THE ENVIRONMENTAL IMPACTS OF THE ASPHALT MIXING PLANT IN ALGERIA CENTRAL CASE STUDY OF CONCRETE IN HENNENCHA (W.Souk ahras)

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ABSTRACT
The purpose of the environmental impact assessment is to determine the integration of a project into its environment by identifying and assessing the direct and/or indirect effects of the project, and verifies that the project in question complies with environmental protection requirements.algorithm is presented in a Nuclear Magnetic Resonance (NMR) context.
This research reports on a study carried out to evaluate the impact of the implantation of a concrete plant to determine the environmental consequences in the commune of Hennencha (wilaya of Souk ahras).
In Algeria since the promulgation of the law on environmental protection in 1983. This study is original insofar as this "inventory" of environmental assessment capacity has never been carried out in Algeria. Environmental assessment processes are not adequately linked to environmental management and decision-making processes.
Keywords: Pollution, industry, environmental impacts; preservation, Algeria.

1. INTRODUCTION
The construction industry is an important sector of activity. The construction industry is an important economic driver. This is true both economically and in terms of the jobs it generates[1]. The construction industry is an important economic driver, as are thousands of jobs in other sectors[3].
Algeria faces serious problems of industrial pollution, and the industrialization process has been carried out until recently without taking into account the necessary environmental precautions. Pollution caused by the discharge of untreated industrial water, gas emissions and the production of hazardous waste, the management of which has not yet found solutions, pose serious environmental problems[2].
The purpose of this study is:

- To describe the implementation of the asphalt mixing plant already in operation and the future project of the concrete mixing plant,
- To define the origin, nature and extent of the inconveniences generated by the activities of the plants on the environment, in normal operation,
- To define the technical, human and organisational measures taken to reduce the nuisances generated,

assess the residual impact of the facilities on the environment.
The description of the initial state takes into account the location of the land on which the coating plant is located and the surrounding environment within a perimeter likely to be impacted by the project.

2. METHODOLOGY
Our methodological approach will be related to the problem and the object of the research.
Our work presented on a limited documentation: general works, statistical data, and cartographic documents, which we used are available at the level of urban administrations: the "DUC" direction of urban planning and construction of Souk ahras and Hennencha, the direction of environment and industry.
- Firstly: the collection of statistical information, data and all the documents concerning the site, without forgetting our contacts with the different services.
- Second: The field survey to deepen our analysis.
- Thirdly: After the collection of information and the field survey, we proceeded to the exploitation and the analysis of the impacts of the industrial unit on the site.
- Fourth: Synthesis of data and surveys for the proposal of recommendations.

3. MATERIALS AND METHODS

3.1. Environmental Generalities

3.1.1. Geographical location

The commune: The commune of Hanancha wilaya of Souk Ahras is located about 20 km southwest of Souk Ahras[14] (fig.4).
- City: Wilaya of Souk Ahras
- Country: Algeria
- Daira: Mechroha
- District : Hanancha
- Population : 15790 hab.
- Coordinates: 36°13'00" North; 7°50'00" East

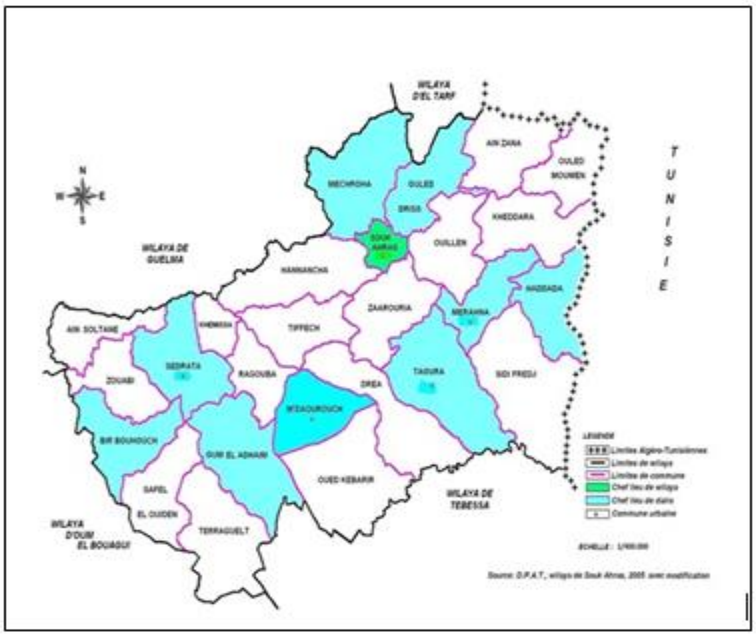

Figure 1. Situation of the commune of Hanancha wilaya of Souk Ahras

- Access to the town :

