DASA SITE REDEVELOPMENT FRAMEWORK PLAN

GLOBAL ATOMIC AND PROJECTED COSTS OF THE WORKS

Reference : GA-PCRDS-COUTS TRAVAUX - RECOMMENDATIONS

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Master Plan for Site Redevelopment

TECHNICAL REPORT

Technical options and associated cost figures

I - Preamble: In Niger, article 58 of the framework law 98 - 56 of 29 December 1998, relating to environmental management and the Environmental Impact Assessment carried out on the site, oblige mining companies to deal with all the impacts linked to their activities at the end of the operations. These impacts listed in the Environmental and Social Impact Assessment must be monitored through an environmental monitoring network, which the company must put in place. The responses to these requirements are expressed in :

- Technical treatment options for each impact
- Cost of implementation.

The document containing all this information, called the Master Site Rehabilitation Plan, must accompany the operational plan. This Master Site Rehabilitation Plan should be updated regularly. This exercise allows the evolution of impacts and economic factors to be taken into account.

The sources of impacts from the operation or mine site are called "source terms".

The technical site redevelopment plan, the subject of this document, proposes treatment options for each of the source terms identified on the future DASA industrial site and the associated costs for their implementation.

These proposed technical solutions should meet the following objectives:

- ✓ Comply with the regulations in force and the recommendations of the ICMM and the IAEA, particularly for uranium mines
- ✓ Ensuring sustainable public safety and health
- ✓ Limit residual impacts to as low as reasonably achievable (ALARA principle)
- ✓ Share these redevelopment options with local stakeholders and submit them to the competent authorities for assessment and approval.
- ✓ Implement the possibility of restricting the use of certain surfaces in order to ensure the sustainability of the solutions put in place.

II - Plan of deliverables :

- ➢ Identification of the various source terms on the site and their impacts (the risks associated with the source terms)

- ✓ Proposal of an optimal treatment solution or solutions for each source term (technical options)
- ✓ Explanation of the basis for the costing elements
- ✓ Estimated implementation costs for each proposed treatment solution
- ✓ Any recommendations for further studies to improve the effectiveness of the options and optimise costs.
- ✓ Any relevant remarks regarding the incompatibility of certain processes that the company is planning to apply, in relation to the environmental requirements in force, and proposals for improving the design of certain works (taking into account the experience of certain industrial sites, for example the case of COMINAK)

III - The different source terms of the DASA website :

III - 1 The Mine :

- Underground Mining
- The day/ground connections (Downpipe and ventilation shafts)
- Backfill manufacturing and placement facilities
- Ventilation facilities at the mine
- Mining equipment
- Evaporation ponds (storage ponds for water from the mine) or mine drainage ponds

III - 2 The Treatment Plant

- The different workshops in the ore processing process
- Reagent preparation facilities
- The sulphuric acid workshop
- The effluent storage tank

III - 3 The Industrial Site

- Water and electricity production facilities and distribution networks
- Shops and storage areas for consumables and reagents
- Offices, maintenance workshops and staff accommodation
- Cloakrooms and lamp room
- Site security features
- The waste disposal centres
- The different strippings
- The raw water basin or industrial water basin

III - 4 - The Residue Pour

- Proposal of the treatment method
- Estimated costs for

III - 5 - Quarries for the extraction of materials (tracks, dams, etc.)

These are the future quarries for the materials that will be used for the redevelopment of the industrial site. Their number and size will depend on the quantities of materials that will be required for this phase.

Impacts related to the different terms and redevelopment options:

III - 1 the Mine :

III - 1a - Underground Mining :

The main risks associated with these structures are:

- Public safety: risks related to the subsidence of structures and repercussions on the surface
- Public health: risks linked to the marking of the different water tables by contact with the water contained in the mining works

Redevelopment option: de-equipping and natural flooding of the mine.

III - 1b - Day/ground connections: down conduits and ventilation shafts

The main risks

They are :

- Safety: intrusions for various reasons and accidental falls of humans and animals
- Radiological: emanation of radon, marking of slicks
- Environmental: depletion of groundwater by runoff if it is crossed by these structures, pollution of groundwater

Redevelopment Option :

- Downhill: construction of reinforced concrete walls separating the aquifers used for drinking water, crossed by this downhill
- Construction of an anti-intrusion device consisting of backfill and a reinforced concrete wall at the access point, then filling in the access pit to the shaft.
  The walls will have an optimal thickness obtained according to a calculation note which takes into account the characteristics of the ground and the physical constraints which will be exerted in the long term.

