cantons and groups are areas that are not covered by the communes and are not governed by the departments, while the communes have elected councils and mayors.

The Agadez Region, (or the Aïr Region as it is locally known), is the largest region in Niger and covers an area of almost 700,000 km², i.e., 52% of the total area of the country. Agadez is located in

north central Niger at the southern tip of the Sahara Desert where the land is semi-arid. The region is divided into six departments: Arlit, Bilma, Tchirozérine, Aderbissinat, In-Gall, and Iférouane. The town of Tchirozérine is located 70 km northwest of Agadez, while the town of Dannet is 140 km northeast of the region's administrative centre. Access is possible via a semi-rigid paved road, Highway RN25, also known as RTA, which is part of the national road network. The Tchirozérine Arlit-Agadez section is part of the Trans-Sahara Highway that runs from Algiers, Algeria to Lagos, Nigeria.

III.4.4.2 Demography

The population of Niger was estimated at 19,865,066 inhabitants in 2016, with an annual intercensal growth rate of 3.9%, one of the highest in the world. This high demographic growth rate is due in particular to a high fertility rate (the total fertility rate for the entire country increased from 7.1 children/woman in 2006 to 7.6 in 2012), which results in the population doubling every eighteen years. The population of Niger is very young and predominantly rural. Children under 15 years of age make up 51.7% of the population. Of these, 21.16% are less than 5 years old and 4.56% are less than 11 months old. Women of childbearing age represent 20.13% of the population. The proportion of people 65 years of age and older is 3.5%. The working population aged 15 to 64 represents 44.9% of the population. The majority of the population is sedentary (98%) and lives in rural areas (81.6%).

The population density in the project area is less than one inhabitant/square kilometre, with over 70% of the population living in the administrative centres of the communes, department and regions. The total population of the two communes of Tchirozérine and Dannet, which are considered to be the area of direct influence of the project, is estimated at 116,630 inhabitants, with, respectively, 80,000 inhabitants in the urban commune of Tchirozérine and 36,630 in that of Dannet. This population is characterized by its large number of young people. For example, according to the 2017 PDC for Tchirozérine, a quarter of the population of Tchirozérine is between 0 and 14 years of age and 36% is between 14 and 40 years of age. This population of Tuareg origin is made up of several tribes belonging to the Kel Ewey Confederation. These tribes belong to three chiefdoms: Sultan, Anastafidat and Imakitan, which all live outside of these communes (Agadez and Timia).

The nomadic Tuaregs have historical connections with their natural environment and temporarily migrate between regions and between departments in search of pasture and seasonal jobs. It is mainly the men who travel while the women stay in their village. With the decline in traditional livelihoods, young people in particular migrate to urban areas in search of alternative lifestyles. Migration from other parts of Niger, as well as from neighboring countries, is mainly associated with job opportunities in the mining industry. For several years now, Arlit, Akokan, Tchibarakaten, Djado and Tchirozérine have been multi-ethnic centres serving the mining industry. It is anticipated that this migration to the zone will further increase with the development of new mining operations proposed by mining companies, in particular Global Atomic Corporation and GOVIX.

III.4.4.3 Social and Land Organization

In Niger, at the local level, social organization reveals two distinct types of authority:

- Modern authority exercised by town councils headed by mayors
- Traditional authority exercised by traditional chiefs and religious leaders for conflict resolution

From a customary standpoint, governance is ensured by the traditional leadership which in the inhabitants' opinion is the institution that is most appropriate and closest to the people and to which they refer first for advice, arbitration and settlement of all disputes.

Traditional chieftaincies are structured around the canton chiefs and are groups with networks of village headmen and tribal leaders.

The permit area therefore has the following traditional structures:

- ❖ The Tuareg Confederation (Kel Ewey in the Air and the Anastafidet), Tchinwafara Tribe, and Kel Gharous.)
- ❖ The Arlit Group (Kel Azara Tribe 1, Kel Azara Tribe 2, Kel Afagawel Tribe, Kel Afagawel Tribe [sic], Tcheguehe N'effes Tribe, Eklan Tawsit Tribe, and Gharouss Tribe).

The inhabitants' livelihoods are essentially agro-pastoral and productive land is therefore an important resource to support these activities. Nigerien legislation recognizes the State as the owner of the land but also establishes and recognizes the right to private property and customary property rights to the land. Pursuant to the Land and Public Domain Code, the State holds private property rights over all "vacant or unclaimed land" and over the public domain, i.e., over land allocated to provide public services and/or for public use.

The State is also entitled to expropriate land if a public interest has been established, to regulate land use for urban or rural development needs and, when it is in the public interest, to establish easements. Traditionally, the land belongs to the village's founding family and is acquired by the households through inheritance, donation or extended families.

III.4.4.4 Education

Niger is one of the countries in Sub-Saharan Africa that is facing serious problems with its education system, in terms of both access and quality. According to the Performances du Système Éducatif Nigérien [Performance of the Nigerien Education System] survey (PASEN 2014), the education system in Niger falls within a Sahelian educational context marked by difficulties in accessing an approach that promotes quality education. These difficulties stem primarily from the education policy guidelines set out in the Programme Décennal de Développement de l'Éducation [Ten-year Education Development Plan (PDDE)]. Indeed, the PDDE has promoted the quantitative development of schools to the detriment of the qualitative accompaniment targeted by the African countries that are party to the "Education Pour Tous" [Education for All] charter (Dakar Action Framework, 2000).

In both communes in general and in the project implantation area in particular, the education sector includes, in addition to conventional schools, medersa schools, literacy courses, and denominational schools. Basic programs are taught at conventional primary schools and medersas. Compared to conventional schools, medersas are very recent.

These two types of schools are characterized by a disparity between girls and boys in particular, between tenured and contractual teachers, and between classrooms in buildings constructed in solid materials and classes taught in huts.

The two communes offer the following schools:

- ✓ **Dannet:** Six middle schools dispensing general education programs (CEGs) and 30 elementary schools for a total enrolment of 984 elementary school students comprising 536 boys and 448 girls.
- ✓ **Tchirozérine:** One secondary school (CES) and three CEGs for 1,071 students. This commune also has 91 elementary schools of which 67 are “conventional” schools; six “community” schools; two “bilingual” schools (French-Tamasheq); 15 Franco-Arabic schools and a private school. These schools have a total enrolment of 7,801 students, with 3,502 girls (i.e., 45% of the total) and 4,299 boys.

With regard to literacy, the commune has 34 functional centres for a total of 850 learners. These centres operate with the support of certain partners such as UNICEF, AFRICAIRE, etc.

Like the literacy centres, the Koranic schools do not have clean and sustainable infrastructures. Classes are usually taught in rough shelters with no conveniences. Education is one of the top priorities of the local communities. Therefore, the local stakeholders’ views on the matter of education are not only very divergent, but also limited. Nevertheless, some of the local leaders met expressed their satisfaction with the initiation of the project because it will continue to support other partners in the area of education.

According to the Regional Directorate of Vocational and Technical Education (DREP/T), the Agadez region offers young people the following opportunities for vocational training: Six information, career guidance and support platforms for young people, of which three are long-standing ones (Agadez, Arlit and Tchirozérine) and three were more recently-opened (Aderbissinat, Bilma and In-Gall).

Tables No. 20 and 21 show the vocational training potential, which is an important asset in the implementation of this project in terms of the availability of a moderately skilled workforce in the Agadez region.

Table20: Vocational Training Schools in the Region

No.	IPD (Inspection Pédagogique Départementale [Departmental Education Inspectorate])	Schools			
		Public	Locality	Private	Locality
1	Tchirozérine	Lycée Professionnelle en Hôtellerie et Tourisme [vocational school for the hospitality and tourism sectors (LPHT)]	Agadez	1. Centre de Formation et d'Apprentissage de l'Air [Air Vocational Training School (CFDA)]	Agadez

2		Centre de Formation Professionnelle et Technique [Centre for Vocational and Technical Training (CFPT)]	Agadez	2. Ecole Supérieur de l'Economie et de Gestion [Higher School of Economy and Management (ESEG)]	Agadez
3		Collèges d'Enseignements Techniques [Vocational Middle Schools (CETs)]	Agadez	3. Centre Privé de Santé Publique [Private Public Health Centre (CPSP)]	Agadez
4	Aderbissinat		4. Institut Pratique de Santé Publique [Practical Institute for Public Health (IPSP)]	Agadez	
5	In-Gall		5. Support Centre (Association d'aide à l'enfance en difficulté [special education association])	Agadez	
6	Tchirozérine				
7	Bilma				
8	Agadez				
9	Aderbissinat				
10	Centre de Formation aux Métiers [Vocational Training Centre (CFM)]	Amataltal			
11		Bilma			
12		Dabaga			
13		Dirkou			
14		Fachi			
15		Tabelot			
16		Tchirozérine			
17		Ecole des Mines et de l'Aïr [Aïr School of Mines (EMAÏR)]	Agadez		
18	Arlit	Collèges d'Enseignements Techniques (CET)	Arlit	6. Institut Supérieur de Technologie [Higher Institute of Technology (IST)]	Arlit
19			Iferouane	7. Centre Privé de Santé Publique (CPSP)	Arlit
20		Centre de Formation aux Métier (CFM)	Arlit		
21			Abarakan		
22			Iferouane		
23			Dannet		
24			Gougaram		
25			Timia		

Source DREP/T Agadez, 2020

Table21: Specialties Offered at the Schools in the Agadez IEFPT (Instituts d'Enseignement et de Formation Professionnelle et Technique [Vocational and Technical Training Institutes]) Network

Schools	Specialties
---------	-------------

I. Centre for Vocational and Technical Training	
CFPT	Agriculture, CM (construction métallique [metal construction]), MRA (Mémoire d'études en Ressources Animales [livestock management diploma]), industrial electricity, construction, and family economy
II. Lycée Professionnel en Hôtellerie et Tourisme (LPHT)	
LPHT	Hospitality and Tourism
III. Centres de Formation aux Métiers (CFMs)	
1. Tchirozérine	Agro-sylvo pastoralism, CM, dressmaking/tailoring, electricity and construction, plumbing, rural mechanics, wood joinery
2. Agadez Commune	CM, rural mechanics, dressmaking/tailoring, electricity Plumbing, wood joinery, masonry
3. Arlit	Rural mechanics, electricity, CM, dressmaking/tailoring
4. Dannel	Rural mechanics, dressmaking/tailoring
IV. Collèges d'Enseignement Technique (CETs)	
1. Agadez Commune	Family economy, rural mechanics, electricity and construction, CM, plumbing
3. Arlit	Family economy, rural mechanics, electricity and construction, CM
7. Tchirozérine	EFA (Economie Familiale [family economy]), rural mechanics, CM, electricity and construction
V. Ecole des Mines de l'Air (EMAIR)	Electro-mechanics (MRA (Mémoire d'études en Électromécanique [electro-mechanic diploma]), mechanical machinery (MME/A (MRA (Mémoire d'études en Mécanique des Engins/Automates [technician diploma in mechanical machinery and automatons])), automotive mechanics (light- and heavy-duty), Mines et Carrières [mining and quarries (MC)], Travaux Publics [Public Works (TP)], drilling, exploration
VI. Private Establishments	
1. IPSP	Basic healthcare worker, State-registered nurse
2. CPSP/Agadez	Bachelor's degree in nursing science, bachelor's degree in obstetrics, bachelor's degree in nutrition, basic healthcare worker, community health worker, pharmacy salesperson
3. CPSP/Arlit	Basic healthcare worker
4. CFDA	Customs Transit Officer, accounting, office administration, industrial electricity
5. STD/Arlit	Office administration, accounting, Customs Transit Officer, management information systems, automotive repair mechanics, industrial electricity, metal construction
6. ESEG	Financial banking, business, IT, accounting
7. Support Centre	Automotive repair mechanics, metal construction

III.4.4.5 Healthcare

With regard to healthcare, the healthcare facilities identified in the two communes are:

- ✓ **Tchirozérine:** 1 hospital run by SONICHAR, 1 functional CSI, 13 functional health clinics, 1 public pharmacy, and 1 private pharmaceutical dispensary in the commune's administrative centre;

- ✓ **Dannet:** One CSI, 12 health clinics, and three healthcare facilities with modern water supply connections. As can be seen, the healthcare services in the two communes are considered limited by the local authorities, with a lack of treatment products in the majority of cases.

The types of recurring illnesses seen at the CSIs in Tchirozérine and RTA (Dannet) are measles, respiratory infections (cough, cold, pneumonia, tuberculosis), skin diseases, chickenpox, vector-borne diseases such as malaria and food/water-borne diseases such as diarrhoea and gastroenteritis. The most frequently-declared illnesses are measles, pneumonia, diarrhoea, cough, cold and gastralgia. Lastly, it should be recalled that the sector is experiencing tremendous problems in terms of infrastructure.

III.4.4.6 Hydraulic Infrastructures

In terms of village and pastoral waterworks, the water supply system available to the people living in the area is based mainly on small-scale drinking water sources (boreholes) and cemented wells. For human and animal consumption, the situation of the water supply infrastructures is as follows:

- ✓ Tchirozérine Commune: over 150 water extraction points in all categories.
- ✓ Dannet Commune: 83 EPEMs: (PCs, PME, AEPs and SPPs).

According to the local authorities, the coverage in both communes in terms of modern water extraction points remains limited (30% according to the mayor of Tchirozérine).

III.4.4.7 Socioeconomic Activities

III.4.4.7.1 Crop Farming

Crop farming is an important activity that is carried out by a small number of men and women in both communes in the project intervention area. This activity is carried out in the main valleys (Elagozan, Inolamane, Mizzene, Oufoud, Sikiret and Issakanan).

It is irrigation-based and takes place practically all year round. The market gardens are laid out on both sides of the koris. The exploitable potential is estimated at approximately 382 ha whereas the surface areas actually farmed are estimated at 22 ha for market gardening, 4 ha for fruit trees and 90 ha for other uses. The main crops are vegetables, lettuce, bell peppers, cabbage, carrots, squashes, onions, potatoes and alfalfa. A portion of the crops is consumed locally and the rest is sold at the markets in Arlit, Tchirozérine and Agadez. These crops provide substantial revenues to the local communities, thereby enabling them to improve their income. **Photo No. 10** shows the market gardens grown in the Elagozan valley. The crops grown are cabbage, cucumbers, carrots, lettuce, melons, onions, tomatoes, watermelons and bell peppers.



Photo No. 10: Market garden crops in the Elagozan Valley

III.4.4.7.2 Stockbreeding

The project area is in a pastoral region. Due to this specificity, stockbreeding is the primary economic activity of the inhabitants of the urban commune of Tchirozérine and the rural commune of Dannet. It is carried out by all sectors of the population, irrespective of ethnic group, gender or social category. Except for some large-scale stock farmers, the herds are family capital managed on behalf of the family members by the head of household. In general, family stock farming involves several species of animals: goats, sheep, donkeys, and camels. Cows are not kept everywhere, particularly in the mountainous areas of the commune.

One of the characteristics of stockbreeding is its high level of vulnerability to climate hazards. Despite the many droughts that the stock farmers have experienced over the past 40 years, they do not seem to have learned from them. Stock farming remains extensive and contemplative, to the point that the observer may get the impression that it is ultimately the herds that own the farmers and not the other way around. The latter often resolve to part with an animal only in case of extreme necessity: to meet urgent family needs or because the animal in question has reached the end of its life.

The quest for water and pasture is the stock farmers' main concern. All of the mobility so typical of transhumant stockbreeding involves seeking a delicate compromise between available pastures, on one hand, and on the other hand, available water, with an acceptable distance between these two resources.

Stock farmers have their traditional lands with which they have almost emotional relationships and to which they return at certain times of the year. Even the animals, due to habituation, perhaps, sometimes experience the same nostalgia for the traditional land. Indeed, it is not uncommon for a camel or donkey to sneak away from its masters over the course of their nomadic movements, just to return to its home territory to wait for them.

Animal health issues in the communes of Tchirozérine and Dannet are characterized by respiratory infections, digestive and urogenital disorders, mastitis, traumatic wounds, internal and external parasitosis, pasteurellosis, foot-and-mouth disease, anthrax, blackleg, sheep pox/chickenpox and diarrhoea.

In some areas, the most critical and recurring problems for stock farmers are the losses caused by jackal predation of small ruminants and by certain diseases that the farmers attribute to the ingestion of *Prosopis juliflora* pods.

III.4.4.7.3 Trade

In the project area, trade is based on small-scale business activities, in particular the sale of products derived from livestock farming, market gardening and logging (woodcutting, charcoal production, etc.), and the sale of basic necessities. Each of the communes in the project area has a permanent market in its administrative centre. In addition to the larger markets, many villages host several weekly farmers' markets. The inhabitants of the communes regularly shop at markets in other communes depending on their accessibility. In the commune of Tchirozérine this includes the markets in Tindawene, Azzel and Attri.

III.4.4.7.4 National Road Network, Transportation and Communications

All categories combined, Niger's classified road network, has a total length of approximately 14,000 km, with 3,797 km of paved roads (27%), 6,291 km of dirt roads (45%) and 3,912 km of farm tracks (28%). This network is classified in three categories: (i) "Routes Nationales" [highways] (main network) running between the administrative centres or connecting Niger to the neighbouring countries, (ii) departmental roads (secondary network), connecting urban centres within the same department, and (iii) rural roads (tertiary network) essentially serving rural areas.

The six road infrastructures in the project area are basically structured around the Agadez-Arlit Highway (RN25-RTA), two gravel roads and three undeveloped farm tracks enabling trade and other necessities. In this area, the road infrastructure network is relatively underdeveloped. The fleet is essentially made up of small passenger transport minibuses commonly called "J-Fives", old Land Rovers, and vans called "*A-kori kouras*" that run between the urban centres and the rural markets and are used to transport goods and animals. There is also a sizeable fleet of 4WD vehicles belonging to individuals, administrations or development organizations. Motorcycle taxis called "*kabou-kabous*" are now becoming the most popular means of transport for young people due to their speed, particularly over the nearly impassable trails. Animals (donkeys and camels) are still used as a means of transport. However, they are increasingly being replaced by carts.

Regarding communications, a large part of the project area is covered by cell phone operator networks. The main operators in terms of coverage are AIRTEL, ORANGE and NIGER TELECOMS. MOOV provides service mainly in urban areas. National media reception (TELE SAHEL and VOIX DU SAHEL) is available within a wide radius around the communes' administrative centres.

III.4.4.7.5 Touristic, Cultural and Artisanal Heritage

With regard to tourism and culture, since the creation of the "Temet-Voyages" travel agency in the 1980s by the late Mano Dayak, other individuals living in the Tidene, Agharous, Gofat, Azzel, and Attrri valleys have created agencies that are now among the most prominent in the trade.

Since the outbreak of the rebellion by the Mouvement Nigérien pour la Justice [Nigerien Movement for Justice (MNJ)] in 2007 and the proliferation of roving Islamist groups in the Saharan band, tourist activities have come to an abrupt halt. Today, no western tourist dares venture out of the big urban centres for fear of falling prey to terrorist groups that have become masters at taking hostages.

Based on the survey of tourist and cultural sites conducted by the Agadez Regional Directorate for Tourism and Craft Trades, the tourist and cultural potential of the project area is provided in the table below.

Artisanal work is mainly utilitarian and is rarely developed for sale because there are few or no markets for it. It is mostly carried out by men and women who are blacksmiths, tanners, and leatherworkers. Each of these activities takes place according to its own procedures and in a very archaic manner. Artisans rarely come together in associations, which does not create conditions that are conducive to their development.

Table22: Tourism, Cultural and Archaeological Potential in the Region (source: DRA/T Agadez)

Department	Commune	Site/Attraction	Location
Arlit	Dannet	“Dabous Giraffes” petroglyphs	70 km south of Dannet on the Agadez road
		Hot springs	90 km west of Dannet
Tchirozérine	Tchirozérine	Hot springs in Tafadek	25 km east of the urban commune of Tchirozérine
		Ancient village in Anossamo	20 km south of the urban commune of Tchirozérine
		Egandawel market every Sunday	50 km east of the urban commune of Tchirozérine

III.4.4.7.6 Mines - Quarries - Energy

In terms of mining and quarrying resources, the project area has significant potential, as evidenced by the allocation of exploration and mining permits. The name of the city of Tchirozérine is closely linked to that of SONICHAR. In fact, this coal mine coupled with a thermal power plant supplying the town of Agadez and the mining towns of Arlit and Akokan is the largest industry in the commune.

Dannet Commune has significant reserves of uranium ore. Several exploration and mining permits have been granted in this commune. These include, among others, the “Imouraren” permit and the “Adrar Emoles” permit that straddles the communes of Tchirozérine and Dannet. Other ores such as talc are mined by artisans. It is not uncommon to see quarries mined for various materials, most often without the approval of the town hall or relevant technical services. In terms of energy, apart from electricity, the main energy source used is wood and coal. Only certain elite city dwellers can afford to use gas or SONICHAR coal. Ordinary households are still using wood despite its increasingly high price.

IV. OVERVIEW OF THE POLITICAL, LEGAL AND INSTITUTIONAL FRAMEWORK

This chapter presents the political, legal and international framework applicable to the project activities. It focuses on the policy guidelines defined at the international and national levels as well as the legal and regulatory requirements governing the preparation, implementation, monitoring and control of the various project phases. It also recalls the various institutions involved in the implementation of the project.

IV.1 Political Framework

IV.1.1 Environmental Policy Framework

Environmental management and protection are priorities of the Nigerien government and are enshrined in several policy documents to achieve the objectives of sustainable development, the main ones of which are:

- The National Policy on the Environment and Sustainable Development, adopted by Decree No. 2016-522/PRN/ME/DD of 28 September 2016. The global objective of this policy is to create overall conditions that are conducive to economic, social and cultural development through the preservation and sustainable management of the environment and natural resources and the strengthening of measures to cope with the negative effects of climate change in order to ensure long-term food security for Nigeriens and improve their living conditions. It covers all key development areas relating to technical, institutional and organizational aspects, capacity-building and the mobilization of resources, in particular national ones. It focuses on four strategic intervention areas, namely:
- Governance of the environment and sustainable development, which is based on five guidelines, namely: implementing a communication program, strengthening the legal and institutional framework, capacity-building, gaining knowledge about the resources, and strengthening the environmental surveillance and monitoring system;
- Sustainable land and water management, which will make it possible to slow or reverse the generalized process of land degradation with a view to preserving forests, grazing land, farmland and aquatic ecosystems through the rehabilitation and restoration of degraded land, securing of land resources, sustainable management of fisheries resources, development of natural forests, agro-forest parks and sylvopastoral areas, increased forest coverage and reinforcement of the woody forest and fisheries sectors;
- Sustainable environmental management through capacity development in terms of adaptability and resilience, and the promotion of better living conditions, improved waste management, and the green economy.
- Management of biological diversity along two axes, i.e., improvement of the management of protected areas, hunting areas and wetlands, and improvement of the management of genetic resources.
- The National Plan for the Environment and Sustainable Development (PNEDD), drawn up in 1998 serves as Agenda 21 for Niger. The PNEDD sets the objectives of the Nigerien policy on environmental protection and sustainable development. Its aim is to implement the three Post-Rio Conventions by establishing conditions that are conducive to the long-term improvement of the living conditions of the population and the economic development of the country. It consists of six major plans, namely: (i) the national action plan for combating

desertification and managing natural resources (PAN/LCD-GRN); (ii) the water and sustainable development plan; (iii) the energy and sustainable development plan; (iv) the biological diversity management plan; (v) the action plan for urban environments and living conditions, and (vi) the climate change and variability plan.

IV.1.2 National Policy Framework in Social Matters

The national policy framework in social matters was developed through:

- ***The Economic and Social Development Plan (PDES)***

The 2017-2021 PDES was founded on the SDDCI, which sets out the Nigerien government's vision for 2035. Through this vision, Niger affirms its firm resolve to transform at all levels and above all its commitment to eradicating poverty and social inequalities. It is also based on the guidelines of the "Renaissance Program Acte-2". This program aims to contribute to the country's development through the following eight priorities: (i) promote cultural renaissance, (ii) continue the consolidation of democratic institutions, (iii) ensure the safety of people and property, (iv) guarantee access to water for all, (v) ensure food and nutritional security through I3N (Initiative les Nigériens Nourrissent les Nigériens [Nigeriens Feeding Nigeriens Initiative]), (vi) develop communication and energy infrastructures, (vii) develop the social sectors: education and health, and (viii) promote youth employment. The PDES aims mainly to "contribute to building a peaceful and well-governed Niger with an emerging and sustainable economy and a society based on the values of equity and sharing the fruits of progress" over the 2017-2021 period. In order to meet the identified challenges and stakes of economic and social development, five strategic axes were selected. They are interrelated and reflect, as a whole, the primary dimensions of sustainable human development. This involves: (i) cultural rebirth; (ii) social development and demographic transition; (iii) improved economic growth; (iv) improved governance, peace and security, and (v) sustainable environmental management.

- ***The Strategy for Sustainable Development and Inclusive Growth (SDDCI***

Niger 2035) which sets out the basic principles for harmonious sustainable development for present and future generations of Nigeriens.

- ***The National Policy on Occupational Health and Safety adopted by Decree No. 2017/540/MET/PS of 30 June 2017.*** This national occupational health and safety policy aims to make occupational health and safety services an instrument for the promotion of health in general, the preservation of the environment and the improvement of occupational productivity, and consequently, the productivity of companies in all sectors of activity. Its purpose is to prevent accidents and health risks in the workplace or in the conditions under which work is performed. Thus, the general objective is to protect and ensure worker health and safety through the prevention of workplace accidents and occupational diseases in all sectors. The specific objectives are to:

- ✓ Train, inform and raise awareness of all stakeholders involved in the field of occupational health and safety,
- ✓ Improve working conditions,
- ✓ Improve the quality of the workplace and working environment,
- ✓ Monitor employee health,
- ✓ Improve work productivity,
- ✓ Reduce health insurance costs in terms of compensation,

- ✓ Combat and prevent the worst forms of child labor,
 - ✓ Promote active research in occupational health and safety,
 - ✓ Develop a culture of prevention in companies and public services.
- **The General Policy Statement of the Prime Minister of May 2016:** This statement stems from the President of the Republic's Renaissance II Program, which is structured around eight main axes, namely: promote cultural rebirth; pursue the consolidation of democratic institutions; ensure the safety of persons and property; guarantee access to drinking water for all; ensure food security through the 3N Initiative; develop the energy and communications infrastructures; develop the social sectors (education and health); and promote youth employment.
 - **The Politique Minière Nationale [National Mining Policy] (PMN 2020-2029) of 3 July 2020,** which is based on international frameworks (SDGs), continental frameworks (Agenda 2063 of the AU, Vision Minière Africaine [Mining Vision for Africa (VMA)], regional and sub-regional frameworks (ECOWAS Vision 2020, ECOWAS Directive and Mining Policy, WAEMU Community Mining Policy) and national frameworks (Constitution of 2010, SDDCI Niger 2035, Déclaration de Politique Générale [General Policy Statement (DPG)] 2016-2021, PDES 2017-2021) It also takes into account the other commitments specific to the mining sector to which Niger has adhered (Global Reporting Initiatives, ITIE, etc.), as well as the standards for good practice in the mining industry.

The guiding principles of the national mining policy are:

- ✓ **The Nigerien people's ownership of the mineral resources in the soil and subsoil of Niger:** the mineral resources contained in the soil and subsoil of Niger are the property of the people, their exploration and mining are carried out through mining permits or authorizations awarded by the State on behalf of the people;
- ✓ **Respect for the environment:** mining activities must be carried out in such a way as to prevent and mitigate negative impacts on the environment and to ensure the rehabilitation and closure of mining sites in accordance with industry standards;
- ✓ **Sustainability:** mining policy must be focused on achieving the SDGs. It must promote mining development that allows diversification of the mining production through the search for new deposits and the renewal of reserves of existing mining operations to extend their life cycle. Mining activities and the use of resources from the mining sector must be part of sustainable development, which ensures the well-being of current generations without compromising that of future generations;
- ✓ **An inclusive approach:** all stakeholders in the sector, in particular the State at the central, regional and local levels, mining companies, civil society, and the general public must be involved in decisions concerning them through consultation and dialogue frameworks in order to achieve the mining policy objectives;
- ✓ **Non-discrimination of investors:** in the granting of mining permit and authorizations, in the negotiation of mining agreements, in the monitoring and control of mining activities, the State will ensure that investors are treated on an equal footing;
- ✓ **Transparency and accountability:** good governance of the sector implies compliance with international standards and principles of good governance (Kimberley Process, Global Reporting Initiative, ITIE, Court of Auditors). Accountability implies empowerment and the obligation to report in order to ensure that the expected results are achieved and that the allocated resources are effectively and efficiently used;
- ✓ **The societal responsibility of mining companies** who are voluntarily involved in the socio-economic development of the local communities through their activities, a guarantee of social acceptance;

- ✓ **Equitable sharing of the revenue generated by the sector:** the revenue generated by mining activities must benefit all parties equitably: mining investors, national administration, local authorities, as well as all other stakeholders;
- ✓ **Gender equality:** the stakeholders in the sector must ensure that women are encouraged to take part in decisions relating to mining activities at the national, local and company levels;
- ✓ **Respect for human rights:** mining activities must be carried out with respect for human rights, in particular civic rights, workers' rights (including child and women's labor), hygiene, health and safety;
- ✓ **Respect for the rights of the local communities when conducting mining activities:** the local communities must be involved in the management of the impacts of mining activities on their environment through frameworks that promote coordination, consultation and dialogue, as they are directly affected by these **impacts;**
- ✓ **Due diligence:** it is important to establish a traceability system and provide customers with all the data obtained through the exercise of due diligence by ensuring that the ores are extracted and negotiated under conditions conducive to peace and development and not in support of conflicts, throughout the supply chain from the extraction site to the users of the end products.

- **National Social Protection Policy**

This policy was adopted in 2011 and defines the strategic priorities and priority areas of intervention for social protection in Niger. Its general objective is to "contribute to the mitigation of the vulnerability of underprivileged groups and help populations to deal with the most significant risks in life". This specifically involves:

- ✓ Contributing to the fight against food and nutritional insecurity;
- ✓ Strengthening social security and promoting jobs and employment;
- ✓ Reducing barriers relating to access to social services and basic social infrastructures;
- ✓ Escalating specific actions in favour of vulnerable groups;
- ✓ Strengthening the consolidation of the legislative and regulatory framework.

- **National Gender Policy**

The overall objective of the Politique Nationale du Genre [National Gender Policy (PNG)] is to contribute to the creation of an environment that is conducive to the achievement of equity and equal chances and opportunities between men and women, girls and boys in Niger. Specifically, this PNG aims to:

- ✓ Establish an institutional, sociocultural, legal and economic environment that is conducive to the achievement of equity and equal chances and opportunities between men and women, girls and boys in Niger;
- ✓ Ensure the effective integration of gender as a variable in the analysis, planning, implementation, monitoring and assessment of development programs.

It focuses on four strategic axes:

- ✓ Improving the sociocultural environment in connection with demographics, peace and security for greater equity between men and women;

- ✓ Strengthening the institutional and legal framework on the effective application of the rights of women and small girls, on combating gender-based violence and on the fair participation of men and women in power management;
- ✓ Economic empowerment and inclusive growth in connection with sustainable management of the environment, management of natural disaster risks, and management of migration and humanitarian emergencies;
- ✓ Strengthening institutional mechanisms and organizational frameworks for coordination, monitoring and assessment and partnership.

The effective implementation of this National Gender Policy will allow for better protection of the rights of women and men in relation to their opportunity to access quality training, non-discriminatory jobs, health benefits for all, drinking water everywhere and for all, peace, security and fair social protection.

- **National Strategy for the Prevention of and Response to Gender-Based Violence (GBV)**

The national survey on the extent and determinants of Gender-Based Violence (GBV) in Niger (UNFPA 2015) showed that the national prevalence of GBV, all types and sexes combined, was 28.4% in 2015. VBGs are political, economic, socio-cultural, psychological, physical and sexual in nature and affect all categories of the population. Teenagers and women are the most exposed (60%). Faced with this problem, in 2017, Niger developed a National Strategy for the Prevention of and Response to Gender-Based Violence in which the strategic priorities are: (i) communication, (ii) capacity-building for GBV intervenors and survivors, (iii) an institutional and legal framework, (iv) resource mobilization, (v) and monitoring/assessment and research

IV.2 National Legal Framework

This chapter will cover the national legal provisions applicable to this project. The implementation of the laws and regulations relating to the exploitation of natural resources, in particular mining, is ensured by various texts developed for this purpose. Table No. 23 provides an overview of the various laws and regulations in force.

Table23: Overview of the various laws and regulations in force

Title	Date adopted	Scope	Contextual references
Constitution of the 7 th Republic	25 November 2010	Rights and duties of citizens	Article 35 specifies that "everyone has the right to a healthy environment. The State has an obligation to protect the environment under the conditions provided for by law in the interest of present and future generations. The State must also ensure the assessment and control of the impacts of any project and program on the environment". Article 37 specifies that "national and international companies are required to comply with the legislation on environmental protection in Niger".
Law 2018-28 of 14 May 2018 setting out the fundamental principles of Environmental Review in Niger	14 May 2018	Environmental Review	Article 10 lists the Environmental Review tools, which are: EES, ESIA and SEA. Article 14 specifies that "development activities or projects initiated by public authorities or private persons which, due to the magnitude of their dimensions or their impacts on biophysical and human environments, may harm the latter, are required to conduct an Environmental and Social Impact Assessment (ESIA).
Act 98-56 on the Framework Law on Environmental Management	29 December 1998	Environmental Management	Article 3 presents the fundamental principles of rational management of the environment and natural resources, in particular in its paragraph c, "Polluter Pays Principle" Article 37 of the law prohibits interfering with the quality of the air or causing any alteration of its characteristics that would be likely to harm public health or the preservation of goods, emitting into the air any polluting substance, in particular fumes, dust or toxic, corrosive or radioactive gases in excess of the limits set by the implementing texts of this law. Article 41 specifies that the Ministry of the Environment must ensure the application of international conventions relating to the protection of the atmosphere and the fight against global warming, in particular the United Nations Framework Convention on Climate Change. Moreover, this law provides in its Article 53

			that public authorities may, in compliance with the legislation in force, prohibit works detrimental to the soil, the subsoil or the ecological balance and may subject certain operations to prior authorization. Furthermore, this law prohibits the production, dumping or incineration of waste without any measure to protect the natural environment (wildlife, vegetation, landscape, soil, air and water), in particular in its Articles 62, 66 and 67 with which the work to open and mine lateritic borrows must comply. Indeed, Article 62 stipulates that: Any person who produces or stores waste under conditions likely to produce harmful effects on the soil, vegetation or wildlife, to damage landscapes, to pollute the air or water, to produce noise and odours and in general to affect human health and the environment, is required to ensure the disposal or recycling thereof or to have it ensured. Article 65 prohibits any person (physical or legal) from releasing wastewater into the environment without prior treatment. Consequently, every establishment must have a wastewater treatment plant that is appropriate and functional in accordance with the regulations in force. Effluents must meet the discharge standards defined by the regulations in force. As for Article 66, it prohibits the outdoor incineration of combustible waste that may cause inconveniences. With regard to the risk of workplace and natural accidents, Article 76 specifies that the competent authorities develop the preventive rules for work-related and natural accident risks.
The Mining Code (Ordinance No. 93-16 of 2 March 1993 supplemented by Ordinance No. 99-48 of 5 November 1999, as amended by Law No. 2006-26 of 9 August 2006)	2 March 1993 5 November 1999 9 August 2006	Mining Resources	This Ordinance No. 93-16 of 2 March 1993 on mining law and subsequent amending texts specifies that on the territory of the Republic of Niger, prospecting, exploration, operation, possession, holding, circulation, trade and transformation of mineral or fossil substances and the tax regime applicable to these activities are governed by the provisions of this ordinance.
Law No. 2006-26 amending Ordinance No. 93-16 of 2 March 1993 on the Mining Law Supplemented by Ordinance No. 99-48 of 5 November 1999	9 August 2006	Mineral resources	Article 72 stipulates that “The permanent authorization to open and mine a quarry is issued by joint Order of the Minister of Mines and the Minister of Domains after approval from the relevant regional or communal authorities”

			<p>Article 85 (new): The exploitation and collection of classified substances under the quarry plan are subject to the payment of a quarry tax at the rate of CFAF 250/m³ of excavated materials.</p> <p>The settlement of amounts due for the mining and collection of substances classified under the quarry plan falls under the jurisdiction of the relevant devolved departments of the Ministry of Mines, except for public quarries.</p> <p>Collection of the amounts due for the extraction and collection of substances classified under the quarry plan is carried out by the territorial authorities concerned on their own behalf.</p> <p>Also, Article 99 (new) provides that <i>“mining or quarry operations must be conducted in such a way as to ensure the rational exploitation of national resources and protection of the environment in accordance with the laws and regulations in force. To this end, companies must carry out their work using confirmed mining industry techniques and take the necessary measures to preserve the environment, treat waste, and preserve forest lands and water resources. If the mining permit is for radioactive substances, the holder will also provide semi-annual and annual radiation protection reports.”</i></p>
Law No. 2012-45 on the Labour Code in the Republic of Niger	25 September 2012	Employment	<p>This law prohibits forced or compulsory labour, as well as any discrimination in employment and remuneration based in particular on race, sex and social origin. It establishes guidelines for the hiring of workers, the use of temporary employment agencies or private employment agencies, as well as for the suspension or termination of employment contracts. It specifies in its Article 8 that companies use their own workforce, or use external staff under temporary work provisions and second their employees to other companies. They can also hire piece workers. Article 9 specifies that subject to compliance with Articles 11, 13 and 48, employers directly recruit the employees they employ. They can also use the services of public or private recruitment agencies. Article 154 stipulates that, after consulting with the Technical Advisory Committee on Occupational Health and Safety, an employer must provide and supply with medications and accessories:</p> <ul style="list-style-type: none"> - An infirmary for an average workforce of more than one hundred workers;

			<ul style="list-style-type: none"> - A treatment room for a workforce of twenty to one hundred workers; - A first aid kit for a workforce of fewer than twenty workers. <p>Article 155 specifies that stress, smoking, alcoholism, drug addiction and HIV/AIDS are emerging health-related risks in the workplace. All employers are required to inform and raise awareness among their workers about emerging risks and to provide them with psychosocial assistance.</p>
Law No. 2014-63 prohibiting the production, importation, marketing, use and storage of bags and packaging made from soft, low-density plastic.	5 November 2014	Bags and packaging made from soft, low-density plastic	Article 1: It is forbidden to produce, import, market, use and store, throughout the territory of the Republic of Niger, bags and packaging made of soft, low-density plastic.
Law 2018-21 of 27 April 2018 on the safety, security and peaceful use of atomic energy.	27 April 2018	Atomic Energy	Chapter V (Articles 64 to 66) and chapter Vi (Article 67 to 69),
Law 2004-040, establishing the forestry regime in Niger	8 June 2004	Forests	<p><i>Article 2</i> provides that forest resources constitute natural resources and, as such, are an integral part of the country's public resources. Everyone is required to respect these natural resources and contribute to their conservation and regeneration.</p> <p><i>Article 33</i> provides that forest resources that are degraded or destroyed due to public utility work must be compensated under conditions set out by regulation.</p> <p><i>Article 34</i> provides that “Forest species requiring special protection are declared protected species by the implementing texts of this law. They cannot be uprooted or mutilated.</p> <p>In the event that their use is authorized, it is subject to the payment of a fee, the rate of which is set by regulation. The use of dead protected trees as firewood is free of charge if the products are intended for the personal or household use of the beneficiaries of customary usage rights”</p>
Law No. 98-07 of 29 April 1998 establishing the Hunting and Wildlife Protection Plan	29 April 1998	Wildlife hunting and protection	<p><i>Article 2:</i> Hunting is any act consisting of either searching for, pursuing, aiming at or sighting, trapping, capturing, injuring or killing a wild animal living in a state of freedom, or collecting or destroying eggs.</p> <p><i>Article 3:</i> It is prohibited to hunt without a hunting license.</p>

Law No. 97-002 on the protection, conservation and development of cultural heritage.	30 June 1997	Cultural heritage	<i>This law determines the fundamental principles of the legal regime by defining the applicable rules in terms of the protection of monuments, cultural property, areas and sites, their identification, their classification, their use and reuse; archaeological digs and incidental discoveries; import, export and international transfer of cultural property.</i>
Law No. 69-8 on reporting violations of the legislation relative to certain explosive substances	18 February 1969	Explosive substances	Law No. 69-8 on reporting violations of the legislation relative to certain explosive substances
Law No. 66-033 on unsafe, unhealthy and unsuitable establishments supplemented by Ordinance No. 76-21 of 31 July 1976	24 May 1966	Classified establishments	Article 1: <i>“Manufacturing, workshops, factories, shops, construction sites and all industrial or commercial establishments that present causes of danger or inconveniences, [...] are subject to the supervision of the administrative authority under the conditions determined by this law”.</i>
Ordinance No. 2010 – 54 on the General Local Authorities Code of Niger	17 September 2010	Nigerien Regional and Local Authorities	Article 30 provides that <i>“the municipal council deliberates in particular in the following areas: preservation and protection of the environment, management of natural resources”</i> Article 105 stipulates <i>“the regional council deliberates in particular the following areas: “...Conservation and protection of the environment, use and conservation of water resources, protection of forests and wildlife, conservation, defense and restoration of soils”.</i>
Ordinance No. 2010-09 on the Water Code	1 April 2010	Water resources	This ordinance recognizes every citizen’s right to have access to water (Article 4), and its Article 6 stipulates that <i>“water is an ecological, social and economic asset whose conservation is in the public interest and whose use in any form whatsoever requires each person to contribute to the efforts of the community and/or the State, in order to ensure its conservation and protection”.</i> Article 12 specifies that anyone who, through their activities, uses the water resource, must contribute to the funding of water management, according to their use, by virtue of the user-payer principle, notwithstanding every citizen’s right to water as set out in Article 4. Article 38 stipulates, in application of the <i>“user-payer”</i> principle set out in Article 12, that natural or legal persons who, through their activities, use water, may be subject to the payment of a financial contribution based on the volume of water collected, consumed or used. Article 38 stipulates, in application of the <i>“user-payer”</i>

			principle set out in Article 12, that natural or legal persons who, through their activities, use water, may be subject to the payment of a financial contribution based on the volume of water collected, consumed or used. [sic: repeat of previous para.] Article 39 specifies that in application of the “polluter-payer” principle set out in Article 13 of this ordinance, natural or legal persons whose activity is likely to cause or worsen the degradation of water resources may be subject to the payment of a financial contribution calculated on the basis of the volume of water collected, consumed or used. Articles 43 and 45 require the authorization, declaration or lease of water use by facilities, structures, works and activities carried out by any natural or legal person, public or private.
Ordinance No. 99-50 on the setting of rates for the disposal and occupancy of public land in the Republic of Niger	2 November 1999	Property	Article 1: Sets the basic disposal prices for urban land for housing (residential and traditional), industrial, artisanal or commercial use, that is within urban centres and agglomerations, subdivided or not, and rural land in the Republic of Niger.
Ordinance No. 93-13 establishing a Public Hygiene Code	2 March 1993	Public hygiene	Article 4 of the Public Hygiene Code prohibits any person from producing or storing waste under conditions likely to cause harmful effects on the soil, vegetation and wildlife, to degrade the landscapes, and in general, to harm the health of humans, domestic animals and the environment, and requires said person to ensure its disposal or recycling or have it ensured. This ordinance is in particular reinforced by Law No. 98-056 of 29 December 1998, on the framework law on the management of the environment in Niger, which provides for the prohibition of any form of inconvenience or pollution of living conditions. It also provides in its Article 80 that staff must wear adequate and specific protective equipment. Article 101 prohibits any discharge of used oils into the environment. The use of used oils as larvicide is subject to authorization from the health and sanitation departments. Lastly, Article 107 specifies that emissions from vehicles and other motorized equipment must comply with the regulations in force.
Ordinance No. 93-015 of 2 March 1993 establishing the Guiding principles of the Rural Code.	2 March 1993	Property	Article 5 provides that “the rights to natural resources benefit from equal protection, whether they result from custom or from written law. Consequently, land title is acquired by custom or by the means provided in written law”.

			<p>Article 9 provides that “customary ownership gives its holder full and effective ownership of the land, this text specifies that: The customary ownership results from:</p> <ul style="list-style-type: none"> ✓ The acquisition of rural land ownership by succession for time immemorial and confirmed by collective memory; ✓ The final allocation of land to a person by the competent customary authority; ✓ Any other method of acquisition provided for by local customs. <p>Article 10 specifies that “ownership according to written law results from the private acquisition of rural land ownership by one of the following acts: registration in the land register; authentic deed: certificate of registration in the Rural Record; private deed.</p>
Ordinance 79-45 supplementing Law No. 66-033 relating to Unsafe, Unsanitary or Unsuitable Establishments of 24 May 1966	27 December 1979	EDIIs	This ordinance amends Article 10 of Law No. 66-033. It specifies the penalties imposed on manufacturers who operate EDIIs without authorization and/or declaring them.
Ordinance 76-21 supplementing Law No. 66-033 relating to Unsafe, Unsanitary or Unsuitable Establishments of 24 May 1966	31 July 1976	EDIIs	Article 11 specifies that “In addition to the judicial police officers and agents of the Customs Department, sworn inspectors of classified establishments may also report violations of the legislation and regulations in unsafe, unsanitary or unsuitable establishments”
Decree No. 2019-27/PRN/MESU/DD of 11 January 2019 implementing Law No. 2018-28 of 14 May 2018 on the fundamental principles of Environmental Review in Niger	11 January 2019	Environmental Review	<p>Article 13: Any project or activity that is likely to have environmental impacts classified in one of the following categories is subject to an Environmental and Social Impact Assessment (ESIA):</p> <ul style="list-style-type: none"> ✓ <i>Category A</i>: high-risk projects or activities likely to have highly negative, generally irreversible impacts, most often felt in a larger area than the sites hosting these projects. These projects are subject to a <i>detailed Environmental and Social Impact Assessment (ESIA)</i>; ✓ <i>Category B</i>: projects or activities with a significant risk and whose negative impacts on the environment are less severe than those of category A projects. These are projects that may have easily-identifiable and limited impacts and whose means of mitigating them are generally known. These projects are subject to a <i>Simplified Environmental and Social Impact Assessment called an “Environmental and Social Impact Statement”</i>;

			<p>✓ <u>Category C</u>: moderate-risk projects or activities with insignificant negative impacts on their biophysical and human environment. These projects are implemented without specific measures".</p> <p>Thus, the execution of any operation carried out as part of a mining project or activity listed in <u>Category A</u> is subject to an Environmental and Social Impact Assessment, as is the presently the case.</p>
Decree No. 2018-191/PRN/MEDD on the conditions for the application of Law No. 2004-040 of 8 June 2004	16 March 2018	Forest Resource Management	<p>Article 11 of this decree determines the Forestry Domain in the Republic of Niger which consists of State-owned forest, forests owned by Territorial Authorities, and privately-owned forest.</p> <p>Article 59 sets out the action plan for the protection of forest species in Niger.</p> <p>Article 114 deals with the logging tax</p> <p>Article 23 of this decree stipulates: "the management of urban and peri-urban forestry is considered to cover green spaces, agro-forestry areas, forested areas and other tree systems in urban or peri-urban zones, with a view to integrated and sustainable land management subject to the effects of urbanization.</p> <p>The State develops and implements a policy for the management of trees and forests in urban and peri-urban agglomerations, ensuring the protection of the environment and improving the social and economic life of the populations concerned.</p> <p>This policy will be devoted to a national strategy accompanied by an urban and peri-urban forestry action plan, which will serve as a coherent framework for the implementation of good practices and intervention in the sub-sector".</p>
Decree No. 2017-682/PRN/MET/PS of 08/10/2017 on the regulatory role of the Labor Code	10 August 2017	Labour regulations	<p>Stipulates in Article 4 that any discrimination in employment and jobs is prohibited and specifies what is meant by discrimination.</p> <p>Articles 25 to 30 regulate the performance of temporary work.</p> <p>Articles 39 to 47 regulate the wording of assignment contracts and secondment contracts</p> <p>Articles 120 to 133 regulate the employment contract</p> <p>Articles 134 to 155 regulate working conditions and remuneration</p>
Decree 2015-541/PRN/MET/PS of 15 December 2015 amending and supplementing Decree	15 December 2015	Management of the system of compensation	<p>Article 117 establishing the list of illnesses considered to be occupational as well as the time limits for coverage by the Caisse Nationale de Sécurité Sociale</p>

No. 65-117/PRN/MFP/T of 18 August 1965 setting out the rules for managing the system of compensation and prevention of workplace accidents and occupational illnesses by the CNSSS		and prevention of workplace accidents and occupational illnesses by the CNSSS	[Social Security Administration] (CNSS) and the indicative list of the main types of work likely to cause them in a 75-page appendix
Decree No. 2015-321/PRN/MESU/DD enacting the terms of application of Law No. 2014-63 of 5 November 2014 prohibiting the production, importation, marketing, use and storage of bags and packaging made from soft, low-density plastic.	25 June 2015	Bags and packaging made from soft, low-density plastic	<p>Article 2 of this decree stipulates: “the natural or legal persons affected by the provisions of Article 1, paragraphs 1 and 2 of Law No. 2014-63 of 5 November 2014, are in particular:</p> <ul style="list-style-type: none"> - Any industry that produces plastic bags and packaging; - Any company importing and marketing plastic bags and packaging; - Any holder of plastic bags and packaging whose main activity is the repackaging and marketing of these materials; - Any final holder of plastic bags and packaging that separates them from the product to be consumed or used and that holds the packaging”. <p>Article 3 defines the types of soft, low-density plastic bags and packaging that may be produced, imported, marketed, used or stored within the meaning of Article 1, paragraph 3 of Law No. 2014-63 of 5 November 2014</p>
Decree No. 2012-358 /PRN /MFPT setting the minimum salaries for each category of workers governed by the inter-professional collective agreement	17 August 2012	Labour Code	Article One of this decree sets the minimum salaries of workers governed by the Interprofessional Collective Agreement.
Decree No. 2011-405 establishing the terms and procedures for declaring, authorizing and granting water use	31 August 2011	Water use	Article 19 specifies that “in the case of an operation subject to an environmental impact assessment, the request is sent to the Minister of the Environment, who examines it in accordance with the provisions of decree No. 2000-397/PRN/ME/LCD of 20 October 2000 on the administrative procedure for assessing and reviewing environmental impacts”.
Decree No. 2006-265/PRN/MME, enacting the conditions of application of the Mining Law	18 August 2006	Mining Code	<p>Quarry exploitation must comply with the provisions governing the opening and operation of quarries.</p> <p>Article 79 stipulates: “Pursuant to Article 121, of the Mining Law, orders by the Minister of Mines set out:</p>

			<ul style="list-style-type: none"> • <i>The general health and safety provisions to which mining or quarrying operations are subject, as well as the outbuildings;</i> • <i>The provisions relating to exposure to ionizing radiation in mines and their outbuildings;</i> • <i>The provisions relating to silicosis risks in mines, quarries and their outbuildings;</i> • <i>The provisions relating to the transport, storage and use of explosives in mines or quarries”</i>
Decree No. 96-409/PRN /MFPT /E, on the terms of the hiring declaration	4 November 1996	Labour Code	Article 1 states that the hiring declaration provided for in the Labour Code is recorded in a register regularly kept by the Agence Nationale pour la Promotion de l’Emploi [National Employment Administration] (ANPE).
Decree No. 96-408 / PRN / MFPT /E on the methods for creating, organizing and running occupational health and safety committees	4 November 1996	Labour Code	Article 2 specifies that an Occupational Health and Safety Committee (OHSC) must be created in all companies or establishments subject to the Labour Code and employing at least 50 employees. The workforce to be taken into consideration is that of workers usually employed in the establishment, whether or not they are necessarily registered in the employer register [...].
Decree No. 2015-321/PRN/MESU/DD of 25 June 2015 enacting the terms of application of Law No. 2014-63 of 5 November 2014 prohibiting the production, importation, marketing, use and storage of bags and packaging made from soft, low-density plastic.	25 June 2015	Packaging made from soft, low-density plastic.	The implementation of this decree will help ensure that our environment is free of plastic, which is a non-biodegradable material.
Decree No. 76-129/PCMS/MMH enforcing the Unsafe, Unhealthy and Unsuitable Establishments Act	31 July 1976	Classified establishments	The text specifies the conditions of application of the law relating to unsafe, unsanitary and unsuitable establishments
Decree No. 70-3/MTP/T/M/U, enacting the administrative rules to which quarry operations are subject	8 January 1970	Quarry operations	Provides for the application of the administrative rules to which quarry operations are subject
Order No. 0099/MESU/DD/SG/BNEE/DL of 28 June 2019 organizing the National Office for Environmental Review (BNEE) and its	28 June 2019	Environmental review	Article 2 of this Order stipulates: <i>“The BNEE is a decision-making body whose missions are to promote and implement Environmental Review in Niger. It has exclusive national jurisdiction over all policies, strategies, plans, programs,</i>

National Directorates and setting out the responsibilities of their management			<i>projects and all activities for which an Environmental Assessment is mandatory or necessary, in accordance with the provisions of Law 2018-28 of 14 May 2018”.</i>
Order No. 140 /MSP /LCE /DGSP/DS/DH enacting the standards for discharging waste into the natural environment.	27 September 2004	Waste management	Sections I, II and III enact the waste standards to be complied with before any release into the natural environment. Article 24 specifies that BNEE agents are responsible for the control and supervision of establishments and companies producing waste.
Order No. 65/MME/DM enacting the rules for the prevention of silicosis risks in exploration and mining operations, quarries and outbuildings	26 August 1999	Dust and other gas emissions standards	When the particle size is between 0.5 and 5 microns, the permissible dust concentrations are set as follows: a) Dust containing less than 6% silica: 5 mg/m ³ ; b) Dust containing between 6% and 25% of silica: 2 mg/m ³ for a period of eight (8) hours of work; c) Dust containing more than 25% silica: 1 mg/m ³ . Article 3 stipulates: <i>“The operator is responsible for the application of the prescribed measures in terms of safety, health and medical surveillance of workers exposed to silicosis risks. As such, it must train and raise awareness among workers in order to allow them to become aware of the importance of the risks to which they are exposed”.</i> Article 4 stipulates: <i>“The operator is required to develop internal regulations meeting the specific requirements of its mining unit in order to allow compliance with the rules of good conduct necessary for the policy for the protection of workers against silicosis risks. It must draft safety instructions relating to silicosis risks, to be submitted for approval”.</i>
Order No. 0037/MMH regulating the inspection and monitoring of EDIIs	8 October 1979	Classified establishments	Defines the procedures for inspection and monitoring of EDIIs
Order No. 14/MMH/MDR/MI/MTP/T/U/MAEI enacting the general requirements for EDIIs listed in the 3 rd class.	1 November 1976	Classified establishments	Enacts the general requirements to which EDIIs listed in the 3 rd class are subject
Order No. 12/MMH, enacting the safety and hygiene rules to which quarry and mining operations are subject	17 November 1975	Health and safety	Enacts the health and safety rules to which quarry and open-pit mining operations are subject, as well as their outbuildings
Order No. 084/MM/SG/DGMC/DM of 08/05/2019 enacting the safety and hygiene	8 May 2019	Health and safety	Enacts the health and safety rules to which quarry and open-pit mining operations are subject, as well as their outbuildings

rules to which the quarry and open-pit mine operations and their outbuildings are subject.			
Order No. 0003/MME/DM of 8 January 2001 on the protection against the dangers of ionizing radiation in the mining sector,	8 January 2001	Ionizing radiation in the mining sector	Enacts the safety rules against ionizing rays from mining operations.
Order No. 140/MSP/LCE/DGP/DS/DH of 27 September 2004 on the standards for the discharge of waste into the natural environment,	27 September 2004	Rejection of waste in the natural environment	Enacts the rules for waste management in the natural environment
Order No. 141/MSP/LCE/DGSP/DS of 27 September 2004 on drinking water potability standards,	27 September 2004	Drinking water potability	Enacts the drinking water potability standards

IV.3 International Legal Framework

The Republic of Niger has had to ratify several international and regional conventions, agreements and treaties. Thus, in accordance with Article 171 of the Constitution of the Republic of 25 November 2010, “regularly ratified treaties or agreements have, as soon as they are published, a higher authority than that of national laws”, subject to the application of each agreement or treaty by the other party”. These Multilateral Environmental Agreements (MEAs) were signed, ratified by the Republic of Niger and translated by the drafting and promulgation of several legal texts. These are the conventions, agreements and treaties referenced in Table No. 24.

