



***COMPREHENSIVE PROGRAM OF
EVALUATION AND MANAGEMENT
OF RISKS AND SPECIFIC POTENTIAL
IMPACTS OF THE PROJECT***

1. ASSESSMENT AND MANAGEMENT OF RISK AND POTENTIAL IMPACTS OF EMISSIONS INTO THE AIR

OBJECTIVE

- Comply with the regulations of air quality.
- Identify and minimize through control measures that allow maintaining at the source low levels of atmospheric pollution from emissions.
- Perform monitoring activities to determine volumes of total suspended pollutant particles (TSP), particulate matter, Sulfur Oxides (SO_x), Nitrogen Oxides (NO_x), Carbon Dioxide (CO₂) and Ozone (O₃).

EXECUTION	1. Planning	2. Installation and Adaptation
	3. Drilling	4. Area Restoration / Abandonment

ENVIRONMENTAL IMPACT	<ul style="list-style-type: none"> • Air quality deterioration from emissions of CO, CO₂, NO_x, particulate matter and production of pollutants to the atmosphere, as a result from machinery operation and vehicle traffic. • Disturbances to the fauna, flora and human settlements located near the wells' facilities.
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TYPE OF ENVIRONMENTAL MANAGEMENT MEASURE	Prevention	Mitigation	Correction
	Compensation	Control	Protection

ACTIONS TO BE TAKEN	<p>Keep permanent control records of the state and maintenance of vehicles and equipment used during the development of the project.</p> <p>Verify the compliance with regulations of the vehicles regarding air quality (gas certification).</p>
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TECHNOLOGY USED	If required , is essential to take into account the relevant provisions in Article 33 of Decree 02 of 1982, the air quality verification should be evaluated using the following methods and frequencies:		
	Pollutant	Method of Analysis	Sampling Frequency
	Particles in suspension	Gravimetric by high volume sampler	A sample taken continuously for 24 hours
	Sulfur Dioxide	Colorimetric using pararosaniline	A sample taken continuously for 24 hours
	Carbon Monoxide	Analyzer, non-dispersive infrared	A daily sample taken continuously from 6: 00 am to 10: 00 p.m. in periods of eight hours
	Photochemical oxidants (O ₃)	Gas-phase chemiluminescence	A daily sample taken continuously from 6: 00 am to 6: 00 p.m.
	Nitrogen oxides	Jacobs and Hochheiser	A sample taken continuously for 24 hours
	NPA	Slow response sound level meter	Between 0.54 – 3.25 minutes/point
PLACE OF IMPLEMENTATION	Wells location and surrounding areas.		
RESPONSIBLE FOR THE IMPLEMENTATION	Well Chief and the contractor company under the supervision of the Environmental Coordinator of the UT-IJP .		
EXPECTED RESULTS	<ul style="list-style-type: none"> • No affectation by emissions caused by the activity to the fauna and the people of the areas surrounding the wells. • Identification and reduction of the polluting sources of the air by emission of pollutants. • Monitoring records performed of air quality in terms of TSP, SO_x, NO_x, CO and HC. • Permanent use of elements of personal protection by workers of the company. 		

2. WASTEWATER DISCHARGE MANAGEMENT – EFFLUENTS

OBJECTIVE

Prevent or mitigate pollution of soil, surface water bodies and aquifers, by the improper disposal of waste water – effluents.

Implement environmental management measures to manage liquid waste generated by managerial and operative activities of the company.

EXECUTION	1. Planning	2. Installation and Adaptation
	3. Drilling	4. Area Restoration / Abandonment

ENVIRONMENTAL IMPACT	Change in the physical, chemical and microbiological properties of the soil, water bodies, streams and aquifers produced by handling and pouring of untreated liquid waste.
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TYPE OF ENVIRONMENTAL MANAGEMENT MEASURE	Prevention	Mitigation	Correction
	Compensation	Control	Protection

