

*ANEXO F*  
*Comparación de Normativa Ecuatoriana y*  
*Estándares Internacionales para la*  
*Planta Industrial de Fundición y*  
*Laminación de Acero de Adelca del Litoral,*  
*Parroquia Milagro, Cantón San Francisco*  
*de Milagro, Provincia de Guayas*

Walsh Project Number: EC153-11  
DRAFT

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**Planta Industrial de Fundición y Laminación de**  
**Acero de Adelca del Litoral, Parroquia Milagro,**  
**Cantón San Francisco de Milagro, Provincia de**  
**Guayas**

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## 1 INTRODUCTION

This Comparación de Normativa Ecuatoriana y Estándares Internacionales was developed to guide engineering design and plant operating procedures of the Planta Industrial de Fundición y Laminación de Acero de Adelca del Litoral, Parroquia Milagro, Cantón San Francisco de Milagro, Provincia de Guayas.

The following sections describe and compares compliance guidelines for Adelca del Litoral at the Milagro steel plant and surrounding environment. These guidelines are specific based on knowledge of the project design and environment to date. The parameters for compliance and the targets can be adjusted, since there may be design changes, regulatory changes, and/or lessons learned during construction and operation of the plant.

The next sections present the quantitative parameters and qualitative criteria set forth by Ecuadorian regulations, the International Finance Corporation/ World Bank (IFC/WB) guidelines, and Adelca del Litoral policies for the listed environmental components. The tables also indicate which criteria should be adopted for the Adelca del Litoral project design.

## 2 PHYSICAL MONITORING AND COMPLIANCE GUIDELINES

### 2.1 Volcanic Activity

The volcanic activity in Ecuador is monitored by the Geophysical Institute of the *Escuela Politécnica Nacional* (EPN) (<http://www.igepn.edu.ec/>). An evaluation of this monitoring program will be conducted each year to determine if risk levels for volcanic ash from active volcanoes in the Sierra present a significant increased risk to the project.

### 2.2 Seismicity

The seismic activity in Ecuador is monitored by the Geophysical Institute of the *Escuela Politécnica Nacional* (EPN) (<http://www.igepn.edu.ec/>). An evaluation of the monitoring program will be conducted each year to determine if risk levels from earthquakes present a significant increased risk to the project.

### 2.3 Geomorphology

A geomorphic evaluation of the Estero de los Monos will be conducted each year. This evaluation will include documentation of scouring of the streambed and banks near the outfalls of stormwater, treated industrial wastewater and treated sewage; general bank stability along the reach of the Estero de los Monos that borders the Adelca property; and documentation of sedimentation and dredging activities near the Adelca facilities.

## 2.4 Groundwater

Groundwater levels and water quality will be monitored within and near the Adelca del Litoral site during construction and operation at appropriate wells (deep and shallow). The location and depths will be determined near the time of commissioning of the plant to avoid potential damage during construction.

The table below indicates the parameters to be monitored.

Criteria for Groundwater Quality Compliance			
Parameter	Unit	Adelca Guideline TULSMA Annex 1, Table 5 (Groundwater Criteria)	Monitoring (Yes/No)
Oil and Grease	mg/l	--	Yes
Arsenic (total)	µg/l	35	Yes
Barium	µg/l	338	Yes
Cadmium	µg/l	3,2	Yes
Cyanide (total)	µg/l	753	Yes
Cobalt	µg/l	60	Yes
Copper	µg/l	45	Yes
Chromium (total)	µg/l	16	Yes
Chromium (hexavalent)	mg/l	--	Yes
Fluorides	µg/l	--	Yes
Iron	µg/l	--	Yes
Molybdenum	µg/l	153	Yes
Mercury (total)	µg/l	0,18	Yes
Nitrogen	µg/l	--	Yes
pH	µg/l	--	Yes
Phosphorous (total)	µg/l	--	Yes
Phenols	µg/l	--	Yes
Sulfides	µg/l	--	Yes
Lead	µg/l	45	Yes
Nickel	mg/l	45	Yes

Criteria for Groundwater Quality Compliance			
Parameter	Unit	Adelca Guideline TULSMA Annex 1, Table 5 (Groundwater Criteria)	Monitoring (Yes/No)
Zinc	µg/l	433	Yes
Benzene	µg/l	15	Yes
Toluene	µg/l	500	Yes
Styrene	µg/l	150	Yes
Ethylbenzene	µg/l	75	Yes
Xylene (Addition)	µg/l	35	Yes
Phenol	µg/l	1000	Yes
Cresol	µg/l	100	Yes
Hydroquinone	µg/l	400	No
HAPs	µg/l		Yes
Naphthalene	µg/l	35	Yes
Phenanthrene	µg/l	2,5	Yes
Anthracene	µg/l	2,5	Yes
Fluoranthene.	µg/l	0,5	Yes
Benzo(a)anthracene	µg/l	0,25	Yes
Chrysene	µg/l	0,026	Yes
Benzo(k)fluoranthene.	µg/l	0,026	Yes
Benzo(a)pyrene	µg/l	0,026	Yes
Benzo(ghi)perylene	µg/l	0,025	Yes
Indeno(1,2,3-cd)pyrene	µg/l	0,025	Yes
Dichloromethane	µg/l	500	Yes
Trichloromethane	µg/l	200	Yes
Tetrachloromethane	µg/l	5,0	Yes
1,1-dichloroethane	µg/l	1300	Yes
1,2-dichloroethane	µg/l	200	Yes
1,1,1- trichloroethane	µg/l	275	Yes
1,1,2-trichloroethane	µg/l	750	Yes
Vinyl chloride	µg/l	0,35	Yes
Cis-1,2 dichloroethylene	µg/l	650	Yes
Trichloroethylene	µg/l	250	Yes
Tetrachloroethylene	µg/l	20	Yes
Monochlorobenzene	µg/l	90	Yes
Dichlorobenzene (total)	µg/l	25	Yes
Trichlorobenzene (total)	µg/l	5	Yes
Tetrachlorobenzene (total)	µg/l	1,26	Yes



Criteria for Groundwater Quality Compliance			
Parameter	Unit	Adelca Guideline TULSMA Annex 1, Table 5 (Groundwater Criteria)	Monitoring (Yes/No)
Pentachlorobenzene	µg/l	0,5	Yes
Hexachlorobenzene	µg/l	0,26	Yes
Monochlorophenol (total)	µg/l	50	Yes
Dichlorophenol (total)	µg/l	15	Yes
Trichlorophenol (total)	µg/l	5	Yes
Tetrachlorophenol	µg/l	5	Yes
Pentachlorophenol	µg/l	1,5	Yes
Chloronaphthalene	µg/l	3	Yes
Polychlorinated biphenyl (PCBs) (total)	µg/l	0,01	Yes
DDD, DDE, DDT (total)	µg/l	0,005	Yes
HCH-Compounds (total)	µg/l	0,5	Yes
Aldrin, Dieldrin, Endrin y Endrin aldehyde (total)	µg/l	0,05	Yes
Carbaril	µg/l	0,06	Yes
Carbofuran	µg/l	0,06	Yes
Maneb	µg/l	0,05	Yes
Atrazine	µg/l	0,05	Yes
Terbutryn	µg/l	--	Yes
Diclorvos+Trichlorfon	µg/l	--	Yes
Hexaconazole	µg/l	--	Yes
Cyclohexane	µg/l	7500	Yes
Phthalates (Addition)	µg/l	2,75	Yes
Total Petroleum Hydrocarbons (TPH)	µg/l	325	Yes
Pyridine	µg/l	1,75	No
Tetrahydrofuran	µg/l	0,75	No
Tetrahydrothiophene	µg/l	15	Yes

## 2.5 Environmental Noise Monitoring

There will be environmental noise monitoring locations near the site and along the access road (Via Barcelona) during construction and operation. The locations will be the same as the baseline study, which were chosen to be representative of the most affected receptors near the plant and along the road access road. The conditions that were considered when selecting the monitoring locations included:

- Volume and speed of the traffic.
- The number of heavy vehicles in the flow of the traffic.
- Road gradient and pavement type.
- Distance and obstructions between the road and the receptor.