Coming from Annaba, one reaches it by the N20 then the N81 and finally the way of the wilaya W19A[13]. On the other hand if you come from Souk-Ahras access will be by the N16 then the N81 and finally the path of the wilaya W19A .

Figure 2: Satellite access to the site

3.1.2. Operating principle of the coating plant

The site's activity will be the manufacture of road asphalt through an asphalt mixing plant. The aggregates stored on the storage area will be taken over by a loader and dumped into the plant's pre-dosed feed hoppers. These hoppers allow the basic aggregates (gravel and sand) to be accurately dosed into the asphalt mix in given proportions. To ensure good adhesion of the binder (bitumen) to the aggregates, it is necessary to dry the materials and heat them. The energy required for these operations will be supplied by a gas-powered system[4]. The role of the dryer drum is :

- To evaporate water from the aggregates;
- To heat the aggregates,
- To coat dry aggregates with bitumen

- .PROJECT PRESENTATION

This project consists of the construction of a unit consisting of a concrete plant for the manufacture of ready-mix concrete and certain derivatives, as well as a coating plant whose activity started in 2010[12]. The land subject to the study is located in EL-MRIS, commune of HANANCHA Wilaya of Souk-Ahras, with a surface area of 19,000 m2.

3.1.3. Asphalt production activity

An asphalt mix is made from a homogeneous mixture of aggregates, bitumen and additives.basically, the manufacture of asphalt mixes is marked by the existence of two production systems: continuous or discontinuous
Continuous mode: this is practiced in an open mixer where the flow of granular components[7], hydrocarbon binder and possible additives are continuous. These characteristics are as follows:

- Aggregates and bitumen are dosed continuously;
- The mixing is done continuously;
- The formulation is unique.

Discontinuous mode: it proceeds from a manufacture by batches made up of weight doses of the constituents successively introduced into a closed mixer[12]. These characteristics are as follows:

- Aggregates and bitumen are weighed in batches;
- The mixing is done by batch;
- The formulation is multiple (grocery type).

The discontinuous system is carried out from a fixed plant[5]. The continuous system uses fixed or mobile plants.
Composition :
Upstream of the mixer, the granular composition can be definitively established by the granulate dosers adjusted to respect the product composition formula. This operation can be carried out in discontinuous mode, by screening and hot granular classification when the components do not have granulometries that comply with standards. In the latter case, it is the screening operation that must condition the recomposition by weighing of the final product[7].
Downstream of the mixer, the delivery of the hydrocarbon product can be done in a similar way for both modes: either directly into trucks or through storage silos[6].
The continuous mode is more particularly adapted to construction sites of all tonnages with single mix formula with granular components complying with standards.

4. RESULTS AND DISCUSSION

4.1. Pollutant flow estimates

4.1.1.Domestic Wastewater

The domestic wastewater produced will not be toxic. It will be connected to the existing toilet cubicle in the field and then discharged into a communal pit .

- **Sprinkling water**

The water will be used to control dust emissions on site that may be produced by the evolution of equipment on site (trucks and loader).

- **Process water**

Water is not used in the process for the asphalt mixing plant and the water used for concrete preparation suffers no (or very minimal) losses since it is incorporated directly into the mixer. There are no industrial discharges[8].