ACTIONS TO BE TAKEN	<p><u>Wash Water</u></p> <p>The location will have a ditch system to collect rain water and wash water polluted by punctual leaks of oils and chemicals from the plants and equipment used by the operations. These waters will pass through an oil trap before being injected into the industrial waste water treatment system of the well.</p> <p>To minimize the production of wash water from machinery and equipment the equipment and drill should be washed as seldom as possible and when they are washed, use as little water as possible. The vehicles should not be washed within the location or the area.</p>
	<p><u>Domestic Waters (gray and black)</u></p> <p>Gray and black waste water will be collected by separate sanitary networks, built in PVC of 3" or 4".</p> <p>The treatment of domestic waste water will be done using compact portable plants of activated sludge. Gray water will be treated in grease traps.</p> <p>The effluent of the activated sludge treatment plant and the grease tramp will be taken to the industrial waste water treatment system of the well, where once it complies with what is established in Decree 1594 of 1984 will be uploaded to a tank truck to be transported to the Palagua – Caipal Battery, where it will be treated with production waters from the field and then be injected into deep.</p>



Industrial Water

The industrial water that will be treated is basically from sludge dewatering or dehydration, removed from the process due to aging, loss of rheological properties or changes in the sludge program, wash water and internal runoff.

Industrial wash water will be sent to the storage system of the well, where a conventional physicochemical treatment will be done (TECHNOLOGY USED). Once the water complies with what is established in Decree 1594 of 1984 will be uploaded to a tank truck for its integration and treatment with production waters from the field and then be injected into deep. Monitoring activities of the effluents should be carried out according to the bounding established on Decree 1594/84 for human consumption.

These waters include the waters used for work-over operations and hydrostatic testing.

Another alternative proposed is to sprinkle the water on the roads, once it complies with the requirements established in Decree 1594 of 1984 for its use.

Oily Liquid Waste

Oily waste generated in the well is basically burnt lubricants from oil changes of engines, therefore it is suggested that the contractors perform previous maintenance to engines, in order to not generate burnt oil or filters within the well. In case they are generated, used oil will be stored in 55 gallon barrels and later removed and taken to Palagua Battery.

**TECHNOLOGY
USED**

Black Water – Activated Sludge Plant

Activated sludge portable treatment plants are the most commonly used for black water treatment, that consist of putting in contact waste water with bacteria that feed on organic waste in the presence of oxygen. The residual water that enters the system is mixed with activated sludge by recirculation. The mixture is aerated to allow different oxidation reactions to occur, that remove many organic components from the residual water. The type characteristics of the design of the activated sludge treatment plant are:

- Hydraulic retention time: 18 – 24 hours
- Operation mode: full mixture
- Type of Aeration: compressed air or mechanical aeration
- Feeding / microorganisms ratio: 0.05 - 0.15 d-1 (d – 1 = days)
- Solids retention time: 20 – 40 days
- Concentration of suspended solids mixing liquor SSML: 3000 – 5000 mg/L

Industrial Water

The treatment of industrial waste water will be done in a tank and basically consist of a



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	<p>physiochemical process, although a bacteriological process will also be carried out when the results from the monitoring samples show it is needed.</p> <p>In the physicochemical treatment will be carried out a pH adjustment, will be added coagulants, flocculants and polymers when the latter are necessary, given that their use should be minimal and must be approved by the staff HSE of the UT- IJP. All the water must be disinfected before being transported to the water plant.</p> <p>For the follow-up of the amount of water treated, three flow gauges must be installed that allow to keep track of the water used and available at the well (one gauge for the water collected by the equipment, one gauge for the water collected by the trailer-lodging, one gauge for the water delivered by the tank trucks).</p> <p>In situ monitoring will be done before and after each treatment.</p>
PLACE OF IMPLEMENTATION	Location where the wells are drilled.
RESPONSIBLE FOR THE IMPLEMENTATION	The Drilling company under the supervision of the Environmental Coordinator of the UT- IJP.
EXPECTED RESULTS	Comprehensive management and handling of liquid waste generated by the drilling of wells.

3. SOLID AND LIQUID WASTE MANAGEMENT

3.1 SOLID WASTE MANAGEMENT

OBJECTIVE

Prevent and/or mitigate potential impact caused by improper management, storage and final disposal of solid waste that will affect polluting soil, superficial water bodies and aquifers, by the improper disposal of domestic and industrial solid waste.

EXECUTION	1. Planning	2. Installation and Adaptation
	3. Drilling	4. Area Restoration / Abandonment

ENVIRONMENTAL IMPACT	Change in the physical and chemical properties of the soil and water bodies by improper disposal of solid waste.
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TYPE OF ENVIRONMENTAL MