
CHAPTER VII

ENVIRONMENTAL IMPACT ASSESSMENT AND CONTROL MEASURES



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A. PRODUCTION LINE AT THE NGHI SON CEMENT PLANT

7.1. AIR ENVIRONMENTAL STATUS IN PROJECT AREA.

At present, Nghi Son Cement Corporation have a cement production line with the capacity of 2.15 millions tons of cement per year, with modern and advanced technology. The Plant is located at Hai Thuong commune, Tinh Gia district, Thanh Hoa province. Raw material sources of limestone and clay were exploited at Hoang Mai limestone mine in Quynh Loc commune, Quynh Luu district, Nghe An province and at Truong Lam clay mine in Truong Lam commune, Tinh Gia district, Thanh Hoa province.

NSCC has been carrying out strictly environmental pollution monitoring with annual frequency of 4 times / year.

Based on the result of environmental situation survey at plant area in 2003, it can summarize the environmental situation of the whole plant area as follows:

7.1.1 The air environmental quality:

a- The air environmental quality in plant site area

The recent results of environmental status monitoring at normal operation of the existing production line is as follows:

Air quality at sampling points surrounding plant site

No.	Sampling points	Parameter	Concentration (mg/m ³)			TCVN standard
			Morning	Afternoon	Evening	
1	At office of the People Committee of Hai Thuong commune	Dust	0.12	0.18	0.11	0.3(*)
		SO ₂	1.00×10 ⁻³	2.22×10 ⁻³	< 0.50×10 ⁻³	0.5(*)
		CO	4.0	4.2	3.8	40(*)
		NO ₂	0.035	0.040	0.041	0.4(*)
2	The Guest House of Corp.	Dust	0.11	0.10	0.08	0.3(*)
		SO ₂	< 0.50×10 ⁻³	0.84×10 ⁻³	< 0.50×10 ⁻³	0.5(*)
		CO	4.2	4.1	4.4	40(*)
		NO ₂	0.038	0.041	0.037	0.4(*)

Note: (*) TCVN 5397 – 1995: The ambient quality standard of Viet Nam.



The above results were measured by the method of average sampling and analyzing for one hour and according to TCVN 5937 – 1995, giving the remark as follows:

The concentration of dust, SO₂, CO and NO₂ measured at sampling points surrounding Nghi Son cement plant less than the permitted concentration of applied standard.

Air quality at sampling points in plant site

No.	Sampling	Parameter	Concentration (mg/m ³)			TCVN standard
			Morning	Afternoon	Evening	
1	In front of the conveyor	Dust	0.12	0.15	0.11	2(**)
		SO ₂	0.51.00×10 ⁻³	1.62×10 ⁻³	0.61×10 ⁻³	10(**)
2	At fence of the Plant in the North-Western	Dust	0.14	0.12	0.10	2(**)
		SO ₂	0.56×10 ⁻³	1.25×10 ⁻³	< 0.50×10 ⁻³	10(**)

Note: (**): The permitted standards of air pollutants in the workplaces (according to the Decision No 3733/2002/QĐ-BYT- The Ministry of Health)

- The average concentration of CO at the sampling points in plant site is 2,0 - 0.45mg/m³ less than permitted standard.
- The average concentration of NO₂ at sampling points in plant site is 0,257- 0,04 mg/m³ less than the permitted standard.

The figures of the concentration of dust, SO₂, CO and of NO₂ are lower than the permitted standard.

b- Air quality around limestone mine

Based on the results of the dust concentration measurement around limestone mine as described in detailed environmental impacts assessment report, result in the remark as follows:

The concentration of dust measured in the residential area surrounding the limestone quarry is less than the ambient air quality standard (TCVN 5937-1995).

The concentration of dust measured at the gate of the material storage and the limestone crushing station fluctuated from 0,10 to 1,69mg/m³, are less than the standards of the Ministry of Health (according to the Decision No. 3733/2002/QĐ-BYT).

c- Air quality around Clay quarry.



Based on the results of the dust concentration measurement around clay mine as described in detailed environmental impacts assessment report, result in the remark as follows:

All the concentrations of dust measured in the residential areas surrounding the clay mine at sampling points are less than the Vietnamese Environmental Standards (TCVN 5937-1995).

7.1.2 Water quality of project area.

a- Wastewater quality

- Industrial wastewater quality

The fundamental data from analyzing two samples of wastewater that taken at outlet of plant's sedimentation pond are as follows:

No.	Parameter	Unit	Result		TCVN 5945-1995(class B)
			Sample 1H	Sample 2H	
1	Temperature	°C	26,4	26,4	40
2	PH		8,02	7,59	5,5 - 9,0
3	DO	mg/l	6,81	7,25	-
4	TSS	mg/l	1,0	2,5	100
5	COD	mg/l	27	40	100
6	BOD5	mg/l	6	9	50
7	N-NH3	mg/l	0,01	0,03	1
8	Total N	mg/l	0,03	0,25	-
9	Total P	mg/l	0,28	0,35	6
10	Total oil	mg/l	0,12	0,25	1
11	E.coil	MNP/100ml	850	1,600	-
12	Total Coliorm	MNP/100ml	1,980	8,300	10,000

Note: TCVN 5945 - 1995: Industrial wastewater standard. (Class B: industrial wastewater. If the industrial wastewater with the values of parameters and concentration of pollutants lower than or equal to those specified for class B can be discharged into the water system of irrigation etc).

Sampling points:

1H - Outlet of sedimentation pond in front of the plant.

2H - Outlet of sedimentation pond at the end of the plant.



Remark:

The results of concentrations of pollutants in the wastewater samples that taken at outlet of plant's sedimentation pond meet the permitted standards (TCVN 5945-1995, class B).

- Domestic wastewater quality

Sampling points

Sample 1T: Outlet of guesthouse's septic tank

Sample 2T: Outlet of domestic wastewater treatment at worker's houses.

Based on the results of analysis as described in detailed environmental impact assessment report, results in the following remark:

The concentrations of pollutants in the wastewater of the guesthouses and worker houses almost meet the Domestic Wastewater Standard. (TCVN 6772 - 2000, level III - guesthouses, boarding houses).

d- Coastal water quality.

Sampling points:

Sample 1B: Seawater at Nghi Son Jetty area.

Sample 2B: Seawater at Fish Port of Nghi Son Island.