  The aquifers likely to be crossed by the descent are: the Izégouande, the Teloua, the Tarat and the Guezouman. Of these aquifers, only the Teloua and the Tarat are

drinking water aquifers in terms of quality. From a hydrogeological point of view, each aquifer has a zone of low natural impermeability at its roof and wall. This is a kind of natural protection of the water table. On the basis of this hydrogeological principle, it will be proposed to position plugs in correspondence with the natural screens (zones of low permeability from the hydrogeological point of view), at depths corresponding to these screens for the water tables in question.

A low wall and a high wall will be built for each of these two aquifers.

The main concern in this option is the preservation of the groundwater, as it is crossed by these structures. To address this aspect, the hydrogeological principle was put forward, which states that each water table has a zone of low natural impermeability at its roof and wall. This is a kind of natural protection of the water table. On the basis of this hydrogeological principle, it was recommended and validated that plugs should be placed in correspondence with the natural screens (areas of low permeability from the hydrogeological point of view), at depths corresponding to these screens for the water tables in question.
For DASA, it appears that the downspout crosses the TELOUA and TARAT aquifers, which are the most important aquifers in terms of exploitation.
A low wall and a high wall will be built for each of these two aquifers.

- Ventilation stack: complete plugging of the column with suitable materials, following a procedure.

III - 1c - Mining Equipment :

These are: mining machinery, electrical installations, crushing installations, dewatering and secondary ventilation installations, maintenance workshop equipment

The main risk is the pollution of water by hydrocarbons, certain chemical substances and heavy metals, contained in, or components of, this equipment

The chosen mode of redevelopment

- ✓ Equipment that is not allowed to be dumped on the seabed will be inventoried and hauled up: this includes equipment containing hydrocarbons, machine batteries, and other equipment containing heavy metals, pyralene, etc.
- ✓ Some equipment may be dismantled and recycled depending on the cost of dismantling or for societal use.

III - 1d - Backfill manufacturing and placement facilities

It is a complex that will be composed of the following elements

- A 'hopper' for drying tailings from ore processing
- A "hopper" for storing dewatered residues
- A series of residue screens
- A belt conveyor for transporting the residues to the mixer
- Cement storage silos
- Water sheets
- A mixer
- A concrete pump (backfill pump) to send the resulting backfill to the bottom of the mine
- Refuse storage areas and/or ponds

The main risks associated with these facilities are:

- Safe
- Radiological, due to the use of ore processing residues
- Environmental

Abandoning them could lead to degradation due to lack of maintenance and acts of vandalism causing the scattering of marked equipment in the public domain and accidents

The selected redevelopment options:

- Dismantling and transfer of marked equipment to the tailings pond
- Valuation or disposal of unmarked equipment in the societal context
- Demolition of concrete pads and transfer to the tailings pond
- Soil stripping and treatment according to the X-ray counter plan (reprofiling and/or covering the right-of-way)
- Filling of pits

III - 1 e - Primary ventilation systems

These are primary ventilation fans

The main risks associated with these facilities are:

- Safe
- Environmental.

Abandoning them could lead to degradation through lack of maintenance and vandalism causing accidents

The chosen redevelopment option: dismantling and recovery or disposal within the societal framework

III - 1f - Pumping installations and drainage network Mine

The main risks associated with these facilities are:

- Radiological
- Safe

This equipment, which was used to pump and dispose of water from the mine, will be potentially marked. It will not be recoverable except for a similar use.

Redevelopment option: dismantle only the surface facilities and transfer them to the tailings pond

III - 1g - Mine drainage basin :

This is the storage basin for water that has risen from the mine.

This basin will have a projected volume of 350 m X 350 m X 2.5 m = 306 250 m^3 . Its surface area of 350m x 350m, i.e. 12.25 hectares, combined with the hot desert climate, is a factor favourable to evaporation. It is also equipped with a mechanical evaporation aid system to prevent overflow. The inner walls will be protected by liners to ensure that it remains watertight for the duration of its operation. This impermeability will be monitored by means of piezometers drilled around the basin.