Table24: Overview of the International and Regional Conventions, Treaties and Agreements

Title	Date adopted/effective date	Date of signature/ratification by Niger	Scope of application	Related texts/objectives
Treaty on the Non-proliferation of Nuclear Weapons (IAEA Standards): <ul style="list-style-type: none"> ○ Fundamental safety principles for the protection of persons and the environment (IAEA, 2006); ○ Fundamental international standards (IAEA, 2014); ○ Safety guidelines (IAEA, 2002). 	1957	10 August 1969	Atomic energy	Niger is a Member State of the International Atomic Energy Agency (IAEA) which establishes safety standards and measures for protection against ionizing radiation. The following references apply to the strategies and protocols relating to the location, design, construction, operation and closure of facilities and which are required to protect the workforce, the public and the environment against the impacts of radioactive waste generated by the mining and crushing of ore (including: mine tailings, waste rock, mineralized waste rock, process water; leaching solutions, precipitates; storage infiltration, and uranium processing plant areas):
ECOWAS Directive C/DIR 3/05/09 dated 27 May 2009 on the harmonisation of guiding principles and policies in the mining sector	27 May 2009	27 May 2009	Mining Resources	<ul style="list-style-type: none"> • Ensures the harmonization of guiding principles and policies in the mining sector of the Member States based on high-level standards of accountability for mining companies and governments in order to promote human rights, transparency and social equity and to

Title	Date adopted/effective date	Date of signature/ratification by Niger	Scope of application	Related texts/objectives
				<p>ensure the protection of the local communities and the environment in the mining areas in the sub-region;</p> <ul style="list-style-type: none"> • Creates a mining environment conducive to sustainable macroeconomic development and which ensures a balance between the need to implement incentive measures to attract investors and that of protecting the basic income and resources of the Member States; • Improves transparency in the process of formulating and implementing mining policy in the sub-region, promotes participation and strengthens the capacities of the mining communities; • Endows Member States with a harmonized mining policy and legal framework; • Ensures that harmonization takes into account the different levels at which each Member State is situated in the mining sector and how policies and various strategies could be conducted to meet the specific needs of each Member State” (Art. 2). The State is considered the owner of the mineral resources. The Directive provides for appropriate and rapid compensation which must be paid to the owner or legitimate occupant of any land acquired for the development of a mineral resource and sets out the methods for calculating the compensation. In addition, “States must classify certain areas

Title	Date adopted/effective date	Date of signature/ratification by Niger	Scope of application	Related texts/objectives
				as prohibited from mining activities, if these areas carry particular risks for the preservation of safety, including in areas with high environmental, social and cultural sensitivity” (Art. 4).
Stockholm Convention on Persistent Organic Pollutants (POPs),	Adopted on 22 May 2001 and entered into force on 17 May 2004	Signed and ratified respectively by Niger in 2001 and 2005 and entered into force in 2006	Protection of human health and the environment against the effects of persistent organic pollutants Persistent Organic Products (POPs)	Article 1 stipulates that “Given the precautionary approach set out in Principle 15 of the Rio Declaration on the Environment and Development, the objective of this Convention is to protect human health and the environment from persistent organic pollutants”. The measures intended to reduce or eliminate discharges resulting from intentional production and use are set out in Article 3 of this Convention.
United Nations Convention on Biological Diversity	Signed on 11 June 1992 in Rio de Janeiro (Brazil), and entered into force on 21 March 1994	Signed by Niger on 23 December 1993	Biodiversity conservation	Article 14 (“Impact assessments and reduction of harmful effects”) of this convention specifies that: “Each Contracting Party, insofar as possible and as appropriate, adopts procedures to require the assessment of the environmental impacts of the projects it has proposed and which are likely to significantly harm biological diversity, in order to avoid and minimize such effects, and, if applicable, allows the public to participate in these procedures.” Thus, SATOM will propose and implement an Environmental Action Plan (EAP) to prevent the loss of biodiversity in the zone of direct influence of the project.
Convention No. 161 of 2009 on occupational health services	Signed on 25 January 1985 by the ILO	Signed and ratified by Niger on 17 February 1988 and December 2010, respectively	Occupational health services	Occupational health service to promote the physical and mental health of all workers by maintaining a safe, healthy and well-adapted

Title	Date adopted/effective date	Date of signature/ratification by Niger	Scope of application	Related texts/objectives
				workplace through a preventive service invested in essentially preventive functions
Convention 155 on Occupational Health and Safety	Signed on 22 June 1981 by the ILO	Signed and ratified by Niger on 11 August 1983 and 19 February 2009, respectively	Occupational Health and Safety	Its purpose is to ensure a culture of safety for workers recruited for the implementation of the project
Convention No. 187 on the Promotional Framework for Safety and Occupational Health	Signed on 15 January 2006 by the ILO	Ratified by Niger on February 19, 2009	Promotional framework for occupational health and safety	Its purpose is to promote a culture of prevention in occupational health and safety matters
International Convention on the fight against desertification in countries severely affected by drought and/or desertification, particularly in Africa	16 June 1994 in Paris and 19 January 1996	14 October 1994 and entered into force on 19 January 1996.	Desertification	This convention recommends “the promotion of new livelihoods and environmental improvement”, in its Article 10.4. This convention will be applicable to the clearing work in the vicinity of installations, with the destruction of woody species.
Convention No. 81 on the Labour Inspectorate of 1947 supplemented by the 1995 protocol on non-commercial services;	June 1995	19 February 2009/effective 19 February 2009	Worker protection	Working conditions and the protection of workers in the exercise of their profession.
Convention No. 100 on Equal Pay of 1951	June 1951	19 February 2009/effective 19 February 2009	Salary protection	Principle of equal pay between the male workforce and the female workforce for work of equal value
United Nations Framework Convention on Climate Change	Signed on 11 June 1992 in Rio de Janeiro (Brazil), and entered into force on 21 March 1994.	Signed by Niger on 23 December 1993	Climate change	Article 4, paragraph f: the signatory parties: “take into account, insofar as possible, considerations related to climate change in their social policies and actions, economic and environmental practices and use appropriate methods, for example impact assessments, formulated and defined at the national level, to minimize the harmful effects to the economy, to public health and the quality of the environment of the projects or measures they

Title	Date adopted/effective date	Date of signature/ratification by Niger	Scope of application	Related texts/objectives
				<i>undertake to mitigate climate change or to adapt to it”.</i>
Convention No. 148 of 1977 on the workplace, (air pollution, noise and vibrations).	Adopted on 20 June 1977	Ratified by Niger on 21 June 1993	Workplace inconvenience	Its purpose is to protect workers against occupational risks due to air pollution, noise and vibrations in the workplace.
Convention No. 138 on the minimum age of admission to employment.	Adopted in Geneva on 26 June 1973 and entered into force on 19 June 1976	Signed by Niger on 4 December 1978	Minimum eligible employment age	Article 2 of the convention provides guidelines on the age of admission to employment to countries having ratified the convention (i.e.: the minimum age must not be less than the age at which compulsory education ceases, or in any case no lower than fifteen years).
Convention No. 102 on minimum social security coverage	Enacting the convention on the standard adopted in Geneva on 28 June 1952 and effective on 27 April 1955	Signed by Niger on 4 December 1978	Employee Social Security coverage	Its purpose is to promote social security at work. To this end, the convention sets out the provisions relating to social security, in particular: medical care, sickness, unemployment and retirement benefits, workplace accident and occupational illness benefits, family allowances, maternity benefits, disability benefits, survivor benefits and the equitable treatment of non-national residents,
Convention on the Protection of World, Cultural and Natural Heritage	Adopted on 16 November 1972 in Paris and entered into force on 17 December 1975	23 December 1974	World, cultural and natural heritage	Article 4 <i>“Each State Party to this Convention recognizes that the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage [...], scientific and technical.”</i>
Convention No. 148 on the workplace (air pollution, noise and vibrations)	11 July 1979, adoption in Geneva, ^{63rd} ILC meeting (20 June 1977)	28 January 1993	Employee Social Security coverage	Its purpose is to ensure a safe environment for the workers recruited for the implementation of the project (during its construction, operation and dismantling phases).

Title	Date adopted/effective date	Date of signature/ratification by Niger	Scope of application	Related texts/objectives
Kyoto Protocol on the Reduction of Greenhouse Gas (GHG) Emissions	Signed on 11 December 1997 and entered into force on 16 February 2005	Ratified by Niger on 30 September 2004	Climate change	Reduce emissions of the six Greenhouse Gases: Carbon dioxide, methane, nitrous oxide, and three chlorofluorocarbon substitutes. As Niger is a signatory to this Protocol, it is necessary to avoid, as far as possible, practices that result in excessive gas emissions
Equator Principles (PE)	Created in 2003, Version 4 (EP4) July 2020 .	Version 4 (EP4) July 2020.	<ol style="list-style-type: none"> 1. Project financing advisory activities, 2. Project financing, 3. Project-related loans to the company, 4. Bridge loans, 5. Refinancing related to a project and project-related acquisition financing. 	The Ecuador Principles are a reference and framework for the development of internal policies, procedures and individual practices in environmental and social matters. These principles apply to all industrial sectors and to financial products.
Rule No. 18/2003/CM/UEMOA of 23 December 2003 on the UEMOA Community Mining Code	Adopted on 23 December 2003	Tacit membership once effective	UEMOA Community Mining Code	This code covers operations relating to prospecting, exploration, mining, holding, circulation, processing, transportation, possession, transformation and marketing of mineral substances throughout the territory of the Union, with the exception of liquid or gaseous hydrocarbons. It sets out the following obligations for prospecting, exploration or mining of mineral substances in terms of environmental protection and the sustainable use of resources:

Title	Date adopted/effective date	Date of signature/ratification by Niger	Scope of application	Related texts/objectives
				<ul style="list-style-type: none"> ○ Performance of environmental impact assessments for the mining phase; ○ Compliance with environmental regulations; ○ Implementation of a surveillance plan as well as an environmental rehabilitation program. <p>As part of the implementation of this project, decisions must be taken with a view to fulfilling these community obligations.</p>
Niger Basin Water Charter	Adopted in Niamey on 30 April 2008	Tacit membership once effective	Charter of Member States of the ABN	<p>Article 2 of the Charter aims to promote cooperation based on solidarity and reciprocity for the sustainable, fair and coordinated use of the water resource of the Niger Hydrographic Watershed.</p> <p>As part of the implementation of this project, if the water resources of the river are used, provisions must be made with a view to their rational use.</p>

IV.4 Institutional Framework

The institutions that are directly responsible for environmental and social issues related to mining exploration and operations are:

- *Ministry of the Environment*

The Ministry of the Environment has, as its mission and in relation with the other Ministries involved, the design, development, implementation, monitoring and evaluation of the national Policy on the Environment and Sustainable Development in accordance with the guidelines set out by the government.

To this end, it has, among other things, the following powers:

- ✓ Definition and implementation of policies and strategies in the areas of restoration and preservation of the environment, the fight against desertification, climate change, biodiversity, biosafety, and management of natural resources and wetlands;
- ✓ Definition and application of environmental and sustainable development standards;
- ✓ Validation of environmental assessment reports on development programs and projects, issuance of environmental compliance certificates, performance of environmental and ecological monitoring, environmental audits and follow-up assessments;

It is organized according to Decree No. 2018-745 /PRN/ME/SU/DD of 19 October 2018 into a central administration, devolved technical departments, decentralized departments, public programs and public projects. These include:

- ✓ The Direction Générale des Eaux et Forêts [Directorate-General of Water and Forests (DGEF)], which includes the following National Technical Directorates:
 - ✓ The Directorate-General for Sustainable Development and Environmental Standards, which includes the following National Technical Directorates:
 - ✓ The Direction Générale de la Salubrité Urbaine et de l'Amélioration du Cadre de Vie [Directorate-General for Urban Health and Improvement of Living Conditions (DG/SU/ACV)] which includes the following National Technical Directorates:
 - ✓ The National Office for Environmental Review (BNEE) created by Law No. 2018-28 of 14 May 2018, setting out the fundamental principles of environmental review in Niger. This is a decision-making body whose missions are to promote and implement environmental reviews in Niger. It has exclusive national jurisdiction over all policies, strategies, plans, programs, projects and all activities for which an Environmental Review is mandatory or necessary, in accordance with the provisions of Law 2018-28 of 14 May 2018".
- *National Council for the Environment for Sustainable Development (CNEDD)*

Created by Decree No. 96-004/PM of 9 January 1996, as amended and supplemented by Decree No. 2000-272/PRN/PM of 4 August 2000, the CNEDD is a deliberating body whose mission is to develop, implement, monitor and assess the implementation of the PNEDD. It

is mainly responsible for ensuring that the environmental dimension is taken into account in Niger's socio-economic development policies and programs. It reports to the Prime Minister's office and is chaired by the Cabinet Director. To carry out its duties as a national coordination body, the CNEDD is endowed with an Executive Secretariat which, itself, is supported at the central level by sectoral technical commissions created by order of the Prime Minister and, at the regional level, by regional environmental councils for sustainable development.

- *Ministry of Mines*

The mission of the Ministry of Mines, in relation to the other Ministries involved, is “to design, develop, implement, monitor and assess national mining policies and strategies in accordance with the guidelines set out by the government”.

In this respect, it has, among others, the following powers:

- ✓ Conducting or initiating studies for the purpose of developing rational exploitation of mining resources, including, in particular, conducting fundamental geological studies;
- ✓ Controlling, monitoring and assessing activities relating to the exploration for and operation of mining resources;
- ✓ Implementing a policy aimed at increasing the mining industries' involvement in the local development of the regions that host these industries;
- ✓ Effective application of the environmental protection directives in the mining sector;
- ✓ Etc.

It is organized as follows and includes:

- ✓ A central administration;
- ✓ External services and related services;
- ✓ Public programs and projects.

The central administration includes:

- ✓ the Direction Générale de la Géologie et du Cadastre Minier [General Directorate of Geology and the Mines Land Registry (DGCM)] comprising the following national technical divisions: the geology division, the mining exploration activities control division and the mines registry and mines promotion division;
 - ✓ the Direction Générale des Mines et des Carrières [General Directorate of Mines and Quarries (DGMC)] comprising the following national technical divisions: the mining division, the small-scale mining and quarrying division, the mining environment division and the economic, control and mine taxation division.
- The Ministries responsible for hydraulics, interior, stockbreeding, employment, trade, transportation and health.

It also is tasked with supervising the following institutions:

✚ *The Centre de Recherche Géologique et Minière [Centre for Geological and Mining Research (CRGM)]*

The CRGM handles a portion of the remit and missions of the former Direction de la Recherche Géologique et Minière et de l'Office National des Ressources Minières [Directorate of Geological and Mining Research and the National Office of Mining Resources (ONAREM)]. Thus, pursuant to Law No. 2004-020 of 16 May 2004, it is responsible for the following:

- Inventory of the country's mineral resources;
- Fundamental geological studies;
- Geological mapping and map updates;
- Occasional prospection of mineralized indexes;
- Compilation and processing of geo-scientific information;
- Participation in mining promotion campaigns;
- Coverage of the State's counterparty in geological and mining research projects financed by development partners.

✚ *The Société de Patrimoine des Mines du Niger S.A. (SOPAMIN S.A.)*

SOPAMIN is a public limited company created by Order No. 2007-003 of 17 August 2007, amended by Order 2010-11 of 1 April 2010.

- *Extractive Industries Transparency Initiative (EITI)*

The EITI aims to promote transparency of payments and income from extractive industries, in particular through their verification and publication for the public at large. The EITI thus promotes a broad debate so that this wealth can contribute to economic growth and ensure sustainable development. The Government of Niger joined the EITI in 2005. In September 2007, Niger became a “candidate state” and in March 2011, it became “compliant state”.

The activities carried out by EITI Niger involve the annual production of reports on payments made by mining companies, income received by the State, independent audit of payments and income, the inclusion of civil society in the process and the strengthening of stakeholders' capacities. The responsibility for the operation of the EITI is entrusted to a Comité National de Concertation [National Dialogue Committee (CNC)] composed of representatives of the administrations, mining companies and civil society.

Following its suspension by the EITI Board of Directors at the latter's meeting in Manila, Philippines, on 26 October 2017 due to insufficient progress, the Government decided to withdraw Niger from the EITI Niger standard. On 22 January 2019, the Government announced that it was rejoining the EITI and intends to play fully and in full responsibility, as it has in fact always done, its role in the governance of extractive industries.

- *The High Nigerien Authority for Atomic Energy [Haute Autorité Nigérienne à l'Energie Atomique (HANEA)]*

According to Article 2 of Decree No. 2019-085/PRN of 1 February 2019 amending Decree No. 2013-490/PRN of December 2013 on the creation, attributions, organization and functioning of the High Nigerien Authority for Atomic Energy, “The main missions of the

National Authority for Atomic Energy are the supervision, coordination and promotion of all peaceful applications, including electronuclear and ionizing radiation, in relation to all ministries and other relevant institutions.

In this respect, it is responsible in particular for:

- ✓ Directing and/or managing the peaceful application of nuclear science and techniques;
 - ✓ Initiating and/or participating in the development and implementation of policies and strategies for the peaceful application of the science and techniques, in accordance with national guidelines and priorities;
 - ✓ Initiating and/or participating in the development of policies and strategies in the field of nuclear safety; defining and implementing nuclear security plans, in accordance with national guidelines and priorities;
 - ✓ Initiating and/or participating in the development of national policies and strategies for the development of nuclear energy resources;
 - ✓ Initiating and/or participating in the development and implementation of human resources development, research and capacity-building policies and strategies in the field of the peaceful application of nuclear science and techniques and ionizing radiation;
 - ✓ Undertaking, encouraging and promoting research and training activities relative to the peaceful application of nuclear science and techniques and ionizing radiation;
 - ✓ Supporting institutes and research or training centres in the nuclear field;
 - ✓ Developing and implementing policies, strategies and communication plans for the promotion of the peaceful application of nuclear science and techniques, as well as a culture of nuclear safety;
 - ✓ Coordinating, guiding, monitoring and harmonizing nuclear safety activities at the national level;
 - ✓ Ensuring that the applicant or beneficiary is responsible for:
 - analyses and radiological monitoring of consumer products nationwide;
 - quality control of radiodiagnostics and nuclear medicine equipment;
 - radiological monitoring of the environment;
 - dosimetry monitoring of staff and the atmosphere of public and private facilities using ionizing radiation;
 - ✓ Ruling on all matters referred to it by the President of the Republic, the government or the structures involved.
- *The Autorité de Régulation et de Sûreté Nucléaire [Nuclear Regulatory and Safety Authority (ARSN)]*

Created by Law No. 2016-45 of 06 December 2016, the ARSN is competent in the regulation and regulation of nuclear and radiological activities in order to guarantee the safety, security and protection of the environment against the effects of ionizing radiation throughout the national territory.

The mission of the ARSN is to regulate the activities and practices related to the use of nuclear or radioactive substances and materials, as well as those related to sources of ionizing radiation.

As such, it is responsible, among other things, for:

- ✓ Establishing and publishing the technical standards for radiation protection, safety, security and guarantees;
 - ✓ Ensuring compliance with nuclear safety and security regulations and guarantees;
 - ✓ Applying coercive measures in the event of violation of laws and regulations or in the event of a dangerous or potentially dangerous situation at any location where authorized activities are carried out;
 - ✓ Informing, raising awareness and consulting with the public and all other stakeholders about the regulatory process and the aspects of these practical activities relating to safety, security, public health and the environment, including incidents, accidents and abnormal events;
 - ✓ Cooperating with all relevant structures to develop and maintain a plan for the preparation and conduct of emergency interventions involving nuclear or other radioactive materials, in accordance with the national emergency plan;
 - ✓ Participating in the definition of the baseline threat for the application of security measures,
- The civil society organizations.

These include:

- ✓ The Network of Organisations for Transparency and Budget Analysis (ROTAB, Publish What You Pay Niger): ROTAB is a group of several associations, NGOs and Nigerien unions that have decided to pool their knowledge and experiences to actively participate in the global Publish What You Pay campaign to contribute to transparency in the extractive industry.
- ✓ The Nigerien Association for the Fight Against Corruption (ANLC/TI) Nigerien Section on International Transparency was created in 2001 and recognized by Order No. 039/MI/AT/ DGAPJ/DLP of 2 February 2001. The Nigerien Association for the Fight Against Corruption (ANLC) is an apolitical, non-denominational and non-profit association with for the purpose of combating corruption.
- ✓ The Reflection Group on Extractive Industries in Niger (GREN), whose purpose is to contribute to taking the public's concerns into account at the various stages of implementation.

- ✓ The Women's Association of the Extractive Industries Sector of Niger (AFSIEN): Created in October 2014, the main objective of this association is to promote women in the extractive industries sector while positioning their actions in the context of improving the living and working conditions of women professionals in the mining industries or living at the sites of the activities concerned.
- ✓ The Association Nigérienne des Professionnels des Etudes d'Impacts sur l'Environnement [Nigerien association of environmental impact assessment experts (ANPEIE)].

V. ASSESSMENT OF LIKELY CHANGES

V.1 General Methodology Used to Conduct the Assessment

This project impact assessment was done by a multidisciplinary team composed of environmental experts with significant experience in analyzing the impacts of large-scale projects on the environment. The following information was used to perform this assessment:

- ✓ Technical characteristics of the project;
- ✓ Baseline data obtained on the environment and socio-economic context;
- ✓ Feedback from similar projects/activities;
- ✓ A review of the available literature (scientific, technical, etc.);
- ✓ The inhabitants' traditional knowledge;
- ✓ The opinions and feedback collected during public consultations.

The main steps in the project impact assessment were as follows:

- ✓ Project description
- ✓ Identification of the sources of impact
- ✓ Identification of the Valued Environmental and Social Components (VESCOs)
- ✓ Creation of an interrelationship grid

Identification, description, analysis and assessment of the impacts

V.2 Methodology Used to Identify the Environmental and Social Impacts

The foreseeable impacts of the project on the environment were analyzed according to the main phases of its execution, which are:

- A)** The construction and development phase;
- B)** The operating and processing phase;
- C)** The closure and post-mine phase.

Impact identification is based on a matrix approach to the interrelationship between the project activities, the sources of impact and the elements of the receptor environments, in this case the physical, biological and human environments.

The main steps in identifying the project impacts are as follows:

- ✓ Project description
- ✓ Identification of the sources of impact
- ✓ Identification of the Valued Environmental and Social Components (VESCOs)
- ✓ Creation of an interrelationship grid
- ✓ Characterization of the impacts.

V.2.1 Identification of the Sources of Impact

“Sources of impact” are the elements of the project (structures, work or activities) that are likely to generate an impact on the valued environmental and social components in the area under study. They are defined based on knowledge of the technical characteristics of the project and the work methods used to carry out each of the activities, as well as of the planned operating method. Based on the project description, it was possible to identify the sources of impact (also called project

components). The project's sources of impact were identified according to the project phases, namely, development and construction, operation, and closure.

V. 2.1.1 Impact-Generating Activities in the Construction and Development Phase

The impact-generating activities in the construction and development phase of the project mainly involve:

- ✓ Preparation and installation of camp sites;
- ✓ Site installation;
- ✓ Extraction and haulage of construction materials (sand, gravel, laterite, etc.) in the quarry areas);
- ✓ Opening access routes within the area under study;
- ✓ Preparation of the land for the structures and surface installations;
- ✓ Transport of construction materials and equipment;
- ✓ Traffic and use of vehicles and construction equipment;
- ✓ Construction of surface structures and installations (administrative facilities, waste rock management facilities, tailings ponds, effluent ponds, etc.);
- ✓ Opening the declines;
- ✓ Waste production and management;
- ✓ Operation of the quarries and borrow sites;
- ✓ Installing the processing plant;
- ✓ Construction work on the base camp and outbuildings;
- ✓ Workforce presence and influx of local workers and migrants;
- ✓ Procurement of miscellaneous goods and services.

V.2.1.2 Impact-Generating Activities in the Operating and Processing Phase

Impact-generating activities in the operating and processing phase mainly involve:

- ✓ Removing and stockpiling waste rock;
- ✓ Extracting the ore (drilling and blasting, stoping the ore and loading it in the dumpers, etc.);
- ✓ Hauling the ore (loading and depositing ore with the dumpers) and waste rock;
- ✓ Mechanical and chemical processing of the ore (crushing, grinding, concentration by chemical leaching, electro-extraction or separation by gravity/concentrating hydrocarbons in stations, etc.);
- ✓ Water consumption;
- ✓ Storing chemical products;
- ✓ Stockpiling the waste rock (deposits of low-content ores);
- ✓ Stockpiling the mill tailings (tailings facilities);
- ✓ Storing the process effluents (effluent ponds);
- ✓ Maintenance of the permanent facilities and related logistics;
- ✓ Wastewater management;
- ✓ Waste production and management;
- ✓ Consumption of petroleum products;
- ✓ Site preparation;
- ✓ Operation of quarries and borrow sites;
- ✓ Mine water storage;
- ✓ Hot water storage;

- ✓ Production fluid storage;
- ✓ Electricity consumption;
- ✓ Workforce presence and influx of local workers and migrants;
- ✓ Procurement of local goods and services.

V.2.1.3 Impact-Generating Activities in the Closure and Post-mine Phase

The impact-generating activities in the closure and the post-mine phase of the project mainly involve:

- ✓ Dismantling and recovery of equipment;
- ✓ Filling in the tunnels;
- ✓ Redeveloping the site;
- ✓ Purging (cleaning) movable and immovable equipment;
- ✓ Waste treatment and restoration of disturbed land;
- ✓ Decontamination of the site (if required).

Table 25 summarizes the project's main sources of impact.

Table 25: Summary of the project's sources of impact

Project phases	Impact-generating activities
<p style="text-align: center;">Construction and development phase</p>	<ul style="list-style-type: none"> ▪ Preparation and installation of camp sites; ▪ Site installation; ▪ Extraction and haulage of construction materials (sand, gravel, laterite, etc.) in the quarry areas); ▪ Opening access routes within the area under study; ▪ Waste production and management; ▪ Operation of quarries and borrow sites; ▪ Installing the processing plant; ▪ Construction work on the mine accommodations and outbuildings; ▪ Preparation of the land for the structures and surface installations; ▪ Soil stripping and stockpiling; ▪ Transport of construction materials and equipment; ▪ Traffic and use of vehicles and site machinery; ▪ Construction of surface structures and installations (administrative facilities, waste rock stockpiles, wastewater ponds, effluent ponds, etc.); ▪ Opening declines and tunnels; ▪ Workforce presence and influx of local workers and migrants; ▪ Procurement of miscellaneous goods and services.
<p style="text-align: center;">Mining and Processing</p>	<ul style="list-style-type: none"> ▪ Removing and stockpiling waste rock; ▪ Extracting the ore (drilling and blasting, stoping the ore and loading it in the dumpers, etc.); ▪ Hauling the ore (loading and hauling ore with the dumpers) and waste rock; ▪ Mechanical and chemical processing of the ore (crushing, grinding, concentration by chemical leaching, electro-extraction or separation by gravity/concentrating hydrocarbons in stations, etc.); ▪ Water consumption; ▪ Storing chemical products; ▪ Stockpiling the waste rock (deposits of low-content ores); ▪ Stockpiling the mill tailings (tailings facilities); ▪ Storing the process effluents (effluent ponds);

	<ul style="list-style-type: none"> ▪ Maintenance of the permanent facilities and related logistics; ▪ Wastewater management; ▪ Waste production and management; ▪ Consumption of petroleum products; ▪ Site preparation; ▪ Operation of quarries and borrow sites; ▪ Mine water storage; ▪ Hot water storage; ▪ Production fluid storage; ▪ Electricity consumption; ▪ Workforce presence and influx of local workers and migrants; ▪ Procurement of local goods and services
Closure	<ul style="list-style-type: none"> ▪ Dismantling and recovery of equipment; ▪ Backfilling declines and tunnels; ▪ Redeveloping the site; ▪ Purging (cleaning) movable and immovable equipment; ▪ Waste treatment; ▪ Decontamination of the site (if required);

V.2.2 Environmental Components Likely to be Affected

The detailed characterization of the environment that was carried out as part of the assessment made it possible to identify the valued environmental and social components (VESC) that could be influenced by the project. The environmental components (or impact receptors) likely to be affected by the project correspond to the sensitive elements of the area under study. These are elements that can be significantly altered by impact-generating activities.

Components of the physical environment likely to be affected:

- ✓ Ambient air quality: Physicochemical properties of the air, including the concentration of dust;
- ✓ Soils: Characteristics of the surface deposits and vulnerability of the soils to erosion. From a hydro-chemical point of view, the water in the sector as well as the samples taken from the wells and the boreholes in the villages have a sodium-calcium tendency due to the presence of carbonated rocks;
- ✓ Landscape;
- ✓ Surface water: Physicochemical properties of the surface water; hydrological regime;
- ✓ Groundwater;

Components of the Biological Environment Likely to be Affected:

- ✓ Vegetation: land plant groups, including species with special status.
- ✓ Wildlife: All land mammals, reptiles, birds and their habitats including species with special status, as well as biodiversity.

Components of the Human Environment Likely to be Affected:

- ✓ Jobs and income;
- ✓ Local, regional and national economy;
- ✓ Safety and health;
- ✓ Land and pastoral activities;
- ✓ Crop farming activities;
- ✓ Archaeological and cultural heritage;
- ✓ Population and community changes or quality of life.


V.2.3 Creation of an Interrelation Grid


Connecting the sources of impact with the environmental VESCs using an interrelationship grid makes it possible to identify the project's likely impacts. **Table No. 26** shows the interaction between the project components and the environmental components, thus making it possible to identify the impacts.

Table26: Interrelationships between the impact-generating activities and the main environmental and social components

Phases of the Project	Impact-generating activities	Valued environmental and social components															
		Biophysical environment										Human environment					
		Air	Soil	Noise	Surface water	Groundwater	Landscape	Vegetation	Wildlife	Natural habitat	Biodiversity	Jobs and income	Economy	Safety and health	Grazing lands	Archaeological Heritage	Quality of life
Construction	Preparation and installation of camp sites	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Green	White	Red	Red	Red	Green
	Site installation	Red	Red	Red	White	Red	White	White	Red	Red	Red	Green	White	Red	White	White	Green
	Export and transport of construction materials	Red	Red	Red	Red	White	Red	Red	Red	Red	Red	Green	White	Red	Red	White	Green
	Opening of access roads	Red	Red	Red	Red	White	Red	Red	Red	Red	Red	Green	White	Red	Red	Red	Green
	Preparation of the land for the structures and surface installations	Red	Red	Red	Red	White	Red	Red	Red	Red	Red	Green	White	Red	Red	Red	Green
	Soil stripping and stockpiling	Red	Red	Red	Red	White	White	White	White	White	White	Green	White	Red	White	White	Green
	Transport of materials and equipment	Red	Red	Red	Red	White	White	White	Red	White	White	White	White	Red	White	White	White
	Traffic and use of industrial vehicles and machinery	Red	Red	Red	Red	Red	White	White	Red	White	White	Green	White	Red	White	White	Green
	Construction of structures and surface installations	White	Red	Red	Red	Red	White	White	White	White	White	Green	White	Red	White	White	Green
	Presence of labour and migrant influx	White	White	White	White	White	White	White	Red	White	Red	White	Green	Red	White	White	Green
	Waste production and management	White	Red	White	Red	Red	Red	White	White	White	White	White	White	White	White	White	White
	Operation of quarries and borrow sites	Red	Red	White	White	White	Red	Red	Red	Red	White	Green	Green	Red	White	Red	White
	Installing the processing plant	Red	Red	White	White	White	White	White	White	White	White	Green	White	Red	White	White	White
	Construction work on the mine accommodations and outbuildings	Red	Red	White	White	White	White	White	White	White	White	Green	White	Red	White	White	White
	Procurement of miscellaneous goods and services	White	White	White	White	White	White	White	White	White	White	White	Green	White	White	White	Green
	Removing and stockpiling waste rock	Red	Red	Red	Red	Red	Red	White	White	White	White	Green	White	Red	White	Red	Green
	Mining the ore	Red	Red	Red	Red	Red	Red	White	White	White	White	Green	White	Red	White	Red	Green
	Haulage of ore and waste rock	Red	Red	Red	White	White	White	White	White	White	White	White	White	Red	White	White	White

Operation	Mechanical and chemical ore treatment	Red	Red	Red	Red	Red	White	Red	Red	White	Red	Green	White	Red	Red	White	Green	
	Water consumption	White	White	White	White	Red	White	White	White	White	White	White	White	White	White	White	White	Red
	Storing chemical products	White	Red	White	Red	Red	White	White	White	White	White	White	White	White	Red	White	White	White
	Stockpiling waste rock	Red	Red	White	Red	Red	Red	Red	Red	White	Red	White	White	White	Red	Red	White	Red
	Storage of mill tailings (tailings facilities)	Red	Red	White	Red	Red	Red	Red	Red	White	Red	White	White	White	Red	Red	White	Red
	Mine water storage	White	Red	White	Red	Red	White	White	Red	White	Red	White	White	White	White	White	White	White
	Hot water storage	White	White	White	White	White	White	White	Red	White	White	White	White	White	Red	White	White	White
	Production fluid storage	White	Red	White	Red	Red	White	White	Red	White	White	White	White	White	Red	White	White	White
	Effluent ponds	White	Red	White	Red	Red	White	White	Red	White	Red	White	White	White	Red	Red	White	Red
	Maintenance and upkeep	White	Red	White	Red	Red	White	White	White	White	White	White	White	White	Red	White	White	White
	Residual water management	White	Red	White	Red	Red	White	White	Red	White	White	White	White	White	Red	White	White	Red
	Waste production and management	White	Red	White	Red	Red	Red	White	Red	White	White	White	White	White	White	White	White	White
	Site preparation	Red	Red	White	White	White	White	White	Red	White	White	White	Green	White	Red	White	White	White
	Electricity consumption	Green	White	White	White	White	White	White	White	White	White	White	Green	White	Red	White	White	White
	Consumption of petroleum products	Red	Red	White	Red	Red	White	White	White	White	White	White	White	White	White	White	White	White
	Operation of quarries and borrow sites	Red	Red	White	White	White	Red	Red	Red	Red	Red	Green	Green	Red	Red	Red	Red	White
Presence of the workforce	White	White	White	White	White	White	White	Red	Red	White	White	Green	Red	White	White	White	Green	
Procurement of local goods and services	White	White	White	White	White	White	White	White	White	White	White	Green	White	White	White	White	Green	
Closure	Dismantling and recovery of equipment	Red	Red	Red	Red	White	Green	Red	White	White	White	Green	Green	White	White	White	Green	
	Backfilling declines and tunnels	White	White	White	Green	Green	Green	White	White	White	White	White	White	Red	White	White	Green	
	Purge (cleaning) of equipment	White	Green	White	Green	Green	White	White	White	White	White	White	White	Green	White	White	Green	
	Waste treatment;	White	Green	White	Green	Green	White	White	White	White	White	White	White	Green	White	White	Green	
	Decontamination of the site	White	Green	White	Green	Green	White	White	White	White	White	White	White	Green	White	White	Green	
Redeveloping the site	White	Green	White	Green	Green	Green	Green	Green	Green	Green	White	White	White	Green	Green	Green	Green	

 Negative impact

 Positive impact

V.3. Methodology Used to Assess the Environmental and Social Impacts

This project impact assessment was done by a multidisciplinary team composed of environmental experts with significant experience in analyzing the impacts of large-scale projects on the environment. Impacts are assessed by considering criteria in order to enable their importance to be evaluated. Three criteria are used: (i) intensity, (ii) extent and (iii) duration of application of the impact on the environmental components of the project's influence area. Depending on their characteristics, the impacts could be subject to improvement measures (for positive impacts) and to mitigation or compensation measures (for negative impacts).

In addition, the following information was used to perform this assessment:

- ✓ Technical characteristics of the project;
- ✓ Baseline data obtained on the environment and socio-economic context;
- ✓ Feedback from similar projects/activities;
- ✓ A review of the available literature (scientific, technical, etc.);
- ✓ The inhabitants' traditional knowledge;
- ✓ The opinions and feedback collected during public consultations.

V.3.1 Assessment Parameters

The nature of an impact refers to the positive or negative nature of the effects of an activity on a given environmental component, whether biophysical or human:

- **Positive impacts** lead to an improvement in the environment (biophysical and socioeconomic), or alter them in a favourable or desirable manner;
- **Negative impacts** lead to a deterioration of the environment or socioeconomic conditions and suppression or mitigation measures must be taken.

V.3.1.1 Intensity of the impact.

The intensity of the environmental impact expresses the relative significance of the consequences attributable to the alteration of a component of the environment. It depends on both the value of the environmental component in question and the extent of the disruption (degree of disruption) that it has undergone. The value of the environmental component integrates both its ecosystemic value and its socio-economic value (*Hydro Québec, 1990*)

According to the approach developed by Hydro Québec, the ecosystemic value of a component expresses its relative significance determined by taking into account its role and function in the ecosystem. It may be:

- **Major:** When the component is of major interest due to its role in the ecosystem or in biodiversity and to its exceptional qualities, and there is a consensus within the scientific community as to its conservation and protection;
- **Moderate:** When the component is of high interest and has recognized qualities whose conservation and protection represent a matter of concern but without there being a consensus;
- **Minor:** When the component is of interest and has qualities whose conservation and protection are a matter of little concern.

The socioeconomic value of a given environmental component expresses the relative significance attributed to it by the public, government agencies or any other legislative or

regulatory authority. It reflects the willingness of the local or regional public and political authorities to preserve the integrity or originality of the component, as well as the legal protection granted to it. Hydro Québec also considers the socio-economic value of a component as:

- **High:** When the component is the subject of legal or regulatory protection measures (threatened or vulnerable species, conservation park, etc.) or is essential to human activities (potable water);
- **Moderate:** When the component is valued (economically or otherwise) or used by a significant portion of the population concerned without, however, being legally protected;
- **Low:** When the component is little or not valued or used by the population.

The value of the component integrates both the ecosystem value and the socio-economic value by retaining the higher of these two values, as shown in Table No. 27.

Table 27: Matrix for determining the value of a component

Socioeconomic value	Ecosystemic value		
	High	Moderate	Low
High	High	High	High
Moderate	High	Moderate	Moderate
Low	High	Moderate	Low

The degree of disruption of a component defines the extent of the structural and functional changes that it is likely to undergo. It depends on the sensitivity of the component with regard to the proposed interventions. Changes can be positive or negative, direct or indirect.

The degree of disruption takes into account the cumulative, synergistic or deferred effects which, beyond a simple cause-and-effect relationship, can amplify the changes in an environmental component when the environment is particularly sensitive. The degree of disruption is considered as:

- **High:** When the anticipated impact jeopardizes the integrity of the component or irreversibly alters this component or the use thereof;
- **Moderate:** When the impact results in a reduction or increase in the quality or use of the component, without compromising its integrity;
- **Low:** when the impact only alters the quality, use or integrity of the component in a minor way;
- **Undetermined:** When it is impossible to predict how or to what degree the component will be affected. When the degree of disruption is undetermined, the environmental impact assessment cannot be performed for this component.

The intensity of the environmental impact, ranging from low to very high, is derived from combinations between the three degrees of disruption (high, moderate and low) and the three classes of value of the component (high, moderate and low). **Table No. 28** shows the matrix for determining the intensity of the environmental effect

Table28: Matrix for determining the intensity of the environmental effect

Degree of disruption	Ecosystemic value		
	High	Moderate	Low
High	Very high	High	Moderate
Moderate	High	Moderate	Low
Low	Moderate	Low	Low

V.3.1.2. Scope of the impact

The scope of the environmental impact expresses the extent or spatial radiation of the impacts caused by an intervention on the environment. This concept refers to either a distance or a surface over which the change in a component, or the population affected by these changes, will be felt.

The three levels of scope considered are:

- Regional: When the impact affects a large area around the project site and up to a significant distance from it or is felt by the entire population of the area under study or by a significant proportion of the latter;
- Local: When the impact affects a relatively small area located within, near or at a short distance from the project site or when it is felt by a limited proportion of the population of the area under study;
- Limited: When the impact affects only a very small area inside or near the project site or when it is felt only by a small number of people in the area under study.

V.3.1.3. Duration of the impact

The duration of the environmental and social impact is the period of time during which the changes in a component will be felt. It is not necessarily equal to the period of time over which the direct source of the impact took place, since this time extends well after the phenomenon that caused it has ceased. The method used distinguishes environmental and social impacts that are:

- Long-term: For impacts felt continuously for the entire life cycle of the equipment or activities and even beyond in the case of irreversible effects;
- Medium-term: For impacts felt continuously over a relatively long period of time but generally less than the life cycle of the equipment or activities;
- Short-term: for impacts felt over a limited period of time, generally corresponding to the equipment installation or activities start-up period, for example for a season.

V.3.2. Significance or magnitude of the impact

The interaction between intensity, scope and duration helps to determine the significance of the environmental and social impact on a component affected by the project. The evaluation of the significance of the impact is based on the combination of the different indicators defined above, and the correlation established between each of the indicators allows the following classification to be established:

- Major impact (Ma): a major impact means that the integrity of the nature of an element and its use are significantly modified; the impact endangers the life of a human, animal or plant species;

- Moderate Impact (Mo): a moderate impact means that the integrity of the nature of an element and its use are partially altered; the impact does not endanger the life of individuals or the survival of an animal or plant species;
- Minor impact (Mi): a minor impact means that the integrity of the nature of an element and its use are slightly altered.

Table No. 29 presents the “Fecteau” Grid, which makes it possible to assess the absolute significance of the impact.

Table29: Impact significance assessment grid (Fecteau, 1997)

Intensity			Scope	Duration	Degree of significance of the impact		
					Major	Moderate	Minor
High	Regional			Long	Major		
				Moderate	Major		
				Short	Major		
	Local			Long	Major		
				Moderate		Moderate	
				Short		Moderate	
	Limited			Long	Major		
				Moderate		Moderate	
				Short			Minor
Moderate	Regional			Long	Major		
				Moderate		Moderate	
				Short		Moderate	
	Local			Long		Moderate	
				Moderate		Moderate	
				Short		Moderate	
	Limited			Long		Moderate	
				Moderate		Moderate	
				Short			Minor
Low	Regional			Long	Major		
				Moderate		Moderate	
				Short			Minor
	Local			Long		Moderate	
				Moderate		Moderate	
				Short			Minor
	Limited			Long			Minor
				Moderate			Minor
				Short			Minor

V.4 Analysis of the Project Impact

The mining project has three steps, as follows:

- ✓ Construction and development,
- ✓ Mining and processing,
- ✓ Closure and post-mine.

V4.1 Impacts of the Project during the Construction and Development Phase

V.4.1.1. Impacts on the Biophysical Environment

V.4.1.1.1. Air quality impacts

The impact on the quality of the air during the construction and development phase essentially concerns the alteration of its quality due to dust and particulate emissions and atmospheric pollutants (carbon monoxide) that may result from site preparation and construction work, vehicle traffic and use of machinery, on one hand, and hydrocarbon combustion on the other hand. Indeed, the preparation, stripping, earthworks and clearing of the sites, extraction of construction materials (sand, gravel, laterite, etc.) that will be done using heavy machinery will generate dust and particulate emissions. Moreover, road transport and heavy vehicle and machinery traffic are sources of air pollution, especially since the roads used are not paved. Also, the combustion of the fossil fuels used by the vehicles and machinery on construction sites will generate atmospheric pollutants including nitrogen oxides, sulphur dioxide, carbon monoxide and volatile organic compounds that can contribute to climate change.

The impact relating to the degradation of the air quality is considered to be of low intensity because emissions of dust and air pollutants will only slightly affect the initial composition of the air in the locality. Since dust emissions will occur during the construction and development work, the duration of the impact is considered moderate. In terms of scope, *the impact is considered local because the change in air quality will be felt only at the level of the area of direct influence of the project. Therefore, the significance of the impact of the construction and development work on air quality will be moderate.*

V.4.1.1.2. Soil impacts

The construction and development phase will require clearing and stripping the soil around the waste rock and tailings stockpiles, access roads, conveyor belts, support facilities, etc.

This will require:

- ✓ Stripping and stockpiling the usable soil (at least 200 mm, depending on the activity and availability, or more to compensate for the loss of soil quality during the storage period);
- ✓ Preparing (levelling and compacting) the storage areas, foundations, buffer zones, right-of-way areas around all of the facilities, run-of-mine stockpiling areas, and in the vicinity of access and transport roads;
- ✓ Preparing for the construction of the stormwater management system (dykes, ponds, etc.) and the foundations of the treatment plant and its support facilities (workshops, fuel depot, stores, etc.);
- ✓ Clearing, stripping and stockpiling the soil following the construction of the entire water supply and electricity supply system;
- ✓ Using heavy machinery on unprotected ground.

Thus, in this phase, the soil impacts essentially concern the alteration of the structure and texture of the soil, exposure to the risks of erosion and contamination and/or pollution by waste, oils and fuel.

In fact, the properties of the soil will be altered during the site preparation and construction of the project infrastructure. This work will strip off the topsoil and by [sic] and alter the biological and physicochemical properties of the soil.

Soil compaction during the construction activities may result from the traffic of construction equipment and vehicles in the project's installation area. This will reduce the rate of water infiltration in the soil and, as a result, will increase water erosion compared to current conditions. Furthermore, the soil may be carried off by wind and runoff water during the work. Excavation and backfill operations lead to exposed soil that will be particularly sensitive to erosion, especially in sectors with acute slopes offering significant wind and water erosion potential. In the project area, rainfall is rare and very brief but often very heavy, which promotes erosion. Also, the risks of soil contamination are likely as a result of accidental fuel spillage when provisioning site vehicles or by fuel and oil leaks from engines and site machinery. The severity of the consequences arising from contamination will depend on the amounts and extent of these pollutant spills. Solid and liquid waste generated during the work may cause soil pollution/contamination. Lastly, poor management of hazardous waste (used oils, used detergent, oil or diesel filters, soiled cloths and used cans or drums) resulting from machine maintenance may pollute the ground. ***The intensity of the impact on the soil will be moderate and local in scope as it is restricted to only a small portion of the site, and will be of moderate duration as such disruptions could occur throughout the construction and development phase. The significance of the impact on the soil will therefore be moderate.***

V.4.1.1.3. Negative impacts on water resources

Groundwater, alluvial and surface water resources may be affected during the construction and development phase. These impacts relate to the reduction of the available potential, risks of waste pollution or contamination, and the alteration of the drainage system.

- *Groundwater*

The "groundwater" component refers to the physical properties of the groundwater (volume, depth, flow rate, etc.) that may be affected in the preparation and construction phase. The supply of water for the construction work will mainly come from the mine boreholes until construction is complete. Also, the additional water supply boreholes drilled to provision the base camp and preliminary pumping during pre-mining surveys could cause a drop in the groundwater tables in the project area where the aquifer recharge rate is less than 5 mm/year. However, due to the fact that the hydrogeological formations in the permit area are mainly metamorphic and plutonic ones, the drawdowns will only affect the groundwater tables used.

The intensity of the sampling will be moderate, local in scope and of moderate duration, so it will be moderately significant.

Also, any accidental discharge of liquid or solid waste, used oil, grease, rubble and miscellaneous waste from the construction work could lead to contamination risks for the local alluvial water tables. The intensity of this impact is considered moderate, local in scope and of moderate duration. It will therefore be of moderate significance.

- *Surface water*

The potential impacts during this phase will result in the disruption of the hydrological regime, on one hand, and the deterioration of the quality of surface water, on the other.

The Adrar Emoles 3 permit is located in the Agatarak watershed where the Isouwarwar and Elagozan-Tagaza subwatersheds are also found. The 292 km² Isouwarwar subwatershed (which is entirely within the permit area) drains most of the water from the permit area to Agatarak which is directly connected to Sikiret. The 188 km² Elagozan-Tagaza subwatershed, part of which

overlaps the Adrar Emoles 3 permit, also drains a large amount of water to Agatarak. It should be noted that the deposit is not in any of these Agatarak subwatersheds. With regard to hydrology, logging and clearing the land to install the mine infrastructures (e.g., constructing access roads, exploratory drilling, removing overburden or constructing mine tailings facilities, etc.) all disrupt the hydrologic regime. The altered topography and soil exposure influence the water runoff and infiltration rates and increase the risk of water erosion. Spills from overburden heaps into natural drainage beds can also partially or completely clog the flow channels (silting, sand accumulation).

During the construction and development phase, on-site water runoff can be loaded with suspended matter (mineral dust or excavated soil), micropollutants (mainly from machinery) or site waste such as cardboard, empty bags, diesel fuel drums etc. that could be carried into the local hydraulic network, in particular the small streams at the basin headwaters or even into the koris, and contaminate or pollute them.

These situations are particularly harmful to the small streams at the basin headwaters and to the koris, which are usually clear. ***The impact of the project on surface water resources will be low-intensity, local in scope and of moderate duration. Its significance will therefore be moderate.***

V.4.1.1.4. Impacts on the vegetation

The project site is mainly covered by stands of vegetation composed of *Leptadenia pyrotechnica* and *Prosopis juliflora* along the koris and bottomlands.

During the construction and development phase, the site preparation work in connection with the installation of the mine facilities (processing plant, waste rock stockpiling facilities, tailings facilities, workshops and storage areas, permanent and temporary camps, haulage facilities, offices, etc.), construction of on-site or service roads and operation of the borrows will result in deterioration and destruction of the plant cover (logging and uprooting of trees and shrubs). The intensity of the disruption of the plant cover therefore appears to be high because the integrity of the plant cover will be significantly altered. The scope of the impact remains limited to vicinity of the mine infrastructure. The impact will be a long-term one as the destruction of the plant cover in the vicinity of the infrastructure will last for the entire project life cycle. The value of the “vegetation” component is considered high. ***The relative significance of the impact on the vegetation in the project preparation phase will therefore be major.***

V.4.1.1.5. Impacts on wildlife

The various logging, clearing, stripping and earthwork activities will negatively alter existing natural habitats and the noise, for example, will disturb the wildlife. Some animal species such as birds, mammals (hares, rats) and reptiles could be considered populations with a higher risk of exposure to the potential impacts of the project. The field investigations and opinions of the local inhabitants have made it possible to report a relatively interesting presence of animal species in the area. The construction and development phase will lead to the destruction of the animals' shelter and habitats, particularly those of birds and burrowing species. This loss of shelter and habitats as a result of the breakup of the ecosystems will give rise to a scarcity of nesting sites, resulting in the disappearance or displacement of certain wildlife species to habitats that are more appropriate for their ecological niche, diet and breeding.

The most mobile species, or those that live on larger territories (large animals, birds) will move away to avoid the work areas and find conditions conducive to their feeding and breeding. They may move into the wooded areas that are still present in the locality (for example, the *Leptadenia pyrotechnica* stands in Oufoud). The most vulnerable species will be those that are less mobile and occupy smaller living areas (very small mammals, reptiles). The mortality risk will thus be all the greater the more machinery is driven over habitats lying in the work areas and construction equipment and cars are driven over roads and tracks. Some of these species will continue to occupy small residual habitats in the areas of the site that are not used as part of the project. Wildlife is also at risk of being injured or killed in collisions with vehicles due to the increase in traffic over the three phases of the project. Lastly, the risk of poaching by the staff is a concern. The intensity of the impact on the wildlife is considered moderate as there could be some mortality and a slight change in the distribution of the animal species around the project site, and this will alter the integrity of the wildlife populations. The scope of the impact is considered limited because the disruption will be limited to the animal population and habitats that are within the immediate vicinity of the operations. The impact is long-term because it will continue to be felt throughout the mining operations, with disruption of habitats. The value of the "wildlife" component is considered high. ***In short, the relative significance of the impact on wildlife will be moderate.***

V.4.1.1.6. Impacts on the landscape

To determine the significance of the potential visual impacts associated with the development of the mine, it is important to understand (i) the project's visual influence zone, (ii) the distance from which the project's appearance is noticeable, (iii) the capacity of the landscape to absorb the changes, (iv) how quickly the receptors adjust to the change, (v) the visual nature of the landscape and (vi) how meaningful the place is to the receptors.

During the construction and development phase, the logging, clearing, stripping, earthworks and site installation activities along with the production and management of waste will appear as a rupture in the topography of the project site and its surroundings. The presence of the facilities and the stockpiles of cuttings and excavation heaps could have an impact on the landscape that is immediately within the project perimeter. Given the characteristics of the local relief around the site, these different sources of impact should not create any major local disparities. The landscape impacts will only be slightly noticeable by the local communities. Moreover, the visual change in the landscape will not be noticeable from a distance. ***The impact can be considered be low-intensity, local in scope and of moderate duration. The significance of the impact will therefore be moderate.***

V.4.1.1.7. Impacts on the ambient noise and vibration

Noise is defined by the WHO as an “unwanted sound”. Noise can affect the environment and quality of life. The noise level can therefore be an important factor in the management of the mine environment. During the construction phase, the main sources likely to generate the most decibels and vibration are mainly related to the use of equipment, in particular: compressors, generators, cement mixers, trucks and machinery, dumpers, cranes, cement mixers, bulldozers, backhoes, carts, vibrating rollers, etc. However, due to the distances between the activities implemented in the construction phase and the noise level receptors, noise and vibrations would not be a concern for the local communities. ***The noise and vibrations generated by the construction activities will therefore be low-intensity. The impact will be of moderate duration because it will be felt intermittently over time and in a localized area. The relative significance of the impact will therefore be moderate.***

V.4.1.2. Impacts on the Human Environment

V.4.1.2.1. Impacts on jobs and income

In Niger, the majority of the working population is mainly concentrated in the agriculture and stockbreeding sectors. The other sectors of activity are trade, crafts and services. The country's workforce is characterized by very low number of skilled workers. This profile seems quite representative of the employment situation in the communes of Tchirozérine and Dannet, but also in the other communes in the Agadez region for the working population occupied in the farming and market gardening sectors.

During the construction phase, the project will have a positive impact on the job market and the inhabitants' standard of living, especially with the prioritization of the employment of young people in the surrounding villages with regard to unskilled jobs. During the construction phase, Global Atomic Fuels Corporation will contribute directly and indirectly to increasing the population's income (through local hiring) and to increasing VAT revenues (through the procurement of local goods and services). In fact, Global Atomic Fuels Corporation will need a workforce during the construction phase, and a large part of it will be locally recruited in the project area through a policy which prioritizes unskilled local workers. Jobs that are open to local recruitment will be accessible to candidates with no qualifications (or with low-level qualifications).

All local job seekers (skilled or otherwise) are the main beneficiaries of the job opportunities. However, the positions will be assigned at the regional, national and international levels if specific skills are required and cannot be recruited in the area under study. The job opportunities created by the project should improve the overall standard of living in the area. The villagers directly impacted will be the ones who live in Oufoud, Mizzene, Tamalolo, Tagaza, Agatarak,

Tchirozérine and Dannel. Over time, the greater Agadez region should begin to benefit from it with the increase in available income and growing trade in goods and services. ***The impact on employment and income will be high-intensity, local in scope and long-term. The relative significance of the impact will therefore be major.***

V.4.1.2.2: Impacts on the local, regional and national economy

Conducting this project will lead to the creation of direct jobs and to indirect and induced economic benefits inherent in the preparation and construction work. To this is added the procurement of the goods and equipment required by the work. In fact, during the construction phase, the project will inject cash directly and indirectly into the local economy of the area through procurement and salaries, as well as the payment of the mining tax. This will stimulate the microeconomics of the area by increasing the available profits, which in turn will increase the local inhabitants' purchasing power, boosting trade with the outside through goods and services providers. However, due to the lack of a strong rural economy and local suppliers, the majority of supplies will not come from the area. These specific equipment needs, which cannot be easily met by local suppliers, will be met at the regional and/or national level.

Lastly, the project should also act as a catalyst for local supply in order to provision the mining camp with products from the stock farmers and local market gardeners.

The impact of the project on the economy will be positive, moderate in intensity, of moderate duration and regional and national in scope. The value of the component is considered to be high, thus the relative significance of the impact will be major.

V.4.1.2.3: Health and safety impacts

The activities in the preparation/construction phase will affect public and worker health in the project impact area. The sources of impact that may affect public health/safety are logging and clearing activities, equipment traffic and transport, earthworks, the presence of the workforce, etc. The project has characteristics that could contribute to outbreaks of contagious diseases due to the massive influx of people into the region. The labour demands are highest during the construction phase. These influxes may occur at the local, regional, national and international levels.

Thus, the arrival of a large number of workers, mainly male workers, could attract sex workers (SWs) as observed in the country's industrial mines. The first impact that will result from this will be the increase in cases of HIV infection and other STDs in the project area. Also, the inconveniences caused by the increase in dust, noise and vibrations in connection with the movement of construction equipment and vehicles and the operation of machinery could lead to health problems for the workers and exposed local populations. The types of recurring illnesses seen at the Integrated Health Centres (CSIs) in the village known as "RTA" and in Tchirozérine are: measles, pneumonia, cough and colds, skin diseases, chickenpox, gastralgia, diarrhoea and vomiting. Activities associated with the construction and development phase could be sources of injury-causing incidents and accidents.

Also, the interactions between site staff in the performance of some work could expose this staff to infectious agents such as bacteria, viruses, parasites, etc., which may have consequences on their health. In addition, the risks associated with hot and noisy environments are also a concern.