In cases where it is impractical to make measurements in such locations in the future, noise levels will be measured at alternative locations, and results will be corrected for distance and reflection effects as appropriate. The IFC EHS guidelines for continuously noise monitoring for 48 hours will be used.

Permissible Noise Levels for Fixed Sources		
Zone (Soil Use)	TULSMA Table 1 Limits Equivalent Sound Pressure Level LAeq [dB(A)]	
	DE 06H00 A 20H00	DE 20H00 A 06H00
Hospital and Educational Zones	45	35
Residential Zone	50	40
Mixed Residential Zone	55	45
Commercial Zone	60	50
Mixed Commercial Zone	65	55
Industrial Zone	70	65

TULMAS Book VI, Annex 5, Table 1

The noise level guidelines established by the IFC EHS Guidelines are presented in the following table.

IFC EHS Noise Level Guidelines		
Receptor	One Hour LAeq (dB[A])	
	Daytime (06:00 – 22:00)	Nighttime (22:00 – 06:00)
Residential; Institutional; Educational	55	45
Industrial; Commercial	70	70

IFC General Environmental, Health, and Safety Guidelines, 2007

The range of background environmental noise conditions (48 hours) measured for the EIA are presented in in the following table.

Noise Measurements		
Receptor	48 Hours LAeq (dB[A])	
	Daytime (07:00 – 22:00)	Nighttime (22:00 – 07:00)
Hospital and Educational Zones	51,7	51,1
Residential Zone	--	--
Mixed Residential Zone	55,1 - 62,0	50,8 - 56,8
Commercial Zone	58,1	52,9
Mixed Commercial Zone	--	--
Industrial Zone	--	--

Noise impacts from project activities in the future should not result in a maximum increase of 3 dB[A] above background levels according to IFC EHS Guidelines.

The provisional environmental noise standard for this project is listed in the following table.

Adelca Guidelines Noise		
Receptor	48 Hours LAeq (dB[A])	
	Daytime (07:00 – 22:00)	Nighttime (22:00 – 07:00)
Hospital and Educational Zones	54,7	54,1
Residential Zone	50	40
Mixed Residential Zone	65,0	59,8
Commercial Zone	61,1	55,9
Mixed Commercial Zone	65	55
Industrial Zone	70	65

## 2.6 Vibration Monitoring

Vibration monitoring will be conducted during construction and operation at locations (receptors) identified for the baseline study, which are structures (residencies and houses of worship) located close to the access road (Via Barcelona). These locations are likely to be among the most affected receptor impacted by vibration produced by truck traffic.

Vibration measurements should comply with ISO-2631-1 and TULMAS, Book VI, Annex 5.

## 2.7 Ambient Air Quality Monitoring

Ambient air quality will be monitored during construction and operation at appropriate locations on the project site and on the access road depending on the results of the final dispersion model after final engineering is complete for the emission producing components of the plant.

The table below indicates the parameters to be monitored.

Criteria for Ambient Air Quality Compliance								
Parameter	Unit	TULSMA, Book VI, Annex 4 (Version Modified with <i>Acuerdo Ministerial 050</i> )			IFC General EHS Guideline		Adelca Guideline	Monitoring (Yes/No)
		Averaging Period	Limit	Number of Allowed Exceedances during a Year	Averaging Period	Guideline Value		
Carbon Monoxide	µg/m <sup>3</sup>	8 hours - maximum	10,000	1	Comply with National or Regional Norms		10,000	Yes
		1 hours - maximum	30,000	1			30,000	Yes
Ozone	µg/m <sup>3</sup>	8 hours - maximum	100	1	8 hour - maximum	160 (interim target 1) 100 (guideline)	100	Yes
Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	1 year - average	40	0	1 year - average	40 (guideline)	40	No
		1 hour - maximum	200	0	1 hour - average	200 (guideline)	200	Yes
Sulfur Dioxide	µg/m <sup>3</sup>	1 year - average	60	0	Comply with National or Regional Norms		350	No
		24 hour - maximum	125	0	24 hour - average	125 (interim target 1) 50 (interim target 2) 20 (guideline)	20	Yes
		10 minute - maximum	500	0	10 minute - average	500	500	Yes
Particulate Matter PM <sub>2.5</sub>	µg/m <sup>3</sup>	1 year - average	15	0	1 year - average	35 (interim target 1) 25 (interim target 2) 15 (interim target 3) 10 (guideline)	10	No
		24 hours - average	50	0	24 hours - average	75 (interim target 1) 50 (interim target 2) 37.5 (interim target 3) 25 (guideline)	25	Yes
Particulate Matter	µg/m <sup>3</sup>	1 year -	50	-	1 year -	70 (interim target 1)	20	No

Criteria for Ambient Air Quality Compliance								
Parameter	Unit	TULSMA, Book VI, Annex 4 (Version Modified with <i>Acuerdo Ministerial 050</i> )			IFC General EHS Guideline		Adelca Guideline	Monitoring (Yes/No)
		Averaging Period	Limit	Number of Allowed Exceedances during a Year	Averaging Period	Guideline Value		
PM10		average			average	50 (interim target 2) 30 (interim target 3) 20 (guideline)		
		24 hour - average	150	2	24 hour - average	150 (interim target 1) 100 (interim target 2) 75 (interim target 3) 50 (guideline)	50	Yes
Sedimentable Particles	mg/cm <sub>2</sub>	30 days continuous	1	0	Comply with National or Regional Norms		1	Yes
Benzene	µg/m <sup>3</sup>	1 year maximum	5	0	Comply with National or Regional Norms		5	Yes
Cadmium	µg/m <sup>3</sup>	1 year maximum	0,005	0	Comply with National or Regional Norms		0,005	Yes
Inorganic Mercury (Vapor)	µg/m <sup>3</sup>	1 year maximum	1	0	Comply with National or Regional Norms		1	Yes

## 2.8 Air Emissions from Fixed Sources

Air emissions monitoring will be performed at significant point sources during operation. A dispersion model will be developed based on final engineering prior to commissioning of the plant.

The following table describes the parameters for air emissions monitoring.

Criteria for Air Emissions Compliance					
Parameter	Units	IFC Air Emission Levels for Integrated Steel Mills	TULMAS Annex 3 Table 2 Table 9	Adelca Guideline	Monitor (Yes/No)
Particulate Matter	mg/Nm <sup>3</sup>	20	120	20	Yes
Oil Mist	mg/Nm <sup>3</sup>	15	NA	15	Yes
NOX	mg/Nm <sup>3</sup>	500	550 (Liquid) 400 (Gas)	500 (Furnace) 400 (Gas)	Yes
SO <sub>2</sub>	mg/Nm <sup>3</sup>	500	1,650 (Liquid)	500	Yes
VOC	mg/Nm <sup>3</sup>	20	NA	20	Yes
PCDD/F	ng TEQ/Nm <sup>3</sup>	0,1	NA	0,1	Yes
Carbon Monoxide (CO)	mg/Nm <sup>3</sup>	100	NA	100	Yes
Chromium (Cr)	mg/Nm <sup>3</sup>	4	NA	4	Yes *
Cadmium (Cd)	mg/Nm <sup>3</sup>	0,2	NA	0,2	Yes *
Lead (Pb)	mg/Nm <sup>3</sup>	2	NA	2	Yes *
Nickel (Ni)	mg/Nm <sup>3</sup>	2	NA	2	Yes *
Hydrogen Chloride (HCl)	mg/Nm <sup>3</sup>	10	NA	10	Yes *
Fluoride	mg/Nm <sup>3</sup>	5	NA	5	Yes *
Hydrogen Fluoride (HF)	mg/Nm <sup>3</sup>	10	NA	10	Yes *
H <sub>2</sub> S	mg/Nm <sup>3</sup>	5	NA	5	Yes *
Ammonia	mg/Nm <sup>3</sup>	30	NA	30	Yes *
Benzo(a)pirene	mg/Nm <sup>3</sup>	0,1	NA	0,1	Yes *
Tar fume	mg/Nm <sup>3</sup>	5	NA	5	Yes *