The risks associated with these pools are :

- Radiological (mine drainage water is water containing finely ground uranium ore that settles to the bottom of the ponds)
- Environmental
- Safety (getting stuck, drowning)

Treatment method: This pond can be treated in the following way

- Drainage of settled water (used for watering the runways during site redevelopment)
- Cleaning of the fine ore carried by the water and deposited at the bottom of the basin
  There are 2 options for disposal of this product:
  - Valuation through an agreement with an active company for its processing in a formal framework
  - Transfer to residue dumping in the absence of any interest in this product
- De-equipping of liners
- Raising the dikes halfway into the basin
- Backfilling with external cover material, reprofiling and covering with a 0.5 m layer of crushed stone.
- **The storage area for the fines from the dredging of the basin**: a potential source of various types of pollution (radioactivity, hydrocarbons from mining activities) will be stripped and reprofiled. The stripping product will be evacuated to the tailings pond.

III - 2 - Ore processing plant and its annexes :

III - 2a - the successive workshops of ore treatment processes :

The plant will consist of the following workshops

- Shredding and its feeding facilities
- The attack
- Filtration
- The solvent
- The finish
- Burning

This arrangement is imposed by the mechanical treatment of the ore, the dissolving of the uranium, its concentration and its conditioning.

And its annexes, the reagents and the contact (the sulphuric acid production workshop)

The main risks are:

- Radiological (radiological marking of equipment and soil)
- Chemical (soil contamination over a certain depth)
- Safety: unmaintained facilities, risk of accidents)
- Environmental

Redevelopment options :

- ➢ Emptying, rinsing and dismantling and transfer to the tailings storage facility in the absence of an express request for use in a similar field, together with legal and regulatory tripartite provisions (the company, the purchaser and the state) which will release the company from the conditions of its operation and post processing operations.
- ✓ Demolition of massifs and civil engineering structures and transfer to waste disposal
- ✓ Stripping of 50 cm of soil in areas where the depth of marking and contamination does not exceed 40 cm and reprofiling
- ✓ Covering with a layer of suitable material to mitigate the various radiological risks so that the regulatory added dose is not exceeded.

III - 2b - Reagent preparation workshop :

The risks associated with this workshop are

- Chemical

- Safe
- Environmental

Proposed redevelopment options:

- ✓ Emptying, rinsing, dismantling and transfer to the residue bin
- ✓ Demolition of the civil engineering structures and transfer to the waste dump
- ✓ Stripping of 50 cm of soil in areas where the depth of marking and contamination does not exceed 40 cm and reprofiling
- ✓ Reprofiling and covering with a layer of suitable material

III - 2c - Sulphuric acid production workshop: contact

The risks associated with this workshop are

- Chemical
- Safe
- Environmental

The proposed redevelopment options: in the absence of a particular interest by a buyer and which must be framed by clauses allowing the company to release all responsibility for the continuation of the business of this workshop, the proposed options are the following

- ✓ Emptying, flushing and dismantling for disposal or recovery
- ✓ Demolition of massifs and other civil engineering works and transfer to waste disposal
- ✓ Stripping of 50 cm of soil in areas where the depth of marking and contamination does not exceed 40 cm and reprofiling
- ✓ Reprofiling and covering with a layer of suitable material as required

III - 2e - effluent storage tank :

It is a tank intended for the storage of liquid effluents from the treatment plant. It will be built on a site which will ensure natural impermeability, but also the internal walls will be lined to ensure double impermeability. In accordance with the recommendations of the environmental impact assessment, the watertightness of the pond will be monitored by means of piezometers drilled and installed around it. The pond will be equipped with an evaporator system, but also its shallow depth and large surface area will ensure that it is heated to intensify evaporation.

Pool dimensions
Length = 200 m
Width = 100 m
Depth = 3 m

Number of pools = 1
Area occupied = 2 ha
Volume = 60,000 m3

The risks associated with this book and its contents are :

- Chemicals
- Radiological
- Environmental
- Safe
- Sanitary

The chosen redevelopment option :

It will consist of filling and covering the whole of the basin's right-of-way with a suitable material to a thickness that will allow sufficient containment of these residues and will be resistant to the weather in a permanent manner.