Based on the results of analysis as described in detailed environmental impacts assessment report results in the following remark:

The concentrations of almost pollutants in the coastal water at Jetty area meet the coastal water quality standard. However, total coliform with concentration of 8200 MNP/100 ml is higher than the permitted standard (according to TCVN 5943-1995).

The concentrations of almost pollutants in the coastal water at Fish Port of Nghi Son Island meet the coastal water quality standard. However, the total coliform in the sample coastal water taken from Fish Port is higher than the permitted standard (according to TCVN 5943-1995).

7.1.3. Ecological environment.

Nghi Son cement plant locates in area where is planned to be Nghi Son industrial zone in future. Generally, ecological environment in the project area is now being paid special care, because there are some residential villages surrounding the project area. However, owing to 3 sides of project location are enclosed by some row of mountain, remainder adjoins the sea and NSCC have also implemented properly the environmental protection regulations therefore the impacts on ecological environment in the project area are not so much.



Environmental status assessment in Nghi Son cement plant site is described in detailed environmental impact assessment report for 2nd production line project of NSCC, which was set up by Thanh Hoa environmental science and technology Central.

7.2 THE MAIN FACTORS CAUSE THE ENVIRONMENTAL IMPACTS.

To assess the environmental impacts caused by activities of project, the project was separated into two phases:

- The first phase: Project in the period of ground preparing, construction and erection.
- The second phase: During the period of operation.

7.2.1-During the process of ground preparing, construction and erection.

Main environmental impacts include:

- Dust caused from excavation, discharging of sand, soil and of building material.
- Noise caused from machines, equipments during the operation.
- Air emission emitted from machines, equipments and material means of conveyance during operation.
- Liquid waste from means of erection, construction and of conveyance such as waste oil, grease...
- Solid wastes during the erection and construction.
- Liquid wastes during daily activities.

So that, during this phase, the concentrations of pollutants are calculated as follows:

a- Dust:

The concentration of dust is higher than permitted standard is about 3 - 4 times. In some cases, for instance when discharging material, the concentration of dust is higher than permitted standard from 5-15 times, mainly consisting of sand, soil, stone and cement dust. The concentrations of pollutants in air emitted from machinery, equipment during operation will raise 1- 1,5 times and may temporarily raise to 2- 3 times within a radius of 20 - 30 m, but those concentrations are still less than permitted standards (according to TCVN 5937 - 1995). Although there are not danger dust, but it will cause impacts on worker's health as well as cause environmental impacts.

b- Noise:

Noise comes out of workplaces during construction and erection will exceed permitted noise level from 10 dBA to 20 dBA. Especially for leveling and bulldozing sites, noise level will last continuously throughout the working days,



and may suddenly raises over the level of 80-90 dBA within a radius of less than 100m. Though the sudden raising is only temporary but that still causes environmental impacts and influences on the residential villages in the area.

c- Waste gas impacts:

Waste gas emitted from means of executing the work, of conveyances with the main components including dust, CO, CO₂, petrol gas. Especially waste gas emitted from all leveling and bulldozing machines that utilizing the fuel of diesel in large consumption during continuous operation. Majority of waste gas will be dispersed into the air because of the airy terrain of project area, therefore its impact on the around environment is inconsiderable. By the estimation showed that depending on each pollutant, the concentrations of pollutants in waste gas can rise to 3-5 times within a radius of less than 100m. Out of the radius of 300m, the pollution impact is lessening, and out of the radius of 500m, it is almost no impact.

d- Solid wastes:

During the period of construction and erection the solid wastes include surplus materials or dropped materials, the wasted wrappings etc., though their quantity is not great but those wasted matters is difficult to be decomposed. They can be collected for re-use or for the use of land filling depending to the kind of solid wastes. The treatment methods for solid wastes are described in section of the measures for environmental pollution control.

Solid wastes from the daily activities of more than 2000 workers at construction site estimated about 1500 kg/day. Components of domestic solid wastes are comparatively multiform, including organic matters, wasted wrappings, nylons, empty bottles and dregs, wasted boxes, of which organic matters are main component. With small quantity but they will be able to cause the negative influences on worker's health as well as environmental negative impacts in area.

e- Liquid wastes:

Liquid wastes include waste oil, grease etc., which are wasted from means of executing the work at the construction site, quantity of those is inconsiderable but causing seriously specific pollution.

When it rain heavily, the run-off rainwater from the construction site with waste oil, waste grease, suspended solid, organic matters, stool, piss... can affect the surface water in the region. But due to small area of construction site and quantity of liquid wastes is not great, consequently the dispersion of liquid wastes into around environment as well as its impact on surface water quality in region is inconsiderable.



With the regular presence of more than 800 persons at construction site, daily utilizing water quantity in an average can amount to 100-150litres and will discharge about 80-90m³ of wastewater. If using the temporary water - closet or temporary bath - washing house, it will make negative influences on surface water sources in region, however that influences are inconsiderable if applying the strict measures of management for collecting the liquid wastes at the construction site.

SUMMARY TABLE FOR ENVIRONMENTAL IMPACTS DURING 2nd PRODUCTION LINE CONSTRUCTION AND ERECTION

Source	Pollutant / factors	Impact
Means of conveyances.	- Temperature - Dust, soil, limestone, sand. - Air emission: CO₂, CO, NO_x, SO_x, - Petrol gas, oil, grease...	- Cause impacts on worker's respiration working directly at construction site as well as impacts making reduction of agricultural productivity. - Cause influences on surface water source and on domestic water.
Means of executing the work.	- Noise - Vibration	- Influence on human health. - Making a decrease in solid of private buildings.
Executing workforce	- Domestic waste matters. - Social evil.	- Water source. - Ground. - Social peace and order. - Fluctuation of price on the market. - Epidemic
Erection and construction for equipment.	- Job accident - Waste matters during executing the work like brick, cement, empty bag, and cargo boxes.	- The loss of human. - Influence on electric supply system. - Influencing directly on worker's health. - Influencing on environmental clean and human health.

7.2.2 During the period of operation

7.2.2.1. Impacts assessment of exploitation and transportation of materials on environmental and socioeconomic aspects.

a) Impacts of limestone exploitation.



Limestone was exploited by drilling and explosive method after that being crushed to required size and then being transported to plant site by the long belt conveyor of 10km in length.