\* If Laboratory is available in Ecuador after start up and commissioning of the Adelca del Litoral Plant

## 2.9 Air Emissions from Mobile Sources

### 2.9.1 Vehicles with Diesel Engines

The applicable Norma Técnica Ecuatoriana del Instituto Ecuatoriano de Normalización (NTE INEN) 2 207 states:

Criteria for Diesel Engines (Dynamic test)* from model year 2000 (American cycles).			
Category	Vehicle Gross Weight (kg)	Vehicle Loaded (kg)	Limit (g/km)
<b>CO:</b>			
Light vehicles	All	All	2.1
Medium vehicles	≤ 3860	≤1700	6.2
	≤ 3860	>1700 ≤ 3860	6.2
Heavy vehicles**	>3860 ≤ 6350	All	15.5
<b>Hydrocarbons</b>			
Light vehicles	All	All	0.25
Medium vehicles	≤ 3860	≤1700	0.5
	≤ 3860	>1700 ≤ 3860	0.5
Heavy vehicles**	>3860 ≤ 6350	All	1.3
<b>Hydrocarbons</b>			
Light vehicles	All	All	0.62
Medium vehicles	≤ 3860	≤1700	0.75
	≤ 3860	>1700 ≤ 3860	1.1
Heavy vehicles**	>3860 ≤ 6350	All	5.0
<b>NOx</b>			
Light vehicles	All	All	0.62
Medium vehicles	≤ 3860	≤1700	0.75
	≤ 3860	>1700 ≤ 3860	1.1
Heavy vehicles	** >3860 ≤ 6350	All	5.0
<b>Total Particulates</b>			
Light vehicles	All	All	0.12
Medium vehicles	≤ 3860	≤1700	0.16
	≤ 3860	>1700 ≤ 3860	0.28
Heavy vehicles	** >3860 ≤ 6350	All	0.10
* Testing conducted at sea level			
** in g/bhp-hr (grams/brake horse power-hour)			
*** value for urban buses is 0.07 g/bhp-h			

Criteria for Diesel Engines (Dynamic test)* from model year 2000 (European Cycles).			
Category	Vehicle Gross Weight (kg)	Vehicle Loaded (kg)	Limit (g/km)
<b>CO:</b>			
M1 <sup>(1)</sup>	≤ 3500	All	2.72
M1 <sup>(2)</sup> , N1	≤ 3500	≤1250	2.72
	≤ 3500	>1250 ≤ 1700	5.17
	≤ 3500	>1700	6.9
N2, N3, M2, M3		All	4.0
<b>Hydrocarbons + NOx</b>			
M1 <sup>(1)</sup>	≤ 3500	All	0.97
M1 <sup>(2)</sup> , N1	≤ 3500	≤1250	0.97
	≤ 3500	>1250 ≤ 1700	1.4
	≤ 3500	>1700	1.4
N2, N3, M2, M3 <sup>(3)</sup>		All	1.1

Criteria for Diesel Engines (Dynamic test)* from model year 2000 (European Cycles).			
Category	Vehicle Gross Weight (kg)	Vehicle Loaded (kg)	Limit (g/km)
<b>NO<sub>x</sub></b>			
M1 <sup>(1)</sup>	≤ 3500	All	0.97
M1 <sup>(2)</sup> , N1	≤ 3500	≤1250	0.97
	≤ 3500	>1250 ≤ 1700	1.4
N2, N3, M2, M3 <sup>(3)</sup>	≤ 3500	>1700	1.4
	≤ 3500	All	7.0
<b>Particulates</b>			
M1 <sup>(1)</sup>	≤ 3500	All	0.14
M1 <sup>(2)</sup> , N1	≤ 3500	≤1250	0.14
	≤ 3500	>1250 ≤ 1700	0.19
N2, N3, M2, M3 <sup>(3)</sup>	≤ 3500	>1700	0.25
	≤ 3500	All	0.15

\* Testing conducted at sea level  
 (1) Vehicles carrying up to 5 passengers plus the driver and with a gross vehicle weight less than or equal to 2.5 tons  
 (2) Vehicles carrying up to 5 passengers plus the driver and with a gross weight vehicle exceeding 2.5 tons  
 (3) Units g / kWh  
 (4) Hydrocarbons + NO<sub>x</sub>

IFC General EHS Guidelines requires compliance with national or regional programs.

## 2.9.2 Vehicles with Gasoline Engines

The applicable Norma Técnica Ecuatoriana del Instituto Ecuatoriano de Normalización (NTE INEN) 204:2002 states:

Criteria for Gasoline Engines (Dynamic test)* from model year 2000 (American cycles).			
Category	Vehicle Gross Weight (kg)	Vehicle Loaded (kg)	Limit (g/km)
<b>CO:</b>			
Light vehicles	All	All	2.1
Medium vehicles	≤ 3860	≤1700	6.2
	≤ 3860	>1700 ≤ 3860	6.2
Heavy vehicles**	>3860 ≤ 6350	All	14.4
	> 6350	All	37.1
<b>Hydrocarbons</b>			
Light vehicles	All	All	0.25
Medium vehicles	≤ 3860	≤1700	0.5
	≤ 3860	>1700 ≤ 3860	0.5
Heavy vehicles**	>3860 ≤ 6350	All	1.1
	> 6350	All	1.9
<b>NO<sub>x</sub></b>			
Light vehicles	All	All	0.62
Medium vehicles	≤ 3860	≤1700	0.75
	≤ 3860	>1700 ≤ 3860	1.1
Heavy vehicles**	>3860 ≤ 6350	All	5.0
	> 6350	All	5.0

\* Testing conducted at sea level  
 \*\* in g/bhp-hr (grams/brake horse power-hour)  
 \*\*\* value for urban buses is 0.07 g/bhp-h

Criteria for Gasoline Engines (Dynamic test)* from model year 2000 (European Cycles).			
Category	Vehicle Gross Weight (kg)	Vehicle Loaded (kg)	Limit (g/km)
<b>CO:</b>			
M1 <sup>(1)</sup>	≤ 3500		2.72



M1 <sup>(2)</sup> , N1	≤ 3500	≤1250	2.72
	≤ 3500	>1250 ≤ 1700	5.17
	≤ 3500	>1700	6.9
<b>Hydrocarbons + NOx</b>			
M1 <sup>(1)</sup>	≤ 3500		0.97
M1 <sup>(2)</sup> , N1	≤ 3500	≤1250	0.97
	≤ 3500	>1250 ≤ 1700	1.4
	≤ 3500	>1700	1.7
* Testing conducted at sea level (1) Vehicles carrying up to 5 passengers plus the driver and with a gross vehicle weight less than or equal to 2.5 tons (2) Vehicles carrying up to 5 passengers plus the driver and with a gross weight vehicle exceeding 2.5 tons			
<b>Gas, and compressed natural gas engines are not regulated by NTE INEN Emissions standards</b>			

IFC General EHS Guidelines requires compliance with national or regional programs.

## 2.10 Climate Monitoring

Climate data from the three (3) closest meteorological stations will be compiled yearly. Adelca del Litoral will install a meteorological station on site (or reach an agreement for another institution to install and monitor like the U. de Milagro) within one (1) year of commissioning the plant. Collect daily metrological data including: rainfall, temperature, heliophany, cloudiness, wind direction and velocity, relative humidity and evaporation.

## 2.11 Sediment Quality Monitoring and Soil Quality/Remediation

Sediment will be monitored in the *Estero de los Monos* upstream and downstream of the effluent discharge points of the plant during operation.

Soil samples will be collected at locations at the points of predicted or observed outfall of particulate material every two (2) years.