- **Stormwater**

Rainwater comes from atmospheric precipitation and will be disposed of naturally The site is located high up.
Runoff on the ground is mainly loaded with suspended solids (TSS) after leaching from the waterproofed surfaces and traces of hydrocarbons leached from roads or from vehicles passing through and parking. This runoff on the platform is likely to result in solid residues and hydrocarbons. It is therefore useful to collect this water separately (separation of process water, including soiled rainwater, from strict rainwater).
This pollution generated by run-off is difficult to assess and quantify, and depends on several factors[9]:
- The average slope of the ground which determines the conditions of flow and the entrainment of particles,
- rain characteristics (storm rain),
- period of dry weather prior to rain (which determines the amount of material likely to be present on the ground).

- **Wash water**

The most loaded effluent comes from concrete returns (mixer bottoms, incomplete or refused deliveries). Washing allows the concrete residues to be returned to a very liquid state. The effluent generated by these operations is highly loaded with aggregates and laitance.
pH 12-13
Suspended solids 5,000 to 300,000 mg TSS/L
COD 400 to 2500 mg/L
Acute toxicity 2 to 15 equitox/m3
Metals :

Al 0.2 to 12 mg/L
Fe 0.2 to 7 mg/L
Zn 0.2 to 1.3 mg/L
Cr as Cr^{6+} 0.1 to 0.4 mg/L
Cu 0.05 to 0.2 mg/L
Ni 0.05 to 0.2 mg/L
Pb 0.1 to 0.15 mg/L

Adjuvants (delaying effects, plasticizer, colouring, ...) would be responsible for the organic filler content (COD). Hexavalent chromium, a very toxic element, comes from cement.

4.2. Compensatory measures taken and planned

4.2.1. Consumption and water supply

A periodic analysis of water consumption will be implemented.

- **Sanitary waters**

Given the personnel present on site, this rejection can be considered marginal. In the absence of a PEA network, the wastewater is collected in a common pit that must be emptied at least twice a year.

- **Watering water**

We saw earlier that the water used will not undergo any treatment. The associated discharge may therefore be assimilated to rainwater.
This water will essentially be loaded with mineral matter due to its use in controlling dust.

- **Rainwater and washing water**

Water from the impermeable areas of the site will be collected and directed to a mud/oil separator (fig.19) which will limit TSS to 30 mg/l and hydrocarbons to 5 mg/l. This mud separator will be equipped with a manual valve for closing in case of fire. The rainwater freed of hydrocarbons will then be directed to the nearest municipality's network.

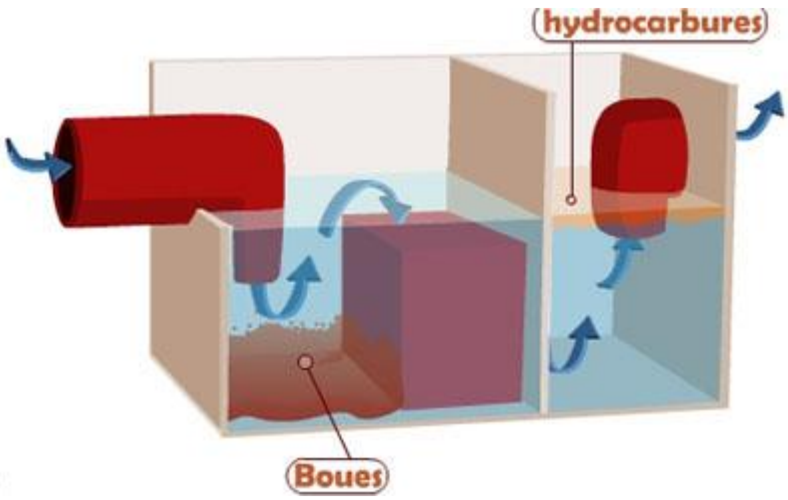

Figure 3. schéma de fonctionnement d'un débourbeur/déshuileur

4.3. Compensatory measures taken and planned

4.3.1. Dust emissions

The control of dust emissions will be achieved by watering the areas where trucks travel (especially during dry periods). The raw material (sand, gravel...) located in the immediate vicinity of the asphalt plant (fig.4) must be separated by walls in order to limit dust dispersion[13].

Figure 4. Unseparated raw material; b) Separated raw material (*photo taken by the author, 2019*)

The equipment of the 2 power stations will be equipped with systems to prevent dust from flying away.
Coating station :
- pre-dosing units,
- of the conveyor overturning,
- filler stock vents (or "fines" = sands and dusts with a cross-section of less than 80 micrometres). These elements, naturally present in small quantities in the aggregates, are essential for coating the binder (the bitumen) with the aggregates, as it is the fines that aggregate the bitumen) which will be equipped with filter bags.

