



ESCUELA SUPERIOR POLITÉCNICA DEL LITORAL
FACULTAD DE CIENCIAS NATURALES Y MATEMÁTICAS
DEPARTAMENTO DE CIENCIAS QUÍMICAS Y AMBIENTALES



MEJORAMIENTO OF ENVIRONMENTAL IMPACT OF PROJECTS (100 PTS)

II SEMESTER 2012-2013
FEBRUARY 14, 2013

NOMBRE:

PARALELO:.....

NOTA: Este examen está diseñado para ser resuelto de manera individual, puede usar una calculadora ordinaria para sus cálculos aritméticos, un lápiz o esferográfico. Solo puede comunicarse con la persona responsable de la recepción del examen; y, cualquier instrumento de comunicación que hubiera traído, deberá apagarlo y ponerlo en la parte anterior del aula, junto con algún otro material que se encuentre acompañándolo. No consultará libros, notas, ni algún apunte adicional a las que se entreguen en esta evaluación. *Desarrolle los temas de manera ordenada. Firme como constancia de haber leído lo anterior.*

_____ **Firma**

1. Write the letter according to the concept of each term (2 pts e/o)

	Term	Concept	
A	Baseline	The environment can recover itself after some time	
B	MAE	environmental conditions that governs before any alteration or impact	
C	Impact	Proposal of measurements in order to prevent, reduce and compensate the impacts	
D	DNPCA	identification and grading of the potential impacts coming from projects	
E	Reversible Impact	like a photograph on time referring to the environment before the execution of project	
F	background	Decide if the EIA must be done and at what level	
G	mitigation	Maximum environmental authority	
H	Recoverable impact	Effect	
I	screening	information directly from the visit	
J	EIA	Underground water quality index	
K	PSI	Methodology used to predict impacts	
L	importance	Can give the Certificado de interseccion	
M	DRASTIC	Objective measurement with indicators	
N	Primary source information	Subjective valuation of the consultancy team	
O	Magnitude	Air quality index	

NOTE: In all the cases above. Indicate as part of your answers which tables did you used for your analysis and conclusions.

CASE 1 (16 pts)

In a sanitary refill there have some filtrations. Authorities decide to do some measurements in order to decide if this filtrations have polluted the underground waters located just in the surroundings of the sanitary landfill. The environmental legislation determines that measurements and samples must be taken from a control point located maximum at 150 m distance from the sanitary landfill. According to the results obtained from the lab analysis you must decide if the filtrations have polluted the aquifer or not. Different control points were performed; you must decide which ones suits the legislation and take them as reference for your results and conclusions.

Parameters	Control Point d=200 m	Control Point 2 d=180 m	Control Point 3 d=140 m	Control Point 4 d=160 m
Cloruro de vinilo	0.001 mg/l	0.002 mg/l	0.0015 mg/l	0,001 mg/l
Endrin	0.0001 mg/l	0.0002 mg/l	0.00015 mg/l	0.00012 mg/l
Arsenico	0.04 mg/l	0.03 mg/l	0.07 mg/l	0.05 mg/l
Mercurio	0.001 mg/l	0.0014 mg/l	0.002 mg/l	0.001 mg/l
Plata	0.04 mg/l	0.04 mg/l	0.046 mg/l	0.05 mg/l
Cadmio	0.0005 mg/l	0.01 mg/l	0.05 mg/l	0.009 mg/l
Bario	0.5 mg/l	1 mg/l	1.0 mg/l	0.8 mg/l
Metoxicloro	0.09 mg/l	0.08 mg/l	0.2 mg/l	0.002 mg/l

- Which control(s) point(s) you selected as reference point(s) for your analysis? Why? (5pts)
- Is the aquifer polluted or not due to filtrations from the sanitary refill? EXPLAIN how did you get that conclusion (5 pts)
- What national legislation are you using to determine the fulfillment of the admissible levels or not? (2 pts)
- Give the conclusions of your findings in an audit report. Remember how you must enunciate your findings in this kind of reports. (4 pts)

Control(s) Point(s) selected Why?	Is the aquifer polluted explain	Legislation document used	Conclusions of your audit report

CASE 2 (20 pts)

An international company called EcoCons built and operate an offshore gas extraction platform in the Ecuadorian coastal zone. This activity and EcoCons have been always monitored and controlled by the authorities and they have all the permissions in order including the environmental license. One day a terrible fire and explosion happens and this was one of the most serious impacts in the environment., there are third parties that have been affected The Ecuadorian authorities execute the legal procedures to compensate to the third parties for the damages occurred to them.

- who is the promotor of the project? Define promotor (5 pts)
- what type of classification will have this project according to the Ministry of Environment. Why? (3pts)
- Do the promotor need to elaborate an EIA according to this classification. why (3 pts)
- What legal document will execute the Ecuadorian authorities to compensate third parties for all the damages occurred? Explain the utility of this document. On behalf of who this document is elaborated? (9 pts)

Promotor and Definition	MAE Classification Why	Need EIA why	What legal document need to be executed Utility Behalf

CASE 3 (34 pts)

In relation to CASE 1. Determine the underground quality index of the aquifer with the following characteristics.