Soil will be sampled and analyzed in areas of suspected or known contamination in and around the project area in the case of a spill or other incident. The parameters chosen for analysis will depend on the known or suspected contaminants.

The following table describes the parameters for sediment quality monitoring and soil remediation.

Criteria for Sediment and Soil Quality/Remediation Compliance									
Parameter	Units	TULMAS, Book VI, Annex 2, Table 2 Quality Criteria	Background Concentration that Exceeds Quality Criteria	Range of Values for Typical Soils in the World <sup>1</sup>	Adelca Guideline TULMAS, Book VI, Annex 2, Table 3 Adelca del Litoral Project Commitment for Soil and Sediment Remediation				Sediment/ Soil Monitoring (Yes/No)
					Agriculture	Residential	Commercial	Industrial	
pH	pH	6-8	--	--	6-8	6-8	6-8	6-8	Yes
Conductivity	µS/cm	2000	--	--	2000	2000	4000	4000	Yes
Arsenic	mg/kg	5	--	0.1-40	12	15	15	15	Yes
Sulfur	mg/kg	250	--	--	500	--	--	--	Yes
Barium	mg/kg	200	--	100 - 3.000	750	500	2000	2000	Yes
Boron	mg/kg	--	--	--	2	--	--	--	Yes
Cadmium	mg/kg	0,5	--	0,01-2	2	5	10	10	Yes
Cobalt	mg/kg	10	23	0.05-65	40	50	300	300	Yes
Copper	mg/kg	30	58	2-250	63	63	91	91	Yes
Chrome (total)	mg/kg	20	83	5-1,500	65	65	90	90	Yes
Chrome Hexavalent	mg/kg	--	--	--	0,4	0,4	0,4	0,4	Yes
Tin	mg/kg	--	--	1-200	5	50	300	300	Yes
Floride	mg/kg	--	--	--	200	200	2000	2000	Yes
Mercury	mg/kg	2,5	--	0.01-8	0,8	2	10	10	Yes
Molybdenum	mg/kg	5	--	0.1-40	5	10	40	40	Yes
Nickel	mg/kg	250	--	2-750	50	100	100	100	Yes
Lead	mg/kg	200	--	2-300	100	100	150	150	Yes
Selenium	mg/kg	0,5	--	0.01-12	2	3	10	10	Yes
Thalium	mg/kg	0,5	--	--	1	1	1	1	Yes
Vanadium	mg/kg	10	149	3-500	130	130	130	130	Yes
Zinc	mg/kg	30	77	1-900	200	200	380	380	Yes
Oil and Grease	mg/kg	--	--	--	500	2500	4000	4000	Yes
Benzene	mg/kg	--	--	--	0,05	0,5	0,5	0,5	Yes
Ethylbenzene	mg/kg	--	--	--	0,1	1,2	20	20	Yes
Styrene	mg/kg	--	--	--	0,1	5	50	50	Yes

Criteria for Sediment and Soil Quality/Remediation Compliance									
Parameter	Units	TULMAS, Book VI, Annex 2, Table 2 Quality Criteria	Background Concentration that Exceeds Quality Criteria	Range of Values for Typical Soils in the World <sup>1</sup>	Adelca Guideline TULMAS, Book VI, Annex 2, Table 3 Adelca del Litoral Project Commitment for Soil and Sediment Remediation				Sediment/ Soil Monitoring (Yes/No)
					Agriculture	Residential	Commercial	Industrial	
Toulene	mg/kq	--	--	--	0,1	0,8	0,8	0,8	Yes
Xylene	mg/kq	--	--	--	0,1	1	17	20	Yes
Phenols	mg/kq	--	--	--	0,05	0,5	5	5	Yes
HAPS	mg/kq	--	--	--	2	--	5	1	Yes
Benzantracene	mg/kq	--	--	--	0,1	1	1	1	Yes
Benzopyrene	mg/kq	--	--	--	0,1	0,7	0,7	0,7	Yes
Naphthale ne	mg/kq	--	--	--	0,1	0,6	22	22	Yes
Pyrene	mg/kq	--	--	--	0,1	10	10	10	Yes
PCBs	mg/kq	--	--	--	0,5	1,3	33	33	Yes
Chlorinate d Aliphatic	mg/kq	--	--	--	0,1	5	5	50	Yes
Chloroben zene	mg/kq	--	--	--	0,05	2	50	50	Yes
Tetrachloro ethylene	mg/kq	--	--	--	0,1	5	50	50	Yes
Aldrin	mg/kq	--	--	--	0,1	0,1	0,1	0,1	Yes
Dieldrin	mg/kq	--	--	--	0,1	0,1	0,1	0,1	Yes
Chlorodan e	mg/kq	--	--	--	0,1	0,1	0,1	0,1	Yes
Endosulfan (total)	mg/kq	--	--	--	0,1	0,1	0,1	0,1	Yes
Endrin	mg/kq	--	--	--	0,01	0,01	0,01	0,01	Yes
Heptachlor	mg/kq	--	--	--	0,01	0,01	0,01	0,01	Yes
Heptachlor Cyclohexa	mg/kq	--	--	--	0,01	0,01	0,01	0,01	Yes
Atrazine	mg/kq	--	--	--	0,005	0,005	0,005	0,005	Yes
Carbofuran	mg/kq	--	--	--	0,01	0,01	0,01	0,01	Yes

## 2.12 Surface Hydrology and Flooding

The hydrologic model for *Estero de los Monos* will be updated prior to commissioning to include the risk of potential back flooding from the Río Chimbo y Río Guayas. This information will be used to determine if the berm and other control structures are sufficient to protect the facilities from future flooding or if additional engineering measures are necessary to protect the facility.

All flood events (water extending outside of the channel of the *Estero de los Monos* onto the floodplain; or floodwaters persisting as ponded water for more than one day) will be documented including the maximum extent and depth of water near or within the plant. Satellite images may be used.

The hydrologic model will be updated during operation if the level of flooding reaches the elevation of the plant working surface.

## 2.13 Surface Water Quality Monitoring

Surface water quality will be monitored in the *Estero de los Monos* upstream and downstream of the effluent discharge points of the plant during construction and operation.

The following table describes the parameters for surface water quality monitoring.

Criteria for Surface Water Quality Compliance			
Parameter	Units	Adelca Guideline TULMAS Annex 1, Table 3 Warm Fresh Water	Monitoring (Yes/No)
Ammonia	mg/l	--	Yes
Ammonium as ammonia	mg/l	0,02	Yes
Cyanide (total)	mg/l	0,01	Yes
Cyanide (free)	mg/l	--	Yes
Fluorides	mg/L	--	Yes
Nitrogen (total)	mg/l	--	Yes
pH	pH	5-9	Yes
Phosphorous (total)	mg/L	--	Yes
Dissolved Oxygen	mg/L	Not lower than 60% and not lower than 5	Yes

Criteria for Surface Water Quality Compliance			
Parameter	Units	Adelca Guideline TULMAS Annex 1, Table 3 Warm Fresh Water	Monitoring (Yes/No)
Residual Chlorine (total)	mg/l	0,01	Yes
Sulfur	mg/l	--	Yes
Sulfur as Hydrogen Sulfide	mg/l	0,0002	Yes
Sulfides	mg/L	--	Yes
Total Suspended Solids	mg/l	--	Yes
Temperature	C	Natural Conditions +3 C	Yes
Oil and Grease	mg/l	0,3	Yes
Phenols	mg/l	0,001	Yes
Total Petroleum Hydrocarbons (TPH)	mg/l	0,5	Yes
PAH	mg/l	--	Yes
Fecal Coliforms	NMP/ 100 ml	200	Yes
Chemical Oxygen Demand (COD)	mg/L	--	Yes
Aluminum	mg/l	0,1	Yes
Arsenic	mg/l	0,05	Yes
Barium	mg/l	1,0	Yes
Beryllium	mg/l	0,1	Yes
Boron	mg/l	0,75	Yes
Cadmium	mg/l	0,001	Yes
Cobalt	mg/l	0,2	Yes
Chromium (total)	mg/l	0,05	Yes
Chromium (hexavalent)	mg/l	--	Yes
Copper	mg/l	--	Yes
Tin	mg/l	--	Yes
Iron	mg/l	0,3	Yes
Manganese	mg/l	0,1	Yes
Mercury	mg/l	0,0002	Yes
Nickel	mg/l	0,025	Yes
Silver	mg/l	0,01	Yes
Lead	mg/l	--	Yes
Selenium	mg/l	0,01	Yes
Zinc	mg/l	0,18	Yes
a-BHC	mg/l	0,01	Yes
Alachlor	mg/l	0,01	Yes
Aldrin	mg/l	0,01	Yes