The following facts may cause impacts on the environment:

- High noise level: the noise exposed during exploding mines can reach higher than 100 dBA within a 100m distance.
- High vibration level will also occur within a 250m radius from the mine exploding point.
- High dust concentration will occur. The dust will affect mostly health of the workers and residents in the surrounding area. If limestone is used at a rate of 2,342,000 ton/year, the dust quantity is estimated as high as 1,834 ton/year in case without any treatment (according to the World Health Organization's WHO assessment).
- Small pieces of limestone can be spreaded away to the surrounding fields and may cause accidents for workers if they do not have proper prevention measures.
- Rain run off through the exploitation area accompany with solids into the crop fields and might cause surface water pollution and bring hazard to aquatic life in the region.
- Limestone exploitation can certainly influence cultural values and change landscape of the region.
- The noise and vibration can affect wild life of the region. Thus, to prevent negative impacts on the environment and human health, the impact reducing measures need to be applied with appropriate control and treatment measures.

b) Impacts of clay exploitation.

- Pollution caused by dust:
Clay exploitation will certainly release dust, especially during summer as clay particles can be blown with the air. The estimated rate of the clay mixed into the air is 0.134kg/ton clay.
- Noise: During clay exploitation can cause noise up to the level of 91dBA.

7.2.2.2. Impacts of the operations of the plant on environment and socioeconomic aspects.

7.2.2.2.1. Impacts assessment on the air environment:

Beside the impacts caused by the operation of 1st Production line on environment, for 2nd Production line project, the sources causing air environment pollution mainly includes:



a/ Dust and air emission sources come out of production processes.

- Receiving, crushing and storing process for Clay.

Dust mostly comes out from Clay receiving hopper of crusher, from the chute locations or transitional places among conveyors and from Tripper, Reclaimer at storage yard during operation.

- Receiving process for Limestone, additive, sand.

Dust mostly comes out from transitional places among conveyors, discharging places into storage yards and from storage yards when stacking and reclaiming equipment in the stockpiles operate.

- Receiving and feeding process for coal, bauxite, for ferrite, for gypsum:

Mainly pollution source is dust, which comes out from receiving hopper, transitional places among conveyors and from discharging places into stockpile, from stockpile when stacking and reclaiming equipment operate.

- Dosing and feeding process:

Pollution causing source is mainly dust comes out from storing hoppers, belt weight, conveying system and from transitional places, chute places.

- Raw mix milling process:

Pollution source is mostly dust, which comes out from discharging places, from the air emission and from raw mix milling process.

- Raw meal homogenizing and kiln feeding process:

Raw meal was transported to the top of silos by bucket elevator, then was charged into kiln feed bin. In this process, dust mostly comes out from bucket elevator, transitional places among air - slides and from discharging place of kiln feed bin into air - slide. After the raw meal pass through the dosing scale, then going into the suspension pre-heater, here dust mostly comes out from the raw meal charging and discharging places for meal feeding scale.

- Burning and Clinker cooling process.

Pollution source is mainly air emission emitted from raw meal burning. Waste gas comes out from Clinker burning process either is used to dry raw mix in the raw milling process or pass through conditioning tower, then going into electric precipitator before scattering into the air through a stack. Exhaust gas comes out from clinker cooling process pass through electric precipitator in order to collect dust, before going into coal milling like drying gas and then is scattered into the air. Most of dust comes out from chute places of conveying equipment and clinker charging points into silo.

- Clinker storing and distributing process:

Most of dust comes out from clinker discharging places out of silo, storing hopper and transitional places among conveying equipments.



- **Coal milling process.**

Pollution source within this process is similar to raw mix milling process. Dust mostly comes out from the transitional places among conveyors and from coal charging place into coal storing bin. For this process, pulverized coal and hot gas will be driven into Bag filter, after that hot gas and inconsiderable small amount of dust will be discharged into the air over a stack.

- **Cement milling process.**

Dust mostly generated from material transitional places among conveying equipment, especially that being at cement charging places into containing silo.

- **Packing and dispatching process for cement.**

By using modern and advanced equipment, consequently for this process dust mainly generate from bag cleaning device and incorrect bag - breaking device.

- **Material, fuel receiving and product shipping process.**

Dust mainly generated from transitional places among conveying equipments, especially for ship - loading and ship - unloading places.

Remark:

Sources cause the air pollution for project will be mainly:

- Noxious gas, dust generated from burning and milling processes.
- Dust generated from crushing, transporting process for material, fuel, clinker and cement.

The typical air pollution sources during operation of the plant will be:

- Dusts of coal, limestone, gypsum and clinker, cement.
- Noxious gas emitted from the coal, oil burning like SO_x, CO_x, NO_x and VOC - evaporated organic compounds.

Above dusts and gases are all harmful, so in order to ensure air quality in the production site, simultaneously to ensure for the health of workers who that directly work during the operation of plant as well as for residential villages surrounding the project area. In the process of investment of 2nd production line, attention has been paid on the selection of technology and equipment meeting the requirements on environmental protection.

For treating the dust, at all dust releasing sources like crushing, milling, materials, fuel and products transporting, the new production line will be equipped with the dust collectors to ensure the dusts concentrations after dust collectors are lower than or equal to 30mg/Nm³, equivalent to existing production line's. Advanced and modern burners will be used for the purpose of complete fuel burning with the low content of NO_x, SO_x, CO.

b) Calculation and prediction for air pollution.



Predictive pollution load generated from all wasted sources of the Plant according to the WHO's assessment are calculated as follows:

**Predictive pollution load generated from all wasted sources
of 2nd production line - Nghi son cement Plant**

No.	Activities	Pollution coefficient according to WHO (kg/ton of Clinker)				Pollution load (ton/year)			
		Dust	SO ₂	NO ₂	CO	Dust	SO ₂	NO ₂	CO
1	Coal storage	0,1				182,7			
2	Coal milling and screening	0,02				3,65			
3	Raw material storage	0,14				255,8			
4	Raw material crushing and screening	0,02				36,5			
5	Raw material conveying	0,075				137,0			
6	Clinker burning	0,34	1,02	2,15	0,3	621,2	1863,5	3928	
7	Clinker cooler	0,048				87,7			
8	Clinker storing	0,12				219,2			
9	Clinker grinding	0,05				91,4			
10	Cement storing	0,13				237,5			
11	Cement shipment	0,01				18,3			
	Total					1753,95	1863,5	3928	

Thus, pollution loads from different sources calculated according to pollution coefficient in the case that the waste gas treatment systems operate normally, each year will be: 1753,95 tons of dust, 1863,5 tons of SO₂ and 3928 tons of NO₂.