The stripping activities and earthworks, road construction, and construction equipment and vehicle traffic are the main sources of impact that can lead to accidents for the workforce and local communities. Lastly, traffic will increase in the project area, particularly on highway RN25 to the mine, during the preparation/construction phase. This will increase the risk of road accidents. Indeed, a large part of this road is already used by the regular traffic between the different communities it serves. There will therefore be an increase in traffic. ***The impact of the project on the “health and safety” component will be negative, moderate in intensity, local in scope and of moderate duration. The value of the “health and safety” component in the preparation/construction phase is considered high. In short, the impact on health and safety will therefore be moderately significant.***

V.4.1.2.4: Impacts on grazing land

Stockbreeding is the primary economic activity of communities in the project area. It is extensive and is often associated with crop farming. The operation of the deposit will have a negative impact on the stock farmers' current land use. The project site is located in an area of traditional importance to the Tuareg and Peul shepherds. This is because it produces seasonal plants and herbs with high mineral content (“salt”) that is nourishing for the herds. Rural communities in the project area drive their livestock to graze over a large portion of the project area during the rainy season and the dry cold season.

The project should result in the occupation of a total area of approximately 20 km². As a result, this will result in a loss of pastureland and could have negative impacts on the communities and people who traditionally use this land. The loss of access to this natural resource is significant and the consecutive economic displacement will contribute to a risk of impoverishment caused by the project. Also, the project could lead to a deterioration of the grazing circuits. Consequently, appropriate alternatives to improve the sustainable livelihoods of the affected communities must be planned and implemented through consultation and participation with these communities. These alternatives must not compromise the social or cultural continuity of the communities affected by the project and must comply with national laws and good international practices to avoid creating social and reputational risks. ***The impact of the project on grazing land will be negative, high-intensity, local in scope and long-term. Its significance is therefore considered moderate.***

V.4.1.2.5: Impacts on the archaeological and cultural heritage

The “archaeological and cultural heritage” component refers to elements that are part of the inhabitants’ heritage, such as sacred sites, cemeteries, historical sites and important natural areas. Stripping and earthworks are the main sources of impact that may affect this environmental component preparation. These activities can lead to the destruction and/or loss of historical, archaeological, or cultural heritage discovered in the project’s direct area of influence. However, the archaeological and cultural heritage survey did not reveal the presence of any historic, archaeological or cultural sites.

Nevertheless, sites might be discovered during the earthworks in the project development phase. Accordingly, a random discovery procedure will be implemented on the project site, as part of the Heritage Assets Management Plan to take into account previously unknown sites (including random discoveries) that may be encountered during construction, operation and closure.

The impact of the project on archaeological and cultural heritage will be of moderate intensity, long-term and local in scope. The overall significance of the impact will therefore be minor.

V.4.1.2.6: Impacts on the population and community changes

Due to the high unemployment rate in Niger, any significant development that could create jobs will tend to attract a large number of job-seekers. This influx is expected to begin during the construction phase and continue until the end of the operating phase. The impact of the population influx in the zone could be both positive and negative, depending on how the population is managed. Impacts could be cultural, socioeconomic, political and environmental. The influx of population into the area will increase the demand for services, including health, food, accommodation, water, transportation and leisure facilities.

The migration phenomenon should primarily affect the villages of RTA, Tagaza, Inolamane, Oufoud, Mizzene, and even the more remote villages such as Tamalolo and Sikiret. Negative impacts that could potentially result from an influx of job seekers include, depending on the number of arrivals, health hazards, prostitution, the **spread of STIs/HIV AIDS**, disruption of the customs and habits of the existing communities, increased alcohol abuse, armed muggings, theft and violence, increasing pressure on the infrastructures, inflation, heightened conflict between locals and outsiders, increasing human rights violations, poor working conditions, Etc. However, the population changes could have positive effects on the socioeconomic environment. The population increase will create a market for farm products and commercial goods as well as for services, thus promoting the development of the zone. ***Under these conditions, it is expected that in the construction phase, the impacts of the massive influx of population and the increase in pressure on public infrastructures and facilities will be negative, of moderate intensity and duration, and local in scope. Their significance is considered moderate.***

V.4.2 Impacts of the Project During the Operating and Processing Phase

V.4.2.1. Impacts on the Biophysical Environment

V.4.2.1.1. Air quality impacts

The project's impact on air quality and climate change will be greater by far in the operating phase. This phase sees the most vehicle traffic on the site and therefore the highest level of exhaust gas emissions into the air. It is also the phase with the highest levels of contaminant emissions in the form of silica and radioactive dusts as well as accidental gas leaks and the release of acid fumes into the atmosphere. During the operating phase, there will be a large number of sources of air pollutant emissions. These can be divided into two main categories:

- ✓ Emissions from the combustion of diesel fuel from the plant, machinery, and vehicles: These are emissions of nitrogen oxide (NO_x), sulphur dioxide (SO₂), fine particulate matter (PM₁₀, PM_{2.5}) and carbon monoxide (CO);
- ✓ Silica and radioactive dust emissions from topsoil excavation, blasting, drilling, ore extraction; equipment handling; dry crushing and grinding; vehicle traffic on the runways; wind erosion from the waste rock stockpiles and tailings ponds throughout the site: This involves coarse dust that settles relatively close to these sources and fine dust that is carried by the wind over longer distances.

Air quality is an aspect of mine operation that can have an impact on human health, particularly due to the increase in radon levels. This gas resulting from the uranium disintegration cycle and present in very small amounts in the atmosphere and in the underground tunnels, will see its levels increase due to the uranium disintegration cycle, in particular with the disintegration of the soil, which can spill and disperse in the atmosphere as dust within a radius of several kilometres from the mine and be deposited over the surrounding soils. As a general rule, the quantity of Rn emitted by a mining activity is proportional to the concentration of uranium in the deposit. Radon is emitted wherever uranium is found, in the mine but also in waste rock stockpiles and mine tailings. However, the operations will generate very little waste rock and this will be backfilled into the mine.

Radon and the elements resulting from its disintegration emit alpha and gamma radiation. However, other elements such as uranium, radium and lead 210 dust may be present in the atmosphere during operation and be carried by the wind thus increasing the human exposure.

In addition, wind erosion of waste rock and mine tailings stockpiles is a factor allowing these elements to be spread if the sites are not protected from bad weather (Harvey et al., 2009). Also, other elements such as uranium, radium and lead 210 dust can be found in the atmosphere during mining operations and be carried by aerial currents. Moreover, extraction operations, in particular traffic, transport, and truck and vehicle operation may generate dust deposits and increase the concentration of particulate matter (PM) in the air as a result of incomplete combustion of hydrocarbons. Similarly, equipment loading and unloading also promotes localized dust formation likely to particularly affect the site staff. In addition, operating truck and vehicle engines will generate carbon dioxide (CO₂), sulphur dioxide (SO₂) and nitrogen oxides (NO_x), which may ultimately affect the health of workers.

Lastly, accidental leaks of gas and acids are also likely in the long term to affect the health of workers.

The air quality impact is negative and high-intensity. It will be local in scope and long-term; therefore, this is a major impact.

V.4.2.1.2. Impacts on the soil

In the operations phase, the redevelopment of the soil during the mining operations, the haulage of the ore to the plant, and the mechanical processing of the ore alters the soils biological and physicochemical properties as well as its structure. For example, the use of heavy machinery helps to compact the soil. This increases runoff and reduces the soil's ability to absorb water. More compact and impermeable soil will not provide the level of moisture conducive to plant growth and will lead to the loss of microorganisms, organic materials and natural seeds (Phelps and Holland, 1987).

On-site logging operations associated with soil excavation work and the construction of infrastructures and roads can leave considerable ecological footprints on the soil and contribute to accentuating soil erosion phenomena.

The overall soil impact will be negative, moderate in intensity, local in scope and long-term. Its significance is considered moderate.

The spread of radionuclides falling on the terrestrial ecosystems around the site can be observed as:

- ✓ Deposits of windblown dust with high concentrations of metal associated with mineral and mining processing activities (such as crushing) during operations and originating from the tailings storage facility and waste rock stockpiles;
- ✓ Deposits of waterborne sediment and contamination from hydrocarbon spills (associated with vehicles and equipment), process reagents, ores and products;
- ✓ Contact with contaminated water in case of spillage.

The soil could also be polluted and/or contaminated due to accidental fuel or chemical spills, on one hand, and the generation and management of waste (solid and liquid), on the other. Lastly, there is a risk of wind and water erosion, mainly from the waste rock and mill tailings facilities. To this end, when designing these structures, Global Atomic Fuels Corporation will carry out a geotechnical stability analysis in order to characterize the long-term geotechnical aspects of all of the various mining structures and work areas erected during the operation of the site. This negative impact will be high-intensity, local in scope and long-term. Its significance is considered high.

The overall soil impact will be negative, moderate in intensity, local in scope and long-term. Its overall significance is considered major.

V.4.2.1.3. Impacts on the ambient noise and vibration

Noise can affect the environment and quality of life. The noise level can therefore be an important factor in the management of the mine environment. During the operating phase, the project will lead to changes in the ambient noise and vibration. In fact, mine blasting and the ore stoping, loading and unloading operations, haulage of ore to the plant, crushing, screening and grinding operations, compressors, ventilation system operation, miscellaneous workshops and the machine traffic will generate noise and continuous and semi-permanent vibrations that may constitute a problem for the workers. The inhabitants of Tagaza, Egatarak and Temilt could notice an increase in the noise levels in their area. ***The noise and vibrations generated by the mining activities will therefore have a localized impact with moderate intensity. The impact will be of moderate duration because it will be felt intermittently over time. The overall significance will therefore be moderate.***

V.4.2.1.4. Impacts on the landscape

In the mining phase, the potential impact of the project on the landscape relates to the degradation of the quality in connection with the stockpiling of the tremendous quantities of waste rock and mine tailings generated by the ore processing, along with the presence and construction of new ponds as operations progress.

In addition, the presence of the facilities (buildings, processing units, etc.) and waste production and management are a source of alteration of the visual quality of the landscape. ***The overall impact on the landscape will be negative, moderate in intensity, local in scope and long-term. Its overall significance is considered moderate.***

V.4.2.1.5. Impacts on water resources

The activities in the operating phase could negatively impact the quality and quantity of the water resources:

- Impact on groundwater

Water contamination is a major issue during the operation of this deposit due to the risks arising from radioelements that may contaminate the groundwater and affect human health. The composition of the water in the aquifers varies according to the geochemical and hydrogeological parameters, in particular the mineralogical ones, of the deposit, as well as the flow rate and circulation of the water. During the operating phase, drilling and blasting may disrupt these parameters and thus influence the composition of the water in the aquifers (Cameron, 1980; Rose and Wright, 1980). When drilling through the layers that separate two adjacent aquifers, the latter may become mixed. These artificial connections contaminate the various groundwater sources. The wells thus created generate environments that are conducive to geochemical reactions, microbial growth, oxidation of sulphurous minerals and acidification of the water. This geochemical and microbiological change in the water leads to the dissolution and mobilization of the uranium, its progeny and the other metals and metalloids present. Furthermore, acid mine drainage or AMD (caused by oxidation of sulphurous minerals, in particular FeS₂ pyrites and chalcopyrites) with its high potential for contamination, constitutes a risk of groundwater contamination. There is a likely risk of acid drainage in the waste rock and mill tailings facilities.

AMDs that solubilize several radionuclides and heavy metals constitute real sources of groundwater contamination in the event of any failure of the storage facilities. The extent of this phenomenon, which depends on the ore's sulphur content, is amplified by the grinding process and the chemical treatments, due to the increased exchange surface between the elements contained in the tailings and waste rock stockpiles and oxygen. Consequently, uranium and its progeny, as well as selenium, arsenic, vanadium, copper, nickel, molybdenum and aluminum, could be found in the acidic solution. Some elements such as thorium are more easily mobilizable in an acid medium and are a problematic element in the mine tailings since they have a low pH due to the sulphuric acid used to extract the uranium. With regard to the waste rock and mill tailings management facilities, water is usually one of the sources of pollution (meteoric water percolation) as well as the vector by which this pollution is transmitted to the surrounding environment (infiltration into water tables, releases into waterways).

On quite another level, the functioning of the groundwater table may be significantly disrupted (reduction in the piezometric level in the excavation tunnels due to dewatering, de-flooding rocks, etc.), with repercussions on the surrounding wells and boreholes.

Indeed, on one hand, dewatering operations aimed at keeping the tunnels dry and the provision of water necessary for the mine's activities lower the groundwater table and dry up some of the water sources and springs used as drinking water by the local inhabitants, and on the other hand these operations disrupt the groundwater flows. Consequently, if dewatering takes place in aquifers that are tapped by the locals by means of boreholes or wells, the hydraulic structures could dry up. The on-site water management will therefore have a significant influence on the site's hydrological and hydrogeological regimes which cannot be completely mitigated. Particular attention should therefore be paid to monitoring the piezometric level of the boreholes located around the mine. ***The groundwater impact is considered high-intensity, local in scope and long-term. The value of the "water" component in the operating phase is considered high. The relative significance of the impact will therefore be major.***

- Impacts on surface water

Contamination of the surface water (hydrographic network) is also a major issue during the operating phase of the deposit. Operating activities involve the movement of vehicles and heavy machinery as well as the exposure of soils with the possible consequence of an increase in particulate matter and turbidity in surface waters, in particular the waterways in the rainy season. It should be noted that in the area of immediate influence, there is no body of water. The soil compaction caused by the incessant passage of site vehicles and machinery is likely to lead to an increase in runoff during the rainy season and consequently, in the particle loads carried by the surface water to the local drainage network. Similarly, the production of site waste (solid and liquid), handling and accidental leakage of oil from site machinery are likely to cause contamination and pollution of the surface water.

Hydrologically, there will be an increasingly significant alteration (in particular as the mining operations progress and due to the presence of tailings and waste rock) in the distribution of the local water runoff networks, as well as a change in certain parameters such as pH, particulate

matter, dissolved materials, heavy metals and hydrocarbons. Indeed, the altered topography and soil exposure influence the water runoff, infiltration and evapotranspiration rates and increase the risk of water erosion. In addition, the changes to the topography caused by the operation facilitate the waterborne carriage of components that can contaminate surface water resources.

In the waste rock heaps and tailings facilities, acid drainage phenomena may occur due to the oxidation of sulphide-containing materials (rock) after exposure to the open air and water. If acids and more particularly sulphuric acid are produced, there is a high risk that the rock will leach and the metals present in it will dissolve. Thus, several radionuclides, metals, metalloids and others could be found in the runoff entering the local bodies of water. Dewatering also constitutes a potential risk of contamination of the surface waters because the mineral composition of the groundwater reflects that of the rock containing the deposit, which means high concentrations of radionuclides. This water contained in the pits risks being contaminated by the waste rock and mine tailings stored on the site and constitutes a potential source of contamination of the surface water. The main method of drainage in the project area is associated with runoff from the koris in Tagaza, Isouwawar and Elagozan, which originates in the Air Mountains and has a prevailing east-west flow direction. In the vicinity of the project infrastructure, most of the flow is planar and the flow channels are often difficult to identify given their changing nature, particularly during storms. ***The impact is considered to be low-intensity, local in scope and long-term. The relative significance of the impact on the surface water flow regime and on the water quality will therefore be moderate.***

V.4.2.1.6. Impacts on the vegetation

During the operating phase, mining new deposits in the perimeter could lead to the logging of trees and cutting of shrubs located in the new right-of-way.

This impact of the project on the vegetation is negative, of moderate intensity, local in scope and long-term. It will be moderately significant.

Moreover, the presence of uranium particles and their progeny in the air as well as in the soil characteristics affect the bioavailability and bioaccumulation of uranium in land plants and expose them to the ecotoxicological effects. Indeed, the bioavailability of uranium for plants varies depending on the composition and physicochemical conditions of the soils, particularly the pH. When the pH increases and organic matter or clay is found in the soil, uranium absorption decreases (Hinck et al., 2010). Furthermore, acid clayey soil with high levels of iron, manganese and organic fractions reduces the bioavailability and bioaccumulation potential of uranium for plants. These generally accumulate more uranium when they grow in soil containing a high concentration of U-carbonate complexes. Sandy soil also promotes the process of absorption through the plant roots (Shahandeh and Hossner, 2002). In addition, adding nutrients to the soil affects the bioavailability of uranium to plants.

The ecotoxicological impact of the project on plants will be of moderate intensity, local in scope and long-term. The relative significance of the impact on the vegetation will therefore be moderate.

Also, during this phase, the disruption of plant photosynthesis is a concern. In fact, the dust generated by the various activities could settle on the leaves of the trees and disrupt of the photosynthesis by clogging the stomates. This could delay plant growth. This impact of the

project on the vegetation is negative, of moderate intensity, local in scope and long-term. It will be moderately significant overall.

This impact of the project on the vegetation is of moderate intensity, local in scope and long-term. It will be moderately significant overall.

V.4.2.1.7. Impacts on wildlife

The operating phase of the project will have negative impacts on the wildlife and its habitat. Some animal species such as birds, mammals (hares, rats) and reptiles could be considered populations with a higher risk of exposure to the potential impacts of the project. Indeed, noise from the use of explosives and from the vehicle and truck traffic are likely to cause the wildlife to emigrate to quieter and more remote areas and discourage the animals from returning to the area under study. In addition, the presence of the staff raises concerns about poaching for certain species of wildlife present in the area under study. Lastly, the risks of wildlife poisoning are a concern as the animals may have access to contaminated water, in particular the water from the evaporation ponds.

The impact of the project on wildlife in the operating phase will be moderate in intensity, local in scope and long-term. Its overall significance will be moderate.

V.4.2.2. Impacts on the Human Environment

V.4.2.2.1. Impacts on jobs and income

During the operating phase, direct and indirect employment opportunities will vary over the mining life cycle in terms of the workforce and skills required. A policy of 100% Nigerien jobs (in terms of blue-collar workers and qualified labour) is required. The creation of jobs, as well as the generation of indirect jobs due to the increased demand for goods and services, could be beneficial to the local economy of the communes of Tchirozérine and Dannet, through a multiplier effect. Similarly, local subcontracting by the project could lead to an additional source of revenue due to the fact that the subcontractors' employees will also spend their money in the local economy. Such subcontracting is essential to the extent and sustainability of the economic impact resulting from the project operation, especially if it supports the development of local entrepreneurship.

In order to maximize the project's beneficial outcomes on local content, Global Atomic Corporation has adopted a policy of offering capacity-building to its subcontractors through various training and assistance to suppliers to improve the quality of their service and products. This is particularly relevant for traditional rural communities that tend to feel excluded from direct and indirect job opportunities in the mining sector. This will have a positive impact on a large proportion of young people who are out of work in the Tchirozérine and Dannet communities. ***The project impact on jobs and income is positive, high-intensity, long-term and regional or even national in scope. The overall significance of the impact will therefore be major.***

V.4.2.2.2. Impacts on the local, regional and national economy

The operation of this deposit will significantly increase the production of uranium in Niger. As the Nigerien government is a legal shareholder of the company to be created, it will receive additional dividends due to the operation of the new deposit in proportion to its share in the capital of said company.

The project will contribute to the increase in revenue in connection with the payment of various fees and other taxes to the communes of Tchirozérine and Dannet. In addition, during the operation phase, we could witness the development of small businesses (in particular the sale of food and other consumer goods), but also the purchase of goods and equipment that will contribute to boosting local consumption and consequently, the economic growth of the communes of Tchirozérine and Dannet as well as that of the other communes in the Agadez region. To this end, the company will implement a system of due diligence rules for responsible management of the supply chain. ***The impact of the project on the economy will be positive, moderate in intensity, long-term and regional in scope. The overall significance of the impact will therefore be major.***

Also, given the local communities' enthusiasm for market gardening activities, the deposit operating phase could trigger the development of market garden production within the local population, which could increase the demand for access to and development of land around the project site. The most relevant cases that should be noted are those in the villages of Agatara, Sikiret, Mizzene and Gololo. Local content has long been left out with regard to the priorities of the mining industry in Niger, but it is a priority for Global Atomic Corporation. Thus, special focus will be given to the development of market gardening in order to enable local communities to benefit from the local content of the project. ***The intensity is considered to be high due to the availability of land and the follow-up that will be conducted. The scope is considered local and long-term. The significance is considered to be major.***

V.4.2.2.3. Health and safety impacts

As in the construction phase, the operation and processing phase will present several health and safety risks for site staff and local inhabitants alike. In fact, uranium mining is a major source of concern for the mine workers and people living near the mine. The radioactive aspect of the elements is the main source of concern. The numerous studies conducted on the subject of health risks caused by uranium mining propose three sources of hazards to humans, namely radon inhalation, radionuclide ingestion and radiation exposure.

In the operating phase, the management of waste rock and mine tailings, water contamination, air contamination by radon and other radioelements, and exposure to external ionizing radiation, are the main sources of potential exposure for human health. These represent potential exposure to hazardous contaminants, radionuclides and chemicals and/or heavy metals. Also, the arrival of sex workers (SWs) raises concerns about the increase in the spread of STIs/HIV AIDS and COVID-19 in the project area. Disturbances due to atmospheric emissions (gas and dust emissions), noise and vibrations in connection with the movement of vehicles and construction vehicles, the operation of mining and thermal power plants as well as emissions from chimneys, ore conveyors, waste rock stockpiles and mine tailings facilities could lead to health problems for exposed workers and local populations. Heavy metals and toxic substances contained in mining site emissions (fluoride, cadmium, lead, silica and radioactive minerals such as uranium and its derivatives) will alter quality, resulting in respiratory and cardiovascular diseases.

Similarly, the interactions between site staff in the performance of some work could expose this staff to infectious agents such as bacteria, viruses, parasites, etc., which may have consequences on their health. In addition, the risks associated with hot and noisy environments are also a concern.

The types of recurring illnesses seen at the CSIs in RTA and Tchirozérine are measles, respiratory infections (cough and colds, pneumonia, tuberculosis), measles, vomiting, skin diseases, chickenpox, water-borne diseases, malaria and gastroenteritis. Activities relating to the operating and processing phase could be sources of injury-causing incidents and accidents. Indeed, mining projects (large-scale mining) are potential sources of several types of accidents, both for workers and for local inhabitants. Thus, accidents in connection with the movement of heavy machinery, handling of explosives and machines and product flammability, fire or explosion of pressurized equipment, explosions or burns due to chemicals, falls, electrocution, and asphyxiation, among others, will be cause for concern.

The increase in vehicle traffic could potentially increase the likelihood of road accidents impacting community health and safety, with injuries or deaths, as well as socioeconomic problems, such as the loss of livestock. Lastly, it should be noted that the change in the noise levels will cause hearing impairments with loss of hearing acuity in workers.

The impact of the project on the “health and safety” component will be negative, high in intensity, local in scope and long-term. The value of the “health and safety” component is therefore considered high. In short, the impact on health and safety will therefore be of major significance.

V.4.2.2.4: Impacts on the archaeological and cultural heritage

During the operating phase of the project, the impacts on archaeological sites will be mainly related to the expansion of the mining operations, infrastructure (waste rock and tailings facilities), as well as to the disruption caused by road traffic which could have a negative impact on archaeological sites. These activities can lead to the destruction and/or loss of historical, archaeological, or cultural heritage discovered in the project's direct area of influence. In fact, the known archaeological sites on the site are cemeteries, but other sites could be discovered as the operations progress. If this occurs, a random discovery procedure will be implemented on the project site, as part of the Heritage Assets Management Plan to take into account previously unknown sites (including random discoveries) that may be encountered during construction, operation and closure.

Based on the current knowledge of the locations of the various mining infrastructures, the impact of the project on archaeological and cultural heritage will be of low intensity because, apart from some cemeteries, no major site has been found in the project area. The impact will be short-term and local in scope. The overall significance of the impact will therefore be minor.

V.4.2.2.5: Impacts on the population and community changes

In the operating phase, at peak activity the mine site will have both positive and negative impacts, depending on how the population is managed. Impacts could be cultural, socioeconomic, political and environmental. The influx of population into the area will increase the demand for services, including health, food, accommodation, water, transportation and leisure facilities, whereas such facilities are already lacking. This migratory influx of job seekers will result in a demographic increase in the villages around the site and also in cohabitation issues between locals and newcomers. Thus, rural populations, mainly from the villages in the vicinity of the mine, are afraid that the wealthier migrant workers, far from their families and with immediate access to cash, will engage in conduct that can negatively influence young local men and women. This represents a risk of potential destabilization of the internal community and the dynamics of local powers. ***These negative and positive impacts will be moderate in intensity, local in scope and long-term. The significance will therefore be moderate.***

Furthermore, the demographic increase may have positive effects on the socioeconomic environment as well as provide an opportunity for the communes' administrative centres (Tchirozérine and Dannet) and a few nearby villages to benefit from certain basic socioeconomic infrastructures, including the renovation and/or upgrade of health centres, school facilities, waterworks, another market, etc. For example, the population increase will create a market for farm and commercial products as well as services, thus promoting local development. ***These positive impacts will be indirect, high-intensity, local in scope and long-term. The significance will therefore be major.***

V.4.3. Impacts of the Project During the Rehabilitation and Closure phase

V.4.3.1. Impacts on the Biophysical Environment

The main impacts will relate to the soil, water resources, air and noise.

V.4.3.1.1. Impacts on air quality

Pollutants likely to affect air quality are dust and particles of different sizes as well as gaseous pollutions generated by combustion, such as nitrogen oxides, sulphur dioxide, carbon monoxide and volatile organic compounds. These pollutants will be emitted during the dismantling of the infrastructures, movement of heavy machinery and vehicles, renovation of the tunnels and temporary roads (loosening and harrowing the soil). But this pollution will be less than that inherent in the construction and operating phases. In addition, wind erosion of the waste rock and mine tailings stockpiles is a factor that contributes to the dispersion of the radioelements into the atmosphere. **The intensity of the impact is considered moderate, local in scope and long-term. The overall significance will therefore be moderate.**

V.4.3.1.2. Impacts on the soil

Dismantling the mining equipment and reclaiming the land around the facilities will require the use of heavy equipment using fuel and lubricants. There will therefore be a risk of accidental spillage and corresponding soil pollution. However, any spills will be local in scope as they will be limited to the areas concerned by the rehabilitation work. In addition, the areas affected by dust pollution (from the waste rock and mill tailings facilities) are potential sources of soil contamination. Thus, the immediate surroundings of these stockpiles could be contaminated and/or polluted, in particular due to the problem of gravity erosion of the stockpiles and their cover and particulate transport to the soil. When designing these structures, in particular the waste rock and mill tailings facilities, Global Atomic Corporation will carry out a geotechnical stability analysis in order to characterize the long-term geotechnical outcome of all of the various mining structures and work areas erected during the operation of the site.

The impact will be low-intensity, long-term and limited in scope. The overall significance of the impact in terms of pollution will be minor.

V.4.3.1.3. Impact on the ambient noise and vibration

There will be no blasting during the project rehabilitation and closure phase; therefore, the vibration factor for this source has not been taken into account in this section. During the rehabilitation and closure phase, there will be constant noise in the project's area of influence. Backfilling, demolition and dismantling of the infrastructures will be the cause of this increase in the noise and vibration levels. It will be likewise for the equipment transports and movement of machinery on the site.

The intensity of the impact is considered to be low and local in scope as the disruption will involve a limited portion of the area under study, and the duration will be moderate. The overall significance of the impact will therefore be minor.

V.4.3.1.4

. Impacts on water resources

During the closure phase, the infrastructure dismantling activities will present a risk of groundwater and surface water contamination at the outskirts of the operating perimeter. In fact, the machinery and equipment that will be used for the various work will require fuel and lubricants. This could therefore be the cause of accidental spills of fuels or other substances likely to lead to the contamination of water resources in the project area and beyond. At this level, the impact will be short-term since it is possible to intervene immediately to decontaminate the area in the event of a spill or leak. The scope of the impact is considered limited to local depending on the period in which the work is performed (rainy season or dry season). ***If the work takes place during the dry season, the extent of the impact will be limited, whereas if occurs during the rainy season, the extent will be local. The impact will be low-intensity, thus the significance is considered minor.***

Furthermore, as in the mining phase, the waste rock and mill tailings facilities and water resources may be exposed to the release of radionuclides and other heavy metals. Indeed, after operations have ceased, the deterioration of the quality of the water resources is of concern due to the risk of increased levels of radionuclides and metals caused by percolation of meteoric water, infiltration into the groundwater tables and releases into the waterways.

The impact on water quality is negative in nature and moderate intensity, local in scope and long-term. The relative significance of the impact will therefore be moderate

On the other hand, the site restoration will restore conditions of water infiltration into the soil and runoff that will facilitate the return to hydrological and hydrogeological conditions close to the initial natural conditions and, consequently, a return to normal in the recharging of the aquifers that were tapped for dewatering during the site operations. ***The impact on the aquifer recharge rate is positive, low-intensity, local in scope and long-term. The relative significance of the impact will therefore be moderate.***

V.4.3.1.5. Impacts on the vegetation

The work relating to the mine closure is aimed at the definitive restoration of the site. To this end, the infrastructures will be removed, freeing up the spaces that will then be the object of the CES/DRS operations. The soils will be loosened, harrowed and re-profiled so as to recover their original properties or at least as close as possible to this state. The soil, organic or otherwise, set aside during the preparation of the land can then be used to cover the surfaces, always ensuring that the original condition is respected (or approached). The seeding that will be carried out will allow a return of the herbaceous stratum that previously prevailed on the site due to the rain. Environmental monitoring will make it possible to check that the plants at the site are thriving and to make the necessary corrections, if necessary. Site restoration at the end of the mining operations is a positive impact since the area initially occupied may offer plant cover similar to that which was present before the project was carried out. ***The intensity of the impact is considered moderate, local in scope and long-term. It will be moderately significant.***

V.4.3.1.6. Impacts on wildlife

During this phase, the dismantling of infrastructures and restoration operations on the site will alter the composition of the ecosystem and the structure of the local habitat (formation of new habitats) that will promote the presence of wildlife in the sector. ***The impact of the rehabilitation of the mining site and its closure is considered positive for wildlife. Its intensity is considered moderate, local in scope and long-term. The relative significance of the impact will therefore be moderate***

V.4.3.1.7. Impacts on the landscape

The dismantling of the infrastructures as well as the site restoration and seeding operations will enable the restoration and stabilization of the soil and restoration of a topography, plant cover and a water supply network that will resemble the natural environment. These measures will also help to restore water infiltration conditions in the soil and runoff conditions that will facilitate the return to hydrological and hydrogeological conditions close to the initial natural conditions. However, due to the tailings ponds and waste rock heaps, the landscape will remain altered for quite some time by the remains of the mine. In this case, the process used to design tailings ponds and waste rock management facilities specifically affects the storage geometry. The maximum height, surface area and the shape of the storage method must be designed in consideration of the surface area of the available land and, to the extent possible, the final shape of the waste rock stockpiles must blend into the natural landscape. If applicable, tailings ponds and waste rock stockpiles should be irregular in shape and have a natural appearance. The slopes of the sides must be designed to accommodate successive vegetation. Long, uninterrupted slopes accelerate surface runoff and can produce ravines. For these reasons, it is recommended to design slopes with an inclination of less than 20° with benches every 7 m and 10 m in height. Slopes under 20° reduce the risk of erosion and offer a better chance for the vegetation to thrive.

The intensity of the impact on the landscape is considered low in the closure phase, with regard to the restoration measures that will be taken. The impact will mainly be noticeable near the mine operations areas, which renders it limited in scope. The duration of the impact is considered to be long-term, so the importance is considered minor.

V.4.3.2. Impacts on the human environment

V.4.3.2.1. Impacts on jobs and income

The loss of jobs related to the cessation of mining operations could have significant repercussions on workers' income and, consequently, on the quality of life and social conditions of their households. Faced with this situation, staff retraining will be an important issue, and the implementation of support and assistance measures will be necessary. ***The intensity is considered moderate given the significance of the potential social impacts inherent in the cessation of mining activities. The scope is considered local and long-term. The significance of the impact on jobs and income will therefore be moderate.***

V.4.3.2.2. Impacts on the local, regional and national economy

The greatest impact is related to the loss of dividends paid on operations, direct and indirect investments, royalties and taxes for the state as well as for the Tchirozérine and Dannel communities. Indeed, as soon as the project's operating phase is over, Global Atomic Corporation will cease to generate direct or indirect contributions to the local, regional and/or national economy; however, the direct, indirect and induced effects of the project's construction, operation and closure phases will have strengthened the local, regional and national economies due to the irreversible positive effects they created.

However, the challenge for local communities will be to use the income and community investments to improve their living conditions and, above all, to diversify the local economy, i.e. to use the mining project as a catalyst for the development of the local economy. Thus, it is expected that the impacts will be similar to those in the construction phase and it is hoped that the work relating to the mine closure will be carried out by these communities (though with lesser scope). However, the socio-economic consequences of the closure of the mine include a reduction in expenses and a loss of livelihoods. During the operating phase, Global Atomic Corporation will develop the socio-economic capacities of the local communities and those in the extended zone, so that the negative consequences of the mine closure are limited to the extent possible. More specific mitigation measures will be identified after a thorough review of the socio-economic profile of the area under study, towards the end of the operating phase.

The intensity is considered moderate, local in scope and long-term. The significance of the impact is considered moderate.

V.4.3.2.3: Impacts on the population and community changes

All mining projects are always likely to result in a phase of cessation and significant social changes, particularly in terms of quality of life and well-being. Indeed, the attraction of labour in the mining industry will lead to a change in livelihoods within the community, currently essentially pastoral, which be replaced by activities in the mining industry. When the project is closed, a significant proportion of people employed directly and indirectly will find themselves out of work. The facilities and services provided or supported by the project's Corporate Social Responsibility program could also cease to be operated if they cannot operate independently in a viable manner. The sectors and areas that could suffer the most are education, water supply and sanitation, trade, and other social assistance services that may be provided directly or indirectly by the project. This impact will begin to be felt during the project downgrade phase, at the time of the staff layoffs.

To avoid a change in the livelihoods arising from the project, alternative livelihoods should be promoted and developed in the area. This is an open market that can only be mitigated by the development of other sectors. Measures aimed at mitigating the change in favour of the operations must come from the government and other stakeholders, including development partners. For example, in order to avoid idleness among the youth in the area, which is in most cases the cause of social delinquency, the latter should be the focus of a development of facilities and activities promoting social interaction and positive behavior for the community.

Although the Corporate Social Responsibility program exists, other sectors of the economy must be promoted through training, the implementation of microcredit plans and the establishment of a market for products and services. The taxes and income that the project will pay the government and other mining companies will allow the government to develop its own training and integration programs. ***The intensity is considered moderate, local in scope and long-term. The significance of the impact on jobs and income will therefore be moderate.***

VI. ANALYSIS OF THE ALTERNATIVES

An analysis of the alternatives was carried out as part of this environmental and social assessment. In the “With Project Option”, the analysis of alternatives is to improve the project design and the decisions relating to construction and operations, based on feasible project alternatives.

The analysis of alternatives compares reasonable alternatives to the site, technology, design and operation of the proposed project based on their potential environmental and social impacts; the feasibility of mitigating these impacts; their capital and recurring costs; their adaptation to local conditions; and their institutional, training and monitoring requirements. It also provides the basis for selecting the design of a particular project and justifies recommended emission levels, as well as approaches to pollution prevention and reduction.

To this end, two alternatives are to be analyzed, namely: “the no-project option” and “the option with project”.

These two alternatives have been compared in terms of environmental, economic and social advantages and disadvantages in order to serve as decision-making elements for the company.

VI.1. “No-Project” Option

The “No-Project” option would mean that things remain at the status quo and the formal mining project as it was developed is not implemented. Such a scenario would not necessarily mean that the environment would not be affected in any way. In fact, certain elements of the biophysical environment, such as the ecological system, are already significantly disrupted by the climatic conditions and anthropogenic activities in the area.

VI.2. “With-Project” Option

In the “With-Project Option”, the purpose of analyzing the alternatives is to improve the project design and the decisions relating to construction and operations, based on feasible project alternatives. The analysis of alternatives compares reasonable alternatives to the site, technology, design and operation of the proposed project based on their potential environmental and social impacts; the feasibility of mitigating these impacts; their capital costs; their adaptation to local conditions; and their institutional, training and monitoring requirements. It also provides the basis for selecting the design of a particular project and justifies recommended emission levels, as well as approaches to pollution prevention and reduction.

Thus, once the positioning of the project infrastructures was completed, various variants to the mine operation and management method were examined in detail in order to arrive at the selected project. To this end, the following alternatives were taken into consideration:

- ✓ Alternative mining methods;
- ✓ Alternative ore processing method;
- ✓ Alternative power supply;
- ✓ Alternative mine water supply;
- ✓ Alternative staff accommodation and services;
- ✓ Alternative management of waste rock and mine tailings;
- ✓ Alternative the management of non-mining waste;
- ✓ Alternative wastewater treatment;
- ✓ Alternative stormwater management;
- ✓ Alternative redevelopment, reconversion and management of the post-mining site.;

VI.2.1. Alternative mining method

There are two main mining methods: open-pit and underground. The chosen mining method generally depends on the geological conditions, in particular the depth of the mineralization, geotechnical conditions of the country rocks, and the potential of the mineralization but also its spatial layout.

Global Atomic Fuels Corporation has opted for the underground mining method. This choice is based on the following essential reasons:

- ✓ The geological conditions as well as the location of the deposit, in particular its spatial position and its dimensions in terms of depth of location and potential;
- ✓ The recommended underground mining will allow selective extraction of the ore but also produce less waste rock and débris. This will significantly reduce the cost of ore haulage and processing, as well as the impact on the environment due to smaller mine tailings facilities and waste rock heaps.
- ✓ The more profitable operation of the deposit and better preservation of the environment.

Table No. 30 provides the details regarding the criteria that motivated the choice of the underground mining method.

Table30: Criteria that motivated the choice of underground mining method

Mining method	Comparison criteria		
	Environmental	Socioeconomic	Technical
Open-pit Mining	<p>At the environmental level, with open-pit mining of its deposit, Global will see:</p> <ul style="list-style-type: none"> ✓ Production of large volume of mine tailings and dust requiring the clearing of several hectares of vegetation; ✓ Production of enormous amounts of dust, vibration and noise due to regular surface blasting; ✓ Significant damage to surface resources including surface water, groundwater and wildlife habitat and soil; ✓ Significant water consumption due to the quantities of ores to be processed; 	<p>Socioeconomically, with this mining method; the project will have direct impacts on the local populations due to exposure to noise and dust; high water consumption during the processing of the ore that may affect the availability of water needs in the nearby communities;</p>	<p>On the basis of the geological conditions of the deposit, in particular its spatial position and its dimensions (depth, thickness, etc.) which were the determining factors for the choice of the mining method, for Global, open-pit extraction is the least favourable method for this project from a technical or even environmental point of view.</p>
Underground Mining	<p>With the underground mining method, at the environmental level, Global will see:</p> <ul style="list-style-type: none"> ✓ Less waste rock; ✓ Less visible dust emission at the surface; ✓ Preservation of surface resources, in particular superficial water, groundwater and wildlife habitat; ✓ A reduction in its water consumption due to the fact that the quantities of ores to be processed will be limited; ✓ Use of tailings for backfilling, etc.). <p>However, the risks are high in terms of landslides and accidents.</p>	<p>Socio-economically, Global undertakes to ensure that the project is socially equitable and has established a strategy aiming to enable the communities directly affected to strengthen their capacities in the fields of health, education and services and to prosper economically. The social impacts of the project are dependent on the effective implementation of the Management Plans, but the project will provide local communities with the opportunity to improve their quality of life. This has been acknowledged at the community level, and is reflected in positive feedback about the project at public meetings</p> <p>The project has the potential to provide significant socioeconomic benefits for Niger. This is one of the biggest challenges for the project and a central theme of Niger's national mining policy.</p>	<p>The geological conditions of the deposit, in particular its spatial position and dimensions (depth, thickness, etc.) constituted factors determining the choice of mining method. Depending on the techniques used to mine the available mineral resources, underground mining is the only mining method to adopt in this context.</p> <p>From a geological point of view, the deposit has a high content on low-depth thicknesses. The recommended underground mining will allow selective extraction of the ore, thus not</p>

		<p>However, the scope of the project requires a very significant capital investment. Funding for this project is a major challenge for Niger and the national benefit from it will depend on the Terms and Conditions of the Mining Agreement that will be negotiated between Global and the Government of Niger.</p> <p>Disadvantages</p> <ul style="list-style-type: none"> ✓ May have negative impacts on the elements of the biophysical and human environment as developed in Chapter V of the ESIAR; ✓ All impacts are reversible and could be mitigated by the implementation of the measures proposed in the ESIA. 	<p>only to ensure this high content but also to produce less waste rock and tailings. This will significantly reduce the cost of ore haulage and processing, as well as the impact on the environment thanks to smaller mine tailings facilities and waste rock heaps.</p>
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VI.2.2. Alternative ore processing method

Global examined a wide range of other options as alternatives for the ore processing method.

The process circuit and processing parameters are similar to those already applied in the uranium mines of the French ORANO group which operates in Niger.

Thus, the major stages of the processing facility include: ore crushing and grinding operations; attack, impregnation, curing and disintegration; filtering and washing the ore; extraction and reextraction; finishing and packing the uranate into drums.

With regard to the processing circuit, this includes the following aspects:

- ✓ **Radiometric sorting of the ore** : This is a process used to reduce the amount of feed returning to the leaching circuit while losing only a small percentage of uranium present in the run-of-mine. Implementing a radiometric ore sorting system can reduce the size of several processing circuit components (thus decreasing investment expenses ["CAPEX"]), reduce the amount of required reagents and downsize pumps, etc. (thus decreasing the operating expenses ["OPEX"]) and lower the overall environmental footprint. The radiometric sorting tests performed on the ore indicated that, on the basis of a synthetic mixture of feeding the available stored samples, approximately 45% of the feeder material in an ore sorter could be rejected with a loss < 10% of the uranium contained.

- ✓ **Ablation:** Ablation offers a low-cost method of concentrating uranium by applying a procedure of physical separation by particle size to the ore slurry without any addition of chemicals “Ablation Technologies” performed tests on the Project samples focusing on optimizing the fragmentation stage of the processing circuit, adding an ablation stage to reduce the amount of feeding material requiring acid leaching, increasing the uranium content and reducing the carbon content. Approximately 63% of the material subjected to the ablation procedure was able to be rejected with a loss <10% of the uranium contained. An essential advantage of including radiometric sorting of the ore and ablation systems in the processing circuit is that approximately 80% of the ore feeding equipment is removed from the procedure without the use of chemicals and before the acid leaching procedure.

Table No. 31 gives the procedure as well as the inputs, outputs and waste from the processing operation.

Table31: Procedure, inputs, output and waste from the processing operation

Procedures in the processing operation		Inputs materials, (raw water and energy)	Outputs (intermediate products and products)	Waste (emissions, effluents and solid waste)
Preparation of the run-of-mine feed	Crushing	100% of run-of-mine ore P80 250 mm	100% of run-of-mine 20 R 300 mm	Dust in the environment
	Radiometric sorting of the ore	100% of run-of-mine 20 mm R 300 mm	55% of run-of-mine	Low amount of uranium waste in the tailings storage facility Dust in the environment
	Ablation	55% of run-of-mine	20% of run-of-mine, 149 µm	Low amount of uranium waste in the tailings storage facility
Leaching circuit	Two-stage tank leaching	20% of run-of-mine, 149 µm	Uranium	Gas emissions into the environment
Uranium recovery circuit	Stripping of impurities	Solution loaded with metals	Solution loaded with Uranium	Waste rich in iron and silica to the waste rock stockpile Gas emissions into the environment
	Stripping the uranium	Solution loaded with Uranium	Uranium precipitation circuit	Solution loaded for the start of the solvent extraction circuit Gas emissions into the environment

Source: Global Atomic Fuels Corporation feasibility study, 2019

The best option for Global is the processing method described in the table above, as it is adapted from an economic and environmental standpoint for the uranium industry.

VI.2.3. Alternative power supply

Energy is a key factor in the development of large mining projects. Discussions with the State and local authorities are essential. It is clear that Global Atomic Fuels Corporation **can** only develop the operation of its deposit as part of a development plan integrating existing infrastructures. Every use of non-fossil energy should be encouraged in light of climate change issues.

In Niger, when considering energy supply solutions, mining project developers will try to work with public power grid connection offers, and failing that, to develop their own energy source. Global Atomic Fuels Corporation conducted a power supply study to assess the costs of power drawdown options other than SONICCHAR. The alternative is to use diesel engine generators for power supply. This will result in more emissions of exhaust gas and, as a result, issues related to air quality and noise. Diesel engine generators will also contribute to increased greenhouse gas emissions.

A study was conducted on the energy options to compare the electrical power supplied by SONICCHAR to that produced by diesel fuel generators. The result showed that the electrical power supplied by SONICCHAR will be more economical for Global and will therefore be taken into account in this ESIA. This latter solution will take priority if the conditions are mutually advantageous for both parties, namely Global Atomic Fuels Corporation and SONICCHAR.

VI.2.4. Alternative mine water supply

The water intended for the processing plant will come from underground capture operations that may be sufficient to meet water needs. This involves mainly the Téloua and Tarat groundwater tables.

Pumping tests were carried out on the Téloua groundwater table (15 and 25 m³/h), the Izégouandan table (2 to 3 m³/h) and the Tarat table which has a flow rate of more than 30 m³/h.

Therefore, to meet the estimated needs of 55 m³/h, it will suffice to drill two or three boreholes to tap into the Telaua groundwater table or to drill a large-diameter borehole tapping into the Tarat groundwater table which can provide a flow rate of 50 m³/h. With regard to the aquifer recharge, it should be remembered that these groundwater tables are classified as fossil tables that recharge only very little or not at all.

Water consumption for the processing facilities is estimated at 55 m³/h. The boreholes will supply the water and the dewatering pumps will send it through a pipeline to the processing plant. Water not used by the processing plant will be stored. The hydrogeological surveys carried out on the permit area have also highlighted the possibility of exploiting other aquifers

such as Guézouman and Tarat. Several locations and alternative sources for water supply boreholes were considered, the location of the borehole and the aquifer were chosen to ensure a minimal impact on the aquifers that have been selected to ensure a minimum drawdown. The water will also be recycled and reused insofar as possible to minimize the drawdown on the groundwater tables.

This alternative is the most appropriate both economically and socially, and also avoids potential user conflicts with the local communities.

VI.2.5. Alternative staff accommodation and services

During construction, a temporary camp (including canteens and leisure facilities) will be built in the project area to house staff. Ultimately, a base camp will be built for the staff and management. This base camp will replace the current Global Atomic Fuels Corporation camp which will be moved. This decision to move the current camp is motivated by the fact that it is about 7 km from the deposit, thus within the direct influence area of the mining operations. The standards for the installation of mining camps will be used as guidelines. The buildings will be constructed with thermal insulation panels pre-wired for electrical installation.

In addition to the private employee districts, the base camp will include the following community buildings: administrative and communications buildings; a complex with kitchen/refectory/refrigerating/freezer rooms; first-aid centre with ambulance service; recreation centre; restrooms at the recreation centre; restrooms.

VI.2.6. Alternative management of waste rock and mine tailings

Managing tailings and waste rock containing high concentrations of radionuclides is one of the most challenging environmental issues. The waste rock, soil and rubble will be reused insofar as possible as backfill material, or stored during construction. However, the method of covering with protective layers and soil containment techniques do not appear to be sustainable mitigation measures that are impervious to the risk of contaminant leaks into the natural environment. Ongoing and regular monitoring is therefore necessary to ensure that the protection and containment layers play their role. The possibility of reusing these tailings and waste rock will be considered in order to permanently and sustainably incorporate them into the environment, while limiting contamination.

As part of this project, the tailings storage facility will be designed according to the standards applied on similar sites. This is the most appropriate concept because the water losses at the tailings storage facility will be minimized and the stability of the tailings will be maximized. This concept is similar to the elimination method used at the SOMAIR and COMINAK mines.

The tailings storage facility will be constructed with a clay coating to minimize the migration of the process water into the underlying layers, and will be rehabilitated in parallel with mill tailings with low uranium content from the processing circuit. Several other alternative locations for the tailings storage facility have been considered. The selected location strategy is designed to mitigate the impact of the tailings storage facility on the environment. The tailings storage facility is placed as close as possible to the processing plant, minimizing the impact of the conveyor, while still ensuring a low-permeability base layer.

With regard to the mine's waste rock, several alternatives for the development of waste rock stockpiles are being examined.

The waste rock stockpiles will be developed and built in succession as they fill up, and the initial stripping soil and overburden will form the initial material.

The location and model of the waste rock stockpiles will comply with the international standards recognized in the uranium industry, such as the location of the surrounding waterways and the geochemical properties of the ore, waste rock and tailings produced by the project.

VI.2.7. Alternative management of non-mining waste

Inert waste rock, soil, subsoil and rubble will be used insofar as possible as backfill material, or stockpiled during construction. Other waste streams such as industrial waste (e.g., used oil, filters, aerosol cans and gas cylinders) and plastic packaging, wood and crates and organic kitchen waste, will be sorted at the source. Government-approved recycling or disposal sites in Niger will be identified insofar as possible for each waste stream.

With regard to household waste, its removal and disposal at local landfills will be entrusted to service providers approved by the Ministry of the Environment.

VI.2.8. Alternative wastewater treatment

Wastewater collection and treatment facilities (including permanent water treatment and portable toilets) will be available at the plant, camps and in administrative buildings.

Global will use proven technology for the treatment of domestic wastewater, i.e., maceration, bacterial decomposition and then destruction by chlorination of the effluents before the final release of the organic matter into an organic material holding pond. This method of treatment was chosen because it is an approach that has been proven in the West African region.

The other options that were examined were:

- ✓ Use wastewater pits that allow water to infiltrate into groundwater. These pits are unhealthy and are hazardous to the environment. Therefore, this option has not been taken into account;
- ✓ Directly discharge the wastewater into the tailings pond. This method is not appropriate because the bacterial population in the wastewater is still “alive” and therefore capable of affecting and/or contaminating humans and animals that come into contact with it. This option was also rejected.

Both options were rejected due to their inherent shortcomings.

VI.2.9. Alternative stormwater management

For the management of stormwater, a drainage system that will empty into settling ponds will be developed in key areas of the rainwater circuit to mitigate the sedimentary load on the environment.

VI.2.10. Alternative redevelopment, reconversion and management of the post-mining site.

This involves ensuring a closure at the end of operations that is safe and sustainable from an environmental point of view. It aims to comply with the regulations in force in Niger, as well as to incorporate good international practices in this area. This plan focuses on potential environmental risks associated with the closure of the mine and the identification of specific measures that will help to avoid or otherwise mitigate them. Its implementation aims to protect overall public health and safety, minimize negative environmental impacts by reducing or preventing biophysical degradation of the environment, restore the area affected by the mine to a condition that is compatible with the stakeholders' expectations and the technical and economic feasibility, and ensure regulatory compliance of the site, in particular by obtaining the required closure certificate (environmental discharge) from the Nigerien government.

- Alternative redevelopment of underground operations

The related surface equipment and building will be dismantled upon closure and the buildings demolished through the following operations:

- ✓ Decontamination of buildings and equipment and the surrounding soil;
- ✓ Recovery of equipment for reuse/recycling/scrapping;
- ✓ Removal of all infrastructure including pipes and electrical wiring;
- ✓ Destruction of walls and foundations from the ground to the ceiling;
- ✓ Haulage of rubble from the demolition to underground facilities and
- ✓ Clean-up of cleared areas and replanting whenever possible.

It is often necessary to keep one part open to inspect and/or visit the shafts and tunnel entrances (rises in water levels, geotechnical inspections, gas vents, surveillance of protected species, etc.). Thus, it is often not useful to “conceal” these structures in their entirety. On the other hand, the areas around these points will be cleaned up and can be re-planted in order to optimally integrate them into the restored site.

- Alternative for dismantling infrastructures

In the dismantling phase, good practices consist of:

- ✓ Examining all possibilities for recycling rubble and old equipment from dismantled facilities (museums, local industries, etc.);
- ✓ Planning for an integrated deconstruction (allowing for the recycling of a large part of the materials);
- ✓ Labeling and disposal of waste in the appropriate local channels.

The advantage of this option is that the assets will still have value for the community and benefit it. The infrastructure assets that could be transferred are electricity and water supplies, roads, accommodation/villages, offices and workshops. The infrastructures that are likely to be removed because they have a recovery value and because they present safety problems for the community are the processing facility, treatment ponds, water tanks and waste rock facilities.

They will be removed in accordance with the closing activities listed below:

- ✓ Decontamination of buildings and equipment and the surrounding soil;
- ✓ Removal and recovery of the equipment with a view to subsequent scrapping;
- ✓ Demolition of buildings;
- ✓ Removal of all infrastructure including pipes and electrical wiring;
- ✓ Destruction of walls and foundations;
- ✓ Removal of access routes and re-opening or recycling, as applicable;
- ✓ Removal of safety barriers and recycling, as applicable;
- ✓ Haulage of non-hazardous demolition rubble to underground shafts;

- ✓ Spreading topsoil and/or a growth support material if necessary.
- Alternative post-mine management

In the post-closure phase, Global Atomic Fuels Corporation will seek to conclude a surveillance/monitoring protocol with the relevant authorities that will determine the projection conditions over time, in terms of the:

- ✓ Nature, duration and frequency;
- ✓ Costs;
- ✓ Technical and financial liability.

VII. IMPACT MITIGATION OR IMPROVEMENT MEASURES

The general environmental and social requirements in both the development phase and the operating phase concern the protection of the environment, the safety of site personnel and that of the population and the consideration of socio-economic aspects. These requirements also take into account certain obligations and/or directives from certain financial partners.

These include, in particular:

- ✓ Endowing the base camp with sanitary equipment and appropriate facilities;
- ✓ Having the necessary authorizations in accordance with the laws and regulations in force;
- ✓ Ensuring compliance of the site facilities with the health and safety measures.
- ✓ Drawing up site rules;
- ✓ Protecting the properties around the site;
- ✓ Ensuring sound and ecological waste management;
- ✓ Informing the local communities and raising popular awareness before any activity that will degrade private property;
- ✓ Installing adequate signage;
- ✓ Protecting soil and water resources against any form of degradation and/or contamination;
- ✓ Avoiding wastewater discharge, accidental or unintentional spillage of used oil and pollutants on the soil, in surface or groundwater, in drainage ponds, etc.;
- ✓ Using local labour as a priority;
- ✓ Developing partnerships with local suppliers for local procurement and subcontracting;
- ✓ Supporting local business creation initiatives,
- ✓ Promoting local content,
- ✓ Promoting the precautionary approach or “principle” for good environmental and social management;
- ✓ Promoting greater environmental responsibility;
- ✓ Contributing to the conservation of biodiversity and to integrated approaches to land use planning.

VII. 1. Measures for Improvement, Mitigation and/or Suppression in the Construction Phase

VII. 1.1. Biophysical environment measures

VII. 1.1. 1. Air quality mitigation measures

The best practice methods and mitigation measures that will be applied to mitigate and control dust and particulate emissions and atmospheric pollutants (sulphur dioxide, nitrogen oxide, carbon monoxide) during the construction and development work include:

- ✓ Giving instructions relative to speed limits to reduce the amount of dust and fine particles raised;
- ✓ Spraying tracks and dusty work areas if large amounts of dust are raised;
- ✓ Limiting vehicle and machinery traffic in the vicinity of access roads and work areas;
- ✓ Using equipment that meets the required gas emissions standards;
- ✓ Implementing equipment and vehicle inspection and requiring the use of vehicles designed for the handling of materials;
- ✓ Implementing an Air Quality Management Plan;
- ✓ Shutting down all construction equipment when not in service;
- ✓ Raising awareness among the project workforce about energy management.

VII. 1.1.2. Soil mitigation measures

The reduction in the scope of the impact on the soil during the construction and development phase will be achieved by implementing the following measures:

- ✓ Restricting, insofar as possible, logging and stripping activities to the vicinity of the facilities including, insofar as possible, waste storage facilities, ore stockpiles, length and width of easements, access and transport roads and conveyor systems in order to reduce the risk of erosion;
- ✓ Renovating temporary structures and right-of-way zones used (geotechnical surveys, trenches, etc.) and the construction phase [sic];
- ✓ Implementing a preventive maintenance program for the mining vehicles and machinery in order to avoid any pollution;
- ✓ Installing an appropriate system for managing liquid waste (uncontrolled oil and fuel leaks) and solid waste generated during the work;
- ✓ Setting up an emergency plan and providing decontamination equipment in the event of an accidental spill of fuel, lubricants and chemicals;
- ✓ Installing a watertight platform.