Criteria for Surface Water Quality Compliance			
Parameter	Units	Adelca Guideline TULMAS Annex 1, Table 3 Warm Fresh Water	Monitoring (Yes/No)
b-BHC	mg/l	0,01	Yes
Chlorotalonil	mg/l	0,01	Yes
Chlrotal-dimetyl	mg/l	0,01	Yes
d-BHC	mg/l	0,01	Yes
Dieldrin	mg/l	0,01	Yes
Endosulfan I	mg/l	0,01	Yes
Endosulfan II	mg/l	0,01	Yes
Endosulfan sulfate	mg/l	0,01	Yes
Endrin	mg/l	0,01	Yes
Endrin aldehyde	mg/l	0,01	Yes
g-BHC	mg/l	0,01	Yes
g-chlordane	mg/l	0,01	Yes
Heptachlor	mg/l	0,01	Yes
Heptachlor epoxide	mg/l	0,01	Yes
Methoxychlor	mg/l	0,01	Yes
Metolachlor	mg/l	0,01	Yes
Oxyfluorfen	mg/l	0,01	Yes
pp`-DDE	mg/l	0,01	Yes
pp`-DDT	mg/l	0,01	Yes
Quintozene	mg/l	0,01	Yes
Cadusafos	mg/l	0,01	Yes
Chlorpirifos	mg/l	0,01	Yes
Diazinon	mg/l	0,01	Yes
Diclorvos+Trichlorfon	mg/l	0,01	Yes
Dimethoate	mg/l	0,01	Yes
Disulfoton	mg/l	0,01	Yes
Enthoprofos	mg/l	0,01	Yes
Fenclorphos	mg/l	0,01	Yes
Malathion	mg/l	0,01	Yes
Methyl parathion	mg/l	0,01	Yes
Mevinphos	mg/l	0,01	Yes
Parathion	mg/l	0,01	Yes
Phorate	mg/l	0,01	Yes
Terbufos	mg/l	0,01	Yes
Cyfluthrin	mg/l	0,05	Yes
Cyhalotrin	mg/l	0,05	Yes
Cypermethrin	mg/l	0,05	Yes
Deltamethrin	mg/l	0,05	Yes
Fenvalerate	mg/l	0,05	Yes

Criteria for Surface Water Quality Compliance			
Parameter	Units	Adelca Guideline TULMAS Annex 1, Table 3 Warm Fresh Water	Monitoring (Yes/No)
Permethrin	mg/l	0,05	Yes

## 2.14 Water Quality – Drinking Water

## 2.15 Effluents Monitoring

The following effluents will be monitored: stormwater runoff, industrial effluent and sewage during operation.

The following table describes the parameters for effluent monitoring.

Criteria for Effluent Compliance						
Parameter	Unit	TULMAS Annex 1 Table 12 (Effluent to Natural Water Bodies)	IFC Foundries Guideline (Effluents)	IFC Integrated Steel Mills Guideline (Effluents)	Adelca Guideline	Monitoring (Yes/No)
Oil and Grease	mg/L	0,3	10	10	10	Yes
Methylmercury	mg/L	Not Detectable		--	Not Detectable	Yes
Ammonia	mg/L	--	5	5	5	Yes
Aldehydes	mg/L	2,0		--	2,0	No
Aluminum	mg/L	5,0	0,02	--	0,02	Yes
Total Arsenic	mg/L	0,1		--	0,1	Yes
Barium	mg/L	2,0		--	2,0	Yes
Boron (total)	mg/L	2,0		--	2,0	Yes
Cadmium	mg/L	0,02	0,01	0,01	0,01	Yes
Chromium (total)	mg/L	--	0,5	0,5	0,5	Yes
Cyanide (free)	mg/L	--		0,1	0,1	Yes
Cyanide (total)	mg/L	0,1		0,5	0,1	Yes
Active Chlorine	mg/L	0,5		--	0,5	Yes
Chloroform	mg/L	0,1		--	0,1	No
Chlorides	mg/L	1,0		--	1,0	Yes
Copper	mg/L	1,0	0,5	0,5	0,5	Yes
Cobalt	mg/L	0,5		--	0,5	Yes
Fecal Coliforms	Nmp/100 ml	99,9 % Removal		--	99,9 % Removal	Yes
Color	Color Units	Not Detectable in Dilution		--	Not Detectable in Dilution	No
ds	mg/L	0,2	1	0,5	0,5	Yes

Criteria for Effluent Compliance						
Parameter	Unit	TULMAS Annex 1 Table 12 (Effluent to Natural Water Bodies)	IFC Foundries Guideline (Effluents)	IFC Integrated Steel Mills Guideline (Effluents)	Adelca Guideline	Monitoring (Yes/No)
Chromium (hexavalent)	mg/L	0,5		0,1	0,1	Yes
Biochemical Oxygen Demand (BOD)	mg/L	100		--	100	Yes
Chemical Oxygen Demand (COD)	mg/L	250	125	250	250	Yes
Dichloroethylene	mg/L	1,0		--	1,0	Yes
Tin	mg/L	5,0	2	2	2	Yes
Fluorides	mg/L	5,0	5	5	5	Yes
Phosphorous (total)	mg/L	10		2	2	Yes
Iron (total)	mg/L	10	5	5	5	Yes
Total Petroleum Hydrocarbons (TPH)	mg/L	20		--	20	Yes
Manganese (total)	mg/L	2,0		--	2,0	Yes
Floating Material	Visible	Absence		--	Absence	No
Mercury (total)	mg/L	0,005		0,01	0,005	Yes
Nickel	mg/L	2,0	0,2	0,5	0,5	Yes
Nitrates	mg/L	10		--	10	Yes
Nitrites	mg/L	10		--	10	Yes
Total Kjeldahl Nitrogen	mg/L	15		30	15	Yes
Organochlorines	mg/l	0,05		--	0,05	Yes
Organophosphates	mg/l	0,1		--	0,1	Yes
PAH	mg/l	--		0,05	0,05	Yes
Silver	mg/l	0,1		--	0,1	Yes
Lead	mg/L	0,2	0,2	0,2	0,2	Yes
pH	pH units	5-9	6-9	6-9	6-9	Yes
Selenium	mg/L	0,1		--	0,1	Yes
Sedimentable Solids	mg/L	1,0		--	1,0	Yes
Suspended Solids (total)	mg/L	100	35	35	35	Yes
Total Solids	mg/L	1600		--		Yes
Sulfates	mg/L	1000		--		Yes
Sulfides	mg/L	2,0		0,1	0,1	Yes
Sulfur	mg/l	0,5		--		No
Temperature	°C	<35	Increase less than 3°C at mixing zone	Increase less than 3°C at mixing zone	Increase less than 3°C at mixing zone	Yes
Tensoactive Substances	mg/L	0,5		--	0,5	Yes
Carbon Tetrachloride	mg/L	1,0		--	1,0	Yes



Criteria for Effluent Compliance						
Parameter	Unit	TULMAS Annex 1 Table 12 (Effluent to Natural Water Bodies)	IFC Foundries Guideline (Effluents)	IFC Integrated Steel Mills Guideline (Effluents)	Adelca Guideline	Monitoring (Yes/No)
Trichloroethylene	mg/L	1,0		--	1,0	Yes
Vanadium	mg/L	5,0		--	5,0	Yes
Zinc	mg/L	5,0	0,5	2	0,5	Yes
Toxicity				To Be Determined		No