In the case that the electrostatic precipitator system is out of work (break-down), in process sections using electrostatic precipitator, pollution load will raise, but only last in a short time.

The concentrations of pollutants of waste gas at the outlet of stacks demonstrated in following table:

The concentrations of pollutants of waste gas at the outlet of stacks



Stack	Air emission flow (Nm ³ /h)	Pollutants	Concentration (mg/Nm ³)	TCVN 5939-1995 mg/Nm ³	
				A	B
At the kiln H: 80 m D: 5,4m	462600	Dust	30	400	100
		SO ₂	532.7	1500	500
		NO ₂	980	2500	1000
At the cooler H10m x D4,2m	300000	Dust	30	400	100
Coal milling	75000	Dust	30	400	100

Comparing the concentration of pollutants of air emission at the outlet of stacks (in case that electrostatic precipitators are in operation) with the air emission criteria show that:

The concentration of pollutants of air emission at the stacks is lower than permissible standards.

Predictive level and area of air pollution:

Based on the characteristic of pollution sources and meteorological data of the project area, Gaussian dispersion model can be used to predict the pollution level and area:

$$C(x,y,z=0) = \frac{E}{\pi\sigma_y\sigma_zU} \exp\left(-\frac{y^2}{2\sigma_y^2}\right) \exp\left(-\frac{H^2}{2\sigma_z^2}\right)$$

Of which:

- C : Concentration of pollutants is near the ground.
- E : Pollution load emitted from pollution source (g/s)
- $\sigma_y\sigma_z$: Dispersion Coefficients on two axes of the Oy and the Oz (m).

$$\sigma_y = 156 x^{0,894}$$

$$\text{If, } x \leq 1 \text{ km: } \sigma_z = 106,6 x^{1,149} + 3,3$$

$$\text{If, } x > 1 \text{ km: } \sigma_z = 108,2 x^{1,098} + 2$$

- x : Spread pollution in distance on the ground calculated from the chimney base (km).
- U : Wind speed at the optimal height of chimney (m/s)
- H : the optimal height of chimney (m)



$$H = h + \Delta H$$

H : the actual height of chimney (m)

ΔH : raising level of smoke jet (m) - Kluighin formula S.A

$$\Delta H = 4,2D (\omega/u - 0,7)^{0,63}$$

- D : Diameter of stack, m
- ω : Emission rate at the outlet of stack, m/s
- u : Wind speed calculated at the actual height of chimney (m/s), $u = 3$ m/s.

Putting Gaussian model into calculation showed that the predictive concentration of pollutants in the air at different points on ground as well as the maximum concentration of noxious gas and dust concentrations at the horizontal plane nearly ground are all lower than permissible standards, for respective pollutant.

7.2.2.2. Impacts assessment for water environment:

+ Wastewater sources cause pollution.

- Waste water discharged from the equipment cooling for raw mill, cement mill and burning process... with high temperature, containing oil scum and suspended dregs. According to principle, they will be cooled, separated oil, and then go into circulating water supply cycle.
- Wastewater from cleaning yard with water, from dust treatment... containing many solid contaminants and other dirty matters. The characteristic of it is high content of suspended dregs, is about (500-1500mg/l), high alkali concentration (normally, pH > 8,0), total mineral concentration is great (500-1000mg/l). Additionally, there is also some split oil, leaked oil in it.
- Wastewater from cleaning equipment, DO oil storing tank with water... containing oil, suspended dregs, COD in great concentration, though the amount of it is inconsiderable but pollutants in it can make considerable influences on the ecosystem of small water area.
- Domestic water from plant, with the flow of 600m³ /day-night not only contains suspended dregs, BOD, N, NH in great concentration but also contain bacteria, that is characterized by the high concentration of Coliform and of Feacal coliform (about 104- 106 MPN/100 ml).

+ Impacts assessment for water environment:

The purpose of using water for the project activities is mainly to serve for equipment cooling processes, sothat the characteristic of wastewater is considered causing pollution due to suspended drags, metal, alkali, total mineral, BOD, COD, NH, oil...as well as high temperature of wastewater after cooling processes. Wastewater with noxious matters shall cause the direct influences on the ecosystem in surrounding water fields.



7.2.2.2.3. Solid waste:

During operation of the plant, industrial solid waste consists of mainly wasted wrappings, wasted papers, and material, clinker, cement dropped as well as strewn and left from the transportation. If industrial and domestic solid waste was not treated properly, it will cause negative impacts on around environment and be convenient condition for bacteria to multiply, especially for pathogenic bacteria. Organic solid waste can be recycled, solid inorganic waste of little noxious type will be collected for land filling, or being used as building materials for the plant and around residential villages.

When the project was put into operation, the quantity of staffs will be decreased considerably. Therefore, this will not cause any considerable impact on natural environment as well as socioeconomic environment in the area.

7.2.2.2.4. Impacts assessment of the plant on other physical environment:

a) Noise and vibration:

Noise and vibration mainly caused from engines, pumps, fans and air blowers, from air compressors and from means of transportation of materials, fuels, products during operation. In order to reduce the noise and vibrating impacts on the workers, who directly work during operating, the proper noise and vibration control measures shall be applied as follows:

- + For places where cause a strong noise (like that crusher, cement mill, coal mill, air compressor station...) need to apply appropriate noise reducing measures to prevent the noise from spreading over around areas. Most of equipment of the plant operated automatically, though there are only some workers to work directly during operation, correspondingly negative impacts on the health of workers is inconsiderable.
- + Air blowers all equipped with vibration reducing device at its blowing and sucking orifice.
- + Control cabins, operating places and corridors all will designed to place in where maximum noise level do not exceed 80 dBA when the whole equipments is being in normal operation condition.
- + Predictive noise level at cement dispatching section.

When the new production line is in operation with increased productivity, the noise shall be in trend of increasing, but not much compared with the noise of existing production line. The noise shall occur in production departments, area of receiving raw materials and dispatching cement.

Noise accompanies with dust, air emission from the means of transportation cement will cause influences on environment within/around the plant. However, by using modern technology and equipment under automatic control, for strong noise releasing source it is not only applying noise reducing measures but also applying isolation measures between the worker and noise source.



Because there are a lot of machines, equipments in operation within the plant, so the noise and vibration will cause impacts on the workers as well as surrounding residents.