- **Filling phase**: Given the corrosiveness of this product, siliceous materials such as dune sand are recommended to absorb the residual juice, mixed with large blocks of unmarked material, which will ensure stability in the evolution of the filling front for the earthmoving machines.
- **Re-profiling and covering phase**: clay over a thickness of 1m (double impermeability) and crushed sand over 50cm (resistance to bad weather: rain and wind)

This perimeter may be a restricted access zone if necessary

III - 3 The Industrial Site

III - 3a - Water and electricity production facilities and distribution networks

These are :

- All electrical power generation equipment (generators, solar or wind power plants)
- The entire electrical energy transformation and distribution network (electrical transformers and distribution lines)
- Wells and pumping equipment
- The entire network of water pipes, storage, treatment and distribution.

This equipment will in principle be unmarked and may go into the public domain

The risks are:

- Environmental
- Safe.

The possible modes of redevelopment are :

- A societal treatment, with the transfer of these facilities to the state or locality. This option assumes sufficient capacity on the part of the beneficiary to maintain and operate the facilities wisely. Also, the proximity to restricted use areas can pose a lot of problems, which requires the implementation of provisions allowing the company to release all its responsibilities in case of abnormal events.
- Outright dismantling of all facilities and recovery (sale or transfer to third parties) and treatment of the areas. This option appears to be the safest.

III - 3b - Stores and storage areas for consumables and reagents:

The risks associated with these facilities are :

- Safe
- Environmental
- And Chemicals for some

The proposed redevelopment option :

At the end of the operations, spare parts, reagents and other residual consumables are recovered or sold to third parties. At the end of these processes, the shops and storage areas are dismantled, the areas are stripped and the stripping products are transferred to the waste dump and stored according to their environmental classification, as special waste (soil contaminated with hydrocarbons, specific chemicals), ordinary waste (civil engineering rubble and other inert materials). The treatment of special waste requires special packaging. It can be packaged in drums or containers and placed in covered cells within the waste dump. Other wastes are simply identified, accounted for, transported and placed in the tailings pond to be covered before reprofiling.

III - 3c - Offices, maintenance workshops, staff accommodation, cloakrooms and lamp room

The risks associated with these facilities are :

- Unsafe if left unattended, without maintenance
- Environmental,

Redevelopment option: The whole complex could be treated in the same way and operated within a formal framework set up as part of the site redevelopment dossier with the State of Niger. But this will depend on the sensitivity of the restricted use areas and any residual source terms. If this formal framework were to be established, it should contain clauses that would release the company from all responsibility for any negative post-sale impacts.

The safest way to deal with it will be to dismantle it in one of two ways:

- Dismantling by the company itself (subcontracting) and recovery of recoverable materials and transfer of the rubble to the waste dump
- Sale of these buildings to potential service providers who will dismantle them to recover

the recoverable materials and transfer the rubble to the waste dump. The company will be responsible for monitoring and controlling the effectiveness of the process. This option will reduce the cost of redevelopment to some extent.

III - 3d - Products and special waste :

These are products that are generally contained in certain equipment or by-products of the ore processing and which, according to the regulations, must be given special treatment according to their nature and impact. These are :

- Sealed sources,
- Pyralene contained in electrical transformers, or contaminated by a pyralene spill (e.g. pyralene contaminated soil)
- Asbestos or equipment containing asbestos,
- Soil contaminated by hydrocarbons
- Active residual solvent
- Etc...

The main risks associated with these products are

- Safe
- Sanitary
- Environmental
- Radiological for some

The proposed mode of treatment:

- Disposal through authorised channels: taken back by manufacturers or organisations that must in principle have approved disposal procedures.
- Disposal through transfer or sale to licensed users
- Burial in the tailings pond, prior to reprofiling: placing them in specially designed cells, using specific materials (waterproof, resistant to any chemical reactions that could damage the liner and lead to damaging environmental accidents. The cells are basins made of inert materials (clays), with lined walls. The waste is packaged either in special big bags, metal or plastic drums, or containers.)
- For waste or liquid products, they can be eliminated in the effluent ponds, if the discharge into this environment does not cause chemical chain reactions likely to cause uncontrollable health or environmental accidents.
  NB: the volume of the cells depends on the volume of waste and/or products to be treated. And the site of their burial must be identified for monitoring purposes.