VII.1.1.3. Measures to mitigate the ambient noise and vibration

A reduction in the level of noise and vibrations can be achieved by applying the following measures which are presented as good practices to minimize noise for the receptors:

- ✓ Equipping facilities with silencers and soundproofing devices;
- ✓ Complying with the IFC's HSE environmental standards for all facilities, to the extent possible. In addition, site workers must comply with the regulatory noise thresholds in accordance with the IFC's HSE standard on acceptable noise levels per person, which will constitute an initial mitigation element;
- ✓ Using low-noise reverse warning devices that can help reduce the effects of noise pollution from vehicles on the site;
- ✓ Scheduling repairs, maintenance and use of site equipment in accordance with the manufacturer's instructions. Machines used intermittently will be shut down during intermediate periods (between two work sessions) or put into minimum operating mode;
- ✓ Informing the local communities of the general activities of the site, including working hours. For example: during the construction phase, the activities take place near the boundaries of the site;
- ✓ With the exception of the generators, pumps and electrical installations (soundproofed) all static installations must be shut down when they are not in use;
- ✓ Mapping the sources and sensitive targets.

VII.1.1.4. Landscape mitigation measures

Potential landscape impacts could be mitigated or corrected by the implementation of the following measures:

- ✓ Restricting soil excavation and logging to the minimum area necessary for the construction of surface infrastructures;
- ✓ Stockpiling topsoil at limited heights. Topsoil is to be stored in a manner that avoids settling and for as short a time as possible; ideally, it should be spread immediately after stripping on areas to be restored;
- ✓ Gradually restoring altered land;
- ✓ Inspecting altered areas and land that has been returned to its original condition to detect visible signs of erosion and/or ground movements.

VII.1.1.5. Measures for mitigating the impacts on water resources

During the construction phase, the following measures will be implemented:

- ✓ Waterproofing the washing and/or maintenance areas for heavy construction equipment, tiling workshops, and equipping fuel depots with retention ponds to prevent water contamination. A drainage system for the fuel depot will enable water to be collected and treated before its release;
- ✓ Preventive maintenance of all equipment consuming hydraulic oil, fuel or any other substance likely to contaminate surface water in the event of a leak;
- ✓ Collecting and directing, by means of embankments and/or channels, runoff water that has been heavily loaded with sediments from reused soils and waste rocks towards dedicated control facilities. These facilities include a series of settling tanks with additional built-in filtration systems, if necessary;
- ✓ Installing an appropriate system for managing liquid waste (uncontrolled oil and fuel leaks) and solid waste generated during the work;

- ✓ Clearing out solids deposited in natural drainage channels;
- ✓ Implementing a preventive maintenance program for the mining vehicles and machinery in order to avoid any pollution;
- ✓ Setting up emergency procedures specifying the measures to be taken in the event of an accidental hydrocarbon spill;
- ✓ Monitoring the level and quality of the groundwater during the construction phase, according to the water management plan;
- ✓ Installing separate units to treat the wastewater in the construction camps and the base camp, and managing them according to the permissible thresholds in Niger and/or the IFC before releasing the water into the receptor environment;
- ✓ Constructing a watertight platform for the maintenance of machinery and storage of hydrocarbons;
- ✓ Constructing impermeable ponds to hold liquid waste (effluents, mine water, production fluids, etc.) and installing monitoring piezometers;
- ✓ Choosing locations for the tailings heaps according to the nature of the land and providing piezometers for monitoring.

VII. 1.1.6. Vegetation mitigation measures

Mitigating the impacts on vegetation during the construction and development phase will be achieved by the implementation of the following measures:

- ✓ Restricting logging and clearing activities to the immediate vicinity of the infrastructures, including, to the extent possible, for the ore stockpiles and waste storage facilities;
- ✓ Prior marking of trees to be felled in order to limit abusive logging and the concerted management of wood obtained by environmental technical services and the communes of Tchirozérine and Dannet;
- ✓ Obtaining the necessary authorizations for felling or trimming the trees in the vicinity of the infrastructures from the environmental technical services in the project installation area;
- ✓ Raising awareness among the workforce on the need to preserve plant species considered to be “rare”, protected, vulnerable or threatened;
- ✓ Offsetting the cleared areas through CES/DRS actions with the seeding of treated areas.

VII. 1.1.7. Wildlife mitigation measures

Mitigating the impacts on wildlife during the construction and development phase will be achieved by the implementation of the following measures:

- ✓ Restricting the logging of trees and clearing of shrubs to the vicinity of the mining infrastructures in order to reduce the impact on wildlife habitats;

- ✓ Prohibiting any form of hunting by mine employees and subcontractors in the mining operations area;
- ✓ Restoring the habitats around cleared areas in order to compensate for the habitat loss;
- ✓ Setting up a sustainable information and awareness-raising program on wildlife conservation for the workforce and the local communities;
- ✓ Regular monitoring of the impact of the work on wildlife and the mitigation measures that have been proposed.

VII.1.2. Measures for the human environment

VII. 1.2.1. Optimization measures for the economy in the construction phase

In order to optimize the positive impacts on the local, regional and national economy, Global Atomic Fuels Corporation plans to:

- ✓ Develop and implement a policy aiming to maximize the procurement of goods and services and the recruitment of labour at the local, regional and national levels;
- ✓ Work with local employment agencies and training centres;
- ✓ Prioritize contracts for local, regional and national contractors when possible, for the performance of the work;
- ✓ Establish a local workforce training program or activities,
- ✓ Set up a committee to monitor the economic impact and relations with the environment (entrepreneurs, economic organizations, suppliers, etc.);
- ✓ Implement an effective stakeholder involvement and internal management program that will enable Global Atomic Corporation to ensure the management of the expectations of local authorities and communities, through effective communication and involvement strategies in terms of employment opportunities (type, duration, qualifications, etc.); guarantee the satisfaction of temporary and permanent staff recruited directly or working for the project through subcontractors and identify support measures to mitigate socio-economic impacts.

VII.1.2.2. Measures for improving employment and income

To improve employment locally, Global Atomic Corporation's hiring policy will give preference to the local workforce. It is only when the local human resources have been exhausted or are not available that the company may consider using people from outside the project area. This measure can be easily carried out using the results of the census of the available local workforce. This policy will also help to avoid any conflict between the local inhabitants and the external hires, as the former may feel that people from outside are stealing job opportunities from them.

The hiring policy should give preference to the residents of the surrounding villages and the people most vulnerable to the impacts of the project, then to the residents of the district, then the region, and optionally the country. For positions requiring specialized training, Global Atomic Corporation will have to develop a multi-phase training program that allows Nigerian

employees to acquire the necessary skills to allow them to access these positions. Similarly, job postings will be disseminated locally (radio, employment office, etc.) to reach local communities. To support the labour regulations, Global Atomic Corporation will apply the legislation and standards applicable to labour law and working conditions in its management plans through the following commitments:

- ✓ Hiring procedures and working conditions will comply with national and international standards on the protection of human rights;
- ✓ Working conditions and employment practices will comply with the performance criteria (workforce and working conditions), the national labour code and ILO standards;
- ✓ Anti-discrimination policies will apply to ensure the transparency and equity of current practices.

VII. 1.2.3. Health and safety mitigation measures

Potential health and safety impacts could be mitigated or corrected through the implementation of the following measures:

- ✓ Implementing an occupational health and safety program for the activities relating to the construction of the access road and site facilities;
- ✓ Training all workers in the occupational health and safety program;
- ✓ Mandatory wearing of PPE on site: helmet, work boots, gloves or masks, hearing protection and safety glasses during specific tasks;
- ✓ Installing and/or setting up adequate signage and fences around the sites presenting the greatest risk of accident, throughout the duration of the work on the access roads and installation of the mining equipment;
- ✓ Implementing speed limits;
- ✓ Implementing a health and safety policy,
- ✓ Implementing a single risk management document and a risk prevention plan;
- ✓ Implementing an awareness-raising program on HIV/AIDS-STDs and other health problems in the communities, organized in places of worship, local institutions, schools and health centres;
- ✓ Supporting the development of community infrastructures and services (care services, improvement of sanitary conditions and drinking water sources, for example);
- ✓ Ongoing monitoring of migration flows with regular transmission of information to local communities;
- ✓ Raising awareness among users and communities affected about road safety, including strategies for interacting with the traffic generated by construction activities.

VII. 1.2.4. Mitigation measures for pastoral activities

Global Atomic Fuels Corporation will implement the following measures to minimize disruptions associated with loss of grazing lands:

- ✓ Development and implementation of a recovery program for the locality's degraded land. These recovered lands will be used to compensate for the grazing land impacted by the project;
- ✓ Capacity-building for the local body responsible for managing conflicts in the locality,
- ✓ Support for the improvement of animal health,
- ✓ Upgrade of existing waterworks;
- ✓ Support for additional livestock feed.

VII. 1.2.5. Measures for the management and mitigation of cultural heritage

The impacts in terms of cultural heritage are associated with the construction phase and the loss of known and unknown archaeological sites in the zone will be mitigated and/or managed by the implementation of the following actions:

- ✓ Drafting a Heritage Assets Management Plan to ensure signage, fencing and, if necessary, excavation of sites that may be directly impacted by the Project
- ✓ Involvement of traditional leaders and administrative authorities in monitoring identified sites and known cultural, historical and aesthetic resources;
- ✓ Relocation of sacred sites (cemeteries) in consultation with local communities;
- ✓ Implementation of a discovery procedure during the construction phase;
- ✓ Informing the administration of any archaeological discovery.

VII.1.2.6. Mitigation and/or improvement measures for impacts on the population and community changes

Global Atomic Fuels Corporation will implement the following measures to minimize and/or improve the impacts on the population and community changes:

- ✓ Conduct a survey of the local activities and create a validated database of local suppliers;
- ✓ Implement a local economic participation plan that will support the sustainable development of the economy;
- ✓ Easy access to calls for tenders to help local companies remain competitive
- ✓ Procurement of local goods and services whenever possible;
- ✓ Support for the development of community infrastructures and services;
- ✓ Conducting awareness-raising campaigns on community health and safety, preferably in places of worship, local institutions, schools and health centres,
- ✓ Prioritize local workers for unskilled jobs.

VII. 2. Measures for Improvement, Mitigation and/or Suppression in the Operating Phase

VII. 2.1. Biophysical environment measures

VII.2.1.1. Air mitigation measures

The best practice methods and mitigation measures that will be applied to mitigate and control dust and particulate emissions and atmospheric pollutants (sulphur dioxide, nitrogen oxide, carbon monoxide) during mine operation include:

- ✓ Giving instructions relative to speed limits to reduce the amount of dust and fine particles raised;
- ✓ Spraying tracks and dusty work areas if large amounts of dust are raised;
- ✓ Limiting vehicle and machinery traffic in the vicinity of access roads and work areas
- ✓ Using equipment that meets the required gas emissions standards;
- ✓ Implementing periodic inspections of site equipment, vehicles and machinery;
- ✓ Implementing an Air Quality Management Plan;
- ✓ Implementing a waste rock management plan;
- ✓ Covering and/or replanting the waste rock piles in order to stabilize the surfaces;
- ✓ Implementing a radiological monitoring program.

VII. 2.1.2. Soil mitigation measures

The impacts associated with the operating phase will be reduced by implementing the following management measures:

- ✓ Ongoing soil rehabilitation throughout the mining life cycle.
- ✓ Cleaning up disturbed land, for example by restoring a thin layer of broken or crushed rocks in the disturbed zone where necessary, in order to reduce dust emissions and the risk of erosion;
- ✓ Inspecting disturbed and renovated areas to detect visual signs of erosion and/or sand deposits. If problems are identified, initiate a corrective action;
- ✓ Dust abatement to minimize the generation of fugitive and generated dust,
- ✓ Implementing spill containment and handling procedures in order to minimize the likelihood of spills and facilitate rapid intervention if a spill occurs;
- ✓ Training in spill cleanup techniques;
- ✓ Prohibiting unnecessary off-road operation of vehicles and machinery in order to reduce the risk of compaction;
- ✓ Regular maintenance of all vehicles, inspection and regular maintenance of storage areas and dams to prevent hydrocarbon and polluted water spills;
- ✓ Cleaning and regular maintenance of all transport roads, haulage roads, access roads, drains and rainwater storage facilities;
- ✓ Implementation of an awareness-raising program on soil management throughout the mine operations, specifically focused on soil sensitivity, storage and management;
- ✓ Monitoring the soil physicochemical parameters,
- ✓ Implementing a radiological monitoring program for the soils.

VII. 2.1.3.Noise and vibration mitigation measures

Reducing noise and vibration levels in the operating phase requires implementing the measures recommended in the construction phase on one hand, and on the other hand, those specific to the operating phase. As a reminder, good practices to minimize noise include:

- ✓ Equipping facilities with silencers and soundproofing devices;
- ✓ Complying with the IFC's HSE environmental standards for all facilities, to the extent possible. In addition, site workers must comply with the regulatory noise thresholds in accordance with the IFC's HSE standard on acceptable noise levels per person, which will constitute an initial mitigation element;
- ✓ Using low-noise reverse warning devices that can help reduce the effects of noise pollution from vehicles on the site;
- ✓ Scheduling repairs, maintenance and use of the site equipment in accordance with the manufacturer's instructions. Machines used intermittently will be shut down during intermediate periods (between two work sessions) or put into minimum operating mode;
- ✓ Regular feedback on noise levels from the selected sensitive receptors, combined with additional follow-up during certain activities likely to generate high noise levels.

In addition to the measures described above, the impacts on the noise level and vibrations in the operating phase may be further reduced, in the absence of specific texts on the matter in Niger, by applying the noise control techniques adapted to the mining projects in the IFC's HSE guide (2007) on the one hand, and by applying the techniques of the British guide entitled "good practice guide for operators".

The 2007 IFC HSE guide provides examples of noise control techniques that are particularly suitable for mining projects, including:

- ✓ Installation of hoods and sheathes at the processing facilities
- ✓ Installation of soundproofing and/or noise containment and reduction barriers, with sheathing and curtains near the source equipment (crushers, grinders and screens)
- ✓ Installation of natural protective barriers around the equipment (vegetation curtains, for example);
- ✓ Optimization of indoor traffic, mainly to minimize the risk of vehicle spills (avoid the noise of the spill alarm), and to maximize distances with the nearest sensitive receptors

An additional reduction in the potential impacts due to blasting vibrations can be obtained, in the absence of specific legislation in Niger, through the application of the following good practices from the British guide entitled "best practices guide for operators":

- ✓ Conducting precise analyses and recording blast holes. If necessary, the blasting design should be revised in light of the data collected;
- ✓ Completion of a proper blasting chart template (correct relationship between the load, spacing and diameter of the holes)
- ✓ Creation of accurate holes, while maintaining minimum sub-drill values
- ✓ Maximum use of free pans, with precise planning of firing sequences
- ✓ Optimization of maximum instantaneous load weight via the following measures:
 - Decrease in the number of holes

- Reduction in instantaneous load per load
- Decrease in bench height or hole depth
- Decrease in the diameter of the borehole
- ✓ Optimization of the blast ratio for changes made to the design.
- ✓ As far as possible, orientation of the direction of detonation outside sensitive areas.
- ✓ To the extent possible, the use of unconfined loads will be avoided, especially in the event of a crack or cracked or weakened floor due to previous blasting.
- ✓ Where possible, the use of detonator cord surface lines should be avoided; detonators and explosives must be covered with appropriate materials.
- ✓ The materials used to stopper them must be of sufficient quality and quantity to contain all explosives during detonation. The use of coarse material (angular debris, for example) will be considered.
- ✓ The lower primers will be preferred to the upper primers.
- ✓ Ignition failure procedures must be distinguished from insufficient charges.
- ✓ In the event of overpressure posing a potential problem, it will be foreseen to reduce the blasting area.
- ✓ Blasting will be carried out at regular intervals, the vibration levels (ground and air) will have to be monitored regularly so that the information can be used to make the required changes to the future blasting designs.
- ✓ A manager will be appointed on the site, who will be the recipient of requests and complaints relating to operational activities. All complaints must be investigated and the required actions must be implemented, if applicable.

Furthermore, the IFC HSE mining guidelines stipulate that for blasting-related emissions (vibrations, blows, overpressure, rock projection, for example), the following management practices are recommended:

- ✓ Mechanical tearing must be used as far as possible to avoid or minimize the use of explosives;
- ✓ Use of specific firing plans, loading procedures and blasting ratios, electronic or time delay detonators, and in situ blasting tests (with lower initialization and time delay detonators) to improve fragmentation and reduce ground vibration;
- ✓ Development of an adequate sizing of the blasting;
- ✓ Implementation of a system for monitoring ground vibrations and overpressures;
- ✓ Appropriate design of primary crusher foundations and other major sources of vibration.

Before the start of blasting, a blasting test must be carried out and controlled, using seismographs defined at different distances from the blasting pan in order to collect a sufficient amount of data for the creation of a regression line adapted to the Project. This regression line can then be used for future blasting in the mine.

VII. 2.1.4. Landscape mitigation measures

In the operating phase, potential landscape impacts could be mitigated or corrected by the implementation of the following measures:

- ✓ Mitigation measures necessary to mitigate the impacts associated with the tailings facilities, waste rock stockpiles and other infrastructures include simultaneous rehabilitation to ensure that the tailings facilities and waste rock stockpiles blend into the natural landscape;
- ✓ Installation of vegetation screens in the form of landscape embankments to allow the site to integrate into the natural environment;
- ✓ Gradually restoring altered land;
- ✓ Construction of pits for the storage of bulky waste
- ✓ Inspecting altered areas and land that has been returned to its original condition to detect visible signs of erosion and/or sand movements.

VII.2.1.5. Measures for mitigating the impacts on water resources

During mining operations, the greatest impacts on water resources are mainly the deterioration in water quality, change in flow regime and risk of lowering groundwater levels. In fact, in order to minimize the problem of contamination from stockpiles of tailings and/or waste rock, Global Atomic Fuels Corporation will carry out a geotechnical stability analysis to project the long-term geotechnical outcome of the various mining structures and work areas erected during the operation of the site. All mining areas will be taken into account: underground or open-pit cavities, shafts, tunnels and boreholes leading up to the surface, surface storage facilities (stockpiles, tailings dykes, slag heaps, etc.) as well as the ancillary facilities. The approach will be based on the comparison of the characteristics of the various materials constituting these structures with the constraints to which they are and will be subject. This comparison thus makes it possible to detect the existence of structures whose long-term stability cannot be guaranteed. The evaluation of the characteristics incorporates factors of ageing, fatigue and water effect analyzed using geological and hydrogeological analyses. Thus, to reduce the impact of mining operations on water resources, Global Atomic Fuels Corporation is proposing to implement the following measures

- ✓ Development of a hydrogeological model for the use and operational monitoring of groundwater flow to assess the likely scope and duration of impacts on groundwater systems in proximity to mining operations;
- ✓ Use of technologies for saving water at the mine (use the water from the mine to combat dust or transfer it to untreated water ponds to be reused in the plant where supply deficits are expected);
- ✓ Establishment of a Water Use Committee in order to maintain strong communication;
- ✓ Development and implementation of a waste rock and mine tailings management plan (stabilization of the waste rock and tailings stockpiles to resist long-term erosion);
- ✓ Regular inspection of waste rock and tailings facilities to verify that they are true to the design;
- ✓ Use of the best techniques for the construction of dykes and/or ponds to ensure the proper performance of the structure;
- ✓ Regular inspection of pumps, pipes and the tailings pond dyke to detect any cracks and other malfunctions;
- ✓ Development and implementation of a rainwater management plan

- ✓ Development and implementation of a waste management plan
- ✓ Preventive maintenance of all equipment consuming hydraulic oil, fuel or any other substance likely to contaminate surface water in the event of a leak;
- ✓ Periodic control of water quality through the installation of piezometers around the tailings ponds and waste rock stockpiles;
- ✓ Compacting the surfaces of the slag heaps to ensure the adequate flow of rainwater to the collection and treatment devices;
- ✓ Establishment of a wastewater treatment plant and disposal of wastewater in accordance with effluent discharge limit values;
- ✓ Limiting insofar as possible water retention time in the mine;
- ✓ Implementation of an emergency response plan for accidental spills
- ✓ Establishing a management plan for contaminated soil.

Water levels will be monitored in order to determine the extent and speed of the spread of the drawdown and to allow the updating of the hydrogeological model and the groundwater modelling, in order to refine the forecasts. Groundwater quality will be monitored around and downstream of waste rock, tailings and low-content ore facilities.

VII.2.1.6. Vegetation mitigation measures

Global Atomic Fuels Corporation will implement the following measures to mitigate the impacts on vegetation during the operating phase:

- ✓ Management of wood cutting by the relevant forestry services;
- ✓ Payment of the logging tax;
- ✓ Establishment of protected natural areas on- and off-site to compensate for the disruption of the vegetation associated with the project, in cooperation with the authorities;
- ✓ Development of the population of *Leptadenia pyrotechnica* in the village of Oufoud during the operation;
- ✓ Gradual rehabilitation of the available areas must be carried out over the mining life cycle;
- ✓ Application of measures to prevent airborne dust
- ✓ Continuation of actions to raise awareness among the workforce and communities on the protection of vegetation and the conservation of certain plant species considered to be “rare”, protected, vulnerable or threatened;
- ✓ Continuation of actions to offset the cleared areas through CES/DRS actions with the seeding of treated areas.
- ✓ Ecotoxicological analysis of the vegetation cover.

VII.2.1.7. Wildlife mitigation measures

During the operating phase, the connections between the habitats and the surrounding wildlife reservoirs will be maintained in order to allow the recolonization of the renovated habitats after the closure of the mine. To this end, Global Atomic Fuels Corporation will make sure to:

- ✓ Promote the creation of protected areas or wildlife habitats that will serve as refuge for wildlife;
- ✓ Prohibit hunting for mine employees and subcontractors;
- ✓ Educate workers and local communities on the protection of wildlife and its habitat.
- ✓ For the safety of wildlife, waste generated by the site, in particular waste attracting animals, will be kept safe and secure. The same is true for the evaporation basins.

VII.2.2. Measures for the human environment

VII. 2.2.1. Measures for improving the local, regional and national economy

Niger is a member of the EITI, which aims to strengthen the transparency of financial and accounting reports in the extractive industry sectors. Global Atomic Fuels Corporation will comply with ITIE standards regarding financial reporting, in order to guarantee the transparency of funds transfers to the Nigerien authorities. Global Atomic Fuels Corporation **will** engage with national and local authorities to encourage cooperation in governance and to maximize the benefits of economic growth and the payment of taxes to central authorities in the communities affected. In addition, during the exploitation phase, Global Atomic Fuels Corporation will develop the socio-economic capacities of the nearby communities and those in the extended zone, in order to develop sustainable programs for crop and livestock farming. These programs aim to support the sustainable development of the local economy through diversification and increase in production in the project area through current best techniques and practices. Finally, to provide local project content to the nearby communities, Global Atomic Fuels Corporation will develop and implement a program to support market garden production in the area.

VII.2.2.2. Measures for improving employment and income

To improve the job market locally, Global Atomic Corporation's hiring policy will give preference to the local workforce. It is only if the local human resources have been exhausted or are not available that the company may consider hiring people from who do not live in the vicinity of the project area. This policy will also help to avoid any conflict between the local inhabitants and the external hires, as the former may feel that people from outside are stealing job opportunities from them.

In general, Global Atomic Corporation's hiring policy should give preference to the residents of the surrounding villages and the people most vulnerable to the impacts of the project, then to the residents of the district, then the region, and optionally the country. For positions requiring specialized training, Global Atomic Fuels Corporation will have to develop a multi-phase training program allowing Nigerien employees to acquire the necessary skills to allow them to access these positions. Similarly, job postings will be disseminated locally (radio, employment office, etc.) to reach local communities. To support the labour regulations, Global Atomic Corporation will apply the legislation and standards applicable to labour law and working conditions in its management plans through the following commitments:

- ✓ Hiring procedures and working conditions will comply with Nigerian and international standards on the protection of human rights;
- ✓ Working conditions and employment practices will comply with the performance IFC criteria (workforce and working conditions), the Nigerian labour code and ILO standards;
- ✓ Anti-discrimination policies will apply to ensure the transparency and equity of current practices.
- ✓ All recruitment will be managed through local employment offices that will be created in the major villages. All persons arriving in work areas must be reported to the nearest office.

VII. 2.2.3. Measures for the population and community changes

Global Atomic Fuels Corporation will adopt national and/or international best practices for the purchase of goods and services. These practices will require stakeholder involvement actions such as:

- ✓ Capacity-building for local suppliers of goods and services to enable them to submit their tenders and meet quality, quantity and reliability requirements;
- ✓ Developing the partnership between regional suppliers of financial products and training and local companies
- ✓ Supporting initiatives to create local businesses that take into account the concerns and views of men and women in urban areas, in order to mobilize their contribution to community development efforts;
- ✓ Implementing a local procurement plan to increase indirect employment;
- ✓ Implementing a community development plan to improve basic social services;
- ✓ Promoting savings, safe investments and banking services as a part of stable financial management;
- ✓ Supporting women in the development of income-generating activities in connection with the mine, and promoting the purchase of local products to boost local development.

In order to avoid the degradation of local infrastructures and services within the communities concerned, Global Atomic Fuels Corporation will collaborate with local authorities via the following measures:

- ✓ Support for the development of community infrastructures and services (water supply, health, education);
- ✓ Involvement of administrative and territorial authorities and other key stakeholders involved in the provision of services and the development of social infrastructure;
- ✓ Implementation of a health and safety awareness program in partnership with local healthcare professionals and community representatives;
- ✓ Development of a policy for identifying accommodation solutions (camps, for example) allowing the company's workers to avoid having to compete with the members of the local community in the event of limited housing infrastructures;
- ✓ Cooperation with United Nations (UNHCR) agencies for reconciliation and appeasement of local communities.

VII. 2.2.4. Health and safety mitigation measures

Global Atomic Fuels Corporation will adopt safety measures aimed at preserving the working conditions of its employees, on one hand, and necessary actions to protect the health and safety of the general public, on the other. In order to minimize the impact on the health and safety of its personnel, Global Atomic Fuels Corporation will enact the safety and health measures of its personnel, which will include:

- ✓ Adoption of strict procedures for hazard identification and risk assessment and for the definition and implementation of appropriate mitigation measures to ensure workplace safety. The appropriate information will be communicated to all project staff;
- ✓ A comprehensive health and safety plan will be drawn up before the activities begin to ensure that workers are aware of the risks associated with the project activities,
- ✓ Machinery such as trucks will be equipped with an air-conditioning system and cabs will be protected against dust and soundproofed in order to protect the drivers;
- ✓ Personal Protective Equipment (PPE) will be provided to staff;
- ✓ Individual and atmospheric dosimeters will be provided to all staff working in areas requiring protection against ionizing radiation.
- ✓ Strict HSE terms regulating the working conditions will be applied to contractors and subcontractors in order to ensure that all persons working as part of the Project are treated on equal footing;
- ✓ Training and awareness of all project staff, including persons employed by service providers, subcontractors and suppliers, of the risks associated with their work, their responsibilities in managing these risks, and any plan, procedure or instruction to be followed regarding the management of these risks.

In addition, Global Atomic Fuels Corporation will implement a dust management plan incorporating the rehabilitation of exposed surfaces, use of tank trucks and sprayers to keep surfaces exposed constantly damp, sterile management to minimize drying of the surface of the waste rock heap, and a dust control program to identify problematic elements. Global Atomic Fuels Corporation will conduct stakeholder involvement and communication campaigns in the nearby villages and among the general public in order to inform the local communities and authorities of its HSE plans and standards, recruitment practices and non-discrimination policy.

This mainly involves:

- ✓ Implementation of a community health and safety awareness program in partnership with local healthcare professionals and community representatives;
- ✓ Implementation of an awareness-raising program about STIs/HIV/AIDS and other community health issues, organized in places of worship, local institutions, schools and health centres;
- ✓ Awareness-raising among users and communities affected about road safety, including strategies for interacting with the traffic generated by the mining activities, in particular ore haulage.

VII.2.2.5. Measures for the management of cultural heritage sites

Mitigation of impacts on cultural heritage requires the continuation of the measures recommended during the construction phase. These include, in particular:

- ✓ Implementation of the Heritage Assets Management Plan to ensure signage, fencing and, if necessary, excavation of sites that may be directly impacted by the Project
- ✓ Involvement of traditional leaders in monitoring identified sites and known cultural, historical and aesthetic resources;
- ✓ Relocation of sacred sites (cemeteries and sacred forests) in consultation with local communities;
- ✓ Implementation of a discovery procedure; informing the administration of any archaeological discovery.

VII.3. Measures for Improvement, Mitigation and/or Suppression in the Closure Phase

VII.3.1. Biophysical environment measures

VII. 3.1.1. Air mitigation measures

The reduction of atmospheric emissions during this phase requires the implementation of the following actions:

- ✓ Spraying the roads used by the machines and vehicles used for rehabilitation,
- ✓ Giving instructions relative to speed limits to reduce the amount of dust and fine particles raised;
- ✓ Using equipment that meets the required gas emissions standards;
- ✓ Implementing regular inspections of equipment, vehicles and machinery mobilised for the closure work;
- ✓ Shutting down all equipment when not in service;
- ✓ Monitoring and control of waste rock stockpiles and mine tailings **facilities** in order to stabilize their surfaces.

VII.3.1.2. Soil mitigation measures

The impacts on the soil during the closing phases will be reduced by implementing the following management measures:

- ✓ Demarcation of non-traffic areas for vehicles in soil stockpile facilities
- ✓ Regular inspection and maintenance of site equipment, vehicles and machinery;
- ✓ Combating erosion of the waste rock and mine tailings stockpiles
- ✓ Prohibiting unnecessary off-road operation of vehicles and machinery in order to reduce the risk of compaction;
- ✓ Raising awareness about soil management throughout the closure work.

VII.3.1.3 Noise and vibration mitigation measures

A reduction in noise level can be obtained by applying the following measures, which are good practices to minimize noise-related disruption with regard to the receptors:

- ✓ equipment with silencers and/or soundproofing devices for machinery and vehicles;
- ✓ optimising the movement of vehicles and site machinery;
- ✓ maintenance of the machinery and vehicles that will be used for the various works.

VII.3.1.4 Mitigation measures for water resources

Reducing the risk of contaminating water resources can be achieved by applying the following measures:

- ✓ Monitoring the quality of water resources even after the closure of the mine to ensure that there is no problem;
- ✓ Implementing measures to prevent and protect against accidental spills;
- ✓ Maintenance of site vehicles and machinery
- ✓ Implementing a hazardous materials management procedure taking into account their storage, transport, disposal, recovery and control measures;
- ✓ Implementing an emergency response plan in the event of accidental spills of products and chemical substances;
- ✓ Establishing a management plan for contaminated soil.

VII.3.1.5. Vegetation mitigation measures

The work relating to the mine closure is aimed at the definitive restoration of the site. To this end, the infrastructures will be removed, freeing up the spaces that will then be the object of the CES/DRS operations. The environmental monitoring that will be implemented will make it possible to verify whether the renovated surface areas are similar to the previous site conditions in terms of recovery by strata, dominant species observed, density, etc.

VII.3.1.6. Wildlife mitigation measures

The impact of the rehabilitation of the mining site and its closure is considered positive for wildlife. In order to improve the positive impacts on wildlife, Global Atomic Fuels Corporation will ensure:

- ✓ The implementation of the various measures already set out to protect wildlife and restore its habitat during the closure;
- ✓ The implementation of a sustainable information and awareness-raising program relating to the management of the habitats created.

VII. 3.1.7. Landscape mitigation measures

In the closure phase, the potential landscaping impacts could be mitigated or corrected by compliance with the coordinated implementation of the measures contained in the mine's closure and rehabilitation plan. Assuming that the various measures already set out in the construction and operating phase and aiming to protect and restore the site are successfully applied, the landscape and visual impact will be further reduced, especially during the site

closure phase and the final restoration of the project area. In short, this involves implementing the site rehabilitation and closure plan and the application of monitoring measures. The objective is to restore the site to a satisfactory state as quickly as possible in terms of:

- ✓ Reducing the health and safety risks;
- ✓ Controlling erosion;
- ✓ Developing a visually-acceptable site for the communities;
- ✓ Developing a profile compatible with future use, in particular for the infrastructure site.

VII.3.2. Measures for the human environment

VII.3.2.1. Measures for the local, regional and national economy

To avoid a change in the livelihoods arising after the end of the project, alternative livelihoods should be promoted and developed in the area. Measures aimed at mitigating the change in favour of the operations must come from the government and other stakeholders, including development partners. Although the Corporate Social Responsibility program exists, other sectors of the economy must be promoted through training, the implementation of microcredit plans and the establishment of a market for products and services. The taxes and income that the project has paid to the government and other mining companies will allow the government to develop its own training programs.

Thus, in order to take charge of the economic interdependencies that are likely to be generated during the closure phase, Global Atomic Corporation will ensure:

- ✓ The performance of a survey of the socio-economic profile of the project area upon its termination;
- ✓ The development and implementation of a plan to support the diversification of the local economy and the consolidation of leading sectors;
- ✓ The consolidation of the socio-economic capacities of the local communities in the extended zone so that the negative consequences of the mine closure are limited to the extent possible,
- ✓ Participation in the Economic Development Plan of the Tchirozérine and Dannet localities.

VII. 3.2.2. Measures for improving employment and income

The loss of jobs related to the permanent shutdown of the mining operations could have significant repercussions on household income and, consequently, on the quality of life and social conditions of the population. In order to avoid idleness among the youth in the area after the closure of the mine, which is in most cases the cause of social delinquency, Global Atomic Fuels Corporation will ensure:

- ✓ Worker training with a view to their reconversion to other professions;
- ✓ The development of facilities and activities promoting social interaction and positive conduct for the community for the benefit of young people.

VII.3.2.3. Measures for the population and community changes

To manage the project's interdependencies with the communities, Global Atomic Fuels Corporation will conduct a societal study of the outbuildings in the communities in the vicinity of the company which takes into account:

- ✓ The water supply
- ✓ Health care
- ✓ The energy supply
- ✓ Stock farming
- ✓ Market gardening
- ✓ The local economy

VIII. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

The Environmental and Social Management Plan is a framework for managing activities for the effective and efficient implementation of the various measures proposed for the effective integration of environmental and social concerns. It is designed as a five-year plan. It describes the methods for implementing, supervising, and monitoring the recommended measures to prevent, minimize, mitigate or compensate for negative environmental and social impacts or to increase positive impacts. It consists of ensuring compliance with Global Atomic Fuels Corporation's environmental commitments and will contribute to effectively strengthening its participation in the sustainable socio-economic development of the local communities. Thus, this ESMP is structured around:

- ✓ a program for mitigating and/or improving impacts
- ✓ an environmental surveillance program;
- ✓ an environmental monitoring program;
- ✓ a program to strengthen the capabilities of the stakeholders.

VIII. 1. Impact mitigation and/or improvement program

The purpose of the impact mitigation and/or improvement program is to ensure that all mitigation and/or improvement measures are actually implemented. In addition, it makes it possible to assess compliance with national policies and regulatory requirements.

Tables No. 32, No. 33 and No. 34, respectively, present the details of the mitigation and/or improvement program for the potential impacts of the project in the construction, operation and rehabilitation and closure phases.

Table32: Program for mitigating and improving the impacts of the construction phase

Impact-generating activities	Environmental component affected	Potential impacts	Mitigation and/or improvement measures	Person in charge of implementing the measures	Implementation indicator	Cost in CFA francs
<ul style="list-style-type: none"> • Site preparation, stripping, earthworks and cleaning work, • Extraction of construction materials • Vehicle and equipment traffic • Use of machinery and equipment • Degradation of grazing circuits • Consumption of energy 	Air	Impaired air quality due to dust and gaseous particles	Implementation of speed limit instructions Spraying tracks and dusty work areas Limiting vehicle and machinery traffic to roads and worksite vicinity Use of equipment that meets standards Equipment and vehicle inspections Implementing an Air Quality Management Plan Shutdown of all construction equipment when not in service	Global Atomic Fuels Corporation	Traffic regulations available Work schedule available Equipment and vehicle maintenance sheet Dustfall level Level of Particulate Matter (PM10, PM2.5, TSP, etc.) Level of NO2 and SO2 in the air Level of Particulate Matter (PM10, PM2.5, TSP, etc.)	<i>Environmental and Social Clauses</i>
		Contribution to climate change	Raise awareness among the project workforce about energy management		Power consumption reduction	<i>Environmental and Social Clauses</i>
<ul style="list-style-type: none"> • Logging and cutting of trees and shrubs • Use of heavy machinery • Traffic of machinery and vehicles • Use of petroleum products 	Soil	Alteration of the structure and texture Soil compaction Erosion, contamination and/or pollution	Restriction of deforestation and stripping activities to the minimum necessary vicinity Simultaneous rehabilitation of temporary structures and vicinities used Restriction of vehicle traffic; Preventive maintenance of vehicles and machinery Implementation of an appropriate waste management system		Report or minutes of site renovation Presence of watertight facilities for washing/maintenance and oil product depots; Operational waste collection and management system Traffic directions available for site vehicles and machinery Visual checks made on site during visits by the agents of the	<i>Environmental and Social Clauses</i>

<ul style="list-style-type: none"> • Generation and management of job site waste 			<p>Installation of a watertight platform for the storage of petroleum and chemical products and site waste Implementation of an emergency plan and decontamination equipment</p>		<p>competent departments or rehabilitated area Waste management report Waste tracking sheet Availability of decontamination kits Erosion control procedures.</p>	
<ul style="list-style-type: none"> • Deforestation and land clearing • Generation and management of solid and liquid job site waste • Accidental releases of oil from the machines • Water consumption 	<p>Water</p>	<p>Disruption of the hydrological regime Risk of contamination and water pollution Lowering of groundwater tables</p>	<p>Waterproofing washing and/or maintenance areas and fuel depots equipped with retention basins with drainage system Preventive maintenance of equipment; Collecting and directing, by means of embankments and/or channels, runoff water loaded with sediments towards dedicated control facilities Implementation of an appropriate job site waste management system; Clearing out solids deposited in natural drainage channels; Preventive maintenance of site vehicles and machinery; Implementation of emergency procedures for managing accidental spills Monitoring the level and quality of groundwater; Installation of separate camp wastewater treatment plants Appropriate choice of the location of the tailings heaps, taking into account the hydrogeology of the area</p>		<p>Presence of watertight facilities for washing/maintenance and oil product depots; Presence of a watertight tank Operational waste collection and management system Underground water analysis results Equipment and vehicle maintenance sheet Operational emergency procedure for managing accidental spills</p>	<p><i>Environmental and Social Clauses</i></p>
<p>Site preparation work</p>	<p>Vegetation</p>	<p>Loss of vegetation</p>	<p>Prior marking of trees to be felled in order to limit abusive logging;</p>		<p>Number of stands cut down Number of stands spared</p>	<p>PM</p>

Operation of quarries and borrow sites Traffic of trucks and site machinery		Disruption of the photosynthesis due to dustfall on the vegetation	Awareness-raising of vegetation protection by site staff		Number of awareness-raising sessions organized;	
			Payment of the logging tax		Payment receipt	PM
			CES/DRS work Application of measures to prevent airborne dust		Surface area recovered and seeded	25,000,000
Logging, cutting, stripping and earthworks Operation of site machinery, Presence of staff	Wildlife	Destruction of refuge areas and habitats, Destruction of individuals, temporary disruption and displacement	Prohibition on killing and/or capturing any species of wildlife at job sites Information and awareness-raising for construction workers and communities on wildlife and the protection of their habitat Conducting an ecological wildlife survey Regular monitoring of the impact of the work on wildlife		Number of individuals killed and/or caught Operational information and awareness program Number of awareness-raising sessions organized Ecological survey of available wildlife Wildlife monitoring report	12,000,000
Stockpiles of backfill and rubble from logging, cutting stripping and earthworks Presence of site installation equipment and materials Waste production and management	Landscape	Visual change of the local landscape	Restriction of stripping and logging operations to the land necessary for the installation of surface infrastructure; Restriction of the thicknesses and heights of the topsoil stockpiles to limited thicknesses Gradually restoring altered land Construction of pits for the storage of bulky waste Inspection of disturbed areas and lands restored		Work regulations Rate of rehabilitation of disturbed sites Bulky waste storage compartments available Inspection report for disturbed areas	<i>Environmental and Social Clauses</i>
Use of equipment (compressors, generators, cement mixers, trucks and machinery, dumpers, bulldozers, backhoes, vibrating compactors, etc.	Noise	Increase in the ambient noise and vibration	Equipping facilities with silencers and soundproofing devices; Compliance with the IFC's HSE environmental standards for all facilities Use of low-noise reverse horns Use of equipment in accordance with the manufacturer's instructions		Mapping of sensitive sources and targets available Noise level observed by the various receptors Number of complaints about the noise	<i>Environmental and Social Clauses</i>

			<p>Inform the local communities of the general activities of the site, including working hours</p> <p>Maintenance of site vehicles and machinery</p> <p>Shutting down or setting machinery to minimum operating mode in between two work sessions</p> <p>With the exception of the generators, shutdown of pumps and electrical installations when they are not in use;</p> <p>Mapping of sensitive sources and targets</p> <p>Regular monitoring of noise levels</p>		
Unskilled work, Procurement of local goods and services	Jobs & income	Job creation & Increased income from income tax	Prioritization of local populations when recruiting unqualified local labour.	Proportion of local workers in the workforce Recruitment contract	<i>Environmental and Social Clauses</i>
Procurement of goods and materials, Mining of quarries and borrows	Economy	Improvement of the local economy	<p>Development and implementation of a policy aiming to maximize the procurement of goods and services and the recruitment of labour at the local, regional and national levels</p> <p>Work with local employment agencies and training centres</p> <p>Prioritization of contracts for local, regional and national contractors when possible</p> <p>Establishment of a local workforce training program or activities</p> <p>Establishment of a committee to monitor the economic outcomes</p> <p>Implementation of a stakeholder involvement and internal complaint management program</p>	<p>Report prepared on local service providers</p> <p>Number of services and service contracts granted to local workers</p> <p>Cooperation frameworks created</p> <p>Number of people trained</p> <p>Number of young people trained and having obtained a job in the mine</p>	15,000,000

Construction work and the movement of machinery and vehicles, Work in dusty areas, Presence of foreign labour	Safety and health:	Risks of accidents for the workforce and for the local populations Respiratory infections, Increased risk of infection with STIs/HIV/AIDS and COVID-19 in the area Interactions between staff Biological risks	Development of an occupational health and safety policy; Developing a single risk management document and a risk prevention plan; Establishment of an occupational health and safety program; Worker training on occupational health and safety; Endowment and obligation to wear PPE Installation of adequate signage and fences around sites presenting the greatest risk of accident; Limitation of traffic and speed limits on the site	Occupational health and safety policy is available; Single risk management document and a risk prevention plan is available Operational Health and Safety Program Number of awareness-raising sessions organized Type and quantity of PPE provided Signposting installed Operational traffic procedure	<i>Environmental and Social Clauses</i>		
			Implementation of an awareness program on COVID-19 STIs/HIV in the communities Awareness-raising on road safety			Number of awareness-raising sessions organized Number of recorded accidents	8,000,000
			Support for basic community infrastructure and social services			Types of support provided to communities	30,000,000
						Surface area reserved for fodder production	20,000,000
Release of rights of way	Grazing lands	Reduction of grazing areas Degradation of grazing circuits	Development of spaces for the production of pastures Capacity-building for the local body responsible for managing conflicts in the locality,	Type of assistance			
			Support for the improvement of animal health, Support for additional livestock feed.	Type and quantity of support provided	15,000,000		
			Upgrade of existing waterworks;	Number of waterworks renovated	25,000,000		
Stripping and earthwork	Archaeological and cultural heritage	Destruction of cultural heritage,	Drafting a Heritage Assets Management Plan to ensure signage Involvement of traditional leadership in the monitoring of identified sites	Heritage Assets Management Plan drafted Number of cemeteries relocated	10,000,000		

		particularly cemeteries	Relocation of sacred sites (cemeteries and sacred forests) Implementation of a discovery procedure during [sic] Informing the administration of any archaeological discovery		Operational procedure in case of discovery of archaeological and cultural heritage	
Mass arrival of outsiders	Population and community changes	Pressure on basic social and community infrastructures Community disruption (STI-HIV/AIDS and COVID-19; alcohol abuse, theft, violence, conflict, inflation)	Conduct health and safety awareness campaigns in the communities Cooperation with United Nations (UNHCR) agencies for reconciliation and appeasement of local communities.		Number of health and safety awareness campaigns organized in the communities Operational framework for consultation with United Nations bodies (UNHCR)	PM
		Improvement of the local socioeconomic framework	Conduct a survey of the local activities and create a validated database of local suppliers; Implementation of a local economic participation plan; Promotion of the procurement of local goods and services Support for the development of community infrastructures and services		Validated database of local suppliers available Number of service contracts awarded to local providers Operational local economic participation plan Basic types and quantity of social services support	15,000,000
TOTAL						175,000,000

Table33: Program for mitigation and improvement of the impacts of the operating phase

Impact-generating activities	Environmental component affected	Potential impacts	Mitigation and/or improvement measures	Person in charge of implementing the measures	Implementation indicator	Cost of implementation
Vehicle and equipment traffic Use of machinery and equipment Mining the ore Mechanical and chemical processing of ore, Wind erosion of stocks of waste rock and tailings Energy consumption	Air	Impaired air quality	Implementation of speed limit instructions Spraying of runways and dusty work areas Limitation of vehicle and machinery traffic in the vicinity of the access road and work areas Use of equipment that meets standards Implementing periodic inspections of site equipment, vehicles and machinery Air quality monitoring Implementing a waste rock management plan; Coverage and/or seeding of completed stockpiles as soon as possible in order to stabilize the surfaces Implementing a radiological monitoring program.	Global Atomic Fuels Corporation	Traffic regulations available Dustfall level Level of Particulate Matter (PM10, PM2.5, TSP, etc.) Level of NO2 and SO2 in the air Level of airborne Particulate Matter (PM10, PM2.5, TSP, etc.) Equipment and vehicle maintenance sheet Levels of radioelements in the target environments Waste rock management plan available Operational radiological monitoring program	<i>Environmental and Social Clauses</i>
		Contribution to climate change	Raise awareness among the project workforce about energy management		Reduction in consumption of energy	
Mining and hauling the ore Use of machinery and equipment Wind erosion of stockpiles of waste rock and tailings Waste production and management	Soil	Alteration of the biological and physicochemical properties of the soils Soil erosion Contamination and soil pollution	Coordinated site rehabilitation; Cleaning up disturbed land Inspection of disturbed areas and renovated areas; Dust removal Operational procedures for containment and processing of spills Training in spill clean-up techniques; Operational traffic procedures Vehicle maintenance, inspection		Site rehabilitation rate Operating procedure available Operational waste management system Storage of petroleum products on sealed retention tanks Collection and storage of job site waste;	<i>Environmental and Social Clauses</i>

			<p>Maintenance of storage areas Installation of a watertight platform for the storage of petroleum and chemical products and site waste Cleaning and maintenance of all transport roads, haulage roads, access roads, drains and rainwater storage facilities; Implementation of a soil management awareness program Soil analysis</p>	<p>Available operational procedures for containment and processing of spills Availability of decontamination kits Erosion control procedures Vehicle maintenance sheet Soil physicochemical parameters,</p>	
<p>Mine blasting; stoping, loading and unloading, crushing, screening and grinding of ore, Operation of compressors, ventilation system, miscellaneous workshops and movement of machinery including heavy machinery</p>	<p>Ambient noise and vibration</p>	<p>Increase in the ambient noise and vibration</p>	<p>Equipping facilities with silencers and soundproofing devices; Compliance with the IFC's HSE environmental standards for all facilities Use of low-noise reverse horns Use of equipment in accordance with the manufacturer's instructions Inform the local communities of the general activities of the site, including working hours Maintenance of site vehicles and machinery Shutting down or setting machinery to minimum operating mode in between two work sessions With the exception of the generators, shutdown of pumps and electrical installations when they are not in use Optimal management of blasting procedures Mapping of sources and targets</p>	<p>Noise level observed by the various receptors Number of complaints about the noise Existence of a noise source map</p>	<p><i>Environmental and Social Clauses</i></p>

<ul style="list-style-type: none"> •Waste rock and mine tailings facility •Presence of infrastructure (buildings, treatment units, etc.) •Waste production and management 	Landscape	Alteration of the visual quality of the landscape	<p>Mitigation measures for impacts associated with the tailings facilities or waste rock stockpiles</p> <p>Installation of vegetation screens</p> <p>Gradually restoring altered land</p> <p>Inspection of disturbed areas</p> <p>Construction of pits for the storage of bulky waste</p>		<p>Storage system for the waste rock and tailings facilities</p> <p>Peri-centralised plantation success rate</p> <p>Work regulations</p> <p>Rate of rehabilitation of disturbed sites</p> <p>Presence of pits for the storage of bulky waste</p> <p>Inspection report for disturbed areas</p>	<i>Environmental and Social Clauses</i>
<p>Pumping of water and blasting</p> <p>Ore extraction (formation of acidic mining drainage)</p> <p>Mine dewatering</p> <p>Stockpiles of waste rock and mill tailings</p> <p>Generation and management of job site waste</p> <p>Movement of vehicles and heavy machinery</p>	Water	<p>Alteration of geochemical and hydrogeological parameters</p> <p>Lowering of groundwater tables</p> <p>Water contamination and pollution</p> <p>Alteration of hydrological regime</p>	<p>Development of a hydrogeological model for the use and monitoring of groundwater flow</p> <p>Savings on water use at the mine level</p> <p>Establishment of a water user committee</p> <p>Development of a waste rock and mine tailings management plan</p> <p>Inspection of waste rock and tailings facilities</p> <p>Inspection of the tailing pond pumps, pipes, and dykes</p> <p>Development and implementation of a rainwater management plan</p> <p>Development and implementation of a waste management plan</p> <p>Preventive maintenance of equipment</p> <p>Installation of piezometers around the waste ponds and waste rock stockpiles</p> <p>Compacting sterile surfaces for the installation of a wastewater treatment plant</p> <p>Implementation of an emergency response plan for accidental spills</p>		<p>Groundwater levels</p> <p>Number of piezometers installed</p> <p>Operational water saving procedure available</p> <p>Operational Water User Committee</p> <p>Number of usage conflicts recorded</p> <p>Operational waste rock and mine tailings management plan</p> <p>Operational level of the waste rock and tailings facilities and of the tailings pond pumps, pipes, and dyke</p> <p>Operational waste and rainwater management plans</p> <p>Physicochemical parameters of the water</p> <p>Technical monitoring sheet for vehicles</p> <p>Liquid waste discharge standards</p> <p>Operational emergency response procedures for spills and</p>	<i>Environmental and Social Clauses</i>

			Establishment of a contaminated soil management plan Monitoring of groundwater levels Appropriate choice of the location of the tailings heaps and of their orientation, taking into account the hydrogeology of the area		management of contaminated soil	
Mining of new deposits Traffic of trucks and site machinery	Vegetation	Destruction of vegetation Disruption of the photosynthesis due to dustfall on the vegetation	Management of cutoffs Application of measures to prevent airborne dust		Number of trees felled and/or spared	PM
			Payment of logging tax		Payment receipt	PM
			CES/DRS work with seeding of treated areas		Surface area recovered and seeded	10,000,000
			Raising awareness among the workforce and communities on the protection of vegetation and the conservation of certain plant species		Number of awareness-raising sessions organized	6,000,000
		Reconstitution of vegetation	Establishment of protected natural zones on site and off site; Development of the population of <i>Leptadenia pyrotechnica</i> in Oufoud.		Surface areas of protected natural areas Surface area developed within the Oufoud stands	8,000,000
Increased uranium bioaccumulation potential for plants	Ecotoxicology analyses of the vegetation		Uranium bioaccumulation potential for plants	PM		
Blasting, movements of machinery and trucks Poaching Clearing the vicinity of new deposits Management of residual waste and	Wildlife	Disturbance and relocation of wildlife Vehicle collisions and destruction Loss of habitat	Creation of protected areas or wildlife habitats; Awareness-raising for workers and communities on wildlife and the protection of their habitat Prohibition of hunting for mine employees and subcontractors.		Number of protected areas created Number of awareness-raising sessions organized Number of species killed Proportion of premises within the workforce	15,000,000

treatment effluents (evaporation basins)		Risks of poisoning for wildlife			Number of offices selected for recruitment management Number of Nigerien technicians trained Type of contracts Proportion of local workers in the workforce Number of offices selected for recruitment management Number of Nigerien technicians trained Types of contracts	
Unskilled work, Local subcontracting work, Procurement of local goods and services	Jobs & income	Job creation Revenue improvement	Prioritization of local populations when recruiting unskilled local labour. Recruitment management by local offices; Training of Nigerien technicians Integration of layoff bonus into the employment contract.		Proportion of local workers in the workforce Number of offices selected for recruitment management Number of Nigerien technicians trained Types of contracts	<i>Environmental and Social Clauses</i>
Acquisition of dividends related to production Payment of fees, taxes and duties Direct and indirect investments, Local purchase of goods and services Local purchase of goods and services	Economy	Improvement of the local, regional and national economy	Payment of taxes to the central authorities for the affected communities; Support for crop farming and stockbreeding Promotion of local content.		Receipt of settlement of taxes, mining taxes and royalties Financial reporting Number of services and service contracts granted to local workers Number of producers supported	PM
Management of waste rock and mine tailings Work in ionizing radiation environments	Safety and health	Illnesses related to exposure to radiation either by inhalation of radon, ingestion of radionuclides, or by exposure	Development of an occupational health and safety policy; Developing a single risk management document and a risk prevention plan; Development of a health and safety plan; Air conditioning system for machinery and cabs;		Available Occupational Health and Safety Policy Single risk management document and a risk prevention plan available Operational and available "Health and Safety Plan"	PM

Traffic of heavy machinery and vehicles, Handling of machines and chemicals Interaction between resident populations and foreign workers and/or sex workers Interactions between site personnel		Risks of respiratory and cardiovascular diseases	Provision and use of PPE; Compliance with HSE requirements for contractors and subcontractors; Training and awareness of staff, service providers, subcontractors and suppliers on the risks associated with their work, their responsibilities in managing these risks		Machines and cabs equipped with an air-conditioning system on the site; Types and nature of PPE Number of training and awareness-raising sessions organized	
		Increase in the frequency of STIs/HIV AIDS and COVID-19 Risks of incidents and accidents	Awareness-raising and education about the dangers of AIDS STIs/HIVs, COVID-19; Raising awareness among users and communities affected by road safety.		Number of awareness-raising and education sessions on AIDS and COVID-19 STIs/HIVs held Number of STI/HIV AIDS and COVID-19 cases recorded Awareness-raising on the hazards associated with the use of water puddles Number of traffic accidents recorded	
Expansion of mining work and other infrastructures	Archaeological and cultural heritage	Loss and/or disruption of historical, archaeological and cultural heritage in the presence of [sic: cut off text]	Implementation of the Heritage Assets Management Plan Monitoring of identified sites and known cultural, historical and aesthetic resources Implementation of a discovery procedure Relocation of sacred sites (cemeteries and sacred forests)		Operational Heritage Assets Management Plan Operational discovery procedure Type and nature of archaeological and cultural heritage Number of sacred sites relocated	PM
Influx of population in the zone	Population and community changes	Pressure on basic social and community infrastructures Community disruption (STI-HIV/AIDS and COVID-19, alcohol abuse, theft, violence, conflict, inflation)	Capacity-building for local suppliers of goods and services Development of the partnership between regional suppliers of financial products and training and local companies Support for local business creation initiatives, Promotion of local supply Promotion of savings, secure investments and banking services Support for women in RGAs Support for the development of basic social and community infrastructures		Number of services provided by local suppliers Number of operational local companies	PM

		Potential destabilization of the internal community and the dynamics of local powers.	Cooperation with United Nations (UNHCR) agencies for reconciliation and appeasement of local communities. Health and safety awareness in partnership with local healthcare professionals and community representatives			
					Number of awareness-raising sessions organized Awareness Report	30,000,000
TOTAL						114,000,000

Table34: Program for mitigating and improving the impacts of the closure phase

Impact-generating activities	Environmental component affected	Potential impacts	Mitigation and/or improvement measures	Person in charge of implementing the measures	Implementation indicator	Cost of implementation
Dismantling work, heavy machinery and vehicle traffic, renovation of tunnels and temporary roadways	Air	Impaired air quality	Spraying of machinery and vehicle traffic lanes; Implementation of speed limitation instructions; Using equipment that meets the required gas emissions standards Implementation of regular inspections of equipment, vehicles and machinery;	Proponent BNEE	Traffic regulations available Equipment and vehicle maintenance sheet Dustfall level Level of Particulate Matter (PM10, PM2.5, TSP, etc.) Level of NO2 and SO2 in the air Level of Particulate Matter (PM10, PM2.5, TSP, etc.)	<i>Environmental and Social Clauses</i>

Wind erosion of waste rock and mine tailings facilities			Shutdown of any equipment not in service; Monitoring and control of waste rock stockpiles and mine tailings facilities in order to stabilize their surfaces.			
Use of industrial vehicles and machinery Wind and water erosion of the waste rock and mine tailings facilities	Soil	Contamination and/or pollution of the soil	Demarcation of non-traffic areas for vehicles in soil stockpile facilities Inspection and maintenance of site equipment, vehicles and machinery; Combating erosion of the waste rock and mine tailings stockpiles Prohibition of off-road driving for vehicles and machinery. Awareness-raising on soil management throughout the closure work.	Proponent	Equipment and vehicle maintenance sheet Operational erosion control procedure Operational traffic procedure for machinery and vehicles	<i>Environmental and Social Clauses</i>
Backfilling, demolition and dismantling of infrastructure; Movement of machinery	Ambient noise and vibration	Increase in noise level	Equipping machinery and/or facilities with silencers and soundproofing devices; Optimisation of the movement of vehicles and site machinery; Maintenance of vehicles and machinery		Silencers and soundproofing devices available on vehicles and machinery Operational traffic procedure for site machinery and vehicles Equipment and vehicle maintenance sheet	<i>Environmental and Social Clauses</i>
Use of machinery and equipment Wind and water erosion of the waste rock and mine tailings facilities Site restoration work	Water	Contamination of ground and surface water	Monitoring the quality of water resources even after the closure of the mine; Implementing measures to prevent and protect against accidental spills; Maintenance of site vehicles and machinery Establishment of a hazardous materials management procedure; Implementation of an emergency response plan for accidental spills		Physicochemical parameters of the water Operational procedures for preventing and protecting against accidental spills Equipment and vehicle maintenance sheet Availability of decontamination kits	PM

			Establishment of a contaminated soil management plan			
CES/DRS work	Vegetation	Improvement of local plant cover	CES/DRS work Environmental monitoring of renovated sites		Forest survey report Surface area treated Visual checks made on site during visits by the agents of the competent departments or rehabilitated area	15,000,000
Dismantling of infrastructures Site restoration	Wildlife	Formation of new habitats Return of wildlife	Continue the implementation of measures to protect fauna and its habitat; Establishment of a sustainable information and awareness program relating to the management of habitats created.		Rate of wildlife frequentation Number of awareness-raising campaigns organized Wildlife survey report	10,000,000
Dismantling of infrastructures Site restoration	Landscape	Restoration of the local landscape	Implementation of measures to restore the site to its final state		Report from the competent departments on the final state of the site	PM
Cessation of mining operations	Jobs & income	Job loss Allocation of workers' income	Worker training with a view to their reconversion. Development of facilities and activities promoting social interaction and positive conduct for the community for the benefit of young people.	Proponent	Number of workers trained Types and nature of facilities and activities developed	PM
Loss of dividends due to operations, direct and indirect investments,	Economy	Allocation of the local, regional and/or national economy	Performance of a survey of the socio-economic profile of the project area after the end of the project in the area; Development and implementation of a plan to support the diversification of the		Results of the report on the socioeconomic profile Report on social investments	15,000,000

royalties and taxes		Reduction of expenses and livelihoods	local economy and consolidation of leading sectors; Reinforcement of the socio-economic capacities of the local communities; Participation in the Economic Development Plan of the Tchirozérine and Dannet localities.			
Suspension of support for investments and other social services	Population and community changes	Risk of decreased quality of life and well-being; Change in the modes and means of subsistence caused by the Project	Carrying out a societal study of the outbuildings of the nearby communities that takes into account the water supply, health, energy supply; stock farming; market gardening and the local economy	Proponent	Results of the societal study report	15,000,000
TOTAL						55,000,000

VIII.2. Environmental and Social Monitoring Plan

The environmental and social mitigation measures proposed as part of the ESIA will be monitored in order to ensure that they are properly implemented and complied with during the implementation of the project according to an adequate schedule. The primary purpose of environmental surveillance is therefore to monitor the proper execution of the activities and work throughout the project, with regard to compliance with the environmental commitments made by the proponent and, more generally, to the respect for and protection of the environment. "Commitment" refers mainly to the environmental measures proposed in the ESIA, to the laws, regulations, certificates of authorization issued by government authorities, as well as to all other commitments made by the Proponent with regard to the project. This monitoring will also make it possible, where applicable, to identify the unforeseen impacts, and, if required, to adjust the measures to eliminate or mitigate them.