Noise firstly will influence on hearing of the workers. If worker work directly in strong noise level sites for a long time, it will make his hearing become weakly, consequently making the workers' s ears become deaf.

b) Heat pollution:

Cement production shall use heat for technological processes like raw milling, coal milling, clinker burning and cooling process.

Total these quantities of heat will discharge into the air around workplaces in great quantity. Result in the temperature in these areas will be increased, (not counting to the influences of climate condition in the region) and cause influences on respiring process of human, leading to the influences on human health and on labour productivity.

7.2.2.2.5. Impacts assessment on biological resources:

a) Agricultural ecosystem:

The activities of project will cause impacts on ecosystem in the region. Especially when the project come into operation, the quantity of air emission, dust, wastewater will increase, hence will cause additional influences on ecosystem in the region. But, because the location of new production line is in existing precinct of the plant, so not to need to expand area of existing precinct, therefore influences on potentially biologic multiform in the adjacent regions is inconsiderable.

Because there are not mostly any valuable and rare animal in around regions, therefore the increasing influences caused by the activities of project on biologic resources in the region is inconsiderable.

b) Water ecosystem:

When the project comes into operation, main impacts on water ecosystem mainly caused by dust, noxious gas, suspended dregs, other wastes during production process of Nghi Son cement plant. Because of not using noxious chemicals during the operation of 2nd production line, therefore there will not be danger wastes. Wastewater will be treated and controlled properly, so will not cause any considerable impact on water ecosystem in the region as well as on other ecosystems. Thank to the environment protection measures, optimal selection of technological and producing procedures, highly automatic level, beside that the whole processes of the plant were all controlled through modern control and measuring units originated from developed countries, for that reason the impacts on water ecosystem is very little.



7.2.2.2.6. Impacts assessment on socio-economic aspects:

The investment of 2nd production line project of NSCC will create a lot of socioeconomic advantages for not only Thanh Hoa but also for the country, the advantages are as follows:

- Enhance producing capacity of the plant as well as meet considerably demands for cement consumption. Infrastructure works like the road net in the region, corporation's house will continue to be expanded in construction and upgraded for more modernly, with natural population and immigrants increasing will lead to the formation of a developed industrial urban.
- During executing the work, construction and erection, material exploitation and transportation, and other services supply for project, will create a lot of direct and indirect job opportunities for a thousands local people, consequently leading to transferring intensively economic structure, improving social and cultural living in the area.

Positive impacts from the investment of project are important and forever, bring both Nghi Son area and all society socioeconomic effectiveness.

7.2.2.2.7. Fighting and prevention for fire, explosion:

Sections use coal, oil during operation, electrostatic precipitators, oil tanks, air compressors are main sources caused fire and explosion. At the present, the whole sections of the plant were installed sufficiently means of fighting and prevention for fire and explosion. For new project, also took account into fighting and prevention measures for fire and explosion, such as installing of safety and explosion fighting valves, special pipe system combined with using modern measuring and controlling units, automatic fire alarming system, appropriate alarming sensors, aiming to keep operation of the plant under safety.

For fire fighting and prevention during operation, new line will be designed with fire water supply system consisting of spray waterspout, fire alarming system with measuring and alarming devices.

Remark:

Investment project of 2nd cement production line of NSCC will entirely meet requirements of environmental protection regulations.

7.3. MEASURES FOR ENVIRONMENTAL POLLUTION CONTROL AND NEGATIVE IMPACT MITIGATION WHEN INVESTING 2ND PRODUCTION LINE.

7.3.1. Compulsory obligations for all Contractors during executing the work at site:

In order to undertake obligations of environmental protection when investing 2nd production line, project management board previously builds the plan of



environmental protection during executing the infrastructures, those are also compulsory obligations for all Contractors having to observe strictly.

Compulsory obligations for all Contractors during executing the work at site:

7.3.1.1. Collecting wastes from construction and erection works:

- Collect constructing wastes and transport to required places.
- Not to be discharged constructing wastes from high points to ground.

7.3.1.2. Surface water and wastewater treatment during executing the work:

- Build up drain water system at construction site in order to ensure that not causing water sources pollution, landslide in around areas as well as not causing muddy in area, affecting on the outside of construction works and road net in the region.
- Liquid solutions from drill hole, mud and soil after ground levelling, road filling will be collected and transported to required places.

7.3.1.3. Cleaning and safety during process of executing the work:

- Undertake to implement strictly regulations about cleaning and labour safety according to TCVN 5308-91, electrical safety according to TCVN 4086-1995 and Construction Standards.
- During executing the work, the constructing places will have to be fenced around against dust and falling drop, against noise and vibration exceeding permissible level according to TCVN 3985- 85, fire fighting and prevention according to TCVN 3254- 89, explosion safety according to TCVN 3255- 86.
- Must implement strictly regulations of environmental hygiene and safety within construction site during execution of the work as well as after the execution of the work was complete.
- Means of transportation of materials, building material and constructing wastes are easily to cause dust and environmental pollution, will be hermetically covered to avoid dropping, strewing as well getting mud, other dirty matters from construction site to road net and public places. Not to be allowed to use too old mechanic means of executing the work or any equipments does not satisfy environmental standards.
- Temporary water closets will be treated properly in order not to cause prolonged environmental influences after finishing execution of the work.

7.3.2. Measures of negative impact mitigation.

7.3.2.1. Pollution control measures during construction:

During executing the work, the following pollution control measures will be put into application:



a) Dust control measures:

In order to restrain the dust concentration in construction area, tank truck containing water will be used to spray water during sun and hot days as well as during hot and dry weather.

In order to restrain the dust concentration generated from the conveyance of building material like sand, soil... means of conveyances will be covered hermetically.

b) Control measures for air pollution caused by means of conveyance:

In order to reduce the quantity of air emission from means of conveyance and construction during execution of the work, Contractors and Sub-contractors at construction site will have to carry out the following measures:

- + Not putting too old means of executing the work into operation.
- + Not transporting the materials exceeding allowable loading capacity.
- + Progress of executing the work and physical volume of conveyances at the construction site shall be slow down within from previous day 22 o'clock to next day 6 o'clock.

c) Noise and vibration control measures during execution of the work for new line:

In order to reduce the influences caused by noise and vibration during execution of the work on surrounding areas, Owner shall carry out the following measures:

- + Selecting the constructing means of foundation by the way using bore piles
- + To monitor frequently noise and vibration level during execution of the work, then basing on those results in order to set up an appropriate construction progress to control noise and vibration level according to permissible standards.