III - 3 e - the various strippings of industrial areas:

These are the sites of accidental spills or surface infiltration of radioactive products (ore, processing residues, etc.), liquid or solid chemicals. Their importance depends on the number of sites where these products are stored and handled. The company will take steps to limit these impact zones to a controllable level and to put in place devices to manage any accidents (slabs, retention, fences and other containment barriers, etc.)

The risks associated with these areas are :

- Chemicals
- Sanitary (through contamination of water, air etc.)
- Radiological (soil marking, air pollution)
- Environmental (soil and groundwater pollution, etc.)

The proposed treatment method: the determination of the marking and contamination zones will be based on the radiological counter plan outside the site's tailings repository and on the completion of research works for chemical and hydrocarbon contamination.

Despite the implementation of devices to limit negative impacts, in the event of contamination, the proposed treatment method is to strip the soil and transfer it to the tailings pond. Within the tailings pond, the soil will be transferred to the special waste and ordinary waste areas, depending on the nature of the pollutant.

- If the depth of marking and/or contamination does not exceed 50 cm, the area will be stripped and reprofiled
- If the depth of marking and/or contamination exceeds 50 cm, carry out a covering study with a suitable material, so as to block any other infiltration that would advance the impact (e.g. rainwater).

At this stage it is extremely difficult to quantify the surface area to be stripped and the depths of contamination. This aspect will be taken into account by setting a lump sum which will be updated in real terms.

III - 3f - Site security devices :

These are the earthen security walls and trenches set up around and inside the industrial site to combat ill-intentioned intrusions. And the devices used to protect highly sensitive areas of activity within the site. These are usually made of used tyres from machinery, fencing, used drums and other packaging and large boulders.
The perimeter of the DASA site = 144.2 km2
They must be dismantled.
In this document the decommissioning cost allocated to these facilities will be a flat rate and will be done by site similarity.

III - 3g - the industrial water basin or raw water basin

It is a mini retention structure for industrial water without tailings, designed for industrial use (use in the ore processing process, in the fire-fighting network, cleaning operations in the maintenance workshops, watering of the tracks and underground mining operations). This pond has a volume of approximately 6000 m3.

The risks associated with this basin are safety and environmental

The proposed redevelopment method: simple filling with simple materials (sand and/or clay)

III - 3h - Hydrocarbon storage and distribution facilities :

These are mainly storage tanks, siphoning and regulating devices, concrete support, protection and retention infrastructures.

The main risk is environmental with the pollution of soil or water by hydrocarbons.

Proposed redevelopment option :

- When they are de-equipped, they can be valorised, especially as they can go into the public domain.
- Demolition of the retaining walls and support structures and transfer to the tailings pond
- Stripping off any dirt and transferring it to the waste bin.

III - 4 - Residue lodging

The following data were taken into account, for the choice of the site and the projection of its most important shape and dimensions:

- The company's production plan over the life of the project and 50% of the amount of tailings that will be generated.
- The recommendations of the environmental impact assessment
- The physical characteristics of the site, based on numerous studies, for a better choice of the location of the tailings pond.

These dimensions are :

- The floor area
- Its geometry on the ground
- And the maximum possible storage height

The system will consist of retention dams and the storage area will be fully covered. The water contained in the tailings will also be drained using a system built into the tailings and operated during the operations phase.

Externally it will be protected by a surface runoff drainage system

This tailings repository will initially consist mainly of solid tailings from ore processing, but the principle of minimising the number of radiological and chemical impact zones militates in favour

of transferring the following wastes to it.

These are :

- Mine waste rock brought up from the bottom
- Stripping products from the industrial area
- Waste from the life of the site in the operation phase
- Buried special waste
- Rubble from the demolition of buildings and other civil engineering structures of the facilities
- TFA from the dismantling of non-recovered surface installations and other solid waste

It will potentially be the main source term for the site, in terms of radiological and chemical impacts

The main risks associated with this source term are

- Radiological (external and internal exposures) due to the nature of the tailings, risk of intrusion, use of the tailings, risk of soil and groundwater marking
- Environmental (intrusion, waste or tailings exploitation, groundwater, soil and air pollution)
- Health and safety (various ailments) environmental (trespassing, waste or tailings exploitation, groundwater, soil and air pollution)
- Chemicals, groundwater marking, soil pollution.