The work will be monitored throughout the entire project from construction until the end of the operations, renovation of the last area used and closure of the sites used. It goes without saying that the monitoring of the work will be very important during the construction of the infrastructure required for the project. The monitoring plan identifies the monitoring parameters, sampling locations, sampling frequency and duration, and detection limits (if any). It includes the control sites, when relevant. The orientation and scope of the monitoring activities are proportional to the risk of the impacts that occur, the sensitivity of the surrounding areas and the perception of the communities affected by the risks to their health and the environment.

The monitoring results will be compared to all of the basic data collected as part of this ESIA. Lastly when there are no thresholds or baseline data available, the collection of initial data can form the basis for the collection of future data. As part of this ESIA, the preliminary monitoring plan provides a monitoring framework to assess performance and help predict and manage impacts. In conjunction with the development of the project, the person in charge of the environmental monitoring plan must conduct regular visits to job sites and take note of the strict compliance with commitments, obligations, measures and other stakeholder requirements. He/she must also assess the quality and effectiveness of the measures applied and record any non-compliance. He/she must then inform the project managers of his/her observations, in particular so that appropriate corrective measures can be taken as soon as possible, in the event that such measures are necessary.

In accordance with its assignments, the BNEE, which is responsible for environmental monitoring, will be tasked with ensuring environmental surveillance (control of the compliance of the work and with the environmental and social protection standards) of the implementation of the ESMP and supporting the capacity-building of agents in the field. The control carried out by the BNEE will in fact be a joint inspection based on the surveillance and monitoring reports. The project will provide institutional support to the BNEE in this monitoring as part of a memorandum of understanding. The BNEE will send a copy of its reports to the project coordination for decision-making purposes.

To this end, the BNEE will be supported by its departmental and regional representatives with regard to surveillance matters.

The BNEE representatives will organize regular quarterly missions during the installation, construction and start-up phases of the operation. The BNEE will then carry out an annual data monitoring report based on semi-annual inspections (start and end of work per year), supplemented by ad-hoc inspections, also based on the information provided by the control engineer. The analysis will make it possible to make adjustments if necessary. As part of the implementation of the ESMP, the elements requiring environmental monitoring are essentially:

- ✓ water management (consumption/station, emptying of septic tanks, etc.),
- ✓ management of fuel and used oil
- ✓ management of solid waste (types, quantities, destination),
- ✓ energy consumption (fuel, electricity),
- ✓ management of hazardous products,
- ✓ management of stockpiles and mine cuttings/excavation heaps
- ✓ dust control
- ✓ soil management
- ✓ redevelopment of borrows and quarries
- ✓ labour use (average number of staff employed per position),
- ✓ site incidents and accidents,
- ✓ management of traffic and movement of machinery
- ✓ employee health and safety (monitoring of workplace accidents and occupational illnesses, number of days of work stoppage, etc.),
- ✓ management of individual and atmospheric dosimetry,
- ✓ staff awareness-raising about environmental protection and STD/AIDS risks
- ✓ emission management systems;
- ✓ wastewater management systems,
- ✓ drainage systems for runoff water
- ✓ the impact of the project on local communities

Table No. 35 presents the environmental and social monitoring plan for a period of five (5) years.

Table35: Environmental and Social Monitoring Plan

Impact-generating activities	Environmental component affected	Potential impacts	Mitigation and/or improvement measures	Supervisory manager	Implementation indicator	Monitoring frequency	Monitoring cost in CFAF
Preparation and construction phase							
Once a quarter for five (5) years	Air	Impaired air quality due to dust and gaseous particles	Implementation of speed limit instructions Spraying tracks and dusty work areas Limiting vehicle and machinery traffic to roads and worksite vicinity Use of equipment that meets standards Equipment and vehicle inspections Implementing an Air Quality Management Plan Shutdown of all construction equipment when not in service		Traffic regulations available Work schedule available Equipment and vehicle maintenance sheet Dustfall level Level of Particulate Matter (PM10, PM2.5, TSP, etc.) Level of NO2 and SO2 in the air Level of Particulate Matter (PM10, PM2.5, TSP, etc.)		
		Contribution to climate change	Raise awareness among the project workforce about energy management		Power consumption reduction		
	Soil	Alteration of the structure and texture Soil compaction Erosion, contamination and/or pollution	Restriction of deforestation and stripping activities to the minimum necessary vicinity Simultaneous rehabilitation of temporary structures and vicinities used Restriction of vehicle traffic; Preventive maintenance of vehicles and machinery Implementation of an appropriate waste management system Installation of a watertight platform for the storage of petroleum and chemical products and site waste Implementation of an emergency plan and decontamination equipment	BNEE	Report or minutes of site renovation Presence of watertight facilities for washing/maintenance and oil product depots; Operational waste collection and management system Traffic directions available for site vehicles and machinery Visual checks made on site during visits by the agents of the competent departments or rehabilitated area Waste management report Waste tracking sheet Availability of decontamination kits Erosion control procedures.		

	Water	<p>Disruption of the hydrological regime</p> <p>Risk of contamination and water pollution</p> <p>Lowering of groundwater tables</p>	<p>Waterproofing washing and/or maintenance areas and fuel depots equipped with retention basins with drainage system</p> <p>Preventive maintenance of equipment;</p> <p>Collecting and directing, by means of embankments and/or channels, runoff water loaded with sediments towards dedicated control facilities</p> <p>Implementation of an appropriate job site waste management system</p> <p>Clearing out solids deposited in natural drainage channels</p> <p>Preventive maintenance of site vehicles and machinery;</p> <p>Implementation of emergency procedures for managing accidental spills</p> <p>Monitoring the level and quality of groundwater;</p> <p>Installation of separate camp wastewater treatment plants</p> <p>Appropriate choice of the location of the tailings heaps, taking into account the hydrogeology of the area</p>	<p>Presence of watertight facilities for washing/maintenance and oil product depots;</p> <p>Presence of a watertight tank</p> <p>Operational waste collection and management system</p> <p>Underground water analysis results</p> <p>Equipment and vehicle maintenance sheet</p> <p>Operational emergency procedure for managing accidental spills</p>		
	Vegetation	<p>Loss of vegetation</p> <p>Disruption of the photosynthesis due to dustfall on the vegetation</p>	<p>Prior marking of trees to be felled in order to limit abusive logging;</p> <p>Awareness-raising of vegetation protection by site staff</p> <p>Payment of the logging tax</p> <p>CES/DRS work</p> <p>Application of measures to prevent airborne dust</p>	<p>Number of stands cut down</p> <p>Number of stands spared</p> <p>Number of awareness-raising sessions organized;</p> <p>Payment receipt</p> <p>Surface area recovered and seeded</p>		
	Wildlife	<p>Destruction of refuge areas and habitats,</p> <p>Destruction of individuals, temporary</p>	<p>Prohibition on killing and/or capturing any species of wildlife at job sites</p> <p>Information and awareness-raising for construction workers and communities on wildlife and the protection of their habitat</p> <p>Conducting an ecological wildlife survey</p>	<p>Number of individuals killed and/or caught</p> <p>Operational information and awareness program</p> <p>Number of awareness-raising sessions organized</p>		

		disruption and displacement	Regular monitoring of the impact of the work on wildlife		Ecological survey of available wildlife Wildlife monitoring report		
	Landscape	Visual change of the local landscape	Restriction of stripping and logging operations to the land necessary for the installation of surface infrastructure; Restriction of the thicknesses and heights of the topsoil stockpiles to limited thicknesses Gradually restoring altered land Construction of pits for the storage of bulky waste Inspection of disturbed areas and lands restored		Work regulations Rate of rehabilitation of disturbed sites Bulky waste storage compartments available Inspection report for disturbed areas		
	Noise	Increase in the ambient noise and vibration	Equipping facilities with silencers and soundproofing devices; Compliance with the IFC's HSE environmental standards for all facilities Use of low-noise reverse horns Use of equipment in accordance with the manufacturer's instructions Inform the local communities of the general activities of the site, including working hours Maintenance of site vehicles and machinery Shutting down or setting machinery to minimum operating mode in between two work sessions With the exception of the generators, shutdown of pumps and electrical installations when they are not in use; Mapping of sensitive sources and targets Regular monitoring of noise levels		Mapping of sensitive sources and targets available Noise level observed by the various receptors Number of complaints about the noise		
Unskilled work, Procurement of local goods and services	Jobs & income	Job creation & Increased income from income tax	Prioritization of local populations when recruiting unqualified local labour.		Proportion of local workers in the workforce Recruitment contract		

<p>Procurement of goods and materials, Mining of quarries and borrows</p>	<p>Economy</p>	<p>Improvement of the local economy</p>	<p>Development and implementation of a policy aiming to maximize the procurement of goods and services and the recruitment of labour at the local, regional and national levels Work with local employment agencies and training centres Prioritization of contracts for local, regional and national contractors when possible Establishment of a local workforce training program or activities Establishment of a committee to monitor the economic outcomes Implementation of a stakeholder involvement and internal complaint management program</p>		<p>Report prepared on local service providers Number of services and service contracts granted to local workers Cooperation frameworks created Number of people trained Number of young people trained and having obtained a job in the mine</p>	
<p>Construction work and the movement of machinery and vehicles, Work in dusty areas, Presence of foreign labour</p>	<p>Safety and health:</p>	<p>Risks of accidents for the workforce and for the local populations Respiratory infections, Increased risk of infection with STIs/HIV/AIDS and COVID-19 in the area Interactions between staff Biological risks</p>	<p>Development of an occupational health and safety policy; Developing a single risk management document and a risk prevention plan; Establishment of an occupational health and safety program; Worker training on occupational health and safety; Endowment and obligation to wear PPE Installation of adequate signage and fences around sites presenting the greatest risk of accident; Limitation of traffic and speed limits on the site Implementation of an awareness program on COVID-19/STIs/HIV in the communities Awareness-raising on road safety Support for basic community infrastructure and social services</p>		<p>Occupational health and safety policy is available; Single risk management document and a risk prevention plan is available Operational Health and Safety Program Number of awareness-raising sessions organized Type and quantity of PPE provided Signposting installed Operational traffic procedure Number of awareness-raising sessions organized Number of recorded accidents Types of support provided to communities</p>	
<p>Release of rights of way</p>	<p>Grazing lands</p>	<p>Reduction of grazing areas</p>	<p>Development of spaces for the production of pastures</p>		<p>Surface area reserved for fodder production</p>	

		Degradation of grazing circuits	Capacity-building for the local body responsible for managing conflicts in the locality, Support for the improvement of animal health, Support for additional livestock feed. Upgrade of existing waterworks;		Type of assistance Type and quantity of support provided Number of waterworks renovated		
Stripping and earthwork	Archaeological and cultural heritage	Destruction of cultural heritage, particularly cemeteries	Drafting a Heritage Assets Management Plan to ensure signage Involvement of traditional leadership in the monitoring of identified sites Relocation of sacred sites (cemeteries and sacred forests) Implementation of a discovery procedure during [sic] Informing the administration of any archaeological discovery		Heritage Assets Management Plan drafted Number of cemeteries relocated Operational procedure in case of discovery of archaeological and cultural heritage		
Mass arrival of outsiders	Population and community changes	Pressure on basic social and community infrastructures Community disruption (STI-HIV/AIDS and COVID-19; alcohol abuse, theft, violence, conflict, inflation)	Conduct health and safety awareness campaigns in the communities Cooperation with United Nations (UNHCR) agencies for reconciliation and appeasement of local communities.		Number of health and safety awareness campaigns organized in the communities Operational framework for consultation with United Nations bodies (UNHCR)		
		Improvement of the local socioeconomic framework	Conduct a survey of the local activities and create a validated database of local suppliers; Implementation of a local economic participation plan; Promotion of the procurement of local goods and services		Validated database of local suppliers available Number of service contracts awarded to local providers Operational local economic participation plan Basic types and quantity of social services support		

			Support for the development of community infrastructures and services				
Mining and processing							
<p>Vehicle and equipment traffic Use of machinery and equipment Mining the ore Mechanical and chemical processing of ore, Wind erosion of stocks of waste rock and tailings Consumption of energy</p>	Air	Impaired air quality	<p>Implementation of speed limit instructions Spraying of runways and dusty work areas Limitation of vehicle and machinery traffic in the vicinity of the access road and work areas Use of equipment that meets standards Implementing periodic inspections of site equipment, vehicles and machinery Air quality monitoring Implementing a waste rock management plan; Coverage and/or seeding of completed stockpiles as soon as possible in order to stabilize the surfaces Implementing a radiological monitoring program.</p>		<p>Traffic regulations available Dustfall level Level of Particulate Matter (PM10, PM2.5, TSP, etc.) Level of NO2 and SO2 in the air Level of airborne Particulate Matter (PM10, PM2.5, TSP, etc.) Equipment and vehicle maintenance sheet Levels of radioelements in the target environments Waste rock management plan available Operational radiological monitoring program</p>		
		Contribution to climate change	Raise awareness among the project workforce about energy management		Power consumption reduction		
<p>Mining and hauling the ore Use of machinery and equipment Wind erosion of stockpiles of waste rock and tailings Waste production and management</p>	Soil	<p>Alteration of the biological and physicochemical properties of the soils Soil erosion Contamination and soil pollution</p>	<p>Coordinated site rehabilitation; Cleaning up disturbed land Inspection of disturbed areas and renovated areas; Dust removal Operational procedures for containment and processing of spills Training in spill clean-up techniques; Operational traffic procedures Vehicle maintenance, inspection Maintenance of storage areas Installation of a watertight platform for the storage of petroleum and chemical products and site waste Cleaning and maintenance of all transport roads, haulage roads, access roads, drains and rainwater storage facilities;</p>		<p>Site rehabilitation rate Operating procedure available Operational waste management system Storage of petroleum products on sealed retention tanks Collection and storage of job site waste; Available operational procedures for containment and processing of spills Availability of decontamination kits Erosion control procedures Vehicle maintenance sheet Soil physicochemical parameters,</p>		

			Implementation of a soil management awareness program Soil analysis			
Mine blasting; stoping, loading and unloading, crushing, screening and grinding of ore, Operation of compressors, ventilation system, miscellaneous workshops and movement of machinery including heavy machinery	Ambient noise and vibration	Increase in the ambient noise and vibration	Equipping facilities with silencers and soundproofing devices; Compliance with the IFC's HSE environmental standards for all facilities Use of low-noise reverse horns Use of equipment in accordance with the manufacturer's instructions Inform the local communities of the general activities of the site, including working hours Maintenance of site vehicles and machinery Shutting down or setting machinery to minimum operating mode in between two work sessions With the exception of the generators, shutdown of pumps and electrical installations when they are not in use Optimal management of blasting procedures Mapping of sources and targets		Noise level observed by the various receptors Number of complaints about the noise Existence of a noise source map	
Waste rock and mine tailings facility Presence of infrastructure (buildings, treatment units, etc.) Waste production and management	Landscape	Alteration of the visual quality of the landscape	Mitigation measures for impacts associated with the tailings facilities or waste rock stockpiles Installation of vegetation screens Gradually restoring altered land Inspection of disturbed areas Construction of pits for the storage of bulky waste		Storage system for the waste rock and tailings facilities Peri-centralised plantation success rate Work regulations Rate of rehabilitation of disturbed sites Presence of pits for the storage of bulky waste Inspection report for disturbed areas	
Pumping of water and blasting Ore extraction (formation of	Water	Alteration of geochemical and hydrogeological parameters	Development of a hydrogeological model for the use and monitoring of groundwater flow Savings on water use at the mine level Establishment of a water user committee		Groundwater levels Number of piezometers installed Operational water saving procedure available	

<p>acidic mining drainage) Mine dewatering Stockpiles of waste rock and mill tailings Generation and management of job site waste Movement of vehicles and heavy machinery</p>		<p>Lowering of groundwater tables Water contamination and pollution Alteration of hydrological regime</p>	<p>Development of a waste rock and mine tailings management plan Inspection of waste rock and tailings facilities Inspection of the tailing pond pumps, pipes, and dykes Development and implementation of a rainwater management plan Development and implementation of a waste management plan Preventive maintenance of equipment Installation of piezometers around the waste ponds and waste rock stockpiles Compacting sterile surfaces for the installation of a wastewater treatment plant Implementation of an emergency response plan for accidental spills Establishment of a contaminated soil management plan Monitoring of groundwater levels Appropriate choice of the location of the tailings heaps and of their orientation, taking into account the hydrogeology of the area</p>		<p>Operational Water User Committee Number of usage conflicts recorded Operational waste rock and mine tailings management plan Operational level of the waste rock and tailings facilities and of the tailings pond pumps, pipes, and dyke Operational waste and rainwater management plans Physicochemical parameters of the water Technical monitoring sheet for vehicles Liquid waste discharge standards Operational emergency response procedures for spills and management of contaminated soil</p>		
<p>Mining of new deposits Traffic of trucks and site machinery</p>	<p>Vegetation</p>	<p>Destruction of vegetation Disruption of the photosynthesis due to dustfall on the vegetation Reconstitution of vegetation</p>	<p>Management of cutoffs Application of measures to prevent airborne dust Payment of logging tax CES/DRS work with seeding of treated areas Raising awareness among the workforce and communities on the protection of vegetation and the conservation of certain plant species Establishment of protected natural zones on site and off site;</p>		<p>Number of trees felled and/or spared Payment receipt Surface area recovered and seeded Number of awareness-raising sessions organized Surface areas of protected natural areas</p>		

			Development of the population of <i>Leptadenia pyrotechnica</i> in Oufoud.		Surface area developed within the Oufoud stands		
		Increased uranium bioaccumulation potential for plants	Ecotoxicology analyses of the vegetation		Uranium bioaccumulation potential for plants		
Blasting, movements of machinery and trucks Poaching Clearing the vicinity of new deposits Management of residual waste and treatment effluents (evaporation basins)	Wildlife	Disturbance and relocation of wildlife Vehicle collisions and destruction Loss of habitat Risks of poisoning for wildlife	Creation of protected areas or wildlife habitats; Awareness-raising for workers and communities on wildlife and the protection of their habitat Prohibition of hunting for mine employees and subcontractors.		Number of protected areas created Number of awareness-raising sessions organized Number of species killed		
Unskilled work, Local subcontracting work, Procurement of local goods and services	Jobs & income	Job creation Revenue improvement	Prioritization of local populations when recruiting unskilled local labour. Recruitment management by local offices; Training of Nigerien technicians Integration of layoff bonus into the employment contract.		Proportion of local workers in the workforce Number of offices selected for recruitment management Number of Nigerien technicians trained Types of contracts		
Acquisition of dividends related to production Payment of fees, taxes and duties Direct and indirect investments, Local purchase of goods and services Local	Economy	Improvement of the local, regional and national economy	Payment of taxes to the central authorities for the affected communities; Support for crop farming and stockbreeding Promotion of local content.		Receipt of settlement of taxes, mining taxes and royalties Financial reporting Number of services and service contracts granted to local workers Number of producers supported		

purchase of goods and services							
<p>Management of waste rock and mine tailings Work in ionizing radiation environments Traffic of heavy machinery and vehicles, Handling of machines and chemicals Interaction between resident populations and foreign workers and/or sex workers Interactions between site personnel</p>	<p>Safety and health</p>	<p>Illnesses related to exposure to radiation either by inhalation of radon, ingestion of radionuclides, or by exposure Risks of respiratory and cardiovascular diseases</p>	<p>Development of an occupational health and safety policy; Developing a single risk management document and a risk prevention plan; Development of a health and safety plan; Air conditioning system for machinery and cabs; Provision and use of PPE; Compliance with HSE requirements for contractors and subcontractors; Training and awareness of staff, service providers, subcontractors and suppliers on the risks associated with their work, their responsibilities in managing these risks</p>		<p>Available Occupational Health and Safety Policy Single risk management document and a risk prevention plan available Operational and available “Health and Safety Plan” Machines and cabs equipped with an air-conditioning system on the site; Types and nature of PPE Number of training and awareness-raising sessions organized</p>		
		<p>Increase in the frequency of STIs/HIV AIDS and COVID-19 Risks of incidents and accidents</p>	<p>Awareness-raising and education about the dangers of AIDS STIs/HIVs, COVID-19; Raising awareness among users and communities affected by road safety.</p>		<p>Number of awareness-raising and education sessions on AIDS and COVID-19 STIs/HIVs held Number of STI/HIV AIDS and COVID-19 cases recorded Awareness-raising on the hazards associated with the use of water puddles Number of traffic accidents recorded</p>		
<p>Expansion of mining work and other infrastructures</p>	<p>Archaeological and cultural heritage</p>	<p>Loss and/or disruption of historical, archaeological and cultural heritage in the presence of [sic: cut off text]</p>	<p>Implementation of the Heritage Assets Management Plan Monitoring of identified sites and known cultural, historical and aesthetic resources Implementation of a discovery procedure Relocation of sacred sites (cemeteries and sacred forests)</p>		<p>Operational Heritage Assets Management Plan Operational discovery procedure Type and nature of archaeological and cultural heritage Number of sacred sites relocated</p>		

<p>Influx of population in the zone</p>	<p>Population and community changes</p>	<p>Pressure on basic social and community infrastructures Community disruption (STI-HIV/AIDS and COVID-19, alcohol abuse, theft, violence, conflict, inflation) Potential destabilization of the internal community and the dynamics of local powers.</p>	<p>Capacity-building for local suppliers of goods and services Development of the partnership between regional suppliers of financial products and training and local companies Support for local business creation initiatives, Promotion of local supply Promotion of savings, secure investments and banking services Support for women in RGAs Support for the development of basic social and community infrastructures Cooperation with United Nations (UNHCR) agencies for reconciliation and appeasement of local communities.</p>		<p>Number of services provided by local suppliers Number of operational local companies</p>		
			<p>Health and safety awareness in partnership with local healthcare professionals and community representatives</p>		<p>Number of awareness-raising sessions organized Awareness Report</p>		

Closure Phase							
Dismantling work, heavy machinery and vehicle traffic, renovation of tunnels and temporary roadways Wind erosion of waste rock and mine tailings facilities	Air	Impaired air quality	Spraying of machinery and vehicle traffic lanes; Implementation of speed limitation instructions; Using equipment that meets the required gas emissions standards Implementation of regular inspections of equipment, vehicles and machinery; Shutdown of any equipment not in service; Monitoring and control of waste rock stockpiles and mine tailings facilities in order to stabilize their surfaces.		Traffic regulations available Equipment and vehicle maintenance sheet Dustfall level Level of Particulate Matter (PM10, PM2.5, TSP, etc.) Level of NO2 and SO2 in the air Level of Particulate Matter (PM10, PM2.5, TSP, etc.)		
Use of industrial vehicles and machinery Wind and water erosion of the waste rock and mine tailings facilities	Soil	Contamination and/or soil pollution	Demarcation of non-traffic areas for vehicles in soil stockpile facilities Inspection and maintenance of site equipment, vehicles and machinery; Combating erosion of the waste rock and mine tailings stockpiles Prohibition of off-road driving for vehicles and machinery. Awareness-raising on soil management throughout the closure work.		Equipment and vehicle maintenance sheet Operational erosion control procedure Operational traffic procedure for machinery and vehicles		
CES/DRS work	Vegetation	Improvement of local plant cover	CES/DRS work Environmental monitoring of renovated sites		Forest survey report Surface area treated		

					Visual checks made on site during visits by the agents of the competent departments or rehabilitated area		
Dismantling of infrastructures Site restoration	Wildlife	Formation of new habitats Return of wildlife	Continue the implementation of measures to protect fauna and its habitat; Establishment of a sustainable information and awareness program relating to the management of habitats created.		Rate of wildlife frequentation Number of awareness-raising campaigns organized Wildlife survey report		
Dismantling of infrastructures Site restoration	Landscape	Restoration of the local landscape	Implementation of measures to restore the site to its final state		Report from the competent departments on the final state of the site		
Cessation of mining operations	Jobs & income	Job loss Allocation of workers' income	Worker training with a view to their reconversion. Development of facilities and activities promoting social interaction and positive conduct for the community for the benefit of young people.		Number of workers trained Types and nature of facilities and activities developed		
Loss of dividends due to operations, direct and indirect investments, royalties and taxes	Economy	Allocation of the local, regional and/or national economy Reduction of expenses and livelihoods	Performance of a survey of the socio-economic profile of the project area after the end of the project in the area; Development and implementation of a plan to support the diversification of the local economy and consolidation of leading sectors; Reinforcement of the socio-economic capacities of the local communities; Participation in the Economic Development Plan of the Tchirozérine and Dannet localities.		Results of the report on the socioeconomic profile Report on social investments		
Suspension of support for investments and other social services	Population and community changes	Risk of decreased quality of life and well-being;	Carrying out a societal study of the outbuildings of the nearby communities that takes into account the water supply, health, energy supply; stock farming; market gardening and the local economy		Results of the societal study report		

		Change in the modes and means of subsistence caused by the Project					
TOTAL							PM

Note: The details about the implementation of the environmental monitoring plan will be set out in the agreement that will be concluded between the Proponent and the environmental authority.

VIII.3. Environmental and Social Monitoring Plan

Environmental monitoring consists of observing the evolution of the components of the natural and human environments potentially affected by the project in order to verify that the environmental measures taken are effective. Environmental monitoring will allow for the monitoring of changes in environmental status, including sensitive environmental elements and significant operating activities, based on environmental indicators, throughout the project. This is a scientific approach that makes it possible to monitor the evolution of certain components of the natural and human environments affected by the implementation of the project. Thus, the identified monitoring elements can be measured by recognized methods and the monitoring results will reflect the changes that have occurred. The project-specific monitoring program must target the following objectives:

- ✓ verification of the accuracy of the forecasts and evaluation of certain impacts, particularly those for which there remain uncertainties in the impact assessment;
- ✓ identification of impacts that were not foreseen and, where applicable, implementation of appropriate environmental measures;
- ✓ assessment of the effectiveness of the environmental measures implemented; and
- ✓ collection of information and/or lessons to improve the methods of forecasting the impacts of similar projects

In the context of this project, two types of monitoring are to be distinguished, namely internal monitoring and external monitoring:

- ✓ Internal monitoring, which will be provided by the Environment Department of Global Atomic Fuels Corporation;
- ✓ External monitoring, which will be carried out through two mechanisms, which are:
 - External monitoring to be carried out by the BNEE and its partners and whose terms of execution and frequency will be decided by mutual agreement between Global Atomic Fuels Corporation and this institution;
 - The environmental audit which will be entrusted to an external consultant for Global Atomic Fuels Corporation and will concern all mine operations.

As part of this assessment, the follow-up program focuses on the external monitoring that will be performed by the BNEE as presented in the table below. The various components and parameters that will be monitored as part of this project are listed in **Table no. 36**.

- ✓ Waste management;
- ✓ Water;
- ✓ Soils
- ✓ Air quality:
- ✓ Noise and vibration levels
- ✓ Biodiversity;
- ✓ Closure and rehabilitation management plan;
- ✓ Commitment to the stakeholders;
- ✓ Social aspects, in particular social investments;
- ✓ Community health and safety;
- ✓ Management of cultural heritage (discovery procedure).

Table36: Environmental Monitoring Plan for Project Activities

Environment		Activities	Monitoring parameters	Follow-up frequency	Oversight		
					Implementation	Monitoring the implementation of actions	
Biophysical environment	Air	Measurements of dust, suspended particles and gaseous emissions (CO ₂ , CO, Nox, SO ₂) in sensitive areas Radiation monitoring	Total dustfall PM ₁₀ and PM _{2.5} (24-hour measurement) Ambient NO ₂ and SO ₂ in concentrations / 24 hours; Short- and long-term gamma and radon measures at the mine site and in nearby communities	Twice a year		BNEE	
	Soil	Measurement of the physical-chemical and biological quality of the soil	Content of pollutants in the soil	Once a year			
	Noise and vibration levels	Initial noise mapping at the start of operation; Measurements of noise level and vibrations.					Periodic
		Basic sound emissions of the new Equipment	dB				Once at the beginning of use
		Vibrations generated by explosions (measured as the peak speed of a particle)	m/s				Every day during each blasting series
	Surface water	Analysis of the quality of surface water during the rainy season. The sampling points are selected from the streams (upstream and downstream of activities) that run at the permit site	pH and conductivity; Cyanide and organic pollution content in the water				Once a year during the rainy season

					Global Atomic Corporation	BNEE
Groundwater	Establishment of a network of sampling and observation points for Monitor potential changes in the quantity and quality of groundwater Analysis of the physicochemical quality of the mine water; Regular measurements of well water/boreholes in nearby villages.	Volume and flow of water pumped from the catchment field and underground operations (pump flow rates can be used); Water content and volume used and recycled at the mine site; Groundwater levels in the village wells and boreholes in the drawdown cone; Quality of groundwater at the mine site and in nearby communities for the following parameters: pH, Eh, MDT, alkalinity, T°, dissolved oxygen, nitrate, chloride, alpha and global beta activity, fluoride, sulphate, phosphate, Na, K, Ca, Mg, Al, Cr, Fe, Mn, B, Cu, Zn, As, Se, Mo, V, and U	Periodic			
Climate	Installation of weather stations on the site; Monitoring of meteorological parameters (rainfall, humidity, temperature, etc.)	Weather conditions on site (wind, rain, temperatures)	Periodic			
Radiation	Radiological analysis of the food chain (soil, air, water, vegetation, cheese)	Short- and long-term gamma and radon measures at the mine site and in nearby communities	Quarterly			
Vegetation	Evolution of plant cover per unit of surface area	Plant cover rate	Annually			

		Inventory of the main types of plant covers and their biodiversity	Monitoring of phytosociological and surface areas of pilot plots			
	Wildlife	Records of major wildlife observations	Changes in animal and bird populations; Biodiversity monitoring	Annually		
	Waste	Verifications of the waste management system	Volume of different types of waste disposed of in waste disposal facilities or disposed of in hazardous waste disposal facilities; Volume of different types of recycled or reused waste	Periodic		
Human environment	Jobs and income:	Source of employees (for the Customer and its operators) categorized by: <ul style="list-style-type: none"> ✓ level of competence; ✓ if they are local, ✓ regional, national, and/or foreign ✓ gender ethnic group. 	Percentage of employees in each category	Ongoing throughout the life cycle of the Project		
	Local content	Origin of operators and suppliers (local, regional, national, and/or international)	Percentage	Once a year		
	Safety and health	Health monitoring of workers and populations in the project area	Rate of prevalence of communicable diseases: STDs, tuberculosis and respiratory tract infections; malaria; diarrhoea	Twice a year for workers		
		Radiological monitoring of workers	Radiological dose level of workers	Periodic		

		Preventable accidents and incidents	Number and type of incidents	Twice a year for workers		
	Archaeology and cultural heritage	Relocation of cemeteries/cultural sites impacted to the satisfaction of the affected persons and administrators	Number and type of sites moved	Twice a year for workers		
	Participation in the Local Economy	Creation of databases for employment and business opportunities Organize workshops to identify and evaluate local companies	Database	Once a year		
	Population and community changes	General social monitoring using the secondary sources available with household questionnaires to evaluate: <ul style="list-style-type: none"> ✓ The population; ✓ The frequency of offences; ✓ The frequency of social diseases (alcoholism, prostitution, drug addiction); ✓ Access to social infrastructures, such as schools, health centres, credit facilities, religious centres, water supply and sanitation. 	Level of access to basic social services	Once a year		

Note: The details of the implementation of the environmental monitoring plan will be specified in the agreement that will be concluded between the Proponent and the Environmental Authority

VIII.4. Capacity-Building Program

In order to promote better implementation of the ESMP, a capacity-building program for the actors involved in the project is necessary. The objective of this program is to ensure the proper implementation of the project so that the various stakeholders can fully play their roles, each insofar as they are concerned, in the effective implementation of the project. The institutional players that may benefit from this capacity-building are the BNEE and its partners, in particular the DGMC, the Agadez Regional Council, and the communes of Tchirozérine and Dannet.

The planned capacity-building activities are based on the staff training at the above-mentioned structures; support in terms of equipment for BNEE and the Directorate of the Mining Environment, key partners in support of the Global Atomic Fuels Corporation; performance of environmental surveillance and monitoring activities as well as collaboration and consultation between the stakeholders.

VIII.4.1. Actors and their Roles

The main actors in the implementation of the Project's Environmental and Social Management Plan (ESMP) are:

- Global Atomic Fuels Corporation;
- National Office for Environmental Review;
- General Directorate of Mines and Quarries;
- National Centre for Radiation Protection;
- Directorate-General for the Environment and Sustainable Development;
- General Directorate of Water and Forestry;
- Agadez Regional Council;
- Regional Directorate for the Environment and Sustainable Development;
- Agadez Regional Directorate for Mines;
- Agadez Regional Directorate for Hydraulics and Sanitation;
- Agadez Regional Directorate for Public Health;
- Agadez Labour Inspectorate;
- Communes of Tchirozérine and Dannet;
- Traditional leaders in the area;
- Community leaders in the area;
- Socio-professional groups/organizations;
- Civil society organizations.

Table No. 37 lists the roles of the actors in the implementation and monitoring of the Environmental and Social Management Plan.

Table 37: Actors and their roles in the implementation of the ESMP

Actors	Roles in the implementation of the ESMP
Global Atomic Fuels Corporation	<ul style="list-style-type: none"> • Prepare a work program with the performance structures • Liaise between the various institutions involved in implementing impact mitigation measures • Implement the measures provided for in the ESMP • Keep a consistent environmental watch regarding the success of the Environmental and Social Management Plan (ESMP)
National Office for Environmental Review	<ul style="list-style-type: none"> • Implement the surveillance and monitoring activities in the project's Environmental and Social Management Plan (ESMP) • Ensure that contractual commitments pertaining to the environment are met
General Directorate of Mines and Quarries	<ul style="list-style-type: none"> • Participate in environmental surveillance and monitoring missions • Ensure the respect and preservation of the environment as part of the project's implementation
<ul style="list-style-type: none"> • National Centre for Radiation Protection • Directorate-General for the Environment and Sustainable Development; • General Directorate of Waters and Forestry • Agadez Regional Directorate for the Environment and Sustainable Development; • Agadez Regional Directorate for Mines; • Agadez Regional Directorate for Hydraulics and Sanitation; • Agadez Regional Directorate for Public Health; • Agadez Labour Inspectorate; • Communes of Tchirozérine and Dannel; • Traditional leaders in the area; • Socio-professional groups/organizations; • Civil society organizations. 	<p>These organizations will take part in the surveillance and monitoring of the implementation of the Project's Environmental and Social Management Plan (ESMP)</p>

VIII.4.2. Topics identified for stakeholder capacity development

Strengthening the capabilities of stakeholders constitutes a necessary condition guaranteeing the proper implementation of the measures provided for in the ESMP. As part of this project, the technical capacities of the stakeholders for implementing the measures provided for in the

ESMP and those monitoring the implementation of these measures will be reinforced. **Table No. 38** below provides details on these topics, the beneficiaries and the related costs.

Table38: Training topics and target audience

Training topics	Targets
<ul style="list-style-type: none"> • Environmental and social issues of the project • Analysis of contractual site documents • Control of the requirements of the Environmental and Social Clauses, 	<ul style="list-style-type: none"> • Global Atomic Fuels Corporation • Executives of the National Office for Environmental Review • Executives of the General Directorate of Mines and Quarries • Agadez Regional Council; • Regional Directorate of Mines • Regional Environmental Directorate • Representatives of the communes of Tchirozérine and Dannet
<ul style="list-style-type: none"> • Environmental monitoring of mining operations, • Monitoring the implementation of the mining project's ESMP, • Preparation and use of monitoring sheets, • Drafting of monitoring and control reports 	<ul style="list-style-type: none"> • Global Atomic Fuels Corporation • Executives of the National Office for Environmental Review • Executives of the General Directorate of Mines and Quarries • Centre National de Radioprotection [National Centre for Radiation Protection] • Representative of the Directorate-General for the Environment and Sustainable Development • Representative of the General Directorate of Water and Forestry; • Representative of the Agadez Regional Council • Representative of the Agadez Regional Directorate for the Environment and Sustainable Development • Representative of the Agadez Regional Directorate for Mines; • Representative of the Agadez Regional Directorate for Hydraulics and Sanitation; • Representative of the Agadez Regional Directorate for Public Health; • Representative of the Agadez Labour Inspectorate • Elected officials of the Communes of Tchirozérine and Dannet; • Traditional leaders in the area; • Representative of community leaders in the area • Representative of socio-professional groups/organizations • Representative of civil society organizations.
<ul style="list-style-type: none"> • Training in monitoring the rehabilitation and closure plan 	<ul style="list-style-type: none"> • Global Atomic Fuels Corporation • Executives of the National Office for Environmental Review • Executives of the General Directorate of Mines and Quarries • Representative of the National Centre for Radiation Protection

	<ul style="list-style-type: none"> • Representative of the Directorate-General for the Environment and Sustainable Development • Representative of the General Directorate of Water and Forestry; • Representative of the Agadez Regional Council • Representative of the Agadez Regional Directorate for Mines; • Representative of the Agadez Regional Directorate for the Environment and Sustainable Development • Representative of the Agadez Regional Directorate for Hydraulics and Sanitation; • Representative of civil society organizations.
<ul style="list-style-type: none"> • Training in the hazards related to ionizing radiation 	<ul style="list-style-type: none"> • Global Atomic Fuels Corporation • Executives of the National Office for Environmental Review • Executives of the General Directorate of Mines and Quarries • Representative of the Agadez Regional Directorate for Mines; • Representative of the General Directorate of Water and Forestry; • Representative of the Agadez Regional Council • Representative of the National Centre for Radiation Protection

VIII.4.3. Cost of the Capacity-Building Program

Table No. 39 gives the training topics and the related costs.

Table39: Cost of the capacity-building program

Section	Cost in CFA Francs
Internalization of the ESMP Analysis of contractual site documents Control of the requirements of the Environmental and Social Clauses	15,000,000
Environmental monitoring of mining operations, Monitoring the implementation of the mining project's ESMP, Preparation and use of monitoring sheets, Drafting of monitoring and control reports	25,000,000
Training in monitoring the closure and redevelopment plan	15,000,000
Training in the hazards related to ionizing radiation	12,000,000
Support for the BNEE and the Ministry of Mines	45,000,000
TOTAL	112,000,000

VIII.5. Estimated Costs of the ESMP

The overall cost of the ESMP is assessed by adding up the costs of the program for the implementation of impact mitigation and improvement measures, of the environmental and

social monitoring program, of the environmental and social monitoring program, and of the capacity-building measures. Based on this addition, the cost of the ESMP amounts to four **hundred and fifty-six million (456,000,000) CFA Francs**. **Table No. 40** provides a summary of the ESMP costs.

Table 40: Overall cost of the ESMP

Section	Cost in CFA Francs
Program for the implementation of impact mitigation and improvement measures	344,000,000
Environmental and social monitoring plan	PM
Environmental and social monitoring plan	PM
Preliminary capacity-building program	112,000,000
TOTAL	456,000,000

VIII.6 Emergency Management Master Plan

Global Atomic Fuels Corporation will implement an Emergency Management Master Plan (EMMP) The plan will be in place from the construction phase and will be regularly revised to take into account the evolution of techniques and technology as well as the degree of its appropriation by the staff. The purpose of the EMMP is to:

- Train staff to identify, report and respond appropriately to emergencies;
- Establish a process to identify potential emergency situations before they occur and take measures to prevent or minimize the impact of potential emergencies;
- Define the detailed steps of the procedure, in order to effectively respond to and manage the various types of potential emergencies;
- Provide information and inform the surrounding population about response measures and environmental risks;
- Test communication procedures, emergency procedures and equipment periodically;
- Contain, to the extent possible, emergencies and their effects within the boundaries of the Project site;
- Make sure normal operations can be restarted safely following an emergency.
- Identify the cause(s) of an emergency and the corrective and preventive action to prevent it from happening again;
- Review and update plans and procedures based on lessons learned from actual past emergency situations and trials.

The EMMP will cover the following items:

- Administration of Global Atomic Fuels Corporation (objective, definitions, scope, of EMMP triggering criteria, date and frequency of updates);
- Organization of emergency zones (for example, control centres and medical stations);
- Staff roles and responsibilities;
- Internal and external communication systems (notification and communication to employees, notification to the community, media contacts and media relations strategy);
- Emergency resources (emergency financing and funds, fire and medical services, mutual assistance agreements providing a clear basis for intervention by mutual assistance providers, list of contacts);
- Emergency equipment (location of isolation valves, fire-fighting equipment, toxicity tests, personal protective equipment and pollution prevention);
- Training and simulation exercises;
- Updating the EMMP;
- Continuity of operations and emergency measures (including measures to enable the continuity of operations following an emergency, backups of critical information in a secure location to accelerate the return to normal operations following an emergency and alternative supply of resources, such as water);
- Cleaning (cleaning options and procedures following accidents);
- Emergency and risk scenarios (identified scenarios, at-risk people and environments, maps of risk areas, hazardous product locations and properties of hazardous products);
- Emergency response procedures for each type of emergency (specific information on specific procedure triggers, intervention actions, equipment, notification procedures,

communication procedures, alarm systems, evacuation procedures, media procedures, medical procedures, assessment, monitoring and recording the progress of the accident, operational interruption procedures if necessary, cleaning procedures, recording of intervention actions taken and deactivation of the procedure);

- Review to identify missing or weak elements, consistency with regional and national disaster plans and compliance with relevant legislation.

The emergency scenarios covered by the EMMP will be determined based on the risks. The procedures will be developed to cover at least the following events:

- spills of chemical products, petroleum products or fuel outside the site;
- releases of chemicals, petroleum products or fuel on the site;
- landslide at the level of tailings storage facilities, waste rock stockpiles or mining job sites;
- emergencies from natural hazards, such as sand storms, extreme heat, sudden flooding;
- security incidents such as loss of contact/missing person, sabotage or a threat of assassination/employee injury;
- vehicle or equipment accidents;
- medical emergencies;
- fire;
- blasting and explosion accidents.

The EMMP distinguishes two types of emergencies:

- Type 1 emergencies: emergencies contained within the limits of the project site, requiring the use of the project's emergency resources, but not requiring external resources;
- Type 2 emergencies: emergencies not contained within the limits of the project site and/or requiring the involvement of external emergency resources.

Type 2 emergencies require that all relevant directives be applied. The main objectives of these guidelines are: • to raise awareness among local communities living near industrial activities on how to react if an accident occurs; and • to establish adequate coordination and communication in situations where the public could be affected by accidents and emergencies from natural hazards (such as sudden flooding).

VIII.7 Site Redevelopment Master Plan

This chapter of the ESIA addresses the closure of the mine, in particular the cessation of operations, downgrading of facilities and equipment, rehabilitation of land as well as their management and use after the closure of the mine. It should be noted that the closure will not begin before many years and that the identification of mitigation measures is only indicative at this stage. The need for specific measures will be reviewed regularly and a closure strategy and a detailed closure plan for the mine will be developed and updated throughout the various phases of development and completion of each stage of the project.

VIII.7.1. Site redevelopment strategy

The purpose of the Site Redevelopment Master Plan is to ensure a closure at the end of operations that is safe and sustainable from an environmental point of view. It aims to comply with the regulations in force in Niger, as well as to integrate good international practices in this area, in particular to meet the requirements of the Performance Standards of the International Financial Company (IFC). This plan focuses on potential environmental risks associated with the closure of the mine and the identification of specific measures that will help to avoid or otherwise mitigate them. The redevelopment strategy will gradually apply to the entire area affected by mining activities, including mine shafts, waste rock stockpiles, conveyors, transport and access roads, grinding and screening plant area, workshop and office area, storage area and worker camps. They will also apply to the other facilities and services owned and managed by the mine and located in the vicinity of the villages built nearby to support the development and operation of the mine. The latter will be included in the strategy and in the plan, but it is likely that they will be privatized or nationalized at an earlier stage and will remain in place at the end of the mining operations.

To do this, a redevelopment fund will be created (from the year of return on the investment) and set up by Global Atomic Fuels Corporation. It will be supplied according to a predetermined frequency. It will be kept in an account created and managed by said company. The account will be supplied by the sales revenue of a certain percentage of the production.

The redevelopment plan will be developed and updated throughout the project operations and will take into account the preliminary closure objectives, current sector standards, description of the current project, prior understanding of the on-site conditions and Global Atomic Fuels Corporation's experience. As part of the mine closure planning process, special priority is given to the redevelopment and decontamination of the tailings storage facilities as they represent most of the radioactive mine tailings.

VIII.7.2. Purpose of the redevelopment strategy

The overall purpose of the redevelopment strategy will be developed in consultation with the stakeholders but will consist essentially of leaving a rehabilitated mine site that is stable, non-contaminating and under generally improved biodiversity conditions, with local communities empowered during the mining exploitation period, so that they can create livelihoods but also

provide and maintain community services, and, if they are not already autonomous when the mine is closed, that they are on the way to becoming autonomous. In this context, the specific objectives of the redevelopment will also be developed in consultation with the stakeholders, and will be as follows:

- ✓ Identify post-site closure uses that are profitable and viable in the long term for the affected communities;
- ✓ Leave behind a safe, stable and clean site, most of which is suitable for future agreed-upon use and on which the closed mine does not present any unacceptable risk to public health and safety;
- ✓ Create a final topography that blends into the surrounding landscape as far as possible;
- ✓ Minimize the negative effects on the environment immediately after the end of mining operations and construct non-polluting post-mining landscapes;
- ✓ Establish plant-based and viable units consistent with undisturbed surrounding vegetation and suitable for future planned use of land;
- ✓ Ensure that the water quality is suitable for planned future use and minimize the negative effects on the local hydrological regime and the supply of water to communities and ecosystems;
- ✓ Equip employees in their transition to new opportunities that provide sustainable livelihoods in the future; and
- ✓ Provide local communities with sustainable long-term opportunities after closure and empower them to continue to gain autonomy as defined during the mining period.

VIII.7.3. Approach to the redevelopment strategy

The redevelopment strategy will present the proposed approach upon closure and thereafter, based on an assessment of the possibilities and an assessment of their costs and positive environmental, social and economic impacts. It will be based on extensive consultation with all relevant stakeholders, including government authorities, local communities and the workforce, and will indicate in detail the research work that will be conducted to keep the strategy up to date. A knowledge base will be established and maintained. It will include information on the socio-economic, cultural, biophysical environment, all regulatory requirements and other requirements relevant to the closure and all agreements concluded with the stakeholders.

VIII.7.4. Redevelopment methods

“Redevelopment” methods are techniques that aim to give the mining site an appearance and use that are similar to those it had before the mining operations. Redevelopment thus mainly concerns the surface mining structures: tunnel entrances, stopes, stockpiles, mine buildings, etc. These redevelopment methods are very often coupled with the safety mode.

VIII.7.4.1. Underground mine

The surface equipment and buildings associated with the shafts and tunnels will be dismantled upon closure and the buildings demolished through the following operations:

- ✓ Removal of equipment and facilities;
- ✓ Decontamination of buildings and equipment and the surrounding soil;
- ✓ Recovery of the equipment for reuse/recycling/scrapping;
- ✓ Removal of all infrastructure including pipes and electrical wiring;
- ✓ Destruction of walls and foundations from the floor to the ceiling;
- ✓ Haulage of rubble from the demolition to underground facilities, and
- ✓ Clean-up of cleared areas and replanting whenever possible.

It is often necessary to keep one part open to inspect and/or visit the shafts and tunnel entrances (rises in water levels, geotechnical inspections, gas vents, surveillance of protected species, etc.). Thus, it is often not useful to “conceal” these structures in their entirety. On the other hand, the areas around these points will be cleaned up and can be re-planted in order to optimally integrate them into the restored site.

VIII.7.4.2. Processing plant and infrastructure

The buildings and construction areas of the mining site will be dismantled at closing due to the limited industrial development near the mining site and the discouraging attitude with regard to the worker arrivals encouraged by the company. The mining site equipment will be dismantled in accordance with the closing activities listed below:

- ✓ Removal of equipment;
- ✓ Decontamination of buildings and equipment and the surrounding soil;
- ✓ Removal and recovery of the equipment with a view to subsequent scrapping;
- ✓ Demolition of buildings;
- ✓ Removal of all infrastructure including pipes and electrical wiring;
- ✓ Destruction of walls and foundations;
- ✓ Removal of access and internal routes and reopening and or recycling, if applicable;
- ✓ Removal of safety barriers and re-opening and/or recycling, if applicable;
- ✓ Haulage of non-hazardous demolition rubble to underground shafts;
- ✓ Spreading topsoil and/or a growth support material if necessary.

The conceptual closure strategy for the processing plant involves the dismantling and removal of the surface infrastructure, removal of foundations, disposal of non-hazardous rubble, and decontamination and disposal, if applicable, of potentially hazardous material. Site rehabilitation involves a detailed soil analysis as well as the removal of contaminated material on or around the mining site and its treatment via the waste storage facility, if necessary. The dismantling and closure of the processing plant area will be included in the closure plan for the entire site that will be created and updated in accordance with Niger regulations.

VIII.7.4.3. Tailings storage facility

The post-closure tailings storage facility must be rigorously planned given that it will involve the majority of the residual radioactive materials on site after closing. It will contain radioactive materials, potentially dangerous for humans and wildlife (receptors) in the event of inhalation, ingestion or exposure. In order to optimize closure planning (and reduce dust emissions during the operations), the facility must be simultaneously rehabilitated using materials with low uranium content from the radiometric sorting of the ore and the ablation processes. The radiometric sorting of ore will be designed to reject material with a high uranium content. This material with a low uranium content will then be stored in the processing plant before serving as a cover material in the tailings storage facility. Rehabilitation measures will be implemented upon closure so that the radiation dose emitted on the surface of the facility does not exceed the recommended levels.

The conceptual closure strategy for the tailings storage facility proposes to cover the facility during the closure. This cover will include two layers: one inner mixed layer and one outer layer of pebbles. The inner mixed layer will consist of an alloy of clay materials/low permeability and sandy gravel with large grains. The purpose of this cover is to block any oxygen inflow, reduce radon emissions and act as a dam to radiation. It will be finished with a layer of coarse-grain gravel to prevent water and wind erosion of the thinner underlying materials. The containment berms will be levelled on the tailings in order to protect the closed facility from precipitation.

VIII.7.4.4. Waste rock heaps

The heaps will be created in accordance with the specified regulatory class to optimise the protection of the surface against water while minimizing the risk of erosion by water and wind. The geochemical properties of the ore, waste rock and tailings have a major influence on mining waste management strategies and mine closure planning.

VIII.7.5. Assessment of residual impacts

As part of the sustainable closure of the mine, Global Atomic Fuels Corporation will conduct assessments prior to ceasing operations. The stages of the proposed assessments must be conducted:

- ✓ In three phases (survey, assessment of residual impacts and measures/treatment);
- ✓ In reference to the regulations in force (mining law, environmental law in particular) and international recommendations on responsible mining, systematically address all of the following topics:
 - Effects on the local economic and social fabric;
 - Surface sites and installations that are essential to the operations (geochemical and geotechnical impacts).
 - Various residual impacts induced on: superficial and groundwater; biodiversity (animals and plants); public health and sanitation.

- Stability of the surface soils;
- Presence of mine gas;
- Problems relating to waste rock and mill tailings stockpiles, heaps or dykes.

VIII.7.5.1. Examination of the socio-economic impacts of the mine closure

Anticipating and preparing to close down mining activities is essential to limiting the reduction of the number of jobs (direct and indirect) and a reduction in local economic activity. In this sense, the mining industry is no different from other economic activities. Except in the case of economic hazards linked to the prices of raw materials, for example, it may even have the advantage of being able to forecast the end date of an activity. Conversely, a diversification of income, activities, jobs and mine personnel, upstream of its closure and in close collaboration with the stakeholders, may lead to the maintenance or even relaunch of socio-economic activity upon cessation of the work. In any cases, the operator realistically quantifies these consequences and draws up a schedule. It proposes measures to conserve the socio-economic fabric it has created from its activities: wage reorientation program, assistance with retraining, job offers at other sites in particular.

VIII.7.5.2. Analysis of residual impacts on water

This analysis is delicate and often fundamental for the development of mining work stoppage studies. The assessment must be conducted at the scale of a coherent hydrogeological entity. One of the purposes of this assessment is to define the stabilized level of the water in mine tunnels after the end of operations (several hypotheses can be formulated to achieve this). Global Atomic Fuels Corporation will thus draw up a report on the long-term effects of the work on the presence, flow and quality of water of any kind (underground and surface areas as well as those produced by the mining site). To this end, Global Atomic Fuels Corporation assesses the consequences of ceasing work or operations on the situation thus created and on water uses, from a quantitative and qualitative point of view, with reference to the site's baseline state (established before mining exploitation):

- ✓ rise of groundwater and flooding of work or permanent drawdown (drainage, pumping, overflow at low point);
- ✓ alteration of the watersheds or hydrological and/or hydrogeological flows;
- ✓ acid mining drainage (AMD) and dissolution of mineral and metal elements (in particular iron, manganese and metal trace elements (Pb, Zn, Ni, etc.) and metalloids (As, Sb, etc.);
- ✓ alteration of the physicochemical characteristics of the water (pH, conductivity, redox potential, turbidity, dissolved oxygen concentration, etc.).