Beside that, domestic wastewater from executing the work of infrastructure will be collected and led to a treatment station in the plant, after that just discharged into around water fields.

Solid waste from process of construction and erection mainly consists of failed material like broken bricks, harden cement, broken woods... and domestic wastes generated from during daily activities of workers at the site. These solid wastes will be treated as follows:

- + Organic wastes will be land filled in the domestic waste treatment station of the plant.
- + Inorganic wastes will be buried, land filled and leveled.



7.3.2.2. Pollution control measures during activities of project:

a) Dust control measures:

Based on the results of calculation and of evaluation showed that air emission from sources of the plant mainly contains dust. Hence, environmental control measures for project will mainly concentrate on treating dust. Dust releasing sources caused by the activities of cement plant are very multiform, dust mainly comes out from sources as follows:

- Material crushing, transporting section.
- Material, fuel receiving section.
- Transporting and storing section.
- Raw milling, coal milling, clinker burning sections.
- Cement milling section.
- Packing and dispatching section.

In the investment scope of project, each section of new production line will be equipped with synchronous dust collectors like: bag filter, electrostatic precipitator to ensure that dust concentration of air emission discharged into the air is lower than or equal to 30 mg/ Nm^3 .

+ Clay crushing, transporting and storing section:

Dust was controlled by the way of using conveyors with covered roof, in combination with using dust sucking system and bag filters with the dust collecting effectiveness of 99,99%.

+ Limestone, additive, sand receiving section:

This section will be equipped with modern bag filters at all main releasing places.

+ Coal, gypsum, bauxite, ferrite receiving and feeding section:

Dust mainly caused from conveyance of materials. For this section, technological line will be equipped with bag filters, simultaneously to prevent dust from spreading to around places from material receiving hoppers by the way of using covered roofs.

+ Raw material dosing and milling section:

This section will be equipped with bag filters and electrostatic precipitator.

+ Raw meal homogenizing and kiln feeding section:

In order to reduce the quantity of dust generated from transitional places of conveying system, technological line will be equipped with bag filters.

+ Clinker burning, cooling and conveying section:

Dust releasing source is mainly air emission from Clinker burning process. Air emission generated from Clinker burning process either is used to dry for raw



mill process or go into conditioning tower then passed through electrostatic precipitator before being scattered in to the air via a stack with the dust concentration lower than or equal to 30mg/Nm^3 . A part of hot air emitted from clinker cooling process is passed the electrostatic precipitators for dust treatment before going to coal mill as heating agent, then is passed to a bag filter and is scattered to the air. Beside that, dust also generated from transitional places, discharging points during conveyances of clinker, therefore here will be equipped additionally with bag filters and electrostatic precipitator.

+ Cement mill section:

In order to reduce the quantity of dust generated from transitional places of bucket elevators, air slides to silos... Technological process will be equipped with bag filters, which is also used for mill ventilation.

+ Packing and cement bag dispatching section:

This section will be equipped with bag filters.

+ Ship loading and Ship unloading section:

Using dust - free hoppers to receive materials and fuels, simultaneously equipped the dust releasing places with bag filters.

b) Measures of air emission pollution control:

Air emission from coal firing process contains some main pollutants like: dust, SOx and NOx, CO, control measures are as follows:

- + During clinker burning and raw meal drying process at high temperature about $800-1400^\circ\text{C}$, SOx will be absorbed by some alkaline oxides like that CaO... in order to form CaSO_4 and CaSO_3 ... Therefore the SO_2 concentration of air emission will be always lower than required concentration according to permitted standards.
- + SO_2 , NO_2 concentrations will be diluted with the air through a stack with 80m in height. Based on results of calculation according to mean of dispersion model, showed that the stack construction as designed is appropriate and ensure the permissible standard for air emission concentration (according to TCVN: 5937-5938, 5939-1995).

c) Measures of noise, vibration, microclimate impacts mitigation:

+ Noise and vibration control measures:

In order to reduce noise and vibration level for all equipment and machinery, the following measures will be applied:

- Bearing and bases of all machinery, equipment will be fabricated and constructed properly according to required technical standard, foundations in sufficient weights and depths, use high strength cement.



- Install rubbered buffers and vibration resistant springs for all equipment with major capacity.
- Check frequently the balance of all machinery, equipment during erection, wear level of the parts of machines as well as periodically to lubricate and grease for all machines and equipments as requirements.
- At all production control stations will be soundproofed aiming at avoiding causing serious influences on workers and staffs during operation.
- Workers work continuously at (and around) strong noise releasing sources will be furnished adequately labour safety tools.

+ Microclimate factor improvement within/ around the plant:

Microclimate factor can cause direct influences on health of the workers, staffs who work for plant. In order to mitigate the impacts caused by pollutions on human and environment, the following measures will be implemented:

- Office, workshops and working house will be designed to be airy and hot resistant.
- Establish appropriate station to bury and land fill solid wastes.
- Internal road net will be constructed with an adequately good quality and strength aiming at reducing the quantity of dust to spread over while means of transportation operate on the road.
- During shun and/or hot and dry, will use water to spray on the internal road net, 2 times / day.
- Areas around plant, waste lands within the plant will be planted trees in order to shade from the shun as well as to prevent noise, vibration from spreading all over, simultaneously make a beautiful sight for plant. Area of plantation of the plant will be about 15% of total area of the plant. Choosing of tree type with low growing rate and proper height to avoid reaching to electrical lines, not being fallen during storms.

d) Measures of water source pollution mitigation:

+ Construct the drain water system.

Construct the drain water system is first measure of all, but it needs designing correctly in such way that to gain a best result during operation.

- Rainwater runs off in covered drain troughs with the average slope of 2%. So the rainwater duct should be short enough. After heavy rains it needs be checked and cleaned. The soakage pit for collecting sand from rainwater shall be arranged before letting out rainwater to the river.
- Wastewater from water closets after treated in local septic tank, together with other living wastewater will be led to a treatment station in order to be deposited



and separate sediments, and then be discharged into general wastewater draining system of the plant.

- Industrial wastewater will be led to a treatment station by its private duct net before being recycled for reuse or discharging into surrounding water fields.
- Water for cooling equipment is reused water in the circulating cycle.

+ **Measures of wastewater treatment:** the wastewaters shall comprise of two types:

- Domestic wastewater within the plant: with no much increase of staff, the volume domestic wastewater shall not be increased. Wastewater will be pretreated, collected and then be treated in treatment station with industrial wastewater.