Proposed redevelopment option :

In contrast to ordinary waste, radioactive waste has the reputation of requiring an often expensive treatment, allowing the protection of the post-operational environment in an efficient and most sustainable way.

This mass of radioactive waste, which contains a number of other special wastes, must be catalogued, collected, circumscribed and separated from the public domain by a physical barrier that meets a number of regulatory requirements, both from the point of view of safety, security and environmental protection.

This barrier must have the properties of protecting the remediated site and its surroundings; from any emanation, possible diffusion of radionuclides; from water infiltration that could reach the waste stockpile, pass through it and lead to groundwater contamination.

It must be constructed (the barrier) using materials whose properties must be able to withstand any physico-chemical reactions that may occur on contact with the waste. They must be impermeable to the possible movement of fluids in both directions. Finally, they must be able to withstand all weather conditions for as long as possible. Their availability on site and in sufficient quantity is a significant advantage. The processes for their operation and installation must be technically controllable and economically efficient.

- Therefore, the tailings pond, once constructed, will be re-profiled over its entire surface, for better stormwater drainage management
- The reprofiled slope will be covered with a 1m thick compacted clay material to ensure double impermeability
- The clay layer will be protected from the weather by a 0.5 m layer of crushed sand with a mesh size of 0 - 250 mm, compacted.

  By applying the erosion rate for desert areas of 40t/km2/year for bare ground (Inter-African Pedological Service) to the North Niger area and to this cover thus constituted (sheltered from human actions), it can remain for thousands of years.

- It is surrounded by a safety barrier 4 m wide and 3 m high
- This area will be a restricted area.

NB: If the DASA ore is processed off-site, 100% of the tailings from the ore processing will go to the tailings pond

But DASA has taken the option of using 50% of the tailings from its ore processing in the composition of the backfill.

III - 5 - Quarrying of materials

These are shallow quarries that will be opened for the purpose of extracting materials for the construction of the runways and dykes of the ponds and other structures, for the operations phase.

The same quarries will be used for the removal of materials during the redevelopment phase of the site. Despite its relatively shallow depth, it poses a risk to human and animal traffic.

- Coarse material quarries: depth: 4 m
- Clay pits: maximum depth 4 m

The associated risks are :

- Mud flats
- Fall

The proposed mode of treatment:

- Reprofiling (re-sloping) , which consists of felling the edges to soften the slope of the embankment (proposed slope: 45°) and then building the merlons at the accesses.

IV - the costs associated with the work :

GA/PC/RdS

COÛTS PREVISIONNELS DU REAMENAGEMENT DU SITE

GLOBAL ATOMIC FC

MINE

Activités	Description		Total	Commentaires
Fermeture des liaisons jour/fond	fermeture descenderie, bouchage cheminées et comblement fosse descenderie		274 618 316	4 murets en béton armé dans la descenderie pour isoler les nappes, Bouchage des 2 cheminées sur toute la colonne et le comblement et recouvrement de la fosse de la descenderie, suivant des options validées avec les parties prenantes
Démantèlement des ventilateurs primaires	désequipement des cheminées		6 000 000	démantèlement et récuperation de tous les ventilateurs primaires
		Total MINE	280 618 316	

CARRIERES

Activités	Description		Total	Commentaires
Carrière de matériaux grossiers ayant servie au réaménagement du site	Rétalutage et merlonnage des accès		9 467 152	abattage et reprofilage des bords de la future carrière pour lui donner une pente d'à peu près 45° et fermeture des accès avec des merlons
Carrière d'argiles	Rétalutage et merlonnage des accès		5 000 000	adoucissement des bords au bull et merlonnage des accès
		Total CARRIERES	14 467 152	

BASSINS

Activités	Description		Total	Commentaires
bassins exhaure	Bassin exhaure Mine rabattement des digues et recouvrement et reprofilage		657 865 833	rabattement des digues à mi hauteur vers l'intérieur des bassins au bull, puis recouvrement proprement dit de bassin
bassins eau industrielle	Bassin eau industrielle comblement (bassin d'eau brut)		4 800 000	comblement simple du bassin
bassin effluents usine	comblement, reprofilage et recouvrement		201 940 267	comblement avec des matériaux adéquats (sable et gros blocs de gré), recouvrement avec de l'argile, reprofilage et capotage au gré concassé
		Total BASSINS	864 606 100	