Variable	Characteristics of the aquifer	Calculation	Value	Quality of the underground water according to table
Conductivity	4.5×10^{-2} cm/s			
Surface soil (<2m)	Arena			
Terrain tilt	3 %			
Depth of the aquifer	2 m			
Recharge	90 mm			
Impact Zone Vadosa	Caliza Karstica			
Aquifer environment	Basaltos			
pH	4.7			

- a) Determine the quality of the water of the aquifer? (7 pts)
- b) Is it possible to use the water of this aquifer for human consumption? Why? (5 pts)
- c) What is the level of acidity-alkalinity of this aquifer. How did you get to that conclusion. (4 pts)

In the surroundings of this sanitary refill, there are some interest to use the lands next to it. For this reason the environmental authority should indicate what is the condition of the soil of these lands. According to the measurements performed and the results of the analysis you should decide what will be the use of these lands.

Parameters	Results of the analysis	Proper Landuse Why	Quality of the soil of the land surrounding the sanitary refill. Explain your answer
Azufre	550		
pH	5		
Arsénico	20		
Estano	450		
Bario	2500		
Fluor	2800		
Molibdeno	56		
Conductividad	5		
Cobre	101		
Niquel	230		
Cianuro	15		
Cobalto	400		
Cadmio	11		
Mercurio	23		
Cromo Total	107		
TABLE USED			

NOTE: the units are the same as the ones referred on the tables.

- a) what is the proper use of the lands surrounding the sanitary refill. Explain how did you get that conclusion? (5pt)
- b) According to the results you obtain, what will you say regarding the quality of the soil of these lands? (3 pts)
- c) Which are the possible ways to compensate for impacts? Which one is the worst of them and why?(10 pts)

$$\text{Underground Quality Index} = \sum W_i \text{Variable}_i$$

In the **tables** with ranges use the typical value for calculations.

Variable	W i generic	W i pesticides
S: Surface soil (≤ 2 m)	2	5
T: terrain tilt	1	3
A: Acquifer environment	3	3
I: Impact on the zone vadosa	5	4
R: Recharge of the acquifer	4	4
D: Depth of the acquifer	5	5
C: Conductivity of the acquifer	3	2

Aquifer environment	Rango de Variable A	Valor Típico Variable A
Lutita masiva	1 – 3	2
Roca metamórfica ó ígnea fresca	2 – 5	3
Roca metamórfica o ígnea meteorizada	3 – 5	4
Till glacial	4 – 6	5
Secuencia de Areniscas, Calizas y	5 – 9	6
Arenisca masiva	4 – 9	6
Caliza masiva	4 – 9	6
Arena o Grava	4 – 9	8
Basaltos	2 – 10	9
Caliza Kárstica	9 – 10	10

Surfase soil (< 2m)	Variable s
Delgado o Ausente	10
Grava	10
Arena	9
Arcilla expansiva	7
Marga Arenosa	6
Marga	5
Marga Aluvial	4
Arcilla Arenosa	3
Arcilla no expansiva	1

Conductivity of the acquifer (cm/s)	Variable c
$4.6 \times 10^{-5} - 4.7 \times 10^{-3}$	1
$4.7 \times 10^{-3} - 1.4 \times 10^{-2}$	2
$1.4 \times 10^{-2} - 3.4 \times 10^{-2}$	4
$3.4 \times 10^{-2} - 4.7 \times 10^{-2}$	6
$5.7 \times 10^{-2} - 1 \times 10^{-1}$	8
$> 1 \times 10^{-1}$	10

Recharge of the acquifer - yearly (mm)	Variable R
0 – 50	1
50 – 103	3
103 – 178	6
178 – 254	8
> 254	9

Terrain tilt (%)	Variable T
0 – 2	10
2 – 4	9
6 – 12	5
12 – 18	3
> 18	1

Depth of the acquifer (m) –	Variable D
0 – 1.50	10
1.50 – 4.60	9
4.60 – 9.10	7
9.10 – 15.20	5
15.20 – 22.90	3
22.90 – 30.50	2
> 30.50	1

Impact on the zone Vadosa	Rango de Variable I	Valor Típico Variable I
Capa confinante	1	1
Cieno – arcilla	2 – 6	3
Lutita	2 – 5	3
Caliza	2 – 7	6
Arenisca	4 – 8	6
Secuencia de Areniscas, Calizas y	4 – 8	6
Arena o Grava con contenido de cieno	4 – 8	6
Roca Metamórfica / Ígnea	2 – 8	4
Arena o Grava	6 – 9	8
Basaltos	2 – 10	9
Caliza Kárstica	8 – 10	10