- Industrial wastewater:

Industrial wastewater from equipment cooling processes shall be treated in cooling tank (to reduce temperature of the water down to below 30°C). Then it shall be separated from oil, grease and sediments via decantor. After that it shall be led to pumping station. Together with additional fresh water, it will be reused for cooling equipment.

The remaining after being separated from oil, scum etc. shall be separated again. Sediments detained in the tank are mainly of inorganic mixture, oil / grease scum shall be collected then be dumped in required place.

The decantor for industrial wastewater and sedimentation pond for rainwater shall be designed with retaining time of 5 hours, sand trap only requires for retaining time of 20-30 min.

The wastewater treatment system for new project shall be install to treat the wastewater before leading to the existing drainage system of the Plant.

The solid waste matter from living wastewater mainly being treated in local septic tank before leading to central treatment station.

Industrial wastewater and wastewater of industrial cleaning will be deposited and separated from oil, grease in pre-treatment tank in production area before being treated together with living wastewater in common treatment.

The quality of wastewater after being treated must be in accordance with wastewater standards of class B (according to TCVN 5945-1995).

+ **Water source pollution control:**

Regulations on pollution monitoring and water management must be set up strictly. Besides frequently water quality monitoring in process station, water quality in downstream of river, aquaculture lakes and wells in residential areas must be monitored at least once every six months.



The controlled parameters consist of pH, suspended solids, dissolved oxygen, hardness, metal ions (Pb, Fe, Hg, Mn...), cations (Ni, Ph, Phenol...), bacteria.

Drains, sewers should be regularly checked and dredged. The main drainage routing should be directly managed by the Plant. Dams, barrages shall be prohibited to build in the drainage routings.

The Plant shall coordinate with the Science Technology and Environment Management Office of Thanh Hoa province, other professional offices to set up the Regulation for monitoring regularly the water source.

e) Measures of education and propagation:

Educate the consciousness of environmental and industrial hygiene for all workers, staffs of the plant. Implement and check regularly waste matters monitoring and management programs of the Corporation.

Promote the plantation movement, road net cleaning, and industrial hygiene within residential area as well as within the plant.

Mobilize movements of technological improvement aiming at mitigating impacts caused by pollution sources on environment. Optimizing in using fuels.

Periodically check health of labour, check the environmental hygiene of all production departments in the plant, take care the precautions against occupational diseases and lung disease.

Commission for Labour safety shall coordinate with Provincial Center of preventive medicine to inspect the hygiene and labor safety in all production sections, to give timely the control measures.

7.3.2.3. Environmental incident and mitigation measures.

7.3.2.3.1. Fire and explosion:

Within the plant as well as within the new production line, fire and explosion incidents can occur at areas of using fuel (oil, coal) like pre-calciner, kiln, coal mill, fuel supply system and electric supply system. During the rainy season, if being thunderstruck it will be easy to be happened the fire and explosion incident. In order to keep the operation of the plant under a safety, production line will be designed in such way that meet entirely the technical standards for fire, explosion fighting and prevention, that must be approved by authorities.

Set up the plan and regulation for fire, explosion fighting and prevention.

Organize training courses on fire, explosion fighting and prevention for all personnel who work within the inflammable and explosible places.

7.3.2.3.2. Electrostatic precipitator incident:

For Electrostatic precipitator equipment, when the dust content and the CO concentration is high, it is easy to occur incident. So that, the measures for safety control should be applied as follows:



- Monitoring the dust and CO gas content to electrostatic precipitator via measuring equipments of high accuracy, when the CO content in gas is over permissible level the electrostatic precipitator shall be tripped automatically.
- Carrying out the periodical maintenance for equipment.
- Checking the operation according to the design instructions, timely correct the troubles.
- The operator shall be trained to the required occupational degree.

The Plant commission for Labour safety shall estimate and provide enough the quantity of protection appliances for the labours working in the production sections with CO gas emission such as: Kiln, Mill, Preheater.

7.3.2.3.3. Thunderstruck incident:

The thunderstruck incident may destroy electrical stations and causing short-circuit, effect to production. Therefore:

- Lightning arrestor should be installed on the top/roof of the construction work (such as: in the summit of chimney, roof of the production building).
- Lightning protection mesh is installed for non-metal civil works with the height over 15m, consisting of lightning rods and conductors being arranged on the roof.
- Grounding resistance of lightning protection system is $\leq 10\Omega$ with the earth specific resistivity of $< 50,000\Omega/\text{cm}^2$, $>10\Omega$ with the earth specific resistivity $>50,000 \Omega/\text{cm}^2$.

7.3.2.3.4. Storm, Whirlwind, low tropical atmosphere incident:

Based on result of natural calamity survey in Bac Bo gun for last years showed that Bac Bo gun can be looked like a storm pocket, holding 50% total storms of all the country, therefore it can cause direct impact on the project area.

New production line is located in the region where regularly be affected by major storms, low tropical atmosphere with the wind force of from level 10 to level 12. They will cause considerably negative influences on construction progress and on the quality of construction works. During executing the work, Constructors should take cares to the quality assurance for construction works, conveyors system for materials and products.

In order to fight as well as prevent above incidents, planning for flood and storm prevention, training regularly during rainy and storm season.

Setting up the flood and storm protection measures and training regularly the flood and storm protection cases.

The systems emitting waste matters causing environmental pollution shall be controlled by treatment equipment with high efficiency. The calculated content of pollutant must meet the permissible environmental standard of Vietnam.



B. NINH THUY CEMENT DISTRIBUTION TERMINAL

7.4. THE FACTORS CAUSING THE ENVIRONMENTAL POLLUTION

7.4.1. Environmental status is within the region of project

(Being described in details in the environment impact assessment report for Ninh Thuy cement distribution terminal).

7.4.2. The factors causing the environmental pollution

7.4.2.1. During the period of executing the work and construction - erection.

During the early period of project, the ground surface leveling and filling up, digging up the foundation, road repairing, construction and erection for works shall be main pollution-causing sources as follows:

- Dust generated from the process of executing the work, transportation.
- The heat generated from the equipment during the execution the work and from the transportation means to the air.
- Wastewater from the process of executing the work and domestic wastewater.
- Solid waste from the daily activities.

However, this period shall only last in a short term of 16-18 months.