DEMANTELEMENT SITE INDUSTRIEL

Activités	Description		Total	Commentaires
aires de stockages des produits chimiques et autres réactifs	Décapage des zones marquées et/ou polluées du site		147 000 000	décapage des surfaces radiologiquement marquées, des aires de stockage des réactifs, des hydrocarbures et divers autres consommables polluants
Installations industrielles hors Mine et Usine	Démantèlement des installations industrielles hors usine et Mine		295 000 000	déséquipement
Usine de traitement et autres installations de surface	Démantèlement des installations industrielles de surface (usine et annexes, hydrocarbures, remblayage et centrale électrique)		2 500 000 000	démantèlement, démolissement et décapage des aires des installations de l'usine de traitement, ses annexes et les autres installations industrielles de surface et transfert des déchets vers la verse à résidus
		Total site industriel	2 942 000 000	

VERSE A RESIDUS

Activités	Description		Total	Commentaires
stockage résidus radioactifs	circonscription reprofilage, recouvrement et merlonnage		1 045 139 530	rassemblement de tous les résidus radioactifs, reprofilage, recouvrement et copotage de la verse à résidus finale avec une couche de l'argilite et du gré
			39 857 600	constitution d'un merlon de sécurité autour de la verse recouverte
		Total VERSE A RESIDUS	1 084 997 130	
Charges liées au fonctionnement des structures internes de SOMIDA pendant les travaux (forfaitaire)			1 000 000 000	
		TOTAL	5 906 070 382	
		INCERTITUDES	590 607 038	10% du TOTAL
maintien du système de surveillance des travailleurs, des populations et de l'environnement, entretien de ouvrages		SURVEILLANCE	500 000 000	cinq (5) ans de surveillance
		TOTAL travaux techniques	6 996 677 420	volet technique
		Montant en Euros	10 665 667 €	

Recommendations:

1 - **Underground Mining Works**: In relation to the option of redeveloping the underground mining works
List of studies to be compiled if already carried out or to be carried out during the operations or before the implementation of this option

- Flooding study of underground mine workings based on :

- Studies of the characteristics of the different geological formations above and below the deposit,
- The geotechnical studies used to select the mining method and the various support methods,
- Geotechnical data collected during the operation.

- Mine flooding modelling studies
- Studies of the impact of flooding on the quality of groundwater and the contact and exchange of water contained in the underground structures and the different water tables

Comment on the company's decision to use mill tailings as a component of the cemented backfill at the Mine:

- The highly chemical nature of this product may be a reason to question the only reasonable option for dealing with underground mine workings and may be a dark spot in the process.

- **Day/ground connections: Downspouts and ventilation stacks**: as the subject of water and aquifers is very sensitive, it is preferable that the routes of these structures be drawn up, highlighting the areas where the different aquifers in the region are crossed. It will be the main document for arguing the treatment options for these structures.

2 - **Tailings disposal site**: relative to its final configuration created by the site redevelopment works
The tailings disposal site: the company must carry out additional geological studies, with a view to integrating other radioactive and non-radioactive waste into the tailings disposal site and monitoring its evolution and potential impact on the water table.

3 - **Covering materials**:

The choice of covering materials

Investigate the site and its surroundings with a view to locating and characterising as exhaustively as possible the materials likely to meet the company's needs in terms of the construction of structures (dams, runways, etc.) and the various treatments during the site redevelopment phase.

4 - **Implementation of source terms** :

In general, the location of source terms that are very sensitive from the point of view of environmental risks (treatment plant, liquid tailings ponds, tailings pits, chemical and other hydrocarbon storage areas) must be subject to studies whose results will allow the company to make the best choice and prevent certain environmental accidents that could have a lasting impact on all treatment actions.

5 - Hot water settling tanks

The DASA process includes a hot water treatment plant. In order to avoid production stoppage in case of unavailability of the hot water treatment system, it would be necessary to provide a storage tank for the cleaning water from the filtration process.