VIII.7.5.3. Assessment of effects on soil quality

Several areas of mining activity may have potential impacts on soil quality, in particular:

- ✓ Deposits or stockpiles of ore, waste rock and mill tailings; The immediate surroundings of the deposits may also be affected (severe erosion of the deposits and their coverage and particulate transport to the soil);
- ✓ Sedimentation of the waterways concerned by the mine water and runoffs on the deposits;
- ✓ Areas of dustfall (from the mine or from waste rock and mill tailings management facilities);

Global Atomic Fuels Corporation will carry out a survey to assess the consequences of the mine closure on the situation thus created and on soil uses, with reference to the initial state of the site (established before mining exploitation).

VIII.7.5.4. Assessment of the environmental risks relating to the waste rock and mill tailings management facilities

With regard to the waste rock and mill tailings management facilities, water is usually one of the sources of pollution (meteoric water percolation) as well as the vector by which this pollution is transmitted to the surrounding environment (infiltration into water tables, releases into waterways). An assessment will be conducted of the potential for infiltration and runoff of meteoric water integrating the precipitation values corresponding to remarkable events (e.g., rain) and taking into account the sensitivity of the site. These potentials will then be compared with the waste rock and mill tailings characterization data (geology, mineralogy, paragenesis and ore processing method), in order to deduce the existence of potential hazards.

To this end, the necessary tests will be carried out on the materials (review of the AMD-generating elements and buffer materials as well as kinetic tests) and mineralogical and geochemical analyses as of the preliminary stages of the mining project and throughout its operations.

VIII.7.5.5. Geotechnical stability analysis

The purpose of this analysis is to project the long-term geotechnical outcome of the various mining structures and work areas erected during the operation of the site. All mining areas will be taken into account: underground or open-pit cavities, shafts, tunnels and boreholes leading up to the surface, surface storage facilities (stockpiles, tailings dykes, slag heaps, etc.) as well as the ancillary facilities: offices, pit frames, etc. The approach is based on a comparison of the characteristics of the various materials used to build these structures and the restrictions to which they are, and will be, subjected. This comparison thus makes it possible to detect the existence of structures whose long-term stability cannot be guaranteed. The assessment of the characteristics incorporates factors of ageing, fatigue and water effects analyzed using geological and hydrogeological analyses.

VIII.7.5.6. Analysis of gas emission potentials

Uranium mines are known or suspected to produce mine gases, even after the mining operations have been shut down. In these cases, an analysis of the gas potentials will be

conducted after the hydrogeologic survey (final level of the water table required) and, if possible, after the stability analysis (stability over time of the cavities to estimate and locate the volumes of the residual mining voids that are still watertight and constitute a potential gas reservoir).

VIII.7.6. Implementation of handling and redevelopment solutions

The techniques for securing and, dealing with hazards and site redevelopment are, by definition, good practices to reduce the impacts related to the closure of a mine.

“Redevelopment” methods are techniques that aim to give the mining site an appearance and use that are similar to those it had before the mining operations. Redevelopment thus mainly concerns the surface mining structures: shafts, tunnel entrances, pits, stopes, stockpiles, mine buildings, etc. These redevelopment methods are very often coupled with the safety mode.

VIII.7.7. Post-Mining or Post-Closure Management

This is the period from which the various measures outlined in the redevelopment Plan were implemented and followed until the required closure criteria are met. The length of the post-closure phase will depend on the success of the various closing measures and the result of the post-closure monitoring activities. The conclusions of the post-closure audit will be sent to the competent authorities and will indicate the level of compliance with the closing objectives.

During the post-closure phase, any residual risks that could not be technically removed will be the subject of a surveillance/monitoring protocol even after the cessation of the closure work. Thus, Global Atomic Fuels Corporation will determine the projection conditions over time for this surveillance/monitoring, in terms of:

- ✓ Nature, duration and frequency;
- ✓ Costs;
- ✓ Technical and financial liability (operator and/or State and/or other delegation).

IX: FRAMEWORK PLAN FOR THE MANAGEMENT OF MINING WASTE

The purpose of this plan is to ensure that waste from development and mining operations is managed efficiently in order to achieve eco-efficiency, comply with the current legislation, prevent pollution and ensure that the site is suitably presentable. It specifically applies to any waste, including waste rock and mine tailings, resulting from the preparation, construction, mining and ancillary activities.

This framework is prepared with a view to compliance with Global Atomic Corporation's environmental policy, with Nigerien law and with the international standards for environmental management and risk prevention. It is based on the "Reduction-Reuse-Recycling" waste management principle throughout the company's operations. Each of these components will require, for its management, appropriate facilities and equipment, procedures and competent personnel.

The development of this plan will include:

- ✓ An environmental policy relating to waste treatment;
- ✓ The legal requirements;
- ✓ A list of the waste streams;
- ✓ A description of all waste streams;
- ✓ The potential and real impact of waste flows on the environment;
- ✓ An assessment of the risks related to the impact of waste flows on the environment;
- ✓ The procedures that will be implemented during operations to manage, recycle and/or dispose of waste flows;
- ✓ Appropriate projects describing the improvements in management, the necessary resources and the dates for completing the proposed improvements;
- ✓ A clear delegation of responsibilities related to waste flow management and its improvement;
- ✓ Standard forms for recording the details of the controls carried out and all necessary corrective and preventive measures;
- ✓ Emergency response plans and procedures adapted to the type of hazardous waste.

IX.1 Global Atomic Corporation Environmental Policy

Our environmental policy commits us to responsible stewardship and contains a number of specific clauses relating to waste management, including:

- ✓ Compliance with legal obligations towards the Nigerien government and other regulations;
- ✓ Continuous improvement of environmental risk reduction results, meeting legal obligations and meeting stakeholder expectations;
- ✓ Open communication with staff, the community and regulatory authorities to capitalize on opportunities that can benefit the environment and the community;

- ✓ A training component to ensure that the mine staff are aware of its impacts on the environment and follow the appropriate procedures to minimize them;
- ✓ Prevention of air pollution, natural environment and water, thanks to facilities that limit emissions;
- ✓ Operations management that will make it possible to prevent accidental spills of hydrocarbons, hazardous chemicals and waste;
- ✓ A well-managed planning of the closure of the operations through strategic waste storage and progressive rehabilitation of disturbed land as needed;
- ✓ Conservation of resources and minimisation of greenhouse gas emissions through rational operations that will produce a minimum amount of waste.

In addition, Global Atomic Fuels Corporation undertakes to comply with the following commitments regarding waste management:

- ✓ Identify and quantify, during the construction and operating phases, large flows of solid and liquid waste and maintain a balance of these materials for all waste subject to regulations (for example lead batteries, tires and used oils) to enable a balance of materials received on site and materials leaving the site or stored;
- ✓ Set quantifiable “Reduction-Reuse-Recycling” goals that will be achieved through targeted improvement programs with performance reports included in the Annual Environmental Report;
- ✓ Carry out all waste disposal operations, including the operation of the site landfill, in accordance with Nigerien law, and avoid any pollution of the air, environment, or water;
- ✓ Carry out off-site waste disposal in accordance with Nigerien law. Any off-site disposal of hazardous waste will be monitored and a Destruction Certificate Register will be kept on this subject;
- ✓ Strictly comply with operational requirements through routine controls; corrective measures will be implemented if necessary;
- ✓ Record the performances relating to waste management in the annual report on the environment.

IX.2 Principles of waste management

IX.2.1 Reduction

Reducing the creation of waste is the primary objective of the waste management plan. This requires good organization and a constant search for ways to eliminate product waste. This also means that we must think about the shelf life of the products before they are purchased. The purchase, for example, of excessive volumes of perishable goods will probably result in a significant proportion of waste. Consumables make up a significant portion of the waste generated and there are always ways to reduce their consumption. The consumption of office paper, printer cartridges, safety glasses, gloves and even safety shoes can be reduced by including checks and staff in their supervision.

In each case, it is necessary to analyze consumption trends and identify opportunities for improvement. In some cases, equipment investments can make a big difference. Supplying tap water can, for example, eliminate the need to supply bottled water, which generates a large number of empty bottles.

IX.2.2 Reuse

A lot of waste can be reused, but this sometimes requires a repackaging cost.

Re-treading tires is one example. Other products, such as empty acid drums, for example, may not be useful for the mine but may be useful for local communities as water tanks. Another example of reuse is the use of scrap metal for the manufacture of metal parts. The use of used oils as a source of energy is another example, as is the transformation of food waste into compost.

IX.2.3 Recycling

Recycling is easily confused with reuse, and they are actually similar. However, recycling is the term more generally applied to waste reprocessing operations. For example, when scrap metal is melted to produce new metal objects, when used paper is converted into new paper as stationery or when used oils are refined to be reused.

IX.3 Description of the Waste Streams

The project operations are described in the ESIA. Waste from mining operations can be classified into the following categories:

- ✓ Hydrocarbon waste (used oils, oil-soaked cloths and oil filters, fuel and oil drums, hydraulic hoses, chemical waste, battery acid);
- ✓ Waste from chemical products;
- ✓ Medical waste;
- ✓ Radioactive waste (waste rock, mill tailings);
- ✓ Wastewater;
- ✓ Food and putrescible waste;
- ✓ Non-hazardous recyclable waste (cardboard/paper, scrap metal, aluminum cans, wood, glass, tires);
- ✓ Non-hazardous, non-recyclable waste.

IX.3.1 Hydrocarbon Waste

Mining equipment, vehicles and machinery produce large amounts of used oil and other hydrocarbon waste including oil-soaked filters and cloths, empty oil and grease drums and hydraulic hoses. The primary objective is to minimize the production of hydrocarbon waste. Options that can contribute to this objective include:

- ✓ Bulk storage of lubricants, hydraulic fluids and engine oils to eliminate the use of drums;

- ✓ Use of motor oils to prolong the periods between oil changes and minimize the amount of used oil produced;
- ✓ Appropriate use of degreasers and water-based detergents that clean effectively and allow water/oil separators to function properly. The objective here is to obtain effluents with no oily film and containing less than 10 ppm of dissolved hydrocarbons, in accordance with national and international regulatory standards.
- ✓ Adequate storage of all new and used fuel and oils in areas equipped with concrete retention tanks to minimize potential soil contamination;
- ✓ Effective planning of maintenance activities to minimize the possibility of hydraulic hose rupture.

IX.3.2 Used Oils

The possibilities for recycling used oils will be examined. Used oils are generally reused as an energy source in various industrial processes rather than being truly recycled. Genuine recycling requires that the different types of oils be separated from the outset and stored separately, especially by ensuring that brake fluids are not mixed with engine oils. Used oils, including hydraulic fluids, lubricants and engine oils will be mixed in used oil tanks. Used oils will be collected periodically by subcontractors and transported off-site for disposal in facilities subject to inspections.

IX.3.3 Oil-soaked Cloths and Oil Filters

Oil-soaked cloths and oil filters will either be stored and sent to a disposal company, or incinerated in a “turbo-burner” incinerator that ensures combustion that does not generate visible smoke or ashes.

IX.3.4 Fuel Drums

Empty fuel drums and other fuel containers will be emptied out and stored on a surface equipped with a retention tank pending their removal off-site and disposal by an approved subcontractor engaged for this purpose and who will be subject to inspection and control. The use of drums will be minimized insofar as possible through the use of large supply tanks.

IX.3.5 Hydraulic Hoses

Hydraulic hoses will be hung in a vertical position and purged for at least 24 hours to remove the fluid before being discarded in the site discharge.

IX.3.6 Battery Acid

Acid from the large number of truck and car batteries will be directed to a lime-filled pit where acid will be neutralized. The empty batteries will then be stacked on a pallet and packaged in heat shrink film to be removed from the site by a scrap metal subcontractor.

IX.3.7 Chemical Waste

Mining and processing the ore will require a considerable amount of chemical products. The use of these products generates a large volume of contaminated bulk bags. These bags will be collected to be disposed of. Chemical waste will not be landfilled, including solvents, acids or alkalis. The company will implement a hazardous chemical management system in accordance with the laws in force. Insofar as possible, the use of individual drums or containers will be minimized through the use of bulk delivery (for example, for fuel and detergents). Adapted software will be used to facilitate the management of chemical products on site. This system will be reinforced by periodic inspections of chemical products to ensure that these products are properly stored, labelled, transported and disposed of.

IX.3.8 Medical Waste

It is important that potentially infectious medical waste is disposed of appropriately to avoid any risk to the health of individuals and in particular the risk of transmission of contagious diseases such as AIDS by used syringes. The site's medical centre will ensure that all used syringes and other sharp or pointed objects are placed in a container labeled "Pointed or Sharp Objects" and that used dressings are disposed of in a container for infectious medical waste. These materials will be placed daily in a "turbo-burner" along with the hydrocarbon waste to be incinerated at high temperature. The ashes and residual metal collected will then be placed in the scrap metal bin to be taken off-site.

The consistency of the operations with these objectives will be monitored through routine checks of medical waste and the results will be included in the monthly and annual environmental reports.

IX.3.9 Management of Radioactive Waste

- Tailings

Tailings will be stored in tailings management facilities (TMFs) designed to prevent contact between the tailings and the environment for a very long period.

TMFs will be designed to prevent groundwater and surface water from coming into contact with tailings and being contaminated. The tailings management facility will be designed as a dry storage facility. This concept is the most appropriate, as the water losses at the tailings storage facility will be minimized and the stability of the tailings will be maximized. The tailings will be deposited in the TMF as sludge. Solid particles are deposited into the TMF, while liquids are collected later and processed in a wastewater treatment unit to remove contaminants.

The location of the TMF will be as close as possible to the processing plant in order to minimize the impact of the conveyor on the environment. Regarding the plant closure phase, the design of the TMF will be planned so as to take into account the majority of other radioactive materials remaining on the site after closure, through the development of a conceptual strategy for sealing the TMF.

- Waste rock

In addition to tailings, mining activities produce large quantities of inert and mineralized waste rock that have to be excavated to free the access to the uranium deposit.

During the mining activities, clean and mineralized waste rock is stockpiled in separate heaps because they are managed differently.

Clean waste rock can be reused in construction work, for example as aggregates in concrete manufacturing and road construction. When the mining activities are completed, clean waste rock can be left on the surface where it is reworked so as to blend into the environment before the latter is replanted.

Mineralized waste rock is either low-content ore or high-concentration secondary materials. If left on the surface indefinitely, this waste rock may produce acid or release contaminants at levels that could affect the local environment. During the mining activities, mineralized waste rock will be stockpiled on waterproof surfaces. Infiltration and runoff water from stockpiles of mineralized waste rock is collected and processed in a wastewater treatment plant to remove contaminants before they are released into the environment.

IX.3.10 Wastewater treatment

The wastewater treatment system used in the mining phase is a standard septic tank and burial trench system. However, when there are many more staff during construction and mining, it will be necessary to install a treatment system more suited to large volumes of wastewater. The final decision has not yet been made on the type of wastewater treatment to be chosen. However, centralized treatment of the site's wastewater (wastewater from the change house and administrative block) with a pipeline to bring the wastewater to a wastewater treatment plant will be considered. The sludge contained in the tank must be emptied periodically and transported to an appropriate discharge.

IX.3.11 Food and putrescible waste

The disposal of food waste and other waste from the waste streams has many advantages for the management of landfills and in particular this avoids having to regularly cover the waste with a layer of soil and to do it immediately after discarding it in the landfill. This minimizes the volume of landfill, which minimizes both waste management costs and the size of the area affected by the landfill site.

There are two options for the management of food and putrescible waste:

- ✓ Food waste can be composted using the Biolytix wet aerobic system by running all food waste from the kitchen through the sink through a built-in garbage disposal in the kitchen sink, which provides a single starting point for the treatment of all organic waste;
- ✓ Alternatively, food waste can be treated by composting it in a conventional lombricomposter.

In both cases, organic waste is transformed into a useful product that can be used to improve crop farming operations or rehabilitate the environment, particularly to set up a nursery for site rehabilitation.

IX.3.12 Recyclable Non-Hazardous Waste

All non-hazardous materials that can potentially be recycled will be sorted and recycled either on-site or off-site.

IX.3.13 Scrap Metal

It is generally economical to recycle ferrous and non-ferrous scrap metal, including used batteries and aluminum cans. Scrap metal dealers are generally willing to provide recycling services to mines, including the supply of bins and a periodic collection service. It will also be necessary to ensure that the scrap metal dealer removes all scrap metal and not only metals with the highest economic interest, otherwise a large volume of non-economic scrap iron will be left on site and will have to be landfilled, which is not the point of a scrap metal removal contract. Scrap metal will be placed in bins provided by a scrap metal dealer and removed off-site periodically. The dealer will also remove used batteries that have been previously purged.

IX.3.14 Glass Waste

It is expected that the operation will generate little glass. If the volume of used glass becomes significant, the recycling options will be reviewed, but initially the glass will be sent to the landfill

IX.3.15 Used tires

As with other types of waste, tire management is based on the “Reduce-Reuse-Recycle” principle.

IX.3.16 Non-Recyclable Non-Hazardous Waste

Generic non-hazardous waste that cannot be recycled includes ordinary waste and certain plastic packaging. These items will be placed in landfills for ordinary detritus and will be disposed of.

PUBLIC CONSULTATION PLAN¹

The concept of corporate social responsibility (CSR) is increasingly a concern in all development projects, particularly mining projects. For this reason, the Nigerien government has dedicated a prominent place to this concept by including provisions in mining agreements that require mining companies to contribute to the development of the local communities. Accordingly, Global Atomic Fuels Corporation has contributed significantly to local development since its installation in the Agadez region, by funding actions that benefit the people living around its exploration sites. ***The funds invested in these actions (construction and renovation of water supply infrastructures, food donations, endowments of an ambulance and medical equipment) in several rural communes, villages and nomadic camps amount to almost 291 million CFA Francs.*** During the public consultations with the people who live near the exploration sites, the latter clearly expressed their willingness to carry out market gardening and stockbreeding, and that given the lack of water sources, it would be desirable for the Proponent to support these villages with modern waterworks right away. All donation handover ceremonies were organized with the cooperation of the regional administrative authorities and traditional leaders and were promoted in infomercials in public and private media. These actions will naturally continue and the associated budgets will be greater when the mine goes into production.

To promote the social acceptability of its project and its integration, Global Atomic Fuels Corporation has put forward a proactive communication and consultation process with the various stakeholders involved in the project. Such an approach was initiated from the first field exploration operation in the early 2007s. It has developed more intensively with the various exploration programs undertaken since then.

The main purpose of the communication and consultation process is to establish a climate of trust between the project Proponent, Global Atomic Fuels Corporation, and the inhabitants and administrations involved. To do this, the company used various discussion formats (**Appendix No. 8: Public consultation minutes and attendance sheet**) to adequately inform the public about the progress of the project and, additionally, to hear people's opinions and concerns, particularly those of the local communities.

For the sake of transparency and harmonious relations with the community, Global Atomic Fuels Corporation will continue the consultation and communication operations initiated during the feasibility study of the project throughout the life cycle of the project.

X.1. Methodological Approach to the Consultations

The meeting approach was intended to be both participatory and inclusive. To this end, it was a matter of approaching all of the stakeholders likely to have an interest in the project activities and asking them to decide on the implementation of the project in order to gather their opinions and expectations with the aim of taking them into account in the ESIA. These public consultations took place in two steps: planning and scheduling the public consultations on the one hand, and the public consultations themselves. To achieve this, the following procedure was adopted:

¹ **Public consultation minutes and attendance sheet in Appendix No. 8**

- ✓ Use of the project documentation;
- ✓ Identification of targets (people/structures) which consisted of gradually identifying all stakeholders who have a direct or indirect interest of any kind in the implementation of the project. The targets identified as part of this project include:
 - Regional authorities and regional technical services (government, Regional Council, regional divisions for mining, environment, hydraulics, health, agriculture and stockbreeding, education, vocational and technical training, tourism and craftsmanship, employment);
 - The departmental authorities and departmental technical services (Prefects, Departmental Directorates for the Environment, Hydraulics, and Health);
 - The authorities and municipal technical services of Tchirozérine and Dannet;
 - The municipal health services of Tchirozérine and Dannet;
 - The populations of Tagaza, Agatara, Issakanan, Inolamane, Sikiret, Oufoud, Mizzene, Tamalolo, Gololo, etc.
- ✓ Preparation for the field data collection activities (mapping/appointment with the resource persons in the project area, namely the advisors/village chiefs, mayors, department heads);
- ✓ Collection of data in a participatory manner from the various target people/structures;
- ✓ Visits to certain strategic points in the project's area of influence.

The meetings consisted of a presentation of the objectives of the assessment and information on the project and its components, the potential impacts and the possible impact mitigation measures. These consultations have helped us understand the fears, needs and expectations of the various stakeholders regarding the project. The information thus collected made it possible to take stock of the existing socio-economic infrastructures in the localities concerned and to gather information about the history of the population, land management, socio-economic activities, the life-cycles of the support structures, their activities, their constraints, etc.

The views expressed during the public consultation and those collected in the project surveys made it possible to identify:

- ✓ Positive impacts and optimization measures,
- ✓ Negative impacts and mitigation measures,
- ✓ Grievances, comments and suggestions to ensure transparency.

Photos Nos. 11, No. 12, No. 13, No. 14, 15 and 16 show some of the public consultation meetings.



Photo No. 11: Public consultation with the inhabitants of Egatarak



Photo No. 12: Public consultation with the inhabitants of Tagaza



Photo No. 13: Public consultation with some of the local leaders in Sekiret



Photo No. 14: Public consultation with the inhabitants of Oufoud



Photo No. 15: Public consultation with the inhabitants of Mizene



Photo No. 16: Public consultation with the inhabitants of Gololo

X.2. Summary of the Public Consultations

During the public consultation meetings with the stakeholders, the main questions and concerns raised by the village leaders and other individuals related to the following topics:

- **Community development**
 - ✓ Assistance with local development, local organizations and associations and revenue-generating activities;
 - ✓ Assistance in the development of new infrastructures (roads, schools, health services, electricity, etc.); and
 - ✓ Support for local content, particularly in the field of market gardening and meat production;
 - ✓ CSR.
- **Social impact**
 - ✓ Job opportunities, particularly for young people and the less-qualified;
 - ✓ Provisions made for the resettlement of the populations in the event of displacement;
 - ✓ Impacts of immigrants on local infrastructures (schools and healthcare facilities, waterworks being most often cited); and
 - ✓ Occupation of pastoral areas;
 - ✓ Marginalization of local populations;
 - ✓ Social disruptions.
- **Environmental protection**
 - ✓ Protection of the environment, in particular the populations of *Leptadenia pyrotechnica* in the zone and wildlife were the most cited;
 - ✓ Securing the cultural and tourist sites;
 - ✓ Securing the aquifers;
 - ✓ Measures taken to limit and/or compensate for the destruction of vegetation;
 - ✓ Measures taken to limit the repercussions on water resources (contamination and depletion of groundwater tables);
 - ✓ Occupation of pastoral areas;
 - ✓ Management of waste from mining operations;
 - ✓ Restoration and rehabilitation of the mine;
- **Health and safety issues**
 - ✓ Fears of lasting effects of the negative impacts of uranium exploitation projects, in particular radioactivity;
 - ✓ Radioactive contamination of the food chain;
 - ✓ Impacts of dust and noise on communities and on the health of people and animals;
 - ✓ HIV-AIDS STDs.
- **Public perception**

During these public consultations, some participants already had a positive view of Global Atomic Fuels Corporation and wanted to let us know. This is why the various stakeholders adhere to the project and want all measures to be taken to protect the population against negative impacts. **Table No. 41** provides a summary of the public consultations with the main concerns, preoccupations, needs and expectations expressed.

Table41: Summary of the Public Consultations

Actors	Stakeholder Preoccupations and Concerns	Needs and Recommendations
Administrative authorities and technical services;	<ul style="list-style-type: none"> ✓ Fears of lasting effects of the negative impacts of uranium exploitation projects, in particular radioactivity; ✓ Recruitment of young people from the local community; ✓ Population displacement; ✓ Occupation of pastoral areas and crop lands; ✓ Marginalization of local populations; ✓ The issue of mining dividends (15%); ✓ Management of labour risks; ✓ Destruction of vegetation and the loss of wildlife habitat, in particular the populations of <i>Leptadenia pyrotechnica</i> in the area and the preservation of wildlife habitat; ✓ Contamination of the food chain; ✓ Securing the cultural and tourist sites; ✓ Securing the aquifers; ✓ Repercussions on water resources (contamination and depletion of groundwater tables); ✓ Management of waste from mining operations; ✓ Restoration and rehabilitation of the mine; ✓ Occupation of pastoral areas; 	<ul style="list-style-type: none"> ✓ Distribute the results of the ESIA; ✓ High level of involvement of the authorities and technical services concerned; ✓ Compliance with the Labor Code and ILO Convention 81; ✓ Facilitate access to training and work for young graduates; ✓ Support for health and socio-cultural infrastructures; ✓ Initiate CES/DRS operations to compensate for the destruction of vegetation and pastoral areas; ✓ Conduct a survey of the water needs and analyze the water in the waterworks; ✓ Assist with covering the cost of herd health; ✓ Renew the herds; ✓ Promote local content and the supply chain; ✓ Inclusive involvement of all stakeholders in the various processes; ✓ Rais awareness with all stakeholders;

<p>Communal authorities and local populations;</p>	<ul style="list-style-type: none"> ✓ Lack of transparency in the redistribution of royalties; ✓ Risk of displacement of the population; ✓ Marginalization of local populations during recruitment; ✓ Pressure on basic social and community infrastructures (health and water); ✓ Fears of lasting effects of the negative impacts of uranium exploitation projects, in particular radioactivity; ✓ Population displacement; ✓ Occupation of pastoral areas and crop lands; ✓ Repercussions on water resources (contamination and depletion of groundwater tables); ✓ Contamination of the food chain; ✓ Repercussions on water resources (contamination and depletion of groundwater tables); ✓ Management of waste from mining operations; ✓ Occupation/restricted access to pastoral areas; ✓ Risks of social disruption within communities; 	<ul style="list-style-type: none"> ✓ Better allocation of mining benefits in order to best serve the local development of the communes concerned; ✓ Involvement of local authorities in social investments; ✓ Completion of the access routes; ✓ Facilitate access to basic social services, particularly water; health and education; ✓ Creation of Revenue-Generating Activities (RGAs); ✓ Promote local content and the supply chain; ✓ Support for school enrollment; ✓ Support for retraining in market gardening activities.
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CONCLUSION

This report is the result of the ESIA process carried out for the project to mine the uranium deposit discovered by Global Atomic Fuels Corporation on its exploration permit area in the urban commune of Tchirozérine. This assessment focused on the following aspects:

- ✓ Project design data;
- ✓ Data from the review of the literature;
- ✓ Data on the initial state of the project;
- ✓ Discussions and interviews with stakeholders in order to identify and assess the environmental and social impacts of the project.

The content of this report is the result of the assessment and analyses of the data derived from the above-mentioned aspects. The purpose of the conclusions drawn therefrom is to help decision-makers determine whether the environmental approval of the project can be granted. The initial state of the site and its environment have been described in Chapter VI.6; the impacts in Chapter VI.9, Section VI.9.1 to VI.9.3; the various programs relating to the Environmental and Social Management Plan (ESMP) along with their various costs in Chapter VI.12; and the Emergency Management Master Plan in Chapter VI.13. The ESIA provides a framework for the implementation of appropriate management measures through the ESMP. Nevertheless, an uncompromising analysis shows, with regard to the successful implementation of this ESMP, that the positive impacts of this project are highly significant, which leads to an overall positive result in terms of the environment.

However, to avoid or reduce the severity of certain impacts, the environmental and social factors must continue to be considered throughout the life cycle of the mine's activities. The robustness of the support management programs, as well as the implementation, assurance and ongoing improvement functions of the ESMP, are essential to the successful implementation of the management measures by Global Atomic Corporation, its contractors and subcontractors. A key element of the ESMP is continuous monitoring to confirm that the impacts identified in this ESIA materialize and whether additional measures are required. The overall conclusion of this ESIA is that the majority of potential negative impacts identified can be reduced to acceptable levels with effective management measures, which Global Atomic Fuels Corporation undertakes to implement. There are several management controls requiring interaction with government officials or potentially affected communities, particularly farmers using the project area as grazing land at certain times of the year.

Global Atomic Fuels Corporation will be actively involved with these key stakeholders to present the proposed management controls and will seek to reach a consensus on how to conduct the activities according to industry standards.

APPENDICES

Appendix No. 1: Results of the bacteriological analyses of the water

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FICHE D'ANALYSE BACTERIOLOGIQUE

<u>Localisation :</u>				
Région :		Département :		
Commune :		Village /Site:	EE01.B	
Type d'ouvrage :		N° IRH :		
Long :		Lat :		
Prélevé par :		Date de prélèvement :	19/03/2020	
Analysé par :	Moussa Adamou	Date d'analyse :	27-28-29/03/2020	
Laboratoire :	DRHA/TI	Qualification opérateur :	Ingénieur Chimiste	
<u>PARAMETRES PHYSIQUES ET ORGANOLEPTIQUES</u>				
Température:	30.9	pH:	8.83	
Conductivité:	720	TDS:	360	
Turbidité:	1.28	chlore résiduel:	/	
Goût:	Non Désagréable	Couleur:	Claire	
Odeur:	Non Désagréable			
<u>PARAMETRES BIOLOGIQUES</u>				
Types de germes	Nombre Par 100 ml après 24 H	Nombre Par 100 ml après 48 H	Normes	Remarque
Coliformes Totaux (CT)	37	37	<10	
Coliformes Fécaux (CF)	0	0	Absence	
Autres	Germes Banaux	Germes banaux		
Observations:	Eau contenant des coliformes totaux et des germes banaux , sa qualité bactériologique n'est pas acceptable à la consommation humaine , nécessite une désinfection.			

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FICHE D'ANALYSE BACTERIOLOGIQUE

<u>Localisation :</u>				
Région :		Département :		
Commune :		Village /Site:		EE02.B
Type d'ouvrage :		N° IRH :		
Long :		Lat :		
Prélevé par :		Date de prélèvement :		19/03/2020
Analysé par :	Moussa Adamou	Date d'analyse :		27-28-29/03/2020
Laboratoire :	DRHA/TI	Qualification opérateur :		Ingénieur Chimiste
<u>PARAMETRES PHYSIQUES ET ORGANOLEPTIQUES</u>				
Température:		32.3	pH:	8.96
Conductivité:		610	TDS:	310
Turbidité:		4.05	chlore résiduel:	/
Goût:	Non Désagréable		Couleur:	Claire
Odeur:	Non Désagréable			
<u>PARAMETRES BIOLOGIQUES</u>				
Types de germes	Nombre Par 100 ml après 24 H	Nombre Par 100 ml après 48 H	Normes	Remarque
Coliformes Totaux (CT)	0		0 <10	
Coliformes Fécaux (CF)	0		0 absence	
Autres	Germes banaux	Germes banaux		
Observations:	Début de développement des germes banaux mais exempte de coliformes totaux et fécaux, nécessite quand même une désinfection.			

Le Responsable du laboratoire :

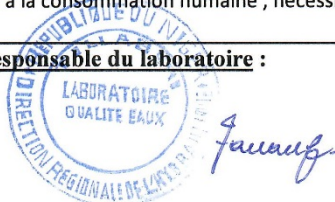


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FICHE D'ANALYSE BACTERIOLOGIQUE

<u>Localisation :</u>				
Région :		Département :		
Commune :		Village /Site:		EE03.B
Type d'ouvrage :		N° IRH :		
Long :		Lat :		
Prélevé par :		Date de prélèvement :		20/03/2020
Analysé par :	Moussa Adamou	Date d'analyse :		27-28-29/03/2020
Laboratoire :	DRHA/TI	Qualification opérateur :		Ingénieur Chimiste
<u>PARAMETRES PHYSIQUES ET ORGANOLEPTIQUES</u>				
Température:		31	pH:	9.04
Conductivité:		1120	TD5:	560
Turbidité:		5.16	chllore résiduel:	/
Goût:	Non Désagréable		Couleur:	Claire
Odeur:	Non Désagréable			
<u>PARAMETRES BIOLOGIQUES</u>				
Types de germes	Nombre Par 100 ml après 24 H	Nombre Par 100 ml après 48 H	Normes	Remarque
Coliformes Totaux (CT)	NTC	NTC	<10	
Coliformes Fécaux (CF)	NTC	NTC	absence	
Observations:	Eau contenant des coliformes totaux et Fécaux très élevés, sa qualité bactériologique n'est pas acceptable à la consommation humaine , nécessite une désinfection avant toute consommation.			

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FICHE D'ANALYSE BACTERIOLOGIQUE

<u>Localisation :</u>				
Région :		Département :		
Commune :		Village /Site:		EE04.B
Type d'ouvrage :		N° IRH :		
Long :		Lat :		
Prélevé par :		Date de prélèvement :		20/03/2020
Analysé par :	Moussa Adamou	Date d'analyse :		27-28-29/03/2020
Laboratoire :	DRHA/TI	Qualification opérateur :		Ingénieur Chimiste
<u>PARAMETRES PHYSIQUES ET ORGANOLEPTIQUES</u>				
Température:		30.7	pH:	8.75
Conductivité:		540	TDS:	270
Turbidité:		45.2	chlore résiduel:	/
Goût:	Non Désagréable		Couleur:	Lég. Trouble
Odeur:	Non Désagréable			
<u>PARAMETRES BIOLOGIQUES</u>				
Types de germes	Nombre Par 100 ml après 24 H	Nombre Par 100 ml après 48 H	Normes	Remarque
Coliformes Totaux (CT)	NTC	NTC	<10	
Coliformes Fécaux(CF)	NTC	NTC	absence	
Observations:	Eau contenant des coliformes totaux et Fécaux très élevés, sa qualité bactériologique n'est pas acceptable à la consommation humaine, nécessite une désinfection avant toute consommation.			

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FICHE D'ANALYSE BACTERIOLOGIQUE

<u>Localisation :</u>				
Région :		Département :		
Commune :		Village /Site:		EE05.B
Type d'ouvrage :		N° IRH :		
Long :		Lat :		
Prélevé par :		Date de prélèvement :		20/03/2020
Analysé par :	Moussa Adamou	Date d'analyse :		27-28-29/03/2020
Laboratoire :	DRHA/TI	Qualification opérateur :		Ingénieur Chimiste
<u>PARAMETRES PHYSIQUES ET ORGANOLEPTIQUES</u>				
Température:		31.1	pH:	8.9
Conductivité:		410	TDS:	200
Turbidité:		4.94	chlore résiduel:	/
Goût:	Non Désagréable		Couleur:	Claire
Odeur:	Non Désagréable			
<u>PARAMETRES BIOLOGIQUES</u>				
Types de germes	Nombre Par 100 ml après 24 H	Nombre Par 100 ml après 48 H	Normes	Remarque
Coliformes Totaux (CT)	20	20	<10	
Coliformes Fécaux (CF)	0	0	absence	
Autres	Germes Banaux	Germes Banaux		
Observations:	Eau contenant des coliformes totaux et des germes banaux , sa qualité bactériologique n'est pas acceptable à la consommation humaine , nécessite une désinfection.			

Le Responsable du laboratoire :



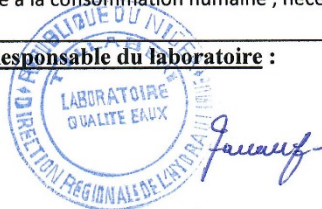
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<u>Localisation :</u>				
Région :		Département :		
Commune :		Village /Site:		EE06.B
Type d'ouvrage :		N° IRH :		
Long :		Lat :		
Prélevé par :		Date de prélèvement :		20/03/2020
Analysé par :	Moussa Adamou	Date d'analyse :		27-28-29/03/2020
Laboratoire :	DRHA/TI	Qualification opérateur :		Ingénieur Chimiste
<u>PARAMETRES PHYSIQUES ET ORGANOLEPTIQUES</u>				
Température:		30.5	pH:	8.43
Conductivité:		770	TDS:	380
Turbidité:		2.51	chlore résiduel:	/
Goût:	Non Désagréable		Couleur:	Clair
Odeur:	Non Désagréable			
<u>PARAMETRES BIOLOGIQUES</u>				
Types de germes	Nombre Par 100 ml après 24 H	Nombre Par 100 ml après 48 H	Normes	Remarque
Coliformes Totaux (CT)	NTC	NTC	<10	
Coliformes Fécaux (CF)	12	12	absence	
Observations:	Eau contenant des coliformes totaux et fécaux très élevés, sa qualité bactériologique n'est pas acceptable à la consommation humaine , nécessite une désinfection avant toute consommation.			

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FICHE D'ANALYSE BACTERIOLOGIQUE

<u>Localisation :</u>				
Région :		Département :		
Commune :		Village /Site:		EE07.B
Type d'ouvrage :		N° IRH :		
Long :		Lat :		
Prélevé par :		Date de prélèvement :		20/03/2020
Analysé par :	Moussa Adamou	Date d'analyse :		27-28-29/03/2020
Laboratoire :	DRHA/TI	Qualification opérateur :		Ingénieur Chimiste
<u>PARAMETRES PHYSIQUES ET ORGANOLEPTIQUES</u>				
Température:		30.9	pH:	8.39
Conductivité:		1090	TDS:	530
Turbidité:		2.67	chlore résiduel:	/
Goût:	Non Désagréable		Couleur:	Claire
Odeur:	Non Désagréable			
<u>PARAMETRES BIOLOGIQUES</u>				
Types de germes	Nombre Par 100 ml après 24 H	Nombre Par 100 ml après 48 H	Normes	Remarque
Coliformes Totaux (CT)	NTC	NTC	<10	
Coliformes Fécaux (CF)	16	16	absence	
Observations:	Eau contenant des coliformes totaux et fécaux très élevés, sa qualité bactériologique n'est pas acceptable à la consommation humaine , nécessite une désinfection avant toute consommation.			

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FICHE D'ANALYSE BACTERIOLOGIQUE

<u>Localisation :</u>				
Région :		Département :		
Commune :		Village /Site:	EE08.B	
Type d'ouvrage :		N° IRH :		
Long :		Lat :		
Prélevé par :		Date de prélèvement :	20/03/2020	
Analysé par :	Moussa Adamou	Date d'analyse :	27-28-29/03/2020	
Laboratoire :	DRHA/TI	Qualification opérateur :	Ingénieur Chimiste	
<u>PARAMETRES PHYSIQUES ET ORGANOLEPTIQUES</u>				
Température:		pH:	8.78	
Conductivité:		TDS:	210	
Turbidité:		chlore résiduel:	/	
Goût:	Non Désagréable	Couleur:	Claire	
Odeur:	Non Désagréable			
<u>PARAMETRES BIOLOGIQUES</u>				
Types de germes	Nombre Par 100 ml après 24 H	Nombre Par 100 ml après 48 H	Normes	Remarque
Coliformes Totaux (CT)	NTC	NTC	<10	
Coliformes Fécaux (CF)	34	34	absence	
Observations:	Eau contenant des coliformes totaux et fécaux très élevés, sa qualité bactériologique n'est pas acceptable à la consommation humaine , nécessite une désinfection avant toute consommation.			

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FICHE D'ANALYSE BACTERIOLOGIQUE

<u>Localisation :</u>				
Région :		Département :		
Commune :		Village /Site:		EE09.B
Type d'ouvrage :		IN° IRH :		
Long :		Lat :		
Prélevé par :		Date de prélèvement :		20/03/2020
Analysé par :	Moussa Adamou	Date d'analyse :		27-28-29/03/2020
Laboratoire :	DRHA/TI	Qualification opérateur :		Ingénieur Chimiste
<u>PARAMETRES PHYSIQUES ET ORGANOLEPTIQUES</u>				
Température:		30.9	pH:	9.35
Conductivité:		420	TDS:	210
Turbidité:		1.75	chlore résiduel:	/
Goût:	Non Désagréable		Couleur:	Claire
Odeur:	Non Désagréable			
<u>PARAMETRES BIOLOGIQUES</u>				
Types de germes	Nombre Par 100 ml après 24 H	Nombre Par 100 ml après 48 H	Normes	Remarque
Coliformes Totaux (CT)	36	36	<10	
Coliformes Fécaux(CF)	0	0	absence	
Autres	Germes banaux	Germes banaux		
Observations:	Eau contenant des coliformes totaux et des germes banaux , sa qualité bactériologique n'est pas acceptable à la consommation humaine , nécessite une désinfection.			

Le Responsable du laboratoire :

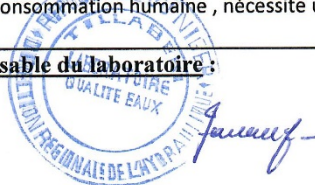


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FICHE D'ANALYSE BACTERIOLOGIQUE

<u>Localisation :</u>				
Région :		Département :		
Commune :		Village /Site:	EE10.B	
Type d'ouvrage :		N° IRH :		
Long :		Lat :		
Prélevé par :		Date de prélèvement :	20/03/2020	
Analysé par :	Moussa Adamou	Date d'analyse :	27-28-29/03/2020	
Laboratoire :	DRHA/TI	Qualification opérateur :	Ingénieur Chimiste	
<u>PARAMETRES PHYSIQUES ET ORGANOLEPTIQUES</u>				
Température:	30.9	pH:	9.26	
Conductivité:	580	TDS:	290	
Turbidité:	1.16	chlore résiduel:	/	
Goût:	Non Désagréable	Couleur:	Claire	
Odeur:	Non Désagréable			
<u>PARAMETRES BIOLOGIQUES</u>				
Types de germes	Nombre Par 100 ml après 24 H	Nombre Par 100 ml après 48 H	Normes	Remarque
Coliformes Totaux (CT)	NTC	NTC	<10	
Coliformes Fécaux (CF)	15	15	absence	
Observations:	Eau contenant des coliformes totaux et fécaux très élevés, sa qualité bactériologique n'est pas acceptable à la consommation humaine, nécessite une désinfection avant toute consommation.			

Le Responsable du laboratoire :

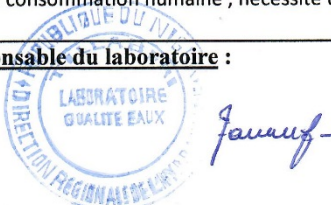


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 DE L'ASSAINISSEMENT
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FICHE D'ANALYSE BACTERIOLOGIQUE

<u>Localisation :</u>				
Région :		Département :		
Commune :		Village /Site:		EE11.B
Type d'ouvrage :		N° IRH :		
Long :		Lat :		
Prélevé par :		Date de prélèvement :		20/03/2020
Analysé par :	Moussa Adamou	Date d'analyse :		27-28-29/03/2020
Laboratoire :	DRHA/TI	Qualification opérateur :		Ingénieur Chimiste
<u>PARAMETRES PHYSIQUES ET ORGANOLEPTIQUES</u>				
Température:		31.2	pH:	8.02
Conductivité:		340	TDS:	170
Turbidité:		0.91	chllore résiduel:	/
Goût:	Non Désagréable		Couleur:	Claire
Odeur:	Non Désagréable			
<u>PARAMETRES BIOLOGIQUES</u>				
Types de germes	Nombre Par 100 ml après 24 H	Nombre Par 100 ml après 48 H	Normes	Remarque
Coliformes Totaux (CT)	NTC	NTC	<10	
Coliformes Fécaux(CF)	17	17	absence	
Observations:	Eau contenant des coliformes totaux et fécaux très élevés, sa qualité bactériologique n'est pas acceptable à la consommation humaine , nécessite une désinfection avant toute consommation.			

Le Responsable du laboratoire :



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 REGION DE TILLABERI
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 DE L'ASSAINISSEMENT
 LABORATOIRE DE CONTROLE
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FICHE D'ANALYSE BACTERIOLOGIQUE

<u>Localisation :</u>				
Région :		Département :		
Commune :		Village /Site:	EE12.B	
Type d'ouvrage :		N° IRH :		
Long :		Lat :		
Prélevé par :		Date de prélèvement :	20/03/2020	
Analysé par :	Moussa Adamou	Date d'analyse :	27-28-29/03/2020	
Laboratoire :	DRHA/TI	Qualification opérateur :	Ingénieur Chimiste	
<u>PARAMETRES PHYSIQUES ET ORGANOLEPTIQUES</u>				
Température:	30.3	pH:	8.81	
Conductivité:	490	TDS:	240	
Turbidité:	1.86	chlore résiduel:	/	
Goût:	Non Désagréable	Couleur:	Claire	
Odeur:	Non Désagréable			
<u>PARAMETRES BIOLOGIQUES</u>				
Types de germes	Nombre Par 100 ml après 24 H	Nombre Par 100 ml après 48 H	Normes	Remarque
Coliformes Totaux (CT)	36	36	<10	
Coliformes Fécaux(CF)	24	24	absence	
Observations:	Eau contenant des coliformes totaux et fécaux très élevés, sa qualité bactériologique n'est pas acceptable à la consommation humaine , nécessite une désinfection avant toute consommation.			

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FICHE D'ANALYSE BACTERIOLOGIQUE

<u>Localisation :</u>				
Région :		Département :		
Commune :		Village /Site:		EE13.B
Type d'ouvrage :		IN° IRH :		
Long :		Lat :		
Prélevé par :		Date de prélèvement :		20/03/2020
Analysé par :	Moussa Adamou	Date d'analyse :		27-28-29/03/2020
Laboratoire :	DRHA/TI	Qualification opérateur :		Ingénieur Chimiste
<u>PARAMETRES PHYSIQUES ET ORGANOLEPTIQUES</u>				
Température:		30.5	pH:	8.41
Conductivité:		960	TDS:	470
Turbidité:		3.88	chlore résiduel:	/
Goût:	Non Désagréable		Couleur:	Claire
Odeur:	Non Désagréable			
<u>PARAMETRES BIOLOGIQUES</u>				
Types de germes	Nombre Par 100 ml après 24 H	Nombre Par 100 ml après 48 H	Normes	Remarque
Coliformes Totaux (CT)	NTC	NTC	<10	
Coliformes Fécaux (CF)	NTC	NTC	absence	
Observations:	Eau contenant des coliformes totaux et fécaux très élevés, sa qualité bactériologique n'est pas acceptable à la consommation humaine , nécessite une désinfection avant toute consommation.			

Le Responsable du laboratoire :



Tableau Récapitulatif

Sites	Date Prél.	Date Anal.	T° c	pH	Ec	TDS	Turb	CT	CF	Autres	Observation
EE01.B	19/03/2020	27-28-29/03/2020	30.9	8.83	720	360	1.28	37	0	G.B	Eau contenant des coliformes totaux et des germes banaux, sa qualité bactériologique n'est pas acceptable à la consommation humaine, nécessite une désinfection.
EE05.B	20/03/2020	27-28-29/03/2020	31.1	8.9	410	200	4.94	20	0	G.B	
EE09.B	20/03/2020	27-28-29/03/2020	30.9	9.35	420	210	1.75	36	0	G.B	
EE02.B	19/03/2020	27-28-29/03/2020	32.3	8.96	610	310	4.05	G.B	0	0	Début de développement des germes banaux mais exempté de coliformes totaux et fécaux, nécessite quand même une
EE03.B	20/03/2020	27-28-29/03/2020	31	9.04	1120	560	5.16	NTC	NTC	G.B	
EE04.B	20/03/2020	27-28-29/03/2020	30.7	8.75	540	270	45.2	NTC	NTC	G.B	
EE13.B	20/03/2020	27-28-29/03/2020	30.5	8.41	960	470	3.88	NTC	NTC	G.B	Eau contenant des coliformes totaux et fécaux très élevés, sa qualité bactériologique n'est pas acceptable à la consommation humaine, nécessite une désinfection avant toute consommation.
EE06.B	20/03/2020	27-28-29/03/2020	30.5	8.43	770	380	2.51	NTC	12	0	
EE07.B	20/03/2020	27-28-29/03/2020	30.9	8.39	1090	530	2.67	NTC	16	G.B	
EE08.B	20/03/2020	27-28-29/03/2020	31	8.78	430	210	1.82	NTC	34	G.B	
EE10.B	20/03/2020	27-28-29/03/2020	30.9	9.26	580	290	1.16	NTC	15	G.B	
EE11.B	20/03/2020	27-28-29/03/2020	31.2	8.02	340	170	0.91	NTC	17	G.B	
EE12.B	20/03/2020	27-28-29/03/2020	30.3	8.81	490	240	1.86	36	24	G.B	
<p>NTC: Trop Nombreux pour être Comptés</p> <p>GB: Germes Banaux</p> <p>CT: Coliformes Totaux</p> <p>CF: Coliformes Fécaux</p>											



Appendix No. 2: Results of the mineralogical analyses of the water

Bureau d'Etudes et de Travaux Géologiques Hydrogéologiques Hydrauliques et de Services
au Sahel

BP: 13 609 Niamey – NIGER Tél: (227) 93 83 31 61

E-mail : bousmane48@yahoo.fr

RC : 2255/RCCM/2007/NI/NIAMEY du 02/11/2007/9

BULLETIN D'ANALYSE D'EAU

Site : **EE 01. PC**

Demandeur : ART & GENIE

Type d'ouvrage :

Date de prélèvement : 19/03/2020

N° IRH :

Coordonnées :

Date d'analyse : 27/03/2020

Long : E ' ' "

Lat. : N ' ' "

1. Paramètres physiques

Conductivité ($\mu\text{S}/\text{cm}$) : **427** (2000 OMS)

Odeur : Non désagréable

Température ($^{\circ}\text{C}$) : **30.0**

Couleur : Claire

PH : **7.46** (6.5 et 9.5 OMS)

Goût : Non désagréable

2. Paramètres chimiques

Anions	mg/l	még/l	Normes OMS	Cations	mg/l	még/l	Normes OMS
Carbonates (CO_3^{2-})	0	0.0	-	Calcium (Ca^{2+})	25.87	1.29	-
Bicarbonate (HCO_3^-)	76	1.24	-	Magnésium (Mg^{2+})	3.21	0.26	-
Chlorures (Cl^-)	19	0.53	250	Sodium (Na^+)	28.44	1.23	200
Sulfates (SO_4^{2-})	37.04	0.77	250	Potassium (K^+)	0.37	0.00	-
Nitrates (NO_3^-)	22.02	0.35	50	Ammonium (NH_4^+)			1.5
Nitrites (NO_2^-)	0.19	0.00	3	Manganèse (Mn^{2+})			0.5
Fluor (F^-)	0.26	0.01	1.5	Fer total ($\text{Fe}^{2+} + \text{Fe}^{3+}$)	0.06	0.00	0.3
Balance ionique : 1.76 %							

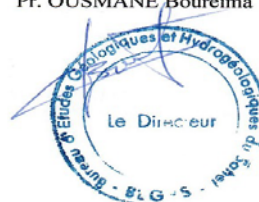
3. Autres paramètres :

TDS : **213.00** mg/l

Dureté totale ($^{\circ}\text{dh}$) : **78.05** (200 OMS) ppm CaCO_3

Remarques : Eau à minéralisation moyenne dont tous les paramètres analysés se situent dans les normes OMS. Sur le plan physico-chimique elle est apte à la consommation humaine.

Directeur du BTEGHS
Pr. OUSMANE Boureima



Bureau d'Etudes et de Travaux Géologiques Hydrogéologiques Hydrauliques et de Services
au Sahel

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RC : 2255/RCCM/2007/NI/NIAMEY du 02/11/2007/9

BULLETIN D'ANALYSE D'EAU

Site : **EE 02. PC**

Demandeur : ART & GENIE

Type d'ouvrage :

N° IRH :

Date de prélèvement : 19/03/2020

Coordonnées :

Long : E ° ' . "

Date d'analyse : 27/03/2020

Lat. : N ° ' . "

1. Paramètres physiques

Conductivité ($\mu\text{S}/\text{cm}$) : **398** (2000 OMS)

Odeur : Non désagréable

Température ($^{\circ}\text{C}$) : **30.1**

Couleur : Claire

PH : **7.38** (6.5 et 9.5 OMS)

Goût : Non désagréable

2. Paramètres chimiques

Anions	mg/l	méq/l	Normes OMS	Cations	mg/l	méq/l	Normes OMS
Carbonates (CO_3^{2-})	0	0.0	-	Calcium (Ca^{2+})	23.15	1.15	-
Bicarbonate (HCO_3^-)	76	1.24	-	Magnésium (Mg^{2+})	2.92	0.24	-
Chlorures (Cl^-)	15	0.42	250	Sodium (Na^+)	27.23	1.18	200
Sulfates (SO_4^{2-})	36.01	0.75	250	Potassium (K^+)	0.24	0.00	-
Nitrates (NO_3^-)	17.62	0.28	50	Ammonium (NH_4^+)			1.5
Nitrites (NO_2^-)	0.06	0.00	3	Manganese (Mn^{2+})			0.5
Fluor (F^-)	0.01	0.00	1.5	Fer total ($\text{Fe}^{2+} + \text{Fe}^{3+}$)	0.05	0.00	0.3
Balance ionique : 2.11 %							

3. Autres paramètres :

TDS : **199.00** mg/l

Dureté totale ($^{\circ}\text{dh}$) : **70.04** (200 OMS) ppm CaCO_3

Remarques : Eau à minéralisation moyenne dont tous les paramètres analysés se situent dans les normes OMS. Sur le plan physico-chimique elle est apte à la consommation humaine.

Directeur du BTEGHS

Pr. OUSMANE Boureima



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BULLETIN D'ANALYSE D'EAU

Site : **EE 03. PC**

Demandeur : ART & GENIE

Type d'ouvrage :

N° IRH :

Date de prélèvement : 20/03/2020

Coordonnées :

Long : E ° ' . "

Date d'analyse : 27/03/2020

Lat. : N ° ' . "

1. Paramètres physiques

Conductivité ($\mu\text{S/cm}$) : **892** (2000 OMS)

Odeur : Non désagréable

Température ($^{\circ}\text{C}$) : **29.1**

Couleur : Claire

PH : **7.96** (6.5 et 9.5 OMS)

Goût : Non désagréable

2. Paramètres chimiques

Anions	mg/l	még/l	Normes OMS	Cations	mg/l	még/l	Normes OMS
Carbonates (CO_3^{2-})	0	0.0	-	Calcium (Ca^{2+})	45.10	2.25	-
Bicarbonate (HCO_3^-)	152	2.49	-	Magnésium (Mg^{2+})	8.02	0.66	-
Chlorures (Cl^-)	61	1.71	250	Sodium (Na^+)	64.14	2.78	200
Sulfates (SO_4^{2-})	78.00	1.62	250	Potassium (K^+)	5.33	0.13	-
Nitrates (NO_3^-)	25.42	0.41	50	Ammonium (NH_4^+)			1.5
Nitrites (NO_2^-)	5.57	0.12	3	Manganese (Mn^{2+})			0.5
Fluor (F^-)	0.01	0.00	1.5	Fer total ($\text{Fe}^{2+} + \text{Fe}^{3+}$)	0.09	0.00	0.3
Balance ionique : 3.27 %							

3. Autres paramètres :

TDS : **447.00 mg/l**

Dureté totale ($^{\circ}\text{dh}$) : **146.16** (200 OMS) ppm CaCO_3

Remarques : Eau à minéralisation élevée dont les teneurs en Nitrites dépassent la norme OMS.

Sur le plan physico-chimique elle ne peut être consommation qu'après une certaine aération

Directeur Général du BTEGHS

Pr. OUSMANE Bouraïma



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RC : 2255/RCCM/2007/NI/NIAMEY du 02/11/2007/9

BULLETIN D'ANALYSE D'EAU

Site : **EE 04. PC**

Demandeur : ART&GENIE

Type d'ouvrage :

N° IRH :

Date de prélèvement : 20/03/2020

Coordonnées :

Long : E ° ' " "

Date d'analyse : 27/03/2020

Lat. : N ° ' " "

1. Paramètres physiques

Conductivité ($\mu\text{S/cm}$) : **411** (2000 OMS)

Odeur : Non désagréable

Température : ($^{\circ}\text{C}$) : **31.6**

Couleur : Claire

PH : **7.42** (6.5 et 9.5 OMS)

Goût : Non désagréable

2. Paramètres chimiques

Anions	mg/l	méq/l	Normes OMS	Cations	mg/l	méq/l	Normes OMS
Carbonates (CO_3^{2-})	0	0.0	-	Calcium (Ca^{2+})	24.31	1.21	-
Bicarbonate (HCO_3^-)	92	1.50	-	Magnésium (Mg^{2+})	2.91	0.24	-
Chlorures (Cl^-)	14	0.39	250	Sodium (Na^+)	26.45	1.15	200
Sulfates (SO_4^{2-})	28.36	0.59	250	Potassium (K^+)	0.31	0.00	-
Nitrates (NO_3^-)	16.22	0.26	50	Ammonium (NH_4^+)			1.5
Nitrites (NO_2^-)	0.26	0.00	3	Manganese (Mn^{2+})			0.5
Fluor (F^-)	0.00	0.00	1.5	Fer total ($\text{Fe}^{2+} + \text{Fe}^{3+}$)	0.05	0.00	0.3
Balance ionique : 2.58 %							

3. Autres paramètres :

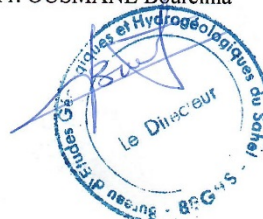
TDS : **206.00** mg/l

Dureté totale ($^{\circ}\text{dh}$) : **72.90** (200 OMS) ppm CaCO_3

Remarques : Eau à minéralisation moyenne dont tous les paramètres analysés se situent dans les normes OMS. Sur le plan physico-chimique est apte à la consommation humaine.