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## 2.16 Occupational Noise Criteria – Workplace

Occupational Noise Criteria – Workplace Conditions					
National Regulation	Representative International Standards & Guidelines		Project Commitment	Adopted Project Specifications	Comment/Rationale
	International Standards	Adelca del Litoral			
<p><b>Regulations on Safety, Worker Health, and Environment Improvement</b></p> <p>Art. 55, paragraph 7 published in the Official Register No. 565 of November 17, 1986. Basic and environmental health conditions in workplaces</p> <p><b>Noise Limits for Various Working Environments under continuous sound pressure:</b></p> <ul style="list-style-type: none"> <li>85 dB (A) (8 hrs/day)</li> <li>90 dB(A) (4 hrs/day)</li> <li>95 dB(A) (2 hrs/day)</li> <li>100 dB(A) (1 hr/day)</li> <li>110 dB(A) (0.25 hrs/day)</li> <li>115 dB(A) (1.25 hrs/day)</li> </ul> <p>Noise Limits for worksites that demand fundamentally intellectual work activities or tasks such as vigilance, concentration o calculation: 70 dB(A)</p>	<p><b>IFC General EHS Guidelines</b></p> <p>Noise Limits for Various Working Environments under continuous sound pressure - Heavy industry: 85 dB(A) (8 hrs/day) without hearing protection</p> <p>or the average maximum sound level reaches 110dB(A). Hearing protective devices provided should be capable of reducing sound levels at the ear to at least 85 dB(A).</p>	None specified	<p><b>Noise Limits for Various Working Environments under continuous sound pressure:</b></p> <p>85 dB(A) (8hrs/day) without hearing protection</p> <p>or the average maximum sound level reaches 110dB(A). Hearing protective devices provided should be capable of reducing sound levels at the ear to at least 85 dB(A).</p>	<p>Ecuadorian Norm</p> <p>IFC General EHS Guidelines</p>	It is recommended that guidelines for noise in various working environments under continuous sound pressure Article 55, be used as criteria for the project.
<p><b>Regulations on Safety, Worker Health, and Environment Improvement</b></p> <p>Art. 55, paragraph 7 published in the Official Register No. 565 of November 17, 1986. Basic</p>	<b>IFC: Health and Work Safety Guidelines</b>	None specified	Noise Limits for Various Working Environments under peak sound pressure:	Ecuadorian Norm	It is recommended that guidelines for noise in various working environments under

Occupational Noise Criteria – Workplace Conditions					
National Regulation	Representative International Standards & Guidelines		Project Commitment	Adopted Project Specifications	Comment/Rationale
	International Standards	Adelca del Litoral			
and environmental health conditions in workplaces.  Noise Limits for Various Working Environments under peak sound pressure: <115 dB(A)	Noise Limits for Various Working Environments under peak sound pressure (instantaneous): 140 dB(C)		<115 dB(C)		peak sound pressure proposed by Ecuadorian Mining Safety Regulation Article 55 be used as criteria for the Fruta del Norte Mine.

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## 2.17 Light Emissions and Illumination Requirements Criteria

Light Emissions and Illumination Requirements Criteria					
National Regulation	Representative International Standards & Guidelines		Project Commitment	Adopted Project Specifications	Comment/ Rationale
	International Standards	Adelca del Litoral			
<p><b>NTE INEN 1152 natural lighting for buildings and NTE INEN 1154 natural lighting for factories and workshops establish criteria for workplace conditions:</b></p> <p>300 - 450 Lux with a natural light factor <sup>1</sup> in a range of 3.75 – 5.62 for activities such as welding, assembly, drilling, maintenance, etc.</p> <p>700 – 1500 Lux with a natural light factor in a range of 8.75 – 18.75 for delicate work such as office work, natural light factor should not be less than: 1.25%</p> <p>A more detailed description of these criteria can be found in the:</p> <p><b>Ecuadorian Regulations on Safety, Worker Health, and Environment Improvement</b> (<i>Reglamento de salud, seguridad de los trabajadores y mejora del ambiente</i>) Art. 56 y 57.</p>	<p><b>IFC</b></p> <p>Emergency Lighting: 10 Lux Outdoor non-working areas 20 Lux</p> <p>Walkways/passages: 5-10 Lux Dynamic locations: 5-50 Lux (Production/development areas)</p> <p>Areas with occasional simple manual tasks: 50-100 Lux</p> <p>Workstations and areas with medium to high precision manual tasks: 150-400 Lux</p> <p>Illumination systems should be adequate and safe for the planned working conditions.</p> <p>Separate and independent emergency light sources should be provided at all places where a hazard could be caused by a failure of the</p>	None specified	TBD	NTE INEN 1152 and 1154 IFC.	It is recommended that Ecuadorian regulations and IFC guidelines be used as outdoor, indoor lighting criteria for the project

<sup>1</sup> Natural light factor is the relationship between the luminance at a point inside a building and the horizontal luminance on an unobstructed exterior surface. Both luminances are simultaneously measured

Light Emissions and Illumination Requirements Criteria					
National Regulation	Representative International Standards & Guidelines		Project Commitment	Adopted Project Specifications	Comment/ Rationale
	International Standards	Adelca del Litoral			
	normal lighting system. The system should turn on automatically, should be adequate to allow the workers to conduct an emergency shutdown of machinery, and should be tested on a regular basis.				

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### 3 BIOLOGICAL MONITORING

#### 3.1 Biodiversity

Criteria for Biodiversity Conservation					
Environmental Component	National Regulation	IFC/ World Bank	Adelca del Litoral Standards	Other	Project Commitment
<b>Biodiversity and landuse</b>	<p><b>Law for Forestry and Natural Areas and Wildlife Conservation (September 2004):</b></p> <p>The Ministry of the Environment (MOE) supervises primary forest materials, wildlife, flora and fauna during all stages (Art. 43), including their movement, which requires a permit issued by the ministry (Art. 44).</p> <p><b>TULAS Book III on the Forest Regime</b></p> <p>All integral EMPs and forestry programs in natural forests must be elaborated and executed based on biodiversity conservation criteria (Art. 97).</p> <p>Collection is permitted for educational, cultural, scientific, athletic, subsistence, promotion, commerce and control purposes in permitted locations and time periods, using ideal implements (Art. 202).</p>	<p><b>IFC Performance Standard No. 6</b></p> <ul style="list-style-type: none"> <li>• Avoid disturbance of critical and significant habitats (natural or modified) where feasible. If this is not possible, disturbance of these habitats must be minimized, according to the value placed on each of the habitats.</li> <li>• Integrate conservation needs and development priorities in a way that meets the land use needs of the local communities.</li> <li>• Buffers must be established with respect to significant habitats; these buffers must be adequate for the conservation of species living in the area.</li> <li>• Minimizing disturbance to vegetation and soils.</li> <li>• Consultation with key stakeholders (e.g. government, civil society, and potentially affected communities) to understand any conflicting land use demands and the communities' dependency on natural resources and / or conservation requirements that may exist in the area.</li> </ul> <p><b>IFC EHS Guidelines</b></p> <ul style="list-style-type: none"> <li>• Minimize temporary and permanent terrestrial habitat</li> </ul>	Does not apply	Does not apply	<p>Ecuadorian Regulation and</p> <p>IFC Performance Standards</p>