7.4.2.2. During the period of operation

When the project put into operation shall cause the pollution as follows:

- Dust generated from the transportation process, material transfer points, from material charging and discharging points, from cement milling system and from packing system.
- Oil sludge and scum containing industrial wastewater and domestic wastewater.
- Noise generated from air compressors, from high - pressure fans and from other machines during operation.
- Solid waste generated from the daily domestic activities.

7.5. ENVIRONMENTAL PROTECTION MEASURES

7.5.1. During the period of design

During the period of design of the project, the following measures shall be applied in order to mitigate the environmental pollution factors:

- Sensible general layout arrangement, the main wind direction in the region shall be taken into account.
- Growing trees in rows, grass cover, flower garden to ensure the cleaned environment as well as to conserving the good scenery.



- Surface drain water system, wastewater treatment system shall be designed in a sensible way.
- Workshops, mill house shall be designed in accordance with design standards ensuring the labour hygiene and safety for industrial work. The sections, which causes dust all shall be covered and applied the complete dust treatment measures by using the bag filters.
- For the noise causing places shall be designed to equip the equipment with sound isolator, vibration resistant system, combining the isolating wall system.

7.5.2. During the period of executing construction and erection.

During this period, the following measures for environmental pollution mitigation shall be applied:

- Layout arrangement and organization for executing the work in a sensible way.
- Not to use too old machinery, equipment during the period of executing the work.
- Carry out to spray water during the hot and dry days.
- Waste matters collection and treatment shall be carried out according to common regulation, aiming to ensuring the environmental hygiene.

7.5.3. During the period of operation

a) Dust treatment measure

In order to ensure the environmental standards according to the stipulated regulations, the equipment and technology of the distribution terminal shall be selected in the type of closed technology with advanced equipment of high automation - control degree, consist of the technology and equipment as follows:

- Bulk receiving and storing system shall consist of 02 pumps in the type of using compressed air, 02 bulk cement transportation pipe systems in corporate with 01 cement containing silo.
- Packing system: shall be equipped with 02 packing machines of electronic rotary type with 08 filling spouts, integrated with enclosed equipment and auxiliary parts.
- Cement bag dispatch system: planned to equipped 02 movable loading equipments in order to dispatch to the transportation means of roadway with the capacity of 100 tons per hour each (max. 120 tons per hour); 01 bulk cement dispatch line with the capacity of 150 tons per hour in order to dispatch to tank truck; 01



Cement bag dispatch system consists of 02 cement bag dispatch lines for the barge with the load capacity of 200-1000 DWT.

- For dust causing places in the technological line shall be all equipped with the appropriate bag filter for the aim of keeping the dust content of exhaust gas shall be lower than 30 mg/Nm^3 .
- The cement transportation from ship to silo shall be carried out by hermetic pipe system, beside that the packing housing area shall be enclosed and covered up hermetically, so that the dust generated during the operation of the distribution terminal shall be limited.
- The road lines shall be concreted.
- To make the clean frequently.
- Carry out to spray the water during the hot and dry days.

b) Noise prevention

The noise prevention shall be taken into account early from the process of survey, design and fabrication, of construction and erection in order to ensure the operation of equipment without the vibration. For the necessary bodies or parts all shall be equipped with the noise reducing devices. Some specific measures shall be applied as follows:

- Cast machinery bearings in a sufficient weight shall be made of high strength concrete in an appropriate depth and reinforcement in order to avoid vibrating.
- The equipment with high capacity shall be equipped with the rubber buffer and vibration resistant spring.
- The balance of machinery and equipment shall be inspected properly. The inspection of wear condition for the parts of machinery and equipment as well as inspecting and feeding the grease and lubricant shall be in periodically.
- For the control room shall be isolated from noise.
- The workers, who work at strong noise locations, shall be provided with appropriate noise prevention tools.

c) Wastewater treatment

Industrial wastewater generating source is mainly from the oil sludge, scum separation, with the domestic wastewater both shall be collected and flowed to wastewater treatment station by specified pipe system to meet completely the regulated permissible standards according to TCVN 5945-1995.

d) Solid waste treatment

- Solid waste generated from the operation of distribution terminal as well as from daily domestic activities shall be collected and transported to place as required.



- This solid waste then shall be transported to common solid waste - treatment station in the industrial zone by the functioned unit in the region.

7.6. THE PROGRAMS FOR ENVIRONMENTAL QUALITY MONITORING AND MANAGEMENT:

At the present, Nghi Son cement Corporation has a division specializing in affairs of production safety and environmental quality assurance. This division is responsible for monitoring, controlling the environmental pollution sources, which consist mainly of dust, air emission, wastewater, noise, vibration, etc. The environmental data in Nghi son cement plant and Hiep Phuoc Distribution Terminal are regularly monitored and logged up.

In order to ensure that the investment of 2nd production line and the Ninh Thuy Distribution terminal will not cause negative impacts on surrounding environment as well as to evaluate the effect of environmental pollution control measures, the programs of environmental quality monitoring and management shall be applied for 2nd production line according to existing program for 1st production line. (The detailed descriptions are stated in the environmental impacts assessment reports for expansion investment of Nghi son cement plant and Ninh Thuy cement distribution Terminal).

7.7. CONCLUSION

Based on analyzing the environmental and socioeconomic situation of the project area, pollution sources, assessment of pollution factors and pollution control measures as well as environmental monitoring and management program, the conclusions and proposals have been made as follows:

- ***The project may cause negative impacts to the environment if necessary measures are not undertaken. The negative impacts are:***
 - Air pollution caused by the dust and noise from activities at the material exploiting, receiving, transporting and milling sections.
 - Water pollution caused by the industrial and domestic wastewater.
 - Negative impacts to the human health in the project area.
 - Negative impacts to the ecosystems and landscape.
- ***In order to meet the regulations of environment protection Law and mitigate the above-mentioned negative impacts, Nghi son cement Corporation is to implement the following necessary measures:***
 - Dust control measures.
 - Noise and vibration control measures.
 - Pollution control measures for rainwater in mining area.
 - Pollution control measures for the high temperature industrial wastewater.



FS of Nghi Son cement plant expansion project

- Pollution control measures for domestic wastewater containing suspended solids, organic matters, and bacteria.
- Preventive measures for incidents of fire, explosion, oil spill etc.

Through authorized organizations, the monitoring and assessment of the environmental program execution of Nghi son cement Plant shall be carried out regularly and periodically.