Concrete batching plant :
- Covering of all the aggregate conveyor belts as well as the room containing the mixer,
- The installation of a dust filter for cement storage silos.

If necessary, the finer aggregates will be sprayed with water, which will prevent dust from flying away.

4.3.2. At the dryer drum of the coating plant

The power plant's drum dryer will be equipped with a dust filter whose role is to recover a maximum of fines carried by the combustion gases from the drum dryer[10]. These fines are then reintegrated into production at the mixing stage.

In order to avoid accidental emission of large quantities of dust, a certain number of maintenance and safety operations will be carried out on the dedusting installation[11]. These operations will aim to ensure the efficiency of the dust removal system (checking that the filter is tight and that the filter bags are in good condition). The control operations will concern the temperature of the gases at the dryer outlet. These operations can induce risks:
- Clogging of the fabrics if the temperature is too low (the filter performance is then reduced),
- Corrosion in the dust collector and damage to the fabric if the temperature is too high.

The overall efficiency of the dust collector is defined as the ratio of the mass of particles retained to the mass of particles entering the dust collector[12].
The overall efficiency of the dust collector is defined as the ratio of the mass of particles retained to the mass of particles entering the filter. The dust collector to be installed must have a high efficiency, i.e. a minimum of 92%. 33,000 Nm3/hourly dust flow at the filter outlet is a maximum of 1.32 kg/hour, i.e. a maximum concentration of 40 mg per Nm3 of smoke.
For combustion products
The installation works with diesel fuel. In order to minimise the risk of fire and thus air pollution, it would be more sensible to switch to natural gas.
Height of the chimney
The height of the chimney of the current station is 23 m, which is much higher than the minimum imposed by the regulations, which is 10 m. The flow rate at the chimney outlet is 33,000 Nm3/h for a section of 0.50 m2 (D=0.80m). The gas ejection velocity will therefore be 18.2 m/s.
Please note the following:
The presence of silica in the dust is possible. Their quantification is however impossible, but given its mass, silica dust will mostly settle in the immediate vicinity of the crushing point.

4.3.3. Vehicle Traffic

The following measures concern traffic on the site in order to limit pollutant emissions:
- Reduced speed vehicle traffic on the site,
- Stopping the engines of vehicles parked on the site,
- Rigorous engine maintenance and servicing.

4.3.4 Odours

The plant's atmospheric emissions will be channelled through a stack with a maximum height of 23 m. The gas ejection will be carried out at a speed of about 18 m/s, which will prevent odour reduction at the level of the nearest dwellings located about 600 m from the site.
It should also be noted that the prevailing winds are mainly from the North-West, where there is a total absence of dwellings or crop fields. Consequently, the exposed sector will be the activity zone itself.

4.4. Analysis of Gross Environmental Effects

Due to its activities, the traffic associated with the site's activities is of two kinds, namely :
- Incoming material deliveries,
- Shipments of finished goods,
- Raw material storage areas.

Truck traffic will be around 4,000 to 5,000 trucks per year (receiving materials and bitumen and shipping asphalt) and will be about double after the concrete plant is started up.

4.4.1. Compensatory measures taken and planned

The development of the activity zone has been dimensioned for the traffic associated with the site's activities. Vehicles circulating on the site will be subject to the traffic rules that will be defined there (speed limits, direction of traffic, parking area...). Delivery / shipping schedules will be included in the opening hours of the site, more precisely from 7am to 2pm or 8am to 3pm depending on the period of activity. The storage area is located on a plot of land about 300 m from the station, rented by the company

Figure 4. Storage area (*photo taken by the author, 2019*)

4.4.2. Health Effects

The overall approach is to assess the full range of human health effects that may be caused by the site's activities during normal operations.

- **Initial site condition**

The initial state of the site is described in more detail in chapter 4.2 of this impact assessment.

Surrounding Populations

Given the display radius and the environment of the site, this population is not representative of the population likely to be concerned by a health risk[13].