Criteria for Biodiversity Conservation					
Environmental Component	National Regulation	IFC/ World Bank	Adelca del Litoral Standards	Other	Project Commitment
<b>Terrestrial Habitat</b>	<p>The Ministry of the Environment or corresponding dependency will periodically nominate species whose collection is permitted, restricted or prohibited for the established purposes.</p> <p>Movement of forest products within national territory requires a circulation permit emitted as part of the exploitation license (Art. 118)</p> <p>All persons are obligated to denounce to the Ministry of the Environment the deterioration of renewable natural resources caused by rural, national or industrial development projects (Art. 258)</p> <p><b>TULAS Book IV On Biodiversity</b></p> <p>Disturbing or attacking wild animals is prohibited nationwide (Art. 109).</p> <p>All scientific investigation of wild flora and fauna to be realized in the National Patrimony of Natural Areas [national system of protected areas] requires</p>	<p>alteration and be consistent with the requirement to protect and preserve critical habitat.</p> <ul style="list-style-type: none"> <li>• Management strategies should include: <ul style="list-style-type: none"> <li>○ Siting access routes and facilities in locations that avoid impacts to critical terrestrial habitat to avoid sensitive times of the year</li> <li>○ Minimizing disturbance to vegetation and soils;</li> <li>○ Implementation of mitigation measures appropriate for the type of habitat and potential impacts including, for example, post-operation restoration (which may include baseline inventories, evaluations, and eventual rescue of species), offset of losses, or compensation of direct users;</li> <li>○ Avoiding or minimizing the creation of barriers to wildlife movement, or threats to migratory species (such as birds) and providing alternative migration routes when the creation of barriers cannot be avoided;</li> <li>○ Planning and avoiding sensitive areas and implementing buffer zone.</li> <li>○ Conducting activities such that the risk of landslides, debris or mud flows, and bank or alluvial fan destabilization is minimized;</li> <li>○ Implementing soil conservation measures (e.g. segregation, proper placement and stockpiling of clean soils and overburden material for existing site remediation); key factors such as placement, location, design, duration, coverage, reuse, and single handling should be considered;</li> </ul> </li> </ul>			

Criteria for Biodiversity Conservation					
Environmental Component	National Regulation	IFC/ World Bank	Adelca del Litoral Standards	Other	Project Commitment
<b>Aquatic Habitat</b>	<p>authorization by the corresponding regional district (Art. 6). Research authorization is not required outside of these areas, unless samples or specimens will be collected. The Ministry of the Environment will give differential treatment, facilitating or restricting the planned activities of scientific investigation of wild flora and fauna, among others, with respect to the following aspects:</p> <p>a) The population status b) The level of experimental manipulation or manipulation of another nature of the populations and habitats, and the potential impacts. c) The biological and ecological sensitivity of the organisms and habitats under investigation.</p> <p>Constitution of Ecuador Title VII, Chapter II, Art. 395.</p> <p>Art. 395.- The constitution recognizes the following environmental principles:</p> <p>1. The State will guarantee a model of sustainable development, environmentally balanced and respectful of cultural diversity that conserves the</p>	<ul style="list-style-type: none"> <li>○ Where topsoil is pre-stripped, it should be stored for future site rehabilitation activities. Topsoil management should include maintenance of soil integrity in readiness for future use. Storage areas should be temporarily protected or vegetated to prevent erosion;</li> <li>○ Conserving the quality and composition of growth medium for use (e.g. for capping) during site reclamation and closure activities;</li> <li>○ Ensuring that the growth medium is sufficient to support native plant species appropriate for the local climate and consistent with proposed future land uses. Overall thickness of the growth medium should be consistent with surrounding undisturbed areas and future land use;</li> <li>○ Manage vegetation growth along access roads and at permanent above-ground facilities. Remove invasive plant species and replant native species. Vegetation control should employ biological, mechanical and thermal vegetation control measures and avoid the use of chemical herbicides as much as possible.</li> <li>○ Prevent/minimize mobilization of sediment from entering watercourses and disrupt water quality and quantity. Develop management strategies to include:</li> <li>○ Minimizing the creation and extent of new access corridors;</li> <li>○ Decommissioning and re-vegetating</li> </ul>			



Criteria for Biodiversity Conservation					
Environmental Component	National Regulation	IFC/ World Bank	Adelca del Litoral Standards	Other	Project Commitment
	<p>biodiversity and natural regeneration capacity of ecosystems, and assures the satisfaction of the necessities of present and future generations.</p> <p>2. Compliance with environmental management policies will be obligatory for all Ecuadorians.</p> <p>3. The State will guarantee the active and permanent participation by affected persons and entities in the planning, execution, and control of all activities that generate environmental impacts.</p> <p>4. If the scope of legal dispositions regarding environmental issues is unclear, they will be applied in the manner that is the most favorable to environmental protection.</p>	<p>exploration access routes, and installing barricades to limit access;</p> <ul style="list-style-type: none"> <li>○ Maintaining, to the extent possible, natural drainage paths and restoring them if they are disrupted;</li> <li>○ Maintaining water body catchment areas equal or comparable to pre-development conditions;</li> <li>○ Protecting stream channel stability by limiting in-stream and bank disturbance, and employing appropriate setbacks from riparian zones;</li> <li>○ Attenuating surface runoff from high precipitation events using on-site storage and water management infrastructure (e.g. storage ponds, sumps, low gradient ditches, clean water diversions);</li> <li>○ Designing temporary and permanent bridges and culverts to manage peak flows depending on the associated potential risk;</li> <li>○ Constructing, maintaining, and reclaiming watercourse crossings that are stable, safe for the intended use, and that minimize erosion, mass wasting and degradation the channel.</li> </ul>			

## 4 SOCIAL MONITORING

The areas of influence for Adelca del Litoral project constitute agricultural and rural areas southeast of the city of Milagro. These areas are organized in groups of dispersed houses called recintos. In the scope of the project there are six (6) recintos: four (4) around the project (El Ceibo, Manabí Chico, El Eden and Paraiso) and two (2) along the access road (Via Barcelona) (El Progreso and Agua Santa). All six (6) recintos group around 260 to 300 families.

Each recinto has particular characteristics but they all have common socio-economic indicators: large young population, lack of infrastructure (educational, health and security), low income, limited employment sources, limited income sources, lack of higher education in the young population, subsistence economy based on agriculture in small family owned ranches for trade and commerce in Milagro, regular and temporary employment in big banana plantations and balers, garden businesses, handicraft production of charcoal, and temporary and occasional employment in Milagro and Guayaquil.

Adelca del Litoral project will bring changes in the socio-economic dynamics of the population, particularly on the employment and income sources and change of land use for the project area. It becomes necessary to monitor socio-economic indicators to analyze the effects of the presence of the project in such area. Monitoring indicators for each Community Relations program are presented below.

Verification of Community Relations Plan			
Program	Indicator	Instruments	Notes
Disclosure of Information	Number of registries for Adelca's meetings with stakeholders.	Attendees Registry Meetings Technical Documents Pictures	Presence of registry, number of meetings with stakeholders, number of attendees, contents of information disclosed.
Disclosure of Information	Number of registries of Adelca's meetings with community.	Attendees Registry Meetings Technical Documents Pictures	Presence of registry, number of meetings held with community, number of attendees, contents of information disclosed.
Disclosure of Information	Number of registries of Adelca communicating monitoring results for air, water, noise and mitigating	Attendees Registry Meetings Technical Documents Pictures	Presence of registry, number of Adelca attendances to community assemblies, number of invitations sent by Adelca, number of attendees, contents of information disclosed.
Disclosure of Information	Number of registries of Adelca communicating advance of the project to community.	Attendees Registry Meetings Technical Documents Pictures	Pre-construction and construction phases. Presence of registry, number of meetings held with community, number of attendees, contents of information disclosed.