Directeur Général du BTEGHS

Pr. OUSMANE Boureima



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BULLETIN D'ANALYSE D'EAU

Site : **EE 05. PC**

Demandeur : ART & GENIE

Type d'ouvrage :

N° IRH :

Date de prélèvement : 20/03/2020

Coordonnées :

Long : E ° ' " "

Date d'analyse : 27/03/2020

Lat. : N ° ' " "

1. Paramètres physiques

Conductivité ($\mu\text{S}/\text{cm}$) : **311** (2000 OMS)

Odeur : Non désagréable

Température ($^{\circ}\text{C}$) : **29.2**

Couleur : Claire

PH : **6.05** (6.5 et 9.5 OMS)

Goût : Non désagréable

2. Paramètres chimiques

Anions	mg/l	még/l	Normes OMS	Cations	mg/l	még/l	Normes OMS
Carbonates (CO_3^{2-})	0	0.0	-	Calcium (Ca^{2+})	16.15	0.80	-
Bicarbonate (HCO_3^-)	50	0.81	-	Magnésium (Mg^{2+})	2.34	0.19	-
Chlorures (Cl^-)	14	0.39	250	Sodium (Na^+)	22.01	0.95	200
Sulfates (SO_4^{2-})	15.34	0.31	250	Potassium (K^+)	0.26	0.00	-
Nitrates (NO_3^-)	33.21	0.53	50	Ammonium (NH_4^+)			1.5
Nitrites (NO_2^-)	0.16	0.00	3	Manganese (Mn^+)			0.5
Fluor (F^-)	0.36	0.01	1.5	Fer total ($\text{Fe}^{2+} \text{Fe}^{3+}$)	0.07	0.00	0.3
Balance ionique : 2.55 %							

3. Autres paramètres :

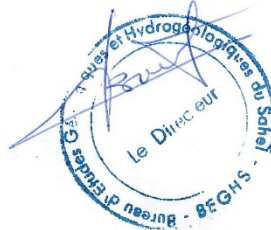
TDS : **154.00** mg/l

Dureté totale ($^{\circ}\text{dh}$) : **50.12** (200 OMS) ppm CaCO_3

Remarques : Eau à minéralisation moyenne dont tous les paramètres analysés se situent dans les normes OMS. Sur le plan physico-chimique elle est apte à la consommation humaine.

Directeur Général du BTEGHS

Pr. OUSMANE Boureima



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RC : 2255/RCCM/2007/NI/NIAMEY du 02/11/2007/9

BULLETIN D'ANALYSE D'EAU

Site : **EE 06. PC**

Demandeur : ART & GENIE

Type d'ouvrage :

N° IRH :

Date de prélèvement : 20/03/2020

Coordonnées :

Long : E ° ' . "

Date d'analyse : 27/03/2020

Lat. : N ° ' . "

1. Paramètres physiques

Conductivité ($\mu\text{S}/\text{cm}$) : **600** (200 OMS)

Odeur : Non désagréable

Température ($^{\circ}\text{C}$) : **29.2**

Couleur : Claire

PH : **7.35** (6.5 et 9.5 OMS)

Goût : Non désagréable

2. Paramètres chimiques

Anions	mg/l	méq/l	Normes OMS	Cations	mg/l	méq/l	Normes OMS
Carbonates (CO_3^{2-})	0	0.0	-	Calcium (Ca^{2+})	35.14	1.75	-
Bicarbonate (HCO_3^-)	76	1.24	-	Magnésium (Mg^{2+})	6.88	0.57	-
Chlorures (Cl^-)	48	1.35	250	Sodium (Na^+)	40.03	1.74	200
Sulfates (SO_4^{2-})	60.69	1.26	250	Potassium (K^+)	1.22	0.03	-
Nitrates (NO_3^-)	30.08	0.48	50	Ammonium (NH_4^+)			1.5
Nitrites (NO_2^-)	0.78	0.01	3	Manganese (Mn^{2+})			0.5
Fluor (F^-)	0.01	0.00	1.5	Fer total ($\text{Fe}^{2+} + \text{Fe}^{3+}$)	0.07	0.00	0.3
Balance ionique : 2.90 %							

3. Autres paramètres :

TDS : **300.00 mg/l**

Dureté totale ($^{\circ}\text{dh}$) : **116.51** (200 OMS) ppm CaCO_3

Remarques : Eau à minéralisation moyenne dont tous les paramètres analysés se situent dans les normes OMS. Sur le plan physico-chimique elle est apte à la consommation humaine.

Directeur Général du BTEGHS

Pr. OUSMANE Boureima



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RC : 2255/RCCM/2007/NI/NIAMEY du 02/11/2007/9

BULLETIN D'ANALYSE D'EAU

Site : **EE 07. PC**

Demandeur : ART & GENIE

Type d'ouvrage :

N° IRH :

Date de prélèvement : 20/03/2020

Coordonnées :

Long : E ° ' . "

Date d'analyse : 27/03/2020

Lat. : N ° ' . "

1. Paramètres physiques

Conductivité ($\mu\text{S}/\text{cm}$) : **822** (2000 OMS)

Odeur : Non désagréable

Température ($^{\circ}\text{C}$) : **31.0**

Couleur : Claire

PH : **7.96** (6.5 et 9.5 OMS)

Goût : Non désagréable

2. Paramètres chimiques

Anions	mg/l	még/l	Normes OMS	Cations	mg/l	még/l	Normes OMS
Carbonates (CO_3^{2-})	0	0.0	-	Calcium (Ca^{2+})	40.02	2.00	-
Bicarbonate (HCO_3^-)	146	2.39	-	Magnésium (Mg^{2+})	7.96	0.66	-
Chlorures (Cl^-)	59	1.66	250	Sodium (Na^+)	60.27	2.62	200
Sulfates (SO_4^{2-})	70	1.45	250	Potassium (K^+)	4.66	0.11	-
Nitrates (NO_3^-)	23.16	0.37	50	Ammonium (NH_4^+)			1.5
Nitrites (NO_2^-)	0.39	0.00	3	Manganese (Mn^{2+})			0.5
Fluor (F^-)	0.37	0.01	1.5	Fer total ($\text{Fe}^{2+} + \text{Fe}^{3+}$)	0.07	0.00	0.3
Balance ionique : 4.27 %							

3. Autres paramètres :

TDS : **411.00** mg/l

Dureté totale ($^{\circ}\text{dh}$) : **133.21** (200 OMS) ppm CaCO_3

Remarques : Eau à minéralisation moyennement importante dont tous les paramètres analysés se situent dans les normes OMS. Sur le plan physico-chimique elle est apte à la consommation humaine.

Directeur Général du BTEGHS

Pr. OUSMANE Boureima



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RC : 2255/RCCM/2007/NI/NIAMEY du 02/11/2007/9

BULLETIN D'ANALYSE D'EAU

Site : **EE 08. PC**

Demandeur : ART & GENIE

Type d'ouvrage :

N° IRH :

Date de prélèvement : 20/03/2020

Coordonnées :

Long : E ° ' " "

Date d'analyse : 27/03/2020

Lat. : N ° ' " "

1. Paramètres physiques

Conductivité ($\mu\text{S}/\text{cm}$) : **303** (2000 OMS)

Odeur : Non désagréable

Température ($^{\circ}\text{C}$) : **30.3**

Couleur : Claire

PH : **6.84** (6.5 et 9.5 OMS)

Goût : Non désagréable

2. Paramètres chimiques

Anions	mg/l	még/l	Normes OMS	Cations	mg/l	még/l	Normes OMS
Carbonates (CO_3^{2-})	0	0.0	-	Calcium (Ca^{2+})	16.47	0.82	-
Bicarbonate (HCO_3^-)	56	0.91	-	Magnésium (Mg^{2+})	2.11	0.17	-
Chlorures (Cl^-)	13	0.36	250	Sodium (Na^+)	21.25	0.92	200
Sulfates (SO_4^{2-})	14.81	0.30	250	Potassium (K^+)	0.23	0.00	-
Nitrates (NO_3^-)	28.17	0.45	50	Ammonium (NH_4^+)			1.5
Nitrites (NO_2^-)	0.01	0.00	3	Manganese (Mn^{2+})			0.5
Fluor (F^-)	0.01	0.00	1.5	Fer total ($\text{Fe}^{2+} + \text{Fe}^{3+}$)	0.07	0.00	0.3
Balance ionique : 2.96 %							

3. Autres paramètres :

TDS : **151.00** mg/l

Dureté totale ($^{\circ}\text{dh}$) : **49.96** (200 OMS) ppm CaCO_3

Remarques : Eau à minéralisation moyenne dont tous les paramètres analysés se situent dans les normes OMS. Sur le plan physico-chimique elle est apte à la consommation humaine.

Directeur du BTEGHS

Pr. OUSMANE Boureima



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RC : 2255/RCCM/2007/NI/NIAMEY du 02/11/2007/9

BULLETIN D'ANALYSE D'EAU

Site : **EE 09. PC**

Demandeur : ART & GENIE

Type d'ouvrage :

N° IRH :

Date de prélèvement : 20/03/2020

Coordonnées :

Long : E ° ' " "

Date d'analyse : 27/03/2020

Lat. : N ° ' " "

1. Paramètres physiques

Conductivité ($\mu\text{S}/\text{cm}$) : **291** (2000 OMS)

Odeur : Non désagréable

Température ($^{\circ}\text{C}$) : **30.6**

Couleur : Claire

PH : **6.87** (6.5 et 9.5 OMS)

Goût : Non désagréable

2. Paramètres chimiques

Anions	mg/l	méq/l	Normes OMS	Cations	mg/l	méq/l	Normes OMS
Carbonates (CO_3^{2-})	0	0.0	-	Calcium (Ca^{2+})	16.02	0.80	-
Bicarbonate (HCO_3^-)	46	0.75	-	Magnésium (Mg^{2+})	1.96	0.16	-
Chlorures (Cl^-)	13	0.36	250	Sodium (Na^+)	21.22	0.92	200
Sulfates (SO_4^{2-})	15.63	0.32	250	Potassium (K^+)	0.19	0.00	-
Nitrates (NO_3^-)	31.54	0.50	50	Ammonium (NH_4^+)			1.5
Nitrites (NO_2^-)	0.16	0.00	3	Manganese (Mn^{2+})			0.5
Fluor (F^-)	0.01	0.00	1.5	Fer total ($\text{Fe}^{2+} \text{Fe}^{3+}$)	0.06	0.00	0.3
Balance ionique : 1.63 %							

3. Autres paramètres :

TDS : **145.00** mg/l

Dureté totale ($^{\circ}\text{dh}$) : **48.21** (200 OMS) ppm CaCO_3

Remarques : Eau à minéralisation moyenne dont tous les paramètres analysés se situent dans les normes OMS. Sur le plan physico-chimique elle est apte à la consommation humaine

Directeur Général du BTEGHS

Pr. OUSMANE Boureima.



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au Sahel

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E-mail : bousmane48@yahoo.fr

RC : 2255/RCCM/2007/NI/NIAMEY du 02/11/2007/9

BULLETIN D'ANALYSE D'EAU

Site : **EE 10. PC**

Demandeur : ART & GENIE

Type d'ouvrage :

N° IRH :

Date de prélèvement : 20/03/2020

Coordonnées :

Long : E ° ' . "

Date d'analyse : 27/03/2020

Lat. : N ° ' . "

1. Paramètres physiques

Conductivité ($\mu\text{S}/\text{cm}$) : **430** (2000 OMS)

Odeur : Non désagréable

Température ($^{\circ}\text{C}$) : **29.3**

Couleur : Claire

PH : **6.20** (6.5 et 9.5 OMS)

Goût : Non désagréable

2. Paramètres chimiques

Anions	mg/l	még/l	Normes OMS	Cations	mg/l	még/l	Normes OMS
Carbonates (CO_3^{2-})	0	0.0	-	Calcium (Ca^{2+})	26.63	1.33	-
Bicarbonate (HCO_3^-)	57	0.93	-	Magnésium (Mg^{2+})	3.27	0.27	-
Chlorures (Cl^-)	22	0.61	250	Sodium (Na^+)	30.14	1.31	200
Sulfates (SO_4^{2-})	45.12	0.94	250	Potassium (K^+)	0.35	0.00	-
Nitrates (NO_3^-)	31.15	0.50	50	Ammonium (NH_4^+)			1.5
Nitrites (NO_2^-)	0.22	0.00	3	Manganese (Mn^{2+})			0.5
Fluor (F^-)	0.01	0.00	1.5	Fer total ($\text{Fe}^{2+} + \text{Fe}^{3+}$)	0.06	0.00	0.3
Balance ionique : 1.23 %							

3. Autres paramètres :

TDS : **215.00** mg/l

Dureté totale ($^{\circ}\text{dh}$) : **80.20** (200 OMS) ppm CaCO_3

Remarques : Eau à minéralisation moyenne dont tous les paramètres analysés se situent dans les normes OMS. Sur le plan physico-chimique elle est apte à la consommation humaine.

Directeur Général du BTEGHS

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BULLETIN D'ANALYSE D'EAU

Site : **EE 11. PC**

Demandeur : ART & GENIE

Type d'ouvrage :

N° IRH :

Date de prélèvement : 20/03/2020

Coordonnées :

Long : E ° ' " "

Date d'analyse : 27/03/2020

Lat. : N ° ' " "

1. Paramètres physiques

Conductivité ($\mu\text{S/cm}$) : **249** (2000 OMS)

Odeur : Non désagréable

Température ($^{\circ}\text{C}$) : **30.7**

Couleur : Claire

PH : **6.19** (6.5 et 9.5 OMS)

Goût : Non désagréable

2. Paramètres chimiques

Anions	mg/l	méq/l	Normes OMS	Cations	mg/l	méq/l	Normes OMS
Carbonates (CO_3^{2-})	0	0.0	-	Calcium (Ca^{2+})	14.25	0.71	-
Bicarbonate (HCO_3^-)	43	0.70	-	Magnésium (Mg^{2+})	1.81	0.15	-
Chlorures (Cl^-)	9	0.25	250	Sodium (Na^+)	17.03	0.74	200
Sulfates (SO_4^{2-})	12.32	0.25	250	Potassium (K^+)	0.12	0.00	-
Nitrates (NO_3^-)	27.14	0.43	50	Ammonium (NH_4^+)			1.5
Nitrites (NO_2^-)	0.36	0.00	3	Manganese (Mn^{2+})			0.5
Fluor (F^-)	0.00	0.00	1.5	Fer total ($\text{Fe}^{2+} + \text{Fe}^{3+}$)	0.04	0.00	0.3
Balance ionique : 1.41 %							

3. Autres paramètres :

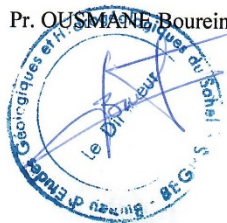
TDS : **124.00** mg/l

Dureté totale ($^{\circ}\text{dh}$) : **43.16** (200 OMS) ppm CaCO_3

Remarques : Eau à minéralisation moyenne dont tous les paramètres analysés se situent dans les normes OMS. Sur le plan physico-chimique est apte à la consommation humaine.

Directeur du BTEGHS

Pr. OUSMANE Boureima



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BULLETIN D'ANALYSE D'EAU

Site : **EE 12. PC**

Demandeur : ART&GENIE

Type d'ouvrage :

N° IRH :

Date de prélèvement : 20/03/2020

Coordonnées :

Long : E ° ' " "

Date d'analyse : 27/03/2020

Lat. : N ° ' " "

1. Paramètres physiques

Conductivité ($\mu\text{S/cm}$) : **363** (2000 OMS)

Odeur : Non désagréable

Température ($^{\circ}\text{C}$) : **31.5**

Couleur : Claire

PH : **7.12** (6.5 et 9.5 OMS)

Goût : Non désagréable

2. Paramètres chimiques

Anions	mg/l	méq/l	Normes OMS	Cations	mg/l	méq/l	Normes OMS
Carbonates (CO_3^{2-})	0	0.0	-	Calcium (Ca^{2+})	20.41	1.02	-
Bicarbonate (HCO_3^-)	76	1.24	-	Magnésium (Mg^{2+})	2.80	0.23	-
Chlorures (Cl^-)	12	0.33	250	Sodium (Na^+)	24.31	1.05	200
Sulfates (SO_4^{2-})	32.01	0.66	250	Potassium (K^+)	0.18	0.00	-
Nitrates (NO_3^-)	13.29	0.21	50	Ammonium (NH_4^+)			1.5
Nitrites (NO_2^-)	0.06	0.00	3	Manganese (Mn^{2+})			0.5
Fluor (F^-)	0.23	0.01	1.5	Fer total ($\text{Fe}^{2+} + \text{Fe}^{3+}$)	0.04	0.00	0.3
Balance ionique : 3.13 %							

3. Autres paramètres :

TDS : **181.00 mg/l**

Dureté totale ($^{\circ}\text{dh}$) : **62.69** (200 OMS) ppm CaCO_3

Remarques : Eau à minéralisation moyenne, dont tous les paramètres analysés se situent dans les normes OMS. Sur le plan physico-chimique, elle est **apte** à la consommation humaine.

Directeur général du BTEGHS

Pr. OUSMANE Boureima



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BULLETIN D'ANALYSE D'EAU

Site : **EE 13. PC**

Demandeur : ART & GENIE

Type d'ouvrage :

N° IRH :

Date de prélèvement : 20/03/2020

Coordonnées :

Long : E ° ' . "

Date d'analyse : 27/03/2020

Lat. : N ° ' . "

1. Paramètres physiques

Conductivité ($\mu\text{S}/\text{cm}$) : **716** (2000 OMS)

Odeur : Non désagréable

Température : ($^{\circ}\text{C}$) : **29.0**

Couleur : Claire

PH : **7.39** (6.5 et 9.5 OMS)

Goût : Non désagréable

2. Paramètres chimiques

Anions	mg/l	még/l	Normes OMS	Cations	mg/l	még/l	Normes OMS
Carbonates (CO_3^{2-})	0	0.0	-	Calcium (Ca^{2+})	40.12	2.06	-
Bicarbonate (HCO_3^-)	76	1.24	-	Magnésium (Mg^{2+})	7.29	0.60	-
Chlorures (Cl^-)	61	1.71	250	Sodium (Na^+)	50.11	2.17	200
Sulfates (SO_4^{2-})	83.53	1.74	250	Potassium (K^+)	3.46	0.08	-
Nitrates (NO_3^-)	35.71	0.57	50	Ammonium (NH_4^+)			1.5
Nitrites (NO_2^-)	1.50	0.03	3	Manganese (Mn^+)			0.5
Fluor (F^-)	0.00	0.00	1.5	Fer total ($\text{Fe}^{2+} \text{Fe}^{3+}$)	0.08	0.00	0.3
Balance ionique : 3.93 %							

3. Autres paramètres :

TDS : **357.00 mg/l**

Dureté totale ($^{\circ}\text{dh}$) : **130.67** (200 OMS) ppm CaCO_3

Remarques : Eau à minéralisation moyenne dont tous les paramètres analysés se situent dans les normes OMS. Sur le plan physico-chimique elle est apte à la consommation humaine.

Directeur Général du BTEGHS

Pr. OUSMANE Bourcema



Appendix No. 3: Results of the radiological analyses of the water



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Rapport d'Essais Page 1 / 1

Edité le : 14/08/2020
ALG2008-7-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
Koira Kano Nord
- NIAMEY
NIGER

Le rapport établi ne concerne que les échantillons soumis à l'essai tels qu'ils ont été reçus. Il comporte 1 page.
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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-7	N° d'affaire : GLATO 60
Identification dossier : ALG20-645	Référence Contrat : ALGC20-58
Libellé Echantillon Client : EE01-R	
Matrice : Eau propre	
Date de prélèvement : 18/03/2020	Date réception laboratoire : 31/07/2020

Paramètre	Résultats A	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
Analyse réalisée par : ALG-SST								
Potassium 40 (*)	0.257	Bq/l	0.028	0.018	10/08/2020	Calcul		
Analyse réalisée par : LAE								
Activité alpha globale	0.05	Bq/l	0.03	0.05	13/08/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Activité beta globale	0.22	Bq/l	0.07	0.08	13/08/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Analyse réalisée par : METAUX								
Potassium dissous (*)	8.2	mg/l K+			08/08/2020	ICP/AES après filtration	NF EN ISO 11885	1

ABSENCE DU LOGO COFRAC

1 L'absence du logo Cofrac provient d'un délai de mise en analyse par rapport au prélèvement supérieur aux exigences normatives.

Echantillon filtré par nos soins pour les paramètres alpha/beta

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

Francis BEREIZIAT

Technicien de Laboratoire

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Rapport d'Essais Page 1 / 1

Edité le : 14/08/2020
ALG2008-8-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
Koirra Kano Nord
- NIAMEY
NIGER

Le rapport établi ne concerne que les échantillons soumis à l'essai tels qu'ils ont été reçus. Il comporte 1 page.
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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-8	N° d'affaire : GLATO 60
Identification dossier : ALG20-645	Référence Contrat : ALGC20-58
Libellé Echantillon Client : EE02-R	
Matrice : Eau propre	
Date de prélèvement : 19/03/2020	Date réception laboratoire : 31/07/2020

Paramètre	Résultats A	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
Analyse réalisée par : ALG-88T								
Potassium 40 (*)	0.013	Bq/l	0.001	0.018	10/08/2020	Calcul		
Analyse réalisée par : LAE								
Activité alpha globale	5.31	Bq/l	1.41	0.05	11/08/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Activité beta globale	2.45	Bq/l	0.68	0.09	11/08/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Analyse réalisée par : METAUX								
Potassium dissous (*)	0.4	mg/l K+			10/08/2020	ICPIAES après filtration	NF EN ISO 11885	1

ABSENCE DU LOGO COFRAC

1 L'absence du logo Cofrac provient d'un délai de mise en analyse par rapport au prélèvement supérieur aux exigences normatives.

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

Francis BEREIZIAT
Technicien de Laboratoire

ALGADE

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Rapport d'Essais Page 1 / 1

Edité le : 14/08/2020

ALG2008-9-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
Koira Kano Nord
- NIAMEY
NIGER

Le rapport établi ne concerne que les échantillons soumis à l'essai tels qu'ils ont été reçus. Il comporte 1 page.
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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-9	N° d'affaire : GLATO 80
Identification dossier : ALG20-845	Référence Contrat : ALGC20-58
Libellé Echantillon Client : EE03-R	
Matrice : Eau propre	
Date de prélèvement : 20/03/2020	Date réception laboratoire : 31/07/2020

Paramètre	Résultats	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
Analyse réalisée par : ALG-SBT								
Potassium 40 (*)	0.078	Bq/l	0.008	0.018	10/08/2020	Calcul		
Analyse réalisée par : LAE								
Activité alpha globale	0.92	Bq/l	0.28	0.08	12/08/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Activité beta globale	0.71	Bq/l	0.20	0.11	12/08/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Analyse réalisée par : METAUX								
Potassium dissous (*)	2.5	mg/l K+			08/08/2020	ICP/AES après filtration	NF EN ISO 11885	1

ABSENCE DU LOGO COFRAC

1 L'absence du logo Cofrac provient d'un délai de mise en analyse par rapport au prélèvement supérieur aux exigences normales.

Echantillon filtré par nos soins pour les paramètres alpha/beta.

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

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Rapport d'Essais Page 1 / 1

Edité le : 14/08/2020
ALG2008-10-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
Koira Kano Nord
- NIAMEY
NIGER

Le rapport établi ne concerne que les échantillons soumis à l'essai tels qu'ils ont été reçus. Il comporte 1 page.
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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-10	N° d'affaire : GLATO 60
Identification dossier : ALG20-645	Référence Contrat : ALGC20-58
Libellé Echantillon Client : EE04-R	
Matrice : Eau propre	
Date de prélèvement : 20/03/2020	Date réception laboratoire : 31/07/2020

Paramètre	Résultats A	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
Analyse réalisée par : ALG-SST								
Potassium 40 (*)	0.078	Bq/l	0.008	0.018	10/08/2020	Calcul		
Analyse réalisée par : LAE								
Activité alpha globale	2.78	Bq/l	0.75	0.05	11/08/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Activité beta globale	0.80	Bq/l	0.18	0.10	11/08/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Analyse réalisée par : METAUX								
Potassium dissous (*)	2.5	mg/l K+			08/08/2020	ICPAES après filtration	NF EN ISO 11885	1

ABSENCE DU LOGO COFRAC

1 L'absence du logo Cofrac provient d'un délai de mise en analyse par rapport au prélèvement supérieur aux exigences normales.

Echantillon filtré par nos soins pour les paramètres alpha/beta.

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

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Rapport d'Essais

Page 1 / 1

Edité le : 14/08/2020
ALG2008-11-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
Koirra Kano Nord
- NIAMEY
- NIGER

Le rapport établi ne concerne que les échantillons soumis à l'essai tels qu'ils ont été reçus. Il comporte 1 page.
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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-11	N° d'affaire : GLATO 60
Identification dossier : ALG20-645	Référence Contrat : ALGC20-58
Libellé Echantillon Client : EE05-R	
Matrice : Eau propre	
Date de prélèvement : 20/03/2020	Date réception laboratoire : 31/07/2020

Paramètre	Résultats A	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
Analyse réalisée par : ALG-SST								
Potassium 40 (*)	0.041	Bq/l	0.008	0.016	10/08/2020	Calcul		
Analyse réalisée par : LAE								
Activité alpha globale	0.23	Bq/l	0.07	0.08	11/08/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Activité beta globale	0.15	Bq/l	0.06	0.08	11/08/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Analyse réalisée par : METAUX								
Potassium dissous (*)	1.3	mg/l K+			09/08/2020	ICP/AES après filtration	NF EN ISO 11885	1

ABSENCE DU LOGO COFRAC

¹ L'absence du logo Cofrac provient d'un délai de mise en analyse par rapport au prélèvement supérieur aux exigences normatives.

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

Francis BEREZIAT
Technicien de Laboratoire

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Rapport d'Essais Page 1 / 1

Edité le : 14/08/2020
ALG2008-12-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
Koira Kano Nord
- NIAMEY
NIGER

Le rapport établi ne concerne que les échantillons soumis à l'essai tels qu'ils ont été reçus. Il comporte 1 page.
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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-12	N° d'affaire : GLATO 60
Identification dossier : ALG20-645	Référence Contrat : ALGC20-58
Libellé Echantillon Client : EE06-R	
Matrice : Eau propre	
Date de prélèvement : 20/03/2020	Date réception laboratoire : 31/07/2020

Paramètre	Résultats	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
Analyse réalisée par : ALG-SBT								
Potassium 40 (*)	0.125	Bq/l	0.013	0.016	10/06/2020	Calcul		
Analyse réalisée par : LAE								
Activité alpha globale	2.16	Bq/l	0.56	0.06	12/06/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Activité beta globale	0.49	Bq/l	0.14	0.00	12/06/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Analyse réalisée par : METAUX								
Potassium dissous (*)	4.0	mg/l K+			06/06/2020	ICP/AES après filtration	NF EN ISO 11885	1

ABSENCE DU LOGO COFRAC

1 L'absence du logo Cofrac provient d'un délai de mise en analyse par rapport au prélèvement supérieur aux exigences normales.

Echantillon filtré par nos soins pour les paramètres alpha/beta.

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

Francis BEREIZIAT
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Rapport d'Essais Page 1 / 1

Edité le : 14/08/2020
ALG2008-13-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
Koira Kano Nord
- NIAMEY
NIGER

Le rapport établi ne concerne que les échantillons soumis à l'essai tels qu'ils ont été reçus. Il comporte 1 page.
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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-13	N° d'affaire : GLATO 60
Identification dossier : ALG20-645	Référence Contrat : ALGC20-58
Libellé Echantillon Client : EE07-R	
Matrice : Eau propre	
Date de prélèvement : 20/03/2020	Date réception laboratoire : 31/07/2020

Paramètre	Résultats A	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
Analyse réalisée par : ALG-SST								
Potassium 40 (*)	0.151	Bq/l	0.014	0.016	10/05/2020	Calcul		
Analyse réalisée par : LAE								
Activité alpha globale	0.47	Bq/l	0.14	0.08	12/05/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Activité beta globale	0.29	Bq/l	0.09	0.10	12/05/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Analyse réalisée par : METAUX								
Potassium dissous (*)	4.2	mg/l K+			08/05/2020	ICPAES après filtration	NF EN ISO 11885	1

ABSENCE DU LOGO COFRAC

¹ L'absence du logo Cofrac provient d'un délai de mise en analyse par rapport au prélèvement supérieur aux exigences normales.

Echantillon filtré par nos soins pour les paramètres alpha/beta.

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

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Rapport d'Essais Page 1 / 1

Edité le : 14/08/2020
ALG2008-14-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
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NIGER

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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-14	N° d'affaire : GLATO 60
Identification dossier : ALG20-645	Référence Contrat : ALGC20-58
Libellé Echantillon Client : EE08-R	
Matrice : Eau propre	
Date de prélèvement : 20/03/2020	Date réception laboratoire : 31/07/2020

Paramètre	Résultats	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
	A							
Analyse réalisée par : ALG-SST								
Potassium 40 (*)	0.041	Bq/l	0.008	0.018	10/08/2020	Calcul		
Analyse réalisée par : LAE								
Activité alpha globale	0.28	Bq/l	0.08	0.04	12/08/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Activité beta globale	0.22	Bq/l	0.07	0.07	12/08/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Analyse réalisée par : METAUX								
Potassium dissous (*)	1.3	mg/l K+			08/08/2020	ICP/AES après filtration	NF EN ISO 11885	1

ABSENCE DU LOGO COFRAC

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Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

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Technicien de Laboratoire

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Rapport d'Essais Page 1 / 1

Edité le : 14/08/2020

ALG2008-15-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
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- NIAMEY
NIGER

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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-15	N° d'affaire : GLATO 60
Identification dossier : ALG20-645	Référence Contrat : ALGC20-58
Libellé Echantillon Client : EE09-R	
Matrice : Eau propre	
Date de prélèvement : 20/03/2020	Date réception laboratoire : 31/07/2020

Paramètre	Résultats A	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
Analyse réalisée par : ALG-SST								
Potassium 40 (*)	0.078	Bq/l	0.008	0.018	10/08/2020	Calcul		
Analyse réalisée par : LAE								
Activité alpha globale	0.31	Bq/l	0.09	0.04	12/08/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Activité beta globale	0.23	Bq/l	0.08	0.08	12/08/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Analyse réalisée par : METAUX								
Potassium dissous (*)	2.5	mg/l K+			08/08/2020	ICPIAES après filtration	NF EN ISO 11885	1

ABSENCE DU LOGO COFRAC

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Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

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Rapport d'Essais Page 1 / 1

Edité le : 14/08/2020

ALG2008-16-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
Koirá Kano Nord
- NIAMEY
NIGER

Le rapport établi ne concerne que les échantillons soumis à l'essai tels qu'ils ont été reçus. Il comporte 1 page.
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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-16	N° d'affaire : GLATO 60
Identification dossier : ALG20-645	Référence Contrat : ALGC20-58
Libellé Echantillon Client : EE10-R	
Matrice : Eau propre	
Date de prélèvement : 20/03/2020	Date réception laboratoire : 31/07/2020

Paramètre	Résultats A	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
Analyse réalisée par : ALG-SBT								
Potassium 40 (*)	0.019	Bq/l	0.008	0.018	10/09/2020	Calcul		
Analyse réalisée par : LAE								
Activité alpha globale	0.81	Bq/l	0.22	0.05	12/09/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Activité beta globale	0.18	Bq/l	0.08	0.09	12/09/2020	Compteur à gaz proportionnel	NF EN ISO 10704	1
Analyse réalisée par : METAUX								
Potassium dissous (*)	0.6	mg/l K+			08/08/2020	ICP/AES après filtration	NF EN ISO 11885	1

ABSENCE DU LOGO COFRAC

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Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

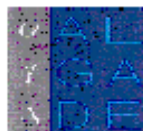
Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

Francis BEREIZIAT
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Appendix No. 4: Results of the radiological analyses of the soils



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Rapport d'Essais Page 1 / 1

Edité le : 19/08/2020
ALG2008-47-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
Koira Kano Nord
- NIAMEY
NIGER

Le rapport établi ne concerne que les échantillons soumis à l'essai tels qu'ils ont été reçus. Il comporte 1 page.
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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-47
Identification dossier : ALG20-854
Libellé Echantillon Client : ES01
Matrice : Sols
Date de prélèvement :

N° d'affaire : GLATO 60
Référence Contrat : ALGC20-58
Date réception laboratoire : 31/07/2020

Paramètre	Résultats A	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
Analyse réalisée par : LAE								
Uranium total	1,70	mg/kg MS	0,51	1,00	14/08/2020	ICPMS après minéralisation aux micro-ondes	Méthode Interne	

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

Francis BEREIZIAT
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Rapport d'Essais Page 1 / 1

Edité le : 19/08/2020
ALG2008-48-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
Koira Kano Nord
- NIAMEY
NIGER

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L'accréditation du COFRAC atteste de la compétence des laboratoires pour les seuls essais ouverts par l'accréditation, identifiés par le symbole #.

Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-48

N° d'affaire : GLATO 60

Identification dossier : ALG20-654

Référence Contrat : ALGC20-58

Libellé Echantillon Client : ES02

Matrice : Sols

Date de prélèvement :

Date réception laboratoire : 31/07/2020

Paramètre	Résultats	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
	A							
Analyse réalisée par : LAE								
Uranium total	1.89	mg/kg MS	0.51	1.00	14/08/2020	ICPMS après minéralisation aux micro-ondes	Méthode interne	

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

Francis BEREIZIAT

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Rapport d'Essais Page 1 / 1

Edité le : 19/08/2020
ALG2008-49-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
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- NIAMEY
NIGER

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ALGADE dégage sa responsabilité sur les données fournies par le client (libellé échantillon, date et lieu de prélèvement et volume prélevé le cas échéant).

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L'accréditation du COFRAC atteste de la compétence des laboratoires pour les seuls essais ouverts par l'accréditation, identifiés par le symbole #.

Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-49	N° d'affaire : GLATO 60
Identification dossier : ALG20-654	Référence Contrat : ALGC20-58
Libellé Echantillon Client : ES03	
Matrice : Sols	
Date de prélèvement :	Date réception laboratoire : 31/07/2020

Paramètre	Résultats	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
	A							
Analyse réalisée par : LAE								
Uranium total	4,28	mg/kg MS	1,28	1,00	14/08/2020	ICPMS après minéralisation aux micro-ondes	Méthode Interne	

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

Francis BEREIZIAT

Technicien de Laboratoire

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Rapport d'Essais Page 1 / 1

Edité le : 19/08/2020
ALG2008-50-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
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NIGER

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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-50	N° d'affaire : GLATO 60
Identification dossier : ALG20-654	Référence Contrat : ALGC20-58
Libellé Echantillon Client : ES04	
Matrice : Sols	
Date de prélèvement :	Date réception laboratoire : 31/07/2020

Paramètre	Résultats	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
	A							
Analyse réalisée par : LAE								
Uranium total	<0.99	mg/kg MS	-	0.98	14/08/2020	ICPMS après minéralisation aux micro-ondes	Méthode interne	

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : $< SD$

Si $A > SD$ alors le résultat est exprimé sous la forme : $A \pm U(A)$

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, $U(A)$: Incertitude élargie associée à A .

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Rapport d'Essais Page 1 / 1

Edité le : 19/08/2020

ALG2008-51-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
Koiria Kano Nord
- NIAMEY
NIGER

Le rapport établi ne concerne que les échantillons soumis à l'essai tels qu'ils ont été reçus. Il comporte 1 page.
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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-51	N° d'affaire : GLATO 60
Identification dossier : ALG20-654	Référence Contrat : ALGC20-58
Libellé Echantillon Client : ES05	
Matrice : Sols	
Date de prélèvement :	Date réception laboratoire : 31/07/2020

Paramètre	Résultats	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
	A							
Analyse réalisée par : LAE								
Uranium total	2.00	mg/kg MS	0.60	1.00	14/08/2020	ICPMS après minéralisation aux micro-ondes	Méthode interne	

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

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Rapport d'Essais Page 1 / 1

Edité le : 19/08/2020

ALG2008-52-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
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- NIAMEY
NIGER

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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-52

N° d'affaire : GLATO 60

Identification dossier : ALG20-854

Référence Contrat : ALGC20-58

Libellé Echantillon Client : ES06

Matrice : Sols

Date de prélèvement : 20/03/2020 à 00h00

Date réception laboratoire : 31/07/2020

Paramètre	Résultats	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
	A							
Analyse réalisée par : LAE								
Uranium total	<0.99	mg/kg MS	-	0.98	14/08/2020	ICPMS après minéralisation aux micro-ondes	Méthode interne	

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

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A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-53	N° d'affaire : GLATO 60
Identification dossier : ALG20-654	Référence Contrat : ALGC20-58
Libellé Echantillon Client : ES07	
Matrice : Sols	
Date de prélèvement : 20/03/2020 à 00h00	Date réception laboratoire : 31/07/2020

Paramètre	Résultats	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
Analyse réalisée par : LAE								
Uranium total	<0.99	mg/kg MS	-	0.98	14/08/2020	ICPMS après minéralisation aux micro-ondes	Méthode interne	

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

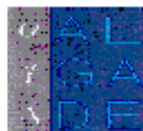
Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

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Rapport d'Essais Page 1 / 1

Edité le : 19/08/2020

ALG2008-53-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
Koira Kano Nord
- NIAMEY
NIGER

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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-53	N° d'affaire : GLATO 60
Identification dossier : ALG20-854	Référence Contrat : ALGC20-58
Libellé Echantillon Client : ES07	
Matrice : Sols	
Date de prélèvement : 20/03/2020 à 00h00	Date réception laboratoire : 31/07/2020

Paramètre	Résultats A	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
Analyse réalisée par : LAE								
Uranium total	<0.99	mg/kg MS	-	0.98	14/08/2020	ICPMS après minéralisation aux micro-ondes	Méthode Interne	

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

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Rapport d'Essais Page 1 / 1

Edité le : 19/08/2020
ALG2008-54-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-54	N° d'affaire : GLATO 60
Identification dossier : ALG20-654	Référence Contrat : ALGC20-58
Libellé Echantillon Client : ES08	
Matrice : Sols	
Date de prélèvement : 21/03/2020 à 00h00	Date réception laboratoire : 31/07/2020

Paramètre	Résultats	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
Analyse réalisée par : LAE								
Uranium total	1.59	mg/kg MS	0.48	1.00	14/08/2020	ICPMS après minéralisation aux micro-ondes	Méthode interne	

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A±U(A)

Avec : SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

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Rapport d'Essais Page 1 / 1

Edité le : 19/08/2020
ALG2008-55-V1

À l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
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- NIAMEY
NIGER

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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-55	N° d'affaire : GLATO 60
Identification dossier : ALG20-654	Référence Contrat : ALGC20-58
Libellé Echantillon Client : ES09	
Matrice : Sols	
Date de prélèvement : 21/03/2020 à 00h00	Date réception laboratoire : 31/07/2020

Paramètre	Résultats	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
	A							
Analyse réalisée par : LAE								
Uranium total	2.70	mg/kg MS	0.81	1.00	14/08/2020	ICPMS après minéralisation aux micro-ondes	Méthode Interne	

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A ± U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

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Technicien de Laboratoire

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Rapport d'Essais Page 1 / 1

Edité le : 19/08/2020
ALG2008-56-V1

A l'attention du chargé d'affaire Frédéric SARRADIN
Pour le client GLOBAL ATOMIC CORPORATION
DIN
Koira Kano Nord
- NIAMEY
NIGER

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Les paramètres sous-traités sont identifiés par (*).

Identification Echantillon : ALG2008-56	N° d'affaire : GLATO 60
Identification dossier : ALG20-654	Référence Contrat : ALGC20-58
Libellé Echantillon Client : ES10	
Matrice : Sols	
Date de prélèvement : 21/03/2020 à 00h00	Date réception laboratoire : 31/07/2020

Paramètre	Résultats	Unité	Incertitude élargie U(A) k=2	Limite de Détection LD	Date de la mesure	Méthode	Norme	cofrac
Analyse réalisée par : LAE								
Uranium total	3.50	mg/kg MS	1.05	1.00	14/08/2020	ICPMS après minéralisation aux micro-ondes	Méthode Interne	

Expression des résultats :

Si A est inférieur ou égal à SD alors le résultat est exprimé sous la forme : < SD

Si A > SD alors le résultat est exprimé sous la forme : A±U(A)

Avec SD : Seuil de décision, LD : Limite de détection, A : Activité, U(A) : Incertitude élargie associée à A.

Francis BEREIZIAT
Technicien de Laboratoire

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Appendix No. 5 List of departments and people consulted

Organizations/Departments	People consulted	Position	Contact details
Global Atomic Corporation (GAC)	Ibrahim Alisso	Country Manager	99 12 76 76
Governorate of Agadez	Adam El Attaher	Secretary General	96 99 14 40
Agadez Regional Council	Aghali Amoumoune	Chair, Rural Development Committee	91 04 12 97
	Sidi Mohamed Jules	Aménagement Territorial, Conseil Régional [territorial planning officer, Regional Council (A/T CR)]	
	Iro Nouhou	A/T CR	95 93 80 94
	Agali Zodi	Comité du Développement, Conseil Régional [Development Committee, Regional Council (CDVT/CR)]	90 18 50 76
Direction régionale de l'environnement, de la salubrité et du développement durable [Regional Directorate for the Environment, Health and Sustainable Development] Agadez (DRE/SU/DD/Az)	Col. Salifou Mamoudou	Regional Director	98 86 20 00
	Cmdt. Abdou "Gogé" Moussa	Head of the Regional Impact Assessments Division	96 40 49 54
Direction Régionale de l'Elevage [Regional Directorate for Stockbreeding] Agadez (D/R/Elevage/Az)	Hamani Boubacar	Regional Director	98 87 31 33
Agadez Regional Mines Directorate	Yahouza Salao	Regional Director	96 98 04 59
Agadez Regional Chamber of Commerce	Maimoune ko Moussa	Regional Director	98 38 87 87
Civil Society - Agadez	Aboubacar Sodé	Chair, ASAD NGO and Chair, CCOAD (Chambre de Concertation des ONG et Acteurs de Développement [board of NGOs and development advocates])	96 99 21 64
	Abou Inchirouak	Coordinator, regional NGOs and Association for the Fight Against Desertification	96 96 79 77
	Bourema Hamadou	NGO "CODED"	90 83 32 36
Direction Regionale de l'Artisanat et du Tourisme [Regional Directorate for Craft Trades and Tourism (D/R/Artisanat et Tourism/Az)]	Abdou Harouna Baba	Regional Director	96 53 77 32
Direction Régionale de l'Hydraulique et de l'Assainissement [Regional Directorate for Waterworks and Sanitation (D/R/Hydraulique et Assainissement)]	Awali Rabo	Regional Director	96 56 00 02
Direction Régionale de la Santé Publique [Regional Directorate for Public Health (D/R/S/P/Az)]	Issoufou Yadidi	Regional Director/Ad	90 74 57 75
Département de la Santé [Health Department (D/S)], Tchiro	Dr. Sani Dan Foulo	Tchiro DS	
Labour Inspectorate/Az	Djibo Oumarou	Regional Inspector	98 67 16 11
D/R/A	Ibrahim Maizoubou	Regional Director/Ad	96 87 73 30
Secrétaire Permanent Régional, Commission Foncière [Permanent Regional Secretary, Land Commission (SP/R/COFO)]	Aboubacar Harouna	SP/Regional	96 59 59 90
Dannat Town Council	Alhousseini Ahalawey	Mayor	91 63 21 31
	Aghali BayAg	Head of Arlit Group	80 15 76 43
	AbakadaWamalan	Town Councillor	
	Younouss Abdoukader	Civil Society	
	Amaman Barbagand	SG	87 77 74 05
	Rhissa Loussa	Youth representative	
Dannet CSI	Ms. Fatima Aghali	Head of CSI	94 59 57 83
	Ms. Tamoumoune Hamadi	Nurse	92 08 46 82
Tchiro Prefecture	Abdou Tahida	SG	96 89 01 55
Tchiro Town Hall	Mohamed Atoufek	Deputy Mayor	89 68 57 64
	Ahané Touné	SG Town Hall	90 81 91 51
Direction Départementale de l'Elevage [Departmental Directorate of Stockbreeding (D/D/E/Tchiro)]	Tankari Salao	Departmental Director	96 40 56 09
DDE/SU/DD/Tchiro	Cmdt Amadou Ganda	Departmental Director	90 52 79 00
Direction Départementale de l'Agriculture [Departmental Directorate of Agriculture (DD/A/Tchiro)]	Bacha Chéhou	Departmental Director	96 57 36 80
Village of Aghatara	Aghli Ali	Village Leader	
	Illo Mamane	School Principal	85 86 76 73
Village of Tagaza	Adoum Housseini	Village Leader	94 30 65 11
Village of Issakalan	Kawali Ousmane	Village Leader	98 04 29 31
Village of Taden	Alghabid Illiass	Town Councillor	
Village of Oufoud	Afori Ouman	Village Leader	92 74 38 63
Village of Mizene	Mahamoud Bakoka	Village Leader	
Village of Ikanan	Adwan Amo	Village Leader	91 21 30 37
Village of Inolamane	Mohamed Abdourahamane	Village Leader	94 74 42 10
Kel Ezeret Tribe	Ahmoudou Bollo	Tribal leader	90 69 02 3
Village of Ersin Tagaba		Village Leader	
Village of Annoumakaram	Choumou Idi	Village Leader	
Village of Daboss			

Appendix No. 6: Bibliographic References

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Appendix No. 7: TORs

**PROPOSAL TO MINE THE URANIUM DEPOSITS
COVERED BY THE “ADRAR EMOLES 3”
EXPLORATION PERMIT
(Tchirozérine Department – Agadez Region)**

**TERMS OF REFERENCE (TORs)
ENVIRONMENTAL AND SOCIAL IMPACT
ASSESSMENT
(ESIA)**

March 2020

I. INTRODUCTION

Nigerien legislation requires the proponent of an activity, project or program that, through its implementation, may have an impact on natural and human environments, to apply for prior authorization from the Minister of the Environment. This authorization is obtained after validation of the Environmental Impact Assessment Report prepared by the proponent and approved by the competent authority (minister in charge of the environment). This approval depends on compliance with the national environmental review procedure and on the relevance of the content of the Environmental and Social Impact Assessment Report (ESIAR) in relation to the issues raised by the conduct of the activity, project or program. These Terms of Reference (TORs) have been drawn up to comply with the law relative to the “Adrar Emoles 3 Project”, the proponent of which is Global Atomic Fuels Corporation.

II. PROJECT DESCRIPTION

Global Atomic Fuels Corporation, a Canadian company that has been conducting mining exploration operations in Niger since 2007, is planning to undertake mining operations on the uraniferous deposit it discovered in the Adrar Emoles 3 exploration permit area.

This uranium deposit is located along the Agadez-Arlit highway and lies approximately 60 km northeast of the town of Tchirozérine, which hosts the Société Nigérienne du Charbon facilities in Anou-Araren. This location roughly corresponds to an area halfway between the town of Agadez and the mining town of Arlit.

This mining project provides for the implementation of several mining operations, as follows:

1. Underground mining operations;
2. Processing the uranium ore by conventional methods;
3. Extracting the uranium by the solid-liquid method;
4. Purifying and precipitating the uranium;
5. Drying the uranate and storing it in drums;
6. Backfilling the mined areas with the waste rock.

The mining method that will be used generates less waste rock (approximately 10% of the material extracted from the mine) the mining discards are mixed with cement and pumped into the mine to fill in the mined galleries. The combined effects of these two techniques will undoubtedly ensure that the mining site is clean with a minimum amount of waste. The mining operations will take place in two phases. The first phase will consist of mining the richest ore (approximately five million tonnes) and will last approximately twelve years.

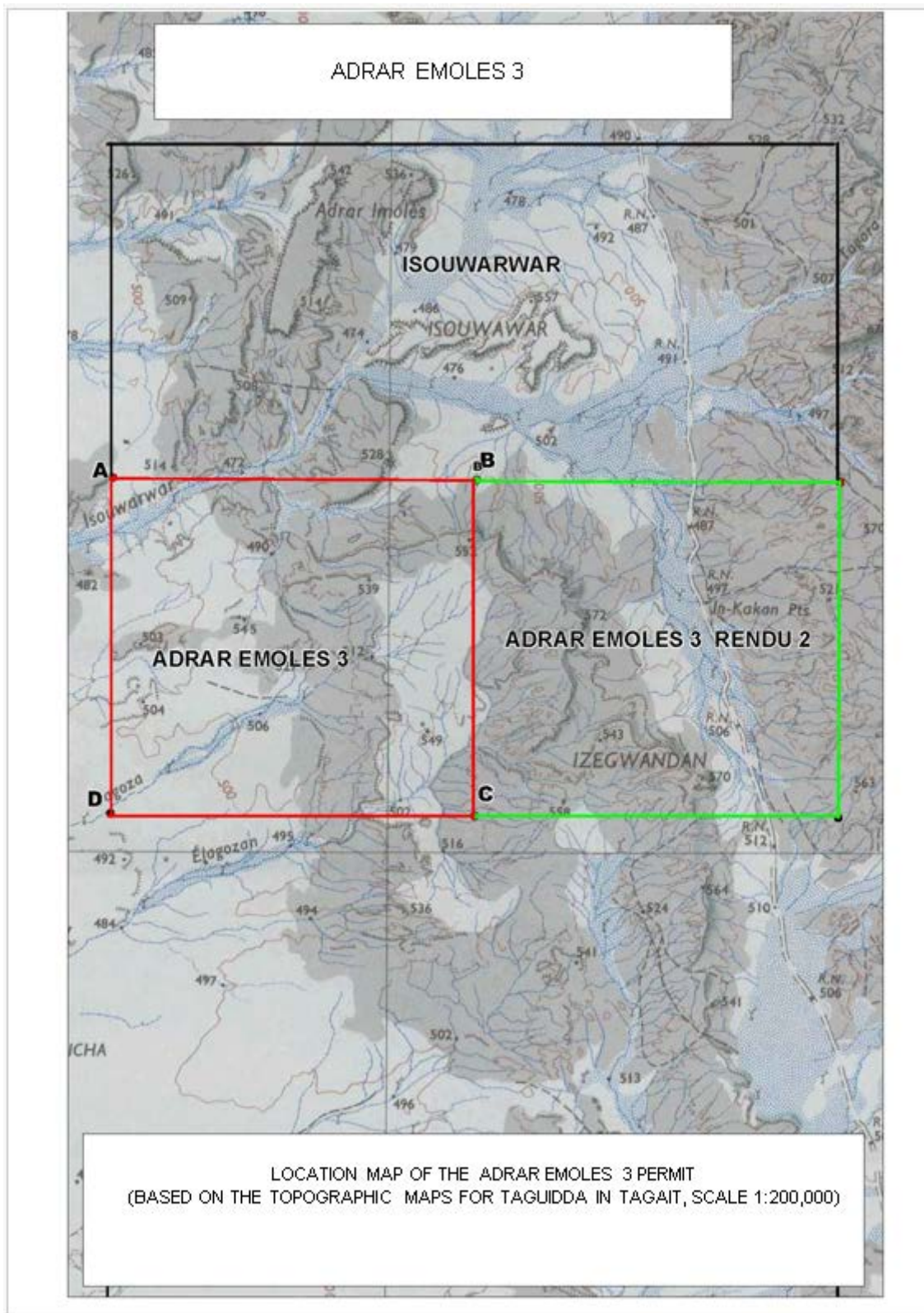
However, with the possibility of processing uranium ore from other sites, the life cycle of the mining site could easily be up to 20 years.

The essential project information is as follows:

- | | |
|--------------------------------|---------------------------|
| ✓ Total ore reserves, Phase 1 | : 5.1 million tonnes |
| ✓ Annual ore production | : 500,000 tonnes |
| ✓ Annual waste rock production | : 50,000 tonnes |
| ✓ Water consumption | : 55 m ³ /hour |
| ✓ Energy requirements | : approximately 10 MW |
| ✓ Project life cycle Phase 1 | : minimum 10-12 years |
| ✓ Direct jobs created | : approximately 900 |
| ✓ Indirect jobs | : approximately 250 |

The permit covers an area of 121.2 km². The coordinates of the permit boundary monuments are:

Monument	Longitude	Latitude
A	7° 40' 00"	17° 51' 14"
B	7° 46' 28"	17° 51' 14"
C	7° 46' 28"	17° 45' 30"
D	7° 40' 00"	17° 45' 30"



These TORs have been developed for the purpose of recruiting an engineering consultancy or a design office with the expertise required to conduct an Environmental and Social Impact Assessment (ESIA) in accordance with Nigerien law pertaining to environmental reviews.

II.1 THE PROPONENT

Global Atomic Fuels Corporation is a company governed by Canadian law that holds six mining exploration permits for uranium and related substances. It has been present in Niger since 2007, where it conducts mining exploration activities in the Agadez region from its national office in Niamey and from its liaison office in Agadez.

In accordance with the provisions of the Treaty of the Organization for the Harmonization of Business Law in Africa (OHADA), the company's business operations in Niger are managed by Global Uranium Niger Inc., a company governed by Nigerien law incorporated in 2009.

The staff of this company is essentially made up of Nigeriens trained in the fields of geology, mining, exploration, logistics, accounting and labour law.

During the years of intense work, the company's workforce was around fifty (50) permanent employees and several dozen temporary jobs.

The company's technical partners are mainly local companies providing services in the fields of drilling, geophysics, analyses, consulting, transport, transit, safety, audits, etc.

The concept of corporate social responsibility (CSR) is increasingly a concern in all development projects, particularly mining projects. For this reason, the Nigerien government has dedicated a prominent place to this concept by including provisions in mining agreements that require mining companies to contribute to the development of the local communities.

Accordingly, Global Atomic Fuels Corporation has contributed significantly to local development since its installation in the Agadez region, by funding actions that benefit the people living around its exploration sites.

The funds invested in these actions (construction and renovation of water supply infrastructures, food donations) in several rural communes, villages and nomadic camps amount to several tens of millions of CFA Francs.

All donation handover ceremonies were organized with the cooperation of the regional administrative authorities and traditional leaders and were promoted in infomercials in public and private media. These actions will naturally continue and the associated budgets will be greater when the mine goes into production.

II.2 PROJECT BACKGROUND AND RATIONALE

Niger, a Sahelian country with approximately 20 million inhabitants in 2017 (INS, 2017), has a wealth of major mining potential that has remained unexploited or underexploited: uranium, oil, gold, coal, cassiterite, etc. The uranium reserves, which are located in the Tim Mersoï basin covering more than 500,000 km², have been mined in Arlit since the 1970s by the companies in the French group ORANO, namely, SOMAÏR and COMINAK.

The mining sector occupies a special place in economic and social development planning in Niger. The share of the mining sector in the Gross Domestic Product (GDP) decreased from 10.8% in 2013 to 6.2% in 2017. This decrease could be explained by the decline in mining production. In addition to the fall in volume, the uranium sector also recorded a sharp drop in price/kg, which fell from CFAF 73,000 in 2013 to CFAF 56,592 in 2014.

The sector, and particularly uranium, accounts for more than half of all exports, yet its share in the GDP is still around 6%. For the 2011-2015 period, it generated revenues of around 258 billion CFA Francs. To improve the mines' impact on poverty reduction, in 2006 the government amended the mining law to include a provision that devotes 15% of all mining revenues to the communes in the mining regions.

The government of Niger has therefore decided to facilitate and support any initiative aimed at opening new uranium mines, with a view to diversifying its partners in the mining sector in general and ensuring the protection of the uranium sector in particular. As part of the implementation of this strategy, Global Atomic Fuels Corporation expects to launch production on its Adrar Emoles project site by 2022-2023.

II.3 PROJECT OBJECTIVES

The overall project objective is the upcoming launch of mining operations on the uranium deposit discovered in the Adrar Emoles 3 exploration permit area. These mining operations will take place in accordance with the laws and regulations governing mining operations in Niger.