Identification of health impact vectors

The potential impact of the asphalt plant on human health can be achieved through 3Vectors

- the waters;
- noise;
- air.

- **Water Vector**

Potential water pollution at the site is related to rainwater runoff, which could affect human health by infiltrating into groundwater for drinking water supply[10], but the potential for groundwater contamination is limited, given the limited availability of water for drinking water supply:

- The absence of the use of potentially polluting products in processes,
- The treatment of rainwater by means of an oil separator,
- Domestic sewage collection from a communal pit,
- From the installation of the site on a rocky mountain.

The health risk resulting from groundwater pollution is therefore very unlikely.

- **Noise vector**

Noise is harmful when it becomes aggressive or not accepted, which can vary according to the individual, the geographical context and the characteristics of the noise (origin, frequency, duration, etc.).

Noise pollution can then have harmful consequences on health and psychological balance. The reactions it causes involve the whole organism by generating stress: cardiovascular, neuroendocrine or emotional reactions.

The consequences can be the following:

- loss of concentration,

- tired,

- irritability,

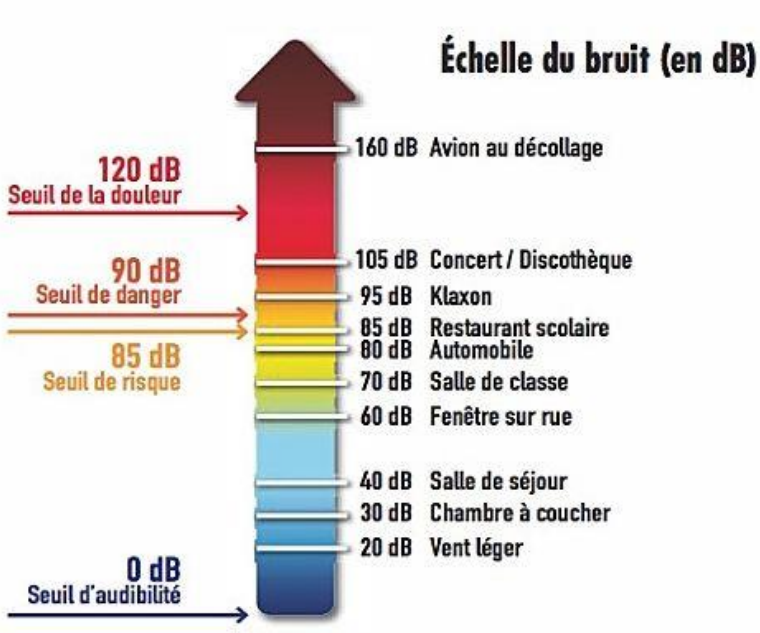

Figure 5. Noise scale

The noise levels to which we may be exposed range from 10 dB (corresponding to a recording studio) to 130 dB (take-off from an aircraft). Above this higher level, the hearing system suffers irreversible damage.
The site is characterized by a sound environment mainly related to the traffic of trucks, machines and the station.
Acoustic measurements must be carried out on the site to verify the permissible noise levels dictated by the regulations.

- **Air Vector**

The main discharges from the site's operations come from the asphalt plant's dryer drum. The atmospheric discharges from the plant's dryer drum correspond to heated bitumen vapours that may contain polycyclic aromatic hydrocarbons and natural gas combustion products (mainly CO, CO2 and NOX).

5. CONCLUSION

The present impact study made it possible to characterize the site's environment in terms of the various human and environmental issues.
The impacts of the activities were also analysed on the different vectors of pollution (water, air, noise, waste, etc.).
Given that the site is located in an area with no housing and no cultivated fields, as well as the provisions put in place and planned, the installation is not likely to disturb the environment in terms of its impact on the landscape and biodiversity. Products likely to be released significantly to the outside have been identified, and the gaseous releases from the site are mainly gases emitted by the asphalt plant's dryer drum.
Consequently, only atmospheric releases from the asphalt plant's dryer drum will be studied in determining health effects. In addition, due to atmospheric pollutants, only inhalation exposure will be considered.
The few recommendations for environmental protection mentioned in this study will have to be respected and applied.

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