<b>Verification of Community Relations Plan</b>			
<b>Program</b>	<b>Indicator</b>	<b>Instruments</b>	<b>Notes</b>
Disclosure of Information	Number of registries of Adelca's environmental, health, welfare, etc., educational campaigns with	Attendees Registry Meetings Technical Documents Pictures	Presence of registry, number of environmental, health, welfare, etc., educational campaigns with community, number of attendees, contents of educational campaigns.
Grievance Program	Number of registries of complaints received, addressed and resolved.	Complaints Registry Compensation Agreements	Presence of registry with number of complaints received, addressed and resolved. Compensations given, follow up, and closure.
Grievance Program	Number of compensations given.	Complaints Registry Compensation Agreements	Presence of registry of compensations given, beneficiaries, outcome, follow up and closure.
Community Development	Number of basic needs services improved in project area of influence.	Attendees Registry Meetings Technical Documents Agreements	Presence of registry of lobbying actions with private, public and NGOs institutions to help improve basic needs services in project area of influence (health, education, welfare, security, etc.)
Community Development	Improvement of Socio-Economic Indicators (health, welfare, employment, occupation,	Socio-Economic Diagnosis Report	Presence of socio-economic diagnosis for community in project areas of influence.
Community Development	Number of Development Programs held with community.	Development Programs Outcomes Report	Presence of registry, number of Development Programs, number of beneficiaries, outcome of implementation of program on community's socio-economic dynamics.
Community Development	Number of student internships held in Adelca.	Development Programs Outcomes Report	Presence of registry, number of student internships held in Adelca, positions occupied, outcome of internships.
Community Development	Number of local Small and Medium Sized Enterprises (SMEs) supported.	Development Programs Outcomes Report	Presence of registry, number of local SMEs supported, outcome.
Community Development	Number of new members to Club de Recicladores from project influence areas (AID y AIR).	Development Programs Outcomes Report	Presence of registry, number of new members, place of residence.

Verification of Community Relations Plan			
Program	Indicator	Instruments	Notes
Land Acquisition and Right of Way	Number of properties voluntarily acquired from local owners and permissions for right of way	Land Acquisition and Right of Way Livelihood Assessment Agreements	Presence of registry, number of hectares bought from local owners or needed for right of way, livelihood assessment for owners' families and workers (if any).
Land Acquisition and Right of Way	Number of properties voluntarily acquired from local owners and permissions for right of way	Economic Resettlement Plan Agreements	Presence of Economic Resettlement Plan, compensation given, outcome, follow up on means of livelihood and closure.
Previous Land Owners and Employees	Improvement of livelihood assessment indicators (housing, occupation, monthly income,	Previous Owners and Employees Livelihood Assessment	Presence of socio-economic interviews for previous owners and workers, Livelihood Assessment reports.
Previous Landowners and Employees	Number of previous landowners and employees employed in Adelca.	Previous Owners and Employees Livelihood Assessment	Presence of registry of human resources hired from previous landowners and employees, livelihood assessment for employees hired from previous landowners and employees.
Local Human Resources Program	Number of training programs form local men and women	Local Human Resources Program Outcomes Report	Presence of registry of men and women that attend to training programs, outcome of training programs.
Local Human Resources Program	Number of men and women from project influence areas employed in Adelca.	Local Human Resources Program Outcomes Report	Presence of registry of men and women human resources hired from project areas of influence, livelihood assessment, change on socio-economic dynamics analysis.
Local Cultural Development Program	Number of local cultural activities supported.	Activities Registry Pictures	Presence of registry for local cultural activities supported.

## 5 TRAFFIC MONITORING

Organic Law on Land Transportation, Traffic and Road Safety (LOTTTSV, Spanish acronym), Chapter IV (Environment), Section 1, Pollution from Mobile Sources, Regulation on the Application of the LOTTTSV Chapter VIII (Environment and pollution from mobile sources).

Ecuadorian Technical Regulation (*Reglamento Técnico Ecuatoriano*), from the *Instituto Ecuatoriano de Normalización*: RTE INEN 017:2008 - Control of Pollution from land-

based mobile sources establishes maximum permissible limits for emissions for mobile sources.

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## 6 ARCHEOLOGICAL AND CULTURAL HERITAGE MONITORING

Criteria for Archaeological and Cultural Heritage Conservation					
Environmental Component	National Regulation	IFC/ World Bank	Adelca del Litoral Standards	Other	Project Commitment
<b>Archaeology and Cultural Heritage</b>	<p>The rights of the State regarding historical monuments and objects of archaeological or paleontological interest on the surface and below ground are maintained during all type of mining exploration, earth movement for buildings, roads or for any other purpose, or building demolitions. In such cases, the responsible contractor, administrator or intermediary will inform the Institute of Cultural Patrimony and suspend labors at the site whether the finding is verified (Art. 30).</p> <p>The informed Provincial representative of the House of Culture will immediately inform the Institute, which will order the corresponding technical site visit, to decide on the importance or merit of the discovery and dictate the respective precautionary measures.</p>	<p>IFC Performance Standard No. 8</p> <p>Design and implement a program of Cultural Heritage protection measures as referenced in Paragraph 4 of the PS and, if appropriate, develop Chance Finds Procedures as indicated in Paragraph 5 of PS.</p> <p>Earthworks and installation for all pipelines (e.g. the tailings delivery pipeline and the reclaim water pipeline) should avoid disturbance of existing artifacts in the area.</p>		<p>Best Management Practices A buffer zone of approximately 50 meters should be established around the location of the existing resources.</p> <p>In the event that archaeological resources are present in areas to be disturbed, no work may be performed at the site without the INPC approval. In case of an archaeological finding during</p>	Ecuadorian Regulation and IFC Performance Standards

	<p>Regulations for the Application of the Cultural Patrimony Law, Art. 37.</p> <p>All persons who leave the country, including those with diplomatic status, must swear at customs that they are not carrying objects belonging to the cultural patrimony of the State (Art. 37)</p> <p>Resolution 103-DN-INPC-2010 Mining Law, Art. 26, letter j), Art. 70</p> <p>Art. 26 – Prior Administrative Acts.- The following administrative acts, clearly documented and previously approved by the relevant authorities and institutions are required to execute the mining activities mentioned in the following chapter in the locations mentioned below:</p> <p>j) Obligatory: The National Institute of Cultural Patrimony in the area where prospecting is conducted for mining activity and archaeological vestiges or national and cultural patrimony may be present.</p> <p>Cultural Patrimony Law, November 2004, Art. 7, 9, 30</p> <p>The Cultural Patrimony of the State is comprised by the</p>	<p style="font-size: 100px; opacity: 0.5;">DRAFT</p>		<p>excavation, earth movement, etc. the task must be stopped immediately and the INPC must be informed to establish protection (recovery) measures.</p>	
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	<p>following goods (Art. 7):</p> <p>Mobile and immobile archaeological monuments from the pre-hispanic and colonial era; human, flora, fauna, and building remains, works of art from the same era; ancient manuscripts and incunabula, rare editions of books, maps and other important documents related to people of historical significance in Ecuador; coins, bills, signs (marks), medallions, objects of philatelic interest, objects of ethnographic importance, cultural goods produced by contemporary artists laureates, natural works with a particular interest, and in general any gold object that for its artistic, scientific or historical merit may be declared a good belonging to cultural patrimony.</p> <p>In the case of immobile patrimony, both the patrimony itself as well as the corresponding environment and landscape necessary to provide it adequate visibility are considered part of the cultural patrimony.</p> <p>The State is owner of all archaeological items previously mentioned (Art. 9), including those that belonged to public and private institutions and persons before this law entered</p>	<p style="text-align: center; font-size: 48px; opacity: 0.3;">DRAFT</p>			



	<p>into force and had not been reported to the Institute of Cultural Patrimony.</p> <p>The Institute of Cultural Patrimony will exercise the property rights of the State. Compensation for damages (Art. 70).</p> <p>The titleholders of mining concessions and permits are obliged to execute there labors with methods and techniques that minimize damages to soil, the environment, national or cultural patrimony, neighboring concessions, third parties and, in all cases, to compensate any damages that are caused by the realization of their activities. Inobservance of these methods and techniques will be considered cause for the suspension of mining activities and for corresponding sanctions.</p> <p>Culture Law, 2004 Regulations for the application of the Culture Law</p> <p>The objectives of the Culture Law include: f) Promote, strengthen, and propel scientific and technical thought and research.</p> <p>In the event that archaeological resources are present in areas to be disturbed, work at the site</p>				
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	must be halted until clearance to continue is granted by the INPC.				
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