The specific objectives are:

- ✓ To establish an adequately secured perimeter in order to provide a safe working environment for employees and contractors;
- ✓ To set up operating facilities and other temporary infrastructures such as access roads, laydown yards for machines and other equipment, drinking and industrial water sources, electricity network connections;
- ✓ To construct the base camp, i.e., staff accommodation, administrative offices, technical areas, sanitary facilities, etc.;
- ✓ To set up permanent facilities and infrastructures (crushers, processing plants, dykes, mine tailings facilities, waste rock and ore stockpiles, water treatment units, machinery and equipment parking lots or garages) as well as ancillary facilities such as input reception areas and facilities for handling and storing various products and equipment;
- ✓ To produce the uranate and pack it in drums prior to export;
- ✓ To perform ancillary operations: maintenance of machinery and facilities, management of effluents, construction of access roads, etc.

II.4 EXPECTED RESULTS OF THE PROJECT.

The expected results are:

- ✓ An adequately secured perimeter enabling a safe working environment for employees and contractors has been defined;
- ✓ The operating facilities and other temporary infrastructures (access roads, machinery laydown yards, drinking and industrial water connections, electricity network connections) have been set up;
- ✓ The staff housing and administrative and social services buildings have been completed;
- ✓ The permanent facilities and infrastructures as well as the ancillary facilities have been completed;
- ✓ Uranate has been produced and packed in drums prior to export.

II.5 PROJECT ACTIVITIES

The main activities of the project are:

- ✓ Development work:
 - Construction of a security perimeter;
 - Constructing access roads such as tracks and ramps;
 - Stripping or removing the overburden;
 - Stockpiling the waste rock;
 - Stockpiling the ore;
 - Setting up an ore sorting facility;
- ✓ Mining work such as drilling, blasting, sorting and hauling the ore;
- ✓ Processing the ore;
 - Crushing, grinding and pulverizing;
 - Attack, impregnation, curing and disintegration;
 - Precipitation;
 - Purifying and drying;
 - Packing in drums and export;
- ✓ Closure of the mine;
- ✓ Site restoration and monitoring project.

II.6 PROJECT INFRASTRUCTURE

Aside from the staff housing and administrative and social buildings, the main project infrastructure can be summarized as follows:

- ✓ The mine, comprising:

All equipment and materials required for ore production and haulage and maintenance workshops for the underground machinery and equipment. It also includes shelters for the miners and a ventilation system.
- ✓ The processing plant that houses:

All ore processing equipment and materials and related infrastructure such as chemical product storage silos and settling ponds;
- ✓ The power plant that houses the generators and the control centre;
- ✓ The various buildings or storage areas;
 - For consumables and spare parts;
 - For tailings, waste rock and effluents;
 - For worn parts and tires;
- ✓ The communications network between the various infrastructures at the mining site as well as the parking lots.

II.7 PROJECT EQUIPMENT AND MATERIALS

The main equipment and materials necessary for the implementation of the project are listed below:

- Bulldozers, backhoe loaders and graders;
- Drilling rigs;
- Trucks;
- Loaders;
- Conveyor belts;

- Tank trucks;
- Crushers, grinders and pulverizers;
- Injection and dewatering pumps;
- Maintenance and repair materials and equipment;
- Lathes for making parts;
- Welding machines;
- Laboratory materials and equipment;
- Mining materials and equipment;
- Filtration and washing materials and equipment;
- Materials and equipment for purification, drying and packing in drums;
- Explosives;
- Various spare parts;
- Various consumables.

II.8 WATER SUPPLY

Industrial and drinking water will be sourced from the aquifers identified for this purpose. This mainly involves the groundwater table in the Teloua geological formation and incidentally that of Tchirozérine 2.

The hydrogeological surveys carried out on the permit area have also highlighted the possibility of exploiting other aquifers such as Guézouman and Tarat.

Pumping tests performed on boreholes tapping into the Téloua groundwater table showed flow rates varying between 15 and 25 m³/h.

III. OBJECTIVES AND EXPECTED RESULTS OF THE ASSESSMENT

III.3.1 Primary objective

The main objective of this assessment is to incorporate environmental and social concerns into the implementation of this mining project and to eliminate, mitigate or improve the impacts of its activities on the environment.

III.3.2. Specific Objectives

- ✓ Assess the evolution of the environmental components in the absence of the project;
- ✓ Establish the baseline situation of the environmental components;
- ✓ Identify the environmental components that could potentially be impacted by the project activities;
- ✓ Identify and characterize these potential impacts;
- ✓ Assess the significance of these potential impacts;
- ✓ Propose elimination, mitigation or improvement measures, according to the nature of the impacts;
- ✓ Set up an Environmental and Social Management Plan (ESMP) for the implementation of the measures to mitigate negative impacts or improve positive impacts, listing the costs and institutional managers of its implementation and providing a specific schedule and clear and precise indicators;
- ✓ Draw up a Plan de Surveillance et de Suivi Environnemental et Social [Environmental and Social Surveillance and Monitoring Plan (PSSSES)];
- ✓ Draw up a Risk Management Framework (RMF);

- ✓ Draw up a Resettlement Action Plan (RAP) for the populations that may be impacted by the implementation of the project in the event that the populations or their property are relocated or in the event of restrictions on the access by the populations to their property;
- ✓ Draw up a Master Plan for Mine Waste Management (waste rock and mine tailings) and Site Restoration after the mining operations have been shut down or closed;
- ✓ Propose costs relative to the implementation of mitigation or improvement measures

III.3.3 EXPECTED RESULTS

- ✓ The evolution of the environmental components in the absence of the project has been assessed;
- ✓ The baseline situation of the environmental components has been established;
- ✓ The environmental components that could potentially be impacted by the project activities have been identified;
- ✓ The potential impacts have been identified and characterized;
- ✓ The significance of these potential impacts has been assessed;
- ✓ Elimination, mitigation or improvement measures have been proposed according to the nature of the impacts;
- ✓ An Environmental and Social Management Plan (ESMP) has been drawn up for the implementation of measures to mitigate negative impacts or to improve positive impacts, in which the costs and institutional managers of its implementation with a defined frequency and clear and precise indicators are included;
- ✓ An Environmental and Social Surveillance and Monitoring Plan (PSSSES) has been drawn up;
- ✓ Risk Management Framework (RMF) has been developed;
- ✓ A Resettlement Action Plan (RAP) has been developed for the populations that may be impacted by the implementation of the project in the event that the populations or their property are relocated or in the event of restrictions on the access by the populations to their property;
- ✓ A Master Plan for Mine Waste Management and Site Restoration after the mining operations have been shut down or closed has been developed;
- ✓ The costs relating to the implementation of the elimination, mitigation or improvement measures as well as the various plans developed have been proposed.

IV. METHODOLOGY USED IN THE ASSESSMENT

The methodology used to conduct the ESIA for the project to mine the uranium deposit in the Adrar Emoles 3 permit area will be developed in accordance with the laws of Niger and on a scientific basis. It will involve all relevant stakeholders, including the local and administrative authorities in the project area, civil society organizations, local communities, etc. The approach adopted for the identification and assessment of the environmental and social impacts will include, in accordance with the expected results:

- ✓ The proposal of a clear and referenced analytical procedure that distinguishes the different project phases (pre-construction – construction – operation – closure);
- ✓ The identification of the main activities that generate project impacts with regard to uranium mining, based on the planned mining operations;
- ✓ The identification of the biophysical (air, soil, water, vegetation and wildlife) and human (jobs, health, safety, well-being) components likely to be affected by the activities;
- ✓ The proposal of elimination, mitigation or improvement measures, according to the nature of the impacts;

- ✓ The development of an environmental and social management plan including the costs and institutional managers of its implementation, with a defined frequency and clear and precise indicators;
- ✓ The development of a resettlement plan for the populations in the event that the populations or their property are relocated or in the event of restrictions on the populations' access to their property;
- ✓ The preparation of a master plan for the management of mining waste and site restoration after the end of the mining operations;
- ✓ The preparation of a plan to manage the social impacts of the mine closure, propose mitigation and/or improvement measures and assess the relevant means.

V. CONSULTANT MANDATE

The Consultant's mission is to carry out this environmental impact assessment in accordance with the TORs and with the laws and regulations in force in the Republic of Niger.

It will organize field missions for all experts involved in conducting the assessment.

It is also required to take part in public consultation hearings and to present and defend the report on said assessment during the validation workshop.

VI. CONTENTS OF THE IMPACT ASSESSMENT REPORT RELATING TO THE ENVIRONMENT

The environmental impact assessment report will include all information necessary for decision-making. Technical information will be limited to the essential points and described so as to be easily understood by non-specialists.

This report will contain at least the following chapters:

VI.1 Non-technical summary

This non-technical summary will briefly present, in a way that can be easily understood by the general public, the content of the environmental and social impact assessment report.

VI.2 Introduction

The introduction will outline the environmental and social impact assessment.

VI.3 Presentation of the proponent

The assessment will present the project proponent. This presentation will include general information on the proponent's background in relation to the planned project, and, where applicable, the main principles of the proponent's policies relative to the environment and sustainable development.

VI.4 Perimeter covered by the assessment

The impact assessment must determine a study area and justify its perimeter. This area must be sufficient to accommodate all planned activities, including, if possible, the other elements necessary to carry out the project, in particular access roads and borrow areas, related facilities and projects, and to encompass all direct and indirect effects of the project on the biophysical and human environments.

VI.5 Full description of the project

The assessment must present the project with its rationale, objectives and expected results. It must describe all known and foreseeable characteristics associated with the project for a detailed analysis of the impacts. This description will include a list and description of the different project phases, the activities, development, work and equipment planned during the project different phases, as well as the major facilities and equipment selected. It also specifies the location of the planned buildings.

This description must cover the entire project, from the opening of the mine through the construction of infrastructures, to the method of managing mine tailings, discharges and other waste, in particular hazardous materials, including in the phases of mining the deposit and processing the ore, including the mining methods and technical processes to be used.

All activities likely to cause the release of contaminants into the environment (including noise, odours and dust) are therefore to be indicated, described and located, as well as the means and mechanisms intended to mitigate their occurrence.

The assessment will determine and characterize liquid, solid and gaseous discharges that may result from activities carried out during the site development and preparation, construction and operating phases, as well as those from chemical processes used for processing the ore and extracting uranium.

It will also present simplified process diagrams identifying inputs, outputs, their management modes and their release points into the environment.

(The standards, criteria and requirements in the field of environmental protection and the management of emissions in particular. To this end, and in order to optimize the management of releases, the assessment will make recommendations with a view to reduction at source and to re-use, recycling and valorization of raw materials. The level and effectiveness of liquid and solid waste treatment systems must be established according to the legal and regulatory requirements in force nationwide or according to international best practices if they are more effective.

As a guideline, the project description will highlight:

- ✓ The general outline of the project components at an appropriate scale and a representation of all planned facilities and structures;
- ✓ The development and construction activities such as logging, clearing, burning, excavation, blasting, digging, backfilling, extraction of borrow materials, use of heavy machinery, etc.;
- ✓ The runoff and drainage water from a collection, control, diversion and containment standpoint;
- ✓ The occasional and diffuse atmospheric emissions;
- ✓ The solid tailings with regard to type, volume, and disposal areas and methods;
- ✓ The site facilities and other temporary infrastructures such as access roads, machinery laydown yards, drinking and industrial water sources, electricity network connections, sanitary facilities, staff accommodation, administrative offices, etc.;
- ✓ The permanent facilities and infrastructures such as crushers, processing plant, dykes, tailings facilities, waste rock management facilities, wastewater treatment units, parking lots or garages for machinery and equipment as well as the ancillary facilities such as access roads, power supplies, water supply connections, input reception areas, handling and storage areas, etc.;

- ✓ The ore and other raw materials in terms of quantity, characteristics, haulage, storage, etc.;
- ✓ For each type of activity, the liquid, solid and gaseous emissions (detailed physical and chemical quantity and characteristics, precise location of release points), noise, odours, diffuse emissions and other inconveniences as well as the equipment and facilities associated with it, etc.;
- ✓ The mine tailings and waste rock in terms of quantity, type, mineralogical characteristics, chemical composition, etc.;
- ✓ The methods and measures for the protection of soils, surface water and groundwater, the atmosphere, wildlife and their habitats (dust control systems, retention basins, confinement, etc.), including temporary measures;
- ✓ The measures for the rational use and conservation of resources (reduction at source, improved efficacy in the use and application of recovery technologies: reuse, recycling, etc.);
- ✓ The net quantity of water that will be collected for the purposes of the project;
- ✓ The completion schedule according to the different phases of the project;
- ✓ The duration of the operations;
- ✓ The required workforce, origins of the workers, working hours and, if applicable, the on-site accommodation and living conditions;
- ✓ The life cycle of the project and future development phases.

VI.6 Description of the baseline conditions of the site

This part is essential to any environmental and social impact assessment as it will establish the baseline situation on which the relevant authorities will rely when monitoring the project's contribution to the improvement or destruction of the environmental and social components.

It will provide an update on the various ecosystems present in the area under study. The description will take into account the geological, topographical, hydrological, hydrogeological and climate factors that condition the ecosystem as well as the main species that make up the ecosystem and their life cycles if necessary (migration, feeding, reproduction, protection). This description will also include an analysis of the importance of each ecosystem listed, in particular on the basis of its ecological and social value and its degree of vulnerability and uniqueness.

The description of the ecosystems in the area under study will be based on a review of the scientific literature and the information available from the administrative entities, communes or local populations. If this information is not available or is no longer representative of the environment, surveys using scientific methods are to be conducted. These surveys will take into account in particular the life cycle and the habits of the species likely to be encountered.

This part must also include a map of the area under study, including the components of the identified ecosystems.

The description of the biophysical environment will provide a summary review of the following points:

- ✓ The relief, drainage, type of soils and surface deposits, various lithologies, areas at risk of water and wind erosion; soil characterization (composition of the different soils) and a description of their past uses;

- ✓ The hydrogeological context in terms of the physicochemical and radiological quality of the groundwater, identification of aquifers, their vulnerability and their size, the direction of the flows;
- ✓ The hydrographic regime, permanent and temporary waterways, floodplains, quality of the surface water, quality of the surface and groundwater;
- ✓ The vegetation, with reference to the presence of fragile or exceptional populations;
- ✓ The plant and animal species (abundance, distribution and diversity) and their habitats, paying particular attention to endangered or vulnerable species or species likely to be designated as such, and to species of social, economic, cultural or scientific interest;
- ✓ The quality of the ambient air in terms of the current concentration of contaminants and odors present;
- ✓ The local weather conditions in terms of temperatures, rainfall and winds
The description of the receptor environment will also deal with the human environment. The main social and historical characteristics will be presented and described in order to help understand the local communities, the relationships between these communities and the natural environment, the use they make of the different elements of the environment and their perceptions of the project. The section on the human environment will cover, but is not limited to, the following important aspects:
- ✓ The main societal characteristics of the population concerned;
Demographic profile: proportion of men and women, age categories, demographic perspectives of the populations concerned; cultural context; economic situation and development prospects: activity, inactivity and unemployment rates, as well as the main sectors of activity and other relevant details relating to training and employment. These data may be compared to regional and national ones. Training and employment perspectives must also be taken into account; social cohesion (stability and strength of the social ties within the local communities); concerns, opinions and reactions of the local communities and, more specifically, of the communities directly affected by the project implementation, including the consultations that will be conducted during the impact assessment.
- ✓ The current and planned use of the land and its resources;
- ✓ Noise levels;
- ✓ Archaeological heritage;
- ✓ Landscapes, including visual elements and groups of elements of local or tourist interest, and landmarks that make it possible to represent the surroundings;
- ✓ Determination of a benchmark area to serve as a natural environment for radiological surveillance;
- ✓ The lifestyles of the local populations;
- ✓ The concentration of contaminants in the food chain and in the soil.

VI.7 Overview of the legal framework of the assessment

This section will cover the legal and institutional framework relating to environmental protection, impact assessments, radiation protection and the mining sector in Niger. It will include, among other things, a reminder:

- ✓ Of the regulations pertaining to environmental and social review;
- ✓ Of the regulations on the safety, security and peaceful use of atomic energy;
- ✓ Of the legislative and regulatory framework governing the mining sector in Niger;

- ✓ Of the international conventions and regulations to which Niger has adhered and which may be applicable to the project;
- ✓ Of the different national standards that exist with regard to the management of natural resources, in particular of water, land, air quality, releases into the natural environment, etc.

The project must meet all environmental requirements in Niger, which are contained in the laws, decrees, mining agreements, orders and regulations relating to environmental protection.

VI.8 Impact identification and assessment methods

The assessment will develop a methodological approach that will be used to identify and assess the impacts of the project throughout all of its phases and for the various biophysical and human components.

VI.9 Project impact analysis

This section will focus on the determination and assessment of the impacts of the uranium mining project throughout the various phases of its implementation, and on the proposal of measures intended to mitigate or eliminate negative impacts or to compensate for inevitable residual impacts.

VI.10 Determination and assessment of impacts

The assessment will address the impacts of the project during the preparation, construction, operation and closure phases, and will assess their importance using an appropriate method and criteria. In this section, the positive and negative, direct and indirect environmental impacts related to the project will be addressed.

The assessment will describe the method used as indicated in the sub-chapter above. This method must allow a reader to easily follow the rationale developed in the report for determining and assessing impacts.

Among other things, in relation to the biophysical environment, the assessment will be expected to address:

- ✓ The effects of the project on the soils;
- ✓ The disruption of hydrographic systems in the areas directly and indirectly impacted by the project;
- ✓ The effects on the quality of the surface water and groundwater, particularly feed water and the potential of the water tables;
- ✓ The effects on air quality in all areas directly and indirectly impacted by the project;
- ✓ The effects on vegetation, wildlife and its habitats, endangered or vulnerable species or those likely to be thus designated.

In the human environment, the assessment will cover:

- ✓ The social impacts of the entire project, the potential changes in the demographic and cultural profile and the socio-economic situation of the population concerned (community life, employment, education, social relations, travel, etc.), as well as quality of life in terms of inconveniences caused by noise, dust and the loss of natural spaces;
- ✓ The potential health impacts, with particular consideration for contaminant concentrations or loads (in water, air and soil) to which the population may be exposed;
- ✓ Inconveniences caused by noise or dust during construction and operating periods;

- ✓ Modifications of the noise levels in the area under study;
- ✓ The economic benefits associated with the implementation of the project and its ancillary facilities;
- ✓ The effects on the visual environment in terms of intrusion of new elements into the field of view and alterations in the quality of the landscape;
- ✓ The impacts (positive and negative) on the lifestyles of the local populations.

VI.11 Description of the project variants

The impact assessment will present the different variants of the uranium mining project. The variants proposed must reflect the major issues associated with the implementation of the project and the concerns expressed by current needs and current techniques and technologies. A comparison of the pre-selected variants must be made with a view to retaining, for the purposes of the detailed impact analysis, the variant or variants that stand out from the others.

The assessment will present the rationale and criteria used to select the variant or variants used for the detailed impact analysis.

The variant or variants studied must take into account the need to preserve the quality of the environment as well as to improve economic efficiency. These variants may relate to the main technologies available or to the types of mining that may be possible.

In addition to determining the project variants and the different types of technologies foreseen in implementing the project, their advantages and disadvantages must be explained in order to retain the technology that seems most conducive to preserving the quality of the environment and improving economic efficiency. This presentation includes both production technologies (mining methods, ore processing methods, etc.) and technologies related to mitigating or eliminating impacts.

VI.12 Mitigating the impacts of the selected variant(s)

Impact mitigation aims to achieve the best possible integration of the project into the biophysical and human environments. In this regard, the assessment will specify the measures planned during the different phases of implementation to eliminate the negative impacts associated with the project or to reduce their intensity, as well as the planned measures to promote or maximize the positive impacts.

It will also identify the measures for preventing and controlling negative impacts. The assessment will present an evaluation of the effectiveness of the proposed mitigation measures and their estimated costs. The following mitigation measures may be developed as an example:

- ✓ Noise reduction for the local inhabitants;
- ✓ Method and effectiveness of the treatment of liquid effluents and atmospheric emission;
- ✓ The conditions and measures to protect the soil, surface water and groundwater, plants, wildlife and their habitats, including temporary measures;
- ✓ The measures foreseen to restore the vegetation cover of the altered sites;
- ✓ The progressive restoration, during the mining operations, of the waste rock stockpiles and mine tailings facilities;
- ✓ The use of landscaping in the restoration of disused sites;
- ✓ The procedures for redeveloping waste rock stockpiles and stabilizing them to combat erosion;

- ✓ The hiring of local labour and awarding of certain contracts to local companies.

VI.13 Environmental and Social Management Plan (ESMP)

The ESMP will present the various components impacted, the activities that cause impacts, the measures planned to prevent, control, eliminate, mitigate or compensate for negative impacts and improve positive impacts. This plan will provide a detailed description of the institutional framework for the implementation and monitoring of the implementation of measures to mitigate the project impacts.

The ESMP will also include a well-defined surveillance plan and an environmental and social monitoring plan.

The service provider will describe these proposed surveillance and monitoring plans, including their objectives, content, implementation, oversight and deadlines for the presentation of results.

The ESMP will also specify the environmental and social implementation and monitoring indicators, the activities to be implemented to inform the indicators, the schedules and the actors in the surveillance and monitoring, as well as the related costs.

VI.14 Emergency Management Master Plan

This plan will provide a description of the emergency response framework for responding to failures and accidents that may occur during the implementation of the various phases of the project. The emergency management plan must propose draft response measures for the worst-case scenarios and take into account local conditions and sensitivities. An emergency plan will be developed during the detailed project assessment.

VI.15 Site Redevelopment Master Plan

A master plan for the redevelopment of the project site must be drawn up and attached to the impact assessment report. The purpose of this plan is to:

- ✓ Limit post-mining impacts;
- ✓ Reduce restricted-use areas as far as possible;
- ✓ Guarantee national environmental compliance.

A detailed site redevelopment plan will be drawn up as the project is implemented.

VI.16 Resettlement Action Plan

The Action Plan will take into account the following aspects:

- ✓ The description of the area of influence of the mine subject to access restriction;
- ✓ The organizational framework for the resettlement of people and/or their assets through the RAP;
- ✓ The involvement of the population in the planning process prior to resettlement;
- ✓ The participatory planning program to be drawn up as part of the development of the RAP;
- ✓ The conduct of a socio-economic survey to establish the baseline data concerning the people and/or their property affected by the project;
- ✓ The legal framework for the resettlement of the populations and/or their property, including dispute resolution and appeals procedures;
- ✓ The institutional framework;
- ✓ The eligibility of the people resettled and/or their property;

- ✓ The valuation of and compensation for loss of capital assets;
- ✓ The identification of possible alternative resettlement or access sites and the delimitation of these sites;
- ✓ The infrastructures and social services to be moved;
- ✓ The schedule of execution;
- ✓ The costs and budget for the resettlement, travel and compensation;
- ✓ The RAP implementation, monitoring and assessment plans;
- ✓ A complaint management or conflict resolution procedure.

VI.17 Overall Findings

These will recall the major negative impacts and the main measures taken to prevent, reduce, mitigate or eliminate the most significant negative impacts. They will indicate any uncertainties relating to the elements presented in the ESIA.

VII. PUBLIC CONSULTATION PLAN

Environmental and Social Impact Assessments must include publicity measures. Pursuant to Article 10 of Decree 2000-397/PRN/ME/LCD of 20 October 2000, these measures must include:

- ✓ Public information about the conduct of an Environmental and Social Impact Assessment. In this case, it means informing the people concerned by the start of production on the project that an ESIA is to be carried out;
- ✓ Consultation of the individuals and groups involved in the project and the general public during the Environmental and Social Impact Assessment;
- ✓ Accessibility to the environmental and social impact assessment report by the populations concerned and the public in general through the National Office for Environmental Review (BNEE);
- ✓ Public information and consultation regarding the content of the Environmental and Social Impact Assessment Report, by any appropriate means.

VIII. DURATION OF THE ASSESSMENT

The Assessment will be conducted for a period of two (2) months, during which data collection campaigns will be carried out in the field, specific analyses will be performed, and reports will be drafted on the various environmental and socio-economic components.

XI. CONSULTANT PROFILE

The Assessment is to be carried out by a firm of engineering consultants or a design office that can provide a team of experts with proven experience in conducting environmental and social impact assessments (ESIAs). This team must consist of at least three (3) key experts:

- ✓ a mining expert with at least ten (10) years' experience in areas relating to project ESIAs and who has conducted at least two (2) ESIAs for uranium mining projects,
- ✓ an environmental expert with at least ten (10) years' experience in areas relating to project ESIAs and who has conducted at least two (2) ESIAs for uranium mining projects,
- ✓ a specialist in Geographic Information Systems (GIS) and mapping with at least five (5) years' experience in work relating to the field.

The following experts may also take part in the Assessment:

- ✓ a hydrogeologist/hydrologist;

- ✓ a forestry and water resources engineer;
- ✓ a radiation protection specialist;
- ✓ a pedologist.

X. DESCRIPTION OF THE DELIVERABLES

The Environmental and Social Impact Assessment Report is to be written in French and will follow the ESIA template as described above by the laws and regulations of Niger.

X.1. Submission of the report to the Proponent, Global Atomic Fuels Corporation

- ✓ A provisional report, in three hard copies and one digital copy, will be submitted fifty (50) days after the contract has been signed by the consulting firm and Global Atomic Fuels Corporation. Global Atomic Fuels Corporation will have a period of fifteen (15) days to send any comments to the consulting firm.
- ✓ A final report will be drafted and sent, in three hard copies and one digital copy, to Global Atomic Fuels Corporation ten (10) days after receipt by the consulting firm of Global Atomic Fuels Corporation's comments.

X.2 Submission of the report to the Ministry of the Environment; drafting and distribution of the final report

Global Atomic Fuels Corporation will submit the final ESIA Report, in three hard copies and one digital copy, to the Ministry of the Environment for the purpose of holding the validation workshop to obtain the Environmental Compliance Certificate. The consulting firm shall participate in this workshop to present and defend the ESIA on behalf of the Proponent, along with any other related activity. At the end of this workshop, the consulting firm will draft the final report, incorporating any feedback and recommendations from the workshop.

The final Assessment Report will be distributed to the administrations involved in the project as provided for by the regulations in force.

APPENDIX No. 8: Public Consultation Minutes and Attendance Sheet

PROJET D'EXPLOITATION DU GISEMENT URANIFERE ADRAR EMOLES 3 DANS LA REGION D'AGADEZ

ETUDE D'IMPACT ENVIRONNEMENTAL ET SOCIAL

PROCES VERBAL DE CONSULTATION PUBLIQUE

Lieu : TAGAZA

Commune:

L'an deux mille vingt et le jeudi dix-neuf mars, le consultant Art & Génie a tenu une réunion de consultation publique avec les populations du village de Tagaza sous la présidence de **Monsieur DANDARE Moussa** Chef de la mission de l'étude.

La consultation publique a pour objectifs :

- ✓ Informer les communautés riveraines sur le projet et ses activités ;
- ✓ Informer les communautés sur les enjeux environnementaux et sociaux potentiels du projet ;
- ✓ Recueillir les attentes, avis et préoccupations des communautés riveraines du projet.

Après les salutations d'usage, le chef du village Adamou Dussaint a pris la parole, pour tout d'abord souhaiter la bienvenue à l'équipe de consultants et, demander aux participants d'être attentifs aux débats puis les, a invité à poser toutes les questions.

La parole est donnée ensuite au chef de la mission qui a procédé à la présentation de l'objet de la mission et à la présentation du projet.

La mission du consultant consiste à élaborer une étude d'impact environnemental et social (EIES) du projet d'exploitation du gisement uranifère ADRAR EMOLES3.

Dans la présentation du projet, le chef de la mission de l'équipe de consultant s'est focalisé sur les aspects suivants :

- ✓ l'historique du projet,
- ✓ L'objectif de développement du projet ;
- ✓ Les enjeux environnementaux et sociaux potentiels ;
- ✓ Les incidences directes et/ou indirectes que le projet pourrait avoir sur le cadre de vie, la qualité de vie des populations riveraines et, les conditions socioéconomiques pour la zone d'intervention,
- ✓ Les actions à prendre pour bonifier les retombés bénéfiques du projet,
- ✓ Les mesures de suppression, d'atténuation et/ou de compensation des incidences négatives du projet.

A l'issue des débats, les participants ont d'abord exprimé leurs préoccupations dans la mise en œuvre

du projet à savoir : v. Déplacement du village
v. Risques sanitaires humain et animal (radiatives)
v. perte aire de pâturage

Après avoir détaillé et analysé leurs préoccupations, les participants sont tombés d'accord que les impacts positifs du projet l'emportent sur les impacts négatifs et sont unanimes sur la pertinence du projet.

Ils ont également estimé que le projet répondrait aux objectifs de développement du pays, de la région d'Agadez et particulièrement des communautés locales.

Enfin, les participants ont formulé des attentes, des suggestions et de recommandations dont les plus pertinentes se résument comme suit :

- ✓ Construction CSI
- ✓ Recrutement des jeunes du village
- ✓ Appui aux Activités Génératrices de Revenus)
-
-
-

L'ordre du jour étant épuisé le président a levé la séance

Pour la mission

DANDARS MOUSSA

Chef de Mission



Pour le... village

Adoum Ousseini

Gu!

Le ... chef du village

PROJET D'EXPLOITATION DU GISEMENT URANIFERE ADRAR EMOLES 3 DANS LA REGION D'AGADEZ

ETUDE D'IMPACT ENVIRONNEMENTAL ET SOCIAL

PROCES VERBAL DE CONSULTATION PUBLIQUE

Lieu : **AGATARA**

CR:

L'an deux mille vingt et le **jeudi dix-neuf** mars, le consultant Art & Génie a tenu une réunion de consultation publique avec les populations **du village de Agatara** sous la présidence de **Monsieur DANDARE Moussa** Chef de la mission de l'étude.

La consultation publique a pour objectifs :

- ✓ Informer les communautés riveraines sur le projet et ses activités ;
- ✓ Informer les communautés sur les enjeux environnementaux et sociaux potentiels du projet ;
- ✓ Recueillir les attentes, avis et préoccupations des communautés riveraines du projet.

Après les salutations d'usage, le **chef du village Agatara** a pris la parole, pour tout d'abord souhaiter la bienvenue à l'équipe de consultants et, demander aux participants d'être attentifs aux débats puis les, a invité à poser toutes les questions.

La parole est donnée ensuite au chef de la mission qui a procédé à la présentation de l'objet de la mission et à la présentation du projet.

La mission du consultant consiste à élaborer une étude d'impact environnemental et social (EIES) du projet d'exploitation du gisement uranifère ADRAR EMOLES3.

Dans la présentation du projet, le chef de la mission de l'équipe de consultant s'est focalisé sur les aspects suivants :

- ✓ L'historique du projet,
- ✓ L'objectif de développement du projet ;
- ✓ Les enjeux environnementaux et sociaux potentiels ;
- ✓ Les incidences directes et/ou indirectes que le projet pourrait avoir sur le cadre de vie, la qualité de vie des populations riveraines et, les conditions socioéconomiques pour la zone d'intervention,
- ✓ Les actions à prendre pour bonifier les retombés bénéfiques du projet,
- ✓ Les mesures de suppression, d'atténuation et/ou de compensation des incidences négatives du projet.

A l'issue des débats, les participants ont d'abord exprimé leurs préoccupations dans la mise en œuvre

du projet à savoir :

- ✓ occupation des aires de pâturage
- ✓ déplacement du village
- ✓ Risques sanitaires humains et animal
- ✓ problèmes de la radiation

Après avoir détaillé et analysé leurs préoccupations, les participants sont tombés d'accord que les impacts positifs du projet l'emportent sur les impacts négatifs et sont unanimes sur la pertinence du projet.

Ils ont également estimé que le projet répondrait aux objectifs de développement du pays, de la région d'Agadez et particulièrement des communautés locales.

Enfin, les participants ont formulé des attentes, des suggestions et de recommandations dont les plus pertinentes se résument comme suit :

- ✓ Construction de CSJ
- ✓ Création de BC
- ✓ Appui à la reconversion à la production maraîchère
- ✓ Recrutement des jeunes du village pour les travaux manuels non qualifiés

L'ordre du jour étant épuisé le président a levé la séance

Pour la mission

Moussa Dandoué

Chef de Mission

Pour le village

Aghali Ali
#

Le Chef du village

Agatara le 19, 03-2020

Liste de présence à la réunion de consultation
publique.

- | | |
|---------------|---|
| 1) Aghali | Alli chef du village 92345696 |
| 2) Mohamed | Siliman 94367101 |
| 3) Illo | Alasane Directeur Ecole primaire 85867673 |
| 4) Amoumoune | Talyanca |
| 5) Boulouka | Afainesse |
| 6) Aghali | Siliman |
| 7) Ahmoudou | Adam |
| 8) Toussa | Siliman |
| 9) Alhadji | Alli |
| 10) Amoumoune | Alli |
| 11) Mohamed | Alli |
| 12) Iliias | Mohamed |
| 13) Alhasan | Elivaili |
| 14) Adam | Akauleb |
| 15) Ibrahim | Akauleb |
| 16) Nassiou | Alhousséini |
| 17) Tahoudou | AKKane |
| 18) Toulin | Afainess |

19) Mohamed

Amoumoune

20) Abdourahmane

Mouhamoud

PROJET D'EXPLOITATION DU GISEMENT URANIFERE ADRAR EMOLES 3 DANS LA REGION D'AGADEZ

ETUDE D'IMPACT ENVIRONNEMENTAL ET SOCIAL

PROCES VERBAL DE CONSULTATION PUBLIQUE

Lieu : *JSSAKANANE*

L'an deux mille vingt et le *jeudi dix neuf* mars, le consultant Art & Génie a tenu une réunion de consultation publique avec les populations *du village de Jssakanane* sous la présidence de **Monsieur DANDARE Moussa** Chef de la mission de l'étude.

La consultation publique a pour objectifs :

- ✓ Informer les communautés riveraines sur le projet et ses activités ;
- ✓ Informer les communautés sur les enjeux environnementaux et sociaux potentiels du projet ;
- ✓ Recueillir les attentes, avis et préoccupations des communautés riveraines du projet.

Après les salutations d'usage, le *chef de village Kweli Dismane* a pris la parole, pour tout d'abord souhaiter la bienvenue à l'équipe de consultants et, demander aux participants d'être attentifs aux débats puis les, a invité à poser toutes les questions.

La parole est donnée ensuite au chef de la mission qui a procédé à la présentation de l'objet de la mission et à la présentation du projet.

La mission du consultant consiste à élaborer une étude d'impact environnemental et social (EIES) du projet d'exploitation du gisement uranifère ADRAR EMOLES3.

Dans la présentation du projet, le chef de la mission de l'équipe de consultant s'est focalisé sur les aspects suivants :

- ✓ l'historique du projet,
- ✓ L'objectif de développement du projet ;
- ✓ Les enjeux environnementaux et sociaux potentiels ;
- ✓ Les incidences directes et/ou indirectes que le projet pourrait avoir sur le cadre de vie, la qualité de vie des populations riveraines et, les conditions socioéconomiques pour la zone d'intervention,
- ✓ Les actions à prendre pour bonifier les retombés bénéfiques du projet,
- ✓ Les mesures de suppression, d'atténuation et/ou de compensation des incidences négatives du projet.

A l'issue des débats, les participants ont d'abord exprimé leurs préoccupations dans la mise en œuvre

du projet à savoir : *✓ Diminution des aires de pâturage*
✓ Risques sanitaires humaine et animal,
✓ Déplacement du village,

Après avoir détaillé et analysé leurs préoccupations, les participants sont tombés d'accord que les impacts positifs du projet l'emportent sur les impacts négatifs et sont unanimes sur la pertinence du projet.

Ils ont également estimé que le projet répondrait aux objectifs de développement du pays, de la région d'Agadez et particulièrement des communautés locales.

Enfin, les participants ont formulé des attentes, des suggestions et de recommandations dont les plus pertinentes se résument comme suit :

- V Recrutement des jeunes du village pour les travaux manuels d'œuvre,
- V Appui en infrastructures communales
- V Construction Forage d'eau,
- V Construction BE
- V Construction Banque Aliment Bétail

L'ordre du jour étant épuisé le président a levé la séance

Pour la mission

Moussa Dandao

Chef de Mission



Pour le Village

Kwadi Ousmane



Le ... Chef du village

Issakanane le 19-03-2020

Liste de Présence de la réunion de Consultation
publique.

- 1) Kwali Ousmane chef du village 98 04 2331
- 2) Rhissa Souleymane
- 3) Ibrahim Mohamed
- 4) Sadak Alhousseini
- 5) Assalek Alhousseini
- 6) Aghali Abdourhamane
- 7) Adoum Ouboutoum
- 8) Algabit Kaka.

PROJET D'EXPLOITATION DU GISEMENT URANIFERE ADRAR EMOLES 3 DANS LA REGION D'AGADEZ

ETUDE D'IMPACT ENVIRONNEMENTAL ET SOCIAL

PROCES VERBAL DE CONSULTATION PUBLIQUE

Lieu : (Sikiret) / Tadan
Commune :

L'an deux mille vingt et le ... jeudi... dix... neuf... mars, le consultant Art & Génie a tenu une réunion de consultation publique avec les populations ... du village... de S.I.K.I.R.E.T... sous la présidence de **Monsieur DANDARE Moussa** Chef de la mission de l'étude.

La consultation publique a pour objectifs :

- ✓ Informer les communautés riveraines sur le projet et ses activités ;
- ✓ Informer les communautés sur les enjeux environnementaux et sociaux potentiels du projet ;
- ✓ Recueillir les attentes, avis et préoccupations des communautés riveraines du projet.

Après les salutations d'usage, le chef... de... village... Algabit... Illiass... a pris la parole, pour tout d'abord souhaiter la bienvenue à l'équipe de consultants et, demander aux participants d'être attentifs aux débats puis les, a invité à poser toutes les questions.

La parole est donnée ensuite au chef de la mission qui a procédé à la présentation de l'objet de la mission et à la présentation du projet.

La mission du consultant consiste à élaborer une étude d'impact environnemental et social (EIES) du projet d'exploitation du gisement uranifère ADRAR EMOLES3.

Dans la présentation du projet, le chef de la mission de l'équipe de consultant s'est focalisé sur les aspects suivants :

- ✓ L'historique du projet,
- ✓ L'objectif de développement du projet ;
- ✓ Les enjeux environnementaux et sociaux potentiels ;
- ✓ Les incidences directes et/ou indirectes que le projet pourrait avoir sur le cadre de vie, la qualité de vie des populations riveraines et, les conditions socioéconomiques pour la zone d'intervention,
- ✓ Les actions à prendre pour bonifier les retombés bénéfiques du projet,
- ✓ Les mesures de suppression, d'atténuation et/ou de compensation des incidences négatives du projet.

A l'issue des débats, les participants ont d'abord exprimé leurs préoccupations dans la mise en œuvre

du projet à savoir :
✓ Risques sanitaires humains (exposition radiation)
✓ Dégradation des surfaces pastorales
✓ Déplacement du village
✓ Contamination de la végétation et du bétail

Après avoir détaillé et analysé leurs préoccupations, les participants sont tombés d'accord que les impacts positifs du projet l'emportent sur les impacts négatifs et sont unanimes sur la pertinence du projet.

Ils ont également estimé que le projet répondrait aux objectifs de développement du pays, de la région d'Agadez et particulièrement des communautés locales.

Enfin, les participants ont formulé des attentes, des suggestions et de recommandations dont les plus pertinentes se résument comme suit :

- v. Recrutement des jeunes du village
- v. construction infrastructures sanitaires et appui en produits pharmaceutiques
- v. construction forage
- v. construction BC

L'ordre du jour étant épuisé le président a levé la séance

Pour la mission

Moussa Sandané

Chef de Mission



Pour le... Village.....

Algabit Illiass

Le chef du village.....



Sikinet le 19-03-2020

Liste de Présence à la réunion de Consultation
publique.

- 1) Algabit Illiass chef village 90381402
- 2) Rhissa Illiass
- 3) Aboussa Abdourhamaue
- 4) Bachir Moussa

PROJET D'EXPLOITATION DU GISEMENT URANIFERE ADRAR EMOLES 3 DANS LA REGION D'AGADEZ

ETUDE D'IMPACT ENVIRONNEMENTAL ET SOCIAL

PROCES VERBAL DE CONSULTATION PUBLIQUE

Lieu : *OUFOUD*

Commune : *Danet*

L'an deux mille vingt et le *le jeudi 20* mars, le consultant Art & Génie a tenu une réunion de consultation publique avec les populations *du village de Oufoud* sous la présidence de **Monsieur DANDARE Moussa** Chef de la mission de l'étude.

La consultation publique a pour objectifs :

- ✓ Informer les communautés riveraines sur le projet et ses activités ;
- ✓ Informer les communautés sur les enjeux environnementaux et sociaux potentiels du projet ;
- ✓ Recueillir les attentes, avis et préoccupations des communautés riveraines du projet.

Après les salutations d'usage, le *Représentant du chef du village* a pris la parole, pour tout d'abord souhaiter la bienvenue à l'équipe de consultants et, demander aux participants d'être attentifs aux débats puis les, a invité à poser toutes les questions.

La parole est donnée ensuite au chef de la mission qui a procédé à la présentation de l'objet de la mission et à la présentation du projet.

La mission du consultant consiste à élaborer une étude d'impact environnemental et social (EIES) du projet d'exploitation du gisement uranifère ADRAR EMOLES3.

Dans la présentation du projet, le chef de la mission de l'équipe de consultant s'est focalisé sur les aspects suivants :

- ✓ l'historique du projet,
- ✓ L'objectif de développement du projet ;
- ✓ Les enjeux environnementaux et sociaux potentiels ;
- ✓ Les incidences directes et/ou indirectes que le projet pourrait avoir sur le cadre de vie, la qualité de vie des populations riveraines et, les conditions socioéconomiques pour la zone d'intervention,
- ✓ Les actions à prendre pour bonifier les retombés bénéfiques du projet,
- ✓ Les mesures de suppression, d'atténuation et/ou de compensation des incidences négatives du projet.

A l'issue des débats, les participants ont d'abord exprimé leurs préoccupations dans la mise en œuvre

du projet à savoir : *✓ problème d'eau*
✓ risques sanitaires

Après avoir détaillé et analysé leurs préoccupations, les participants sont tombés d'accord que les impacts positifs du projet l'emportent sur les impacts négatifs et sont unanimes sur la pertinence du projet.

Ils ont également estimé que le projet répondrait aux objectifs de développement du pays, de la région d'Agadez et particulièrement des communautés locales.

Enfin, les participants ont formulé des attentes, des suggestions et de recommandations dont les plus pertinentes se résument comme suit :

- ✓ Construction infrastructures sanitaires
- ✓ Appui en approvisionnement en eau
- ✓ Appui en santé animale
- ✓ Emploi des jeunes du village -

L'ordre du jour étant épuisé le président a levé la séance

Pour la mission

Nouze Sandou

Chef de Mission



Pour le Village

AFORI Oumana



Le Représentant du chef de village

Dupud le 20-03-2020

Liste de Présence à la réunion de Consultation
publique.

- 1) Aïori Dumana
- 2) Rhissa Biga
- 3) Mohamed Ahmad
- 4) Rhissa Litto
- 5) Abbaka Amadou
- 6) Fano Ekade'

PROJET D'EXPLOITATION DU GISEMENT URANIFERE ADRAR EMOLES 3 DANS LA REGION D'AGADEZ

ETUDE D'IMPACT ENVIRONNEMENTAL ET SOCIAL

PROCES VERBAL DE CONSULTATION PUBLIQUE

Lieu : Mizeine

quartier : Commune Daut

L'an deux mille vingt et le vingt (20) mars, le consultant Art & Génie a tenu une réunion de consultation publique avec les populations du Village de Mizeine sous la présidence de Monsieur DANDARE Moussa Chef de la mission de l'étude.

La consultation publique a pour objectifs :

- ✓ Informer les communautés riveraines sur le projet et ses activités ;
- ✓ Informer les communautés sur les enjeux environnementaux et sociaux potentiels du projet ;
- ✓ Recueillir les attentes, avis et préoccupations des communautés riveraines du projet.

Après les salutations d'usage, le chef du village de Mizeine a pris la parole, pour tout d'abord souhaiter la bienvenue à l'équipe de consultants et, demander aux participants d'être attentifs aux débats puis les, a invité à poser toutes les questions.

La parole est donnée ensuite au chef de la mission qui a procédé à la présentation de l'objet de la mission et à la présentation du projet.

La mission du consultant consiste à élaborer une étude d'impact environnemental et social (EIES) du projet d'exploitation du gisement uranifère ADRAR EMOLES3.

Dans la présentation du projet, le chef de la mission de l'équipe de consultant s'est focalisé sur les aspects suivants :

- ✓ L'historique du projet,
- ✓ L'objectif de développement du projet ;
- ✓ Les enjeux environnementaux et sociaux potentiels ;
- ✓ Les incidences directes et/ou indirectes que le projet pourrait avoir sur le cadre de vie, la qualité de vie des populations riveraines et, les conditions socioéconomiques pour la zone d'intervention,
- ✓ Les actions à prendre pour bonifier les retombés bénéfiques du projet,
- ✓ Les mesures de suppression, d'atténuation et/ou de compensation des incidences négatives du projet.

A l'issue des débats, les participants ont d'abord exprimé leurs préoccupations dans la mise en œuvre

du projet à savoir : V. Contamination des eaux, de la végétation et du bétail, Risque sanitaire humain, Baisse du niveau des nappes.....

Après avoir détaillé et analysé leurs préoccupations, les participants sont tombés d'accord que les impacts positifs du projet l'emportent sur les impacts négatifs et sont unanimes sur la pertinence du projet.

Ils ont également estimé que le projet répondrait aux objectifs de développement du pays, de la région d'Agadez et particulièrement des communautés locales.

Enfin, les participants ont formulé des attentes, des suggestions et de recommandations dont les plus pertinentes se résument comme suit :

- ✓ Appui au développement local
- ✓ Appui en approvisionnement en eau
- ✓ Construction Banque Alimentaire (BAA)
- ✓ Appui aux activités maraichères
- ✓ Appui à la protection des berges de Kouré,
- ✓ Recrutement des jeunes du village

L'ordre du jour étant épuisé le président a levé la séance

Pour la mission

Moussa Sandaou

Chef de Mission

Pour le Village

Mohamadou Bakaka

+

Le Chef de Village

PROJET D'EXPLOITATION DU GISEMENT URANIFERE ADRAR EMOLES 3 DANS LA REGION D'AGADEZ

ETUDE D'IMPACT ENVIRONNEMENTAL ET SOCIAL

PROCES VERBAL DE CONSULTATION PUBLIQUE

Lieu : *Ghalalo*

Commune : *Tchirozrine*

L'an deux mille vingt et le ... *vint (2020)* ... mars, le consultant Art & Génie a tenu une réunion de consultation publique avec les populations sous la présidence de **Monsieur DANDARE Moussa** Chef de la mission de l'étude.

La consultation publique a pour objectifs :

- ✓ Informer les communautés riveraines sur le projet et ses activités ;
- ✓ Informer les communautés sur les enjeux environnementaux et sociaux potentiels du projet ;
- ✓ Recueillir les attentes, avis et préoccupations des communautés riveraines du projet.

Après les salutations d'usage, le ... *chef du village de Ghalalo* ... a pris la parole, pour tout d'abord souhaiter la bienvenue à l'équipe de consultants et, demander aux participants d'être attentifs aux débats puis les, a invité à poser toutes les questions.

La parole est donnée ensuite au chef de la mission qui a procédé à la présentation de l'objet de la mission et à la présentation du projet.

La mission du consultant consiste à élaborer une étude d'impact environnemental et social (EIES) du projet d'exploitation du gisement uranifère ADRAR EMOLES3.

Dans la présentation du projet, le chef de la mission de l'équipe de consultant s'est focalisé sur les aspects suivants :

- ✓ l'historique du projet,
- ✓ L'objectif de développement du projet ;
- ✓ Les enjeux environnementaux et sociaux potentiels ;
- ✓ Les incidences directes et/ou indirectes que le projet pourrait avoir sur le cadre de vie, la qualité de vie des populations riveraines et, les conditions socioéconomiques pour la zone d'intervention,
- ✓ Les actions à prendre pour bonifier les retombés bénéfiques du projet,
- ✓ Les mesures de suppression, d'atténuation et/ou de compensation des incidences négatives du projet.

A l'issue des débats, les participants ont d'abord exprimé leurs préoccupations dans la mise en œuvre

du projet à savoir :
..... *✓ problèmes radiations,*
..... *✓ problème d'eau*
..... *✓ non recouvrement des puits*

Après avoir détaillé et analysé leurs préoccupations, les participants sont tombés d'accord que les impacts positifs du projet l'emportent sur les impacts négatifs et sont unanimes sur la pertinence du projet.

Ils ont également estimé que le projet répondrait aux objectifs de développement du pays, de la région d'Agadez et particulièrement des communautés locales.

Enfin, les participants ont formulé des attentes, des suggestions et de recommandations dont les plus pertinentes se résument comme suit :

- ✓ Appui en infrastructure d'approvisionnement en eau,
- ✓ Appui en produits pharmaceutiques,
- ✓ Recrutement de jeunes,
- ✓ Appui à l'éducation.
-
-

L'ordre du jour étant épuisé le président a levé la séance

Pour la mission

Roussa Dandéou

Chef de Mission



Pour le... Village.....

Atehoua Amou

i ~

Le ... *chef* du ... village.....

Ghalala, le 20-03-2020

Liste de présence à la Réunion de Consultation
publique.

- 1) Atchoua Amou. chef du village 91213037
- 2) Mahmoud Ghilbane
- 2) Ehalawé Amoumoune
- 3) Hibi Kamal
- 4) Mohamed Koutoul
- 5) Najim Amoumoune
- 6) Mohamed Hanjar
- 7) Taboul Kalla
- 8) Mohamed Atchoua
- 9) Mati Aghali
- 10) Ahmad Kamal
- 11) Aghali Wantassa
- 12) Adoum Daouel
- 13) Adahaya Katti
- 14) Hita Ehalawé

PROJET D'EXPLOITATION DU GISEMENT URANIFERE ADRAR EMOLES 3 DANS LA REGION D'AGADEZ

ETUDE D'IMPACT ENVIRONNEMENTAL ET SOCIAL

PROCES VERBAL DE CONSULTATION PUBLIQUE

Lieu : *Nouveau Tribu Kelezeret*

Commune : *Davet*

L'an deux mille vingt et le *Vendredi 20* mars, le consultant Art & Génie a tenu une réunion de consultation publique avec les populations *de la Tribu de Kelezeret* sous la présidence de **Monsieur DANDARE Moussa** Chef de la mission de l'étude.

La consultation publique a pour objectifs :

- ✓ Informer les communautés riveraines sur le projet et ses activités ;
- ✓ Informer les communautés sur les enjeux environnementaux et sociaux potentiels du projet ;
- ✓ Recueillir les attentes, avis et préoccupations des communautés riveraines du projet.

Après les salutations d'usage, le *chef de tribu Ahmedou B. Bello* a pris la parole, pour tout d'abord souhaiter la bienvenue à l'équipe de consultants et, demander aux participants d'être attentifs aux débats puis les, a invité à poser toutes les questions.

La parole est donnée ensuite au chef de la mission qui a procédé à la présentation de l'objet de la mission et à la présentation du projet.

La mission du consultant consiste à élaborer une étude d'impact environnemental et social (EIES) du projet d'exploitation du gisement uranifère ADRAR EMOLES3.

Dans la présentation du projet, le chef de la mission de l'équipe de consultant s'est focalisé sur les aspects suivants :

- ✓ l'historique du projet,
- ✓ L'objectif de développement du projet ;
- ✓ Les enjeux environnementaux et sociaux potentiels ;
- ✓ Les incidences directes et/ou indirectes que le projet pourrait avoir sur le cadre de vie, la qualité de vie des populations riveraines et, les conditions socioéconomiques pour la zone d'intervention,
- ✓ Les actions à prendre pour bonifier les retombés bénéfiques du projet,
- ✓ Les mesures de suppression, d'atténuation et/ou de compensation des incidences négatives du projet.

A l'issue des débats, les participants ont d'abord exprimé leurs préoccupations dans la mise en œuvre

du projet à savoir : *✓ Diminution aires de pâturage*
✓ Non recrutement des habitants
✓ problème radiation humaine et animal
✓ Gestion déchets après mines

Après avoir détaillé et analysé leurs préoccupations, les participants sont tombés d'accord que les impacts positifs du projet l'emportent sur les impacts négatifs et sont unanimes sur la pertinence du projet.

Ils ont également estimé que le projet répondrait aux objectifs de développement du pays, de la région d'Agadez et particulièrement des communautés locales.

Enfin, les participants ont formulé des attentes, des suggestions et de recommandations dont les plus pertinentes se résument comme suit :

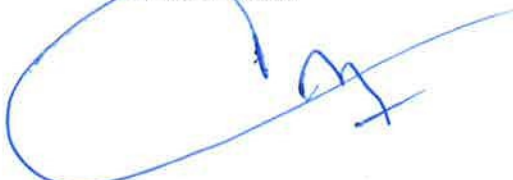
- ✓ Appui en infrastructures sanitaires.....
- ✓ Appui à l'éducation.....
- ✓ Appui aux activités maraichères de la vallée de Tlogotay.....
- ✓ Recrutement des jeunes du village.....
- ✓ Appui en l'approvisionnement en eau.....

L'ordre du jour étant épuisé le président a levé la séance

Pour la mission

Thomas Jandoul

Chef de Mission



Pour la population.....

Ahamoudou Bollo

Le chef de tribu.....

Site tribu Kelezeret, le 20-03-2020

Liste de présence à la Consultation publique.

- 1) Ahamoudou Bollo chef de tribu
- 2) Alhousseini Abouhalil.

PROJET D'EXPLOITATION DU GISEMENT URANIFERE ADRAR EMOLES 3 DANS LA REGION D'AGADEZ

ETUDE D'IMPACT ENVIRONNEMENTAL ET SOCIAL

PROCES VERBAL DE CONSULTATION PUBLIQUE

Lieu : Inolamaup
Comm. Tchirozerine

L'an deux mille vingt et le ...vingt... (20) mars, le consultant Art & Génie a tenu une réunion de consultation publique avec les populations ...du village... de Inolamaup sous la présidence de Monsieur DANDARE Moussa Chef de la mission de l'étude.

La consultation publique a pour objectifs :

- ✓ Informer les communautés riveraines sur le projet et ses activités ;
- ✓ Informer les communautés sur les enjeux environnementaux et sociaux potentiels du projet ;
- ✓ Recueillir les attentes, avis et préoccupations des communautés riveraines du projet.

Après les salutations d'usage, le ...chef de village... D. Mohamed Abdourahmane a pris la parole, pour tout d'abord souhaiter la bienvenue à l'équipe de consultants et, demander aux participants d'être attentifs aux débats puis les, a invité à poser toutes les questions.

La parole est donnée ensuite au chef de la mission qui a procédé à la présentation de l'objet de la mission et à la présentation du projet.

La mission du consultant consiste à élaborer une étude d'impact environnemental et social (EIES) du projet d'exploitation du gisement uranifère ADRAR EMOLES3.

Dans la présentation du projet, le chef de la mission de l'équipe de consultant s'est focalisé sur les aspects suivants :

- ✓ l'historique du projet,
- ✓ L'objectif de développement du projet ;
- ✓ Les enjeux environnementaux et sociaux potentiels ;
- ✓ Les incidences directes et/ou indirectes que le projet pourrait avoir sur le cadre de vie, la qualité de vie des populations riveraines et, les conditions socioéconomiques pour la zone d'intervention,
- ✓ Les actions à prendre pour bonifier les retombés bénéfiques du projet,
- ✓ Les mesures de suppression, d'atténuation et/ou de compensation des incidences négatives du projet.

A l'issue des débats, les participants ont d'abord exprimé leurs préoccupations dans la mise en œuvre du projet à savoir :

- ✓ occupation des aires de pâturage
- ✓ gestion des déchets de la pierre mine
- ✓ Repercussions sur les ressources en eau

Après avoir détaillé et analysé leurs préoccupations, les participants sont tombés d'accord que les impacts positifs du projet l'emportent sur les impacts négatifs et sont unanimes sur la pertinence du projet.

Ils ont également estimé que le projet répondrait aux objectifs de développement du pays, de la région d'Agadez et particulièrement des communautés locales.

Enfin, les participants ont formulé des attentes, des suggestions et de recommandations dont les plus pertinentes se résument comme suit :

- ✓ Appui en infrastructure de santé,
- ✓ Recrutement des jeunes,
- ✓ Appui en approvisionnement en eau.
-
-
-

L'ordre du jour étant épuisé le président a levé la séance

Pour la mission

Moussa Dandou

Chef de Mission



Pour le village.....

Mohamed Abdourhamane

Le chef de village

Inokamane, le 20-03-2020

Liste de présence Consultation Publique

- 1) Mohamed Abdourhamane chef village 94744210
- 2) Mohamed Dumq
- 3) Issoufou Goumour
- 4) Assan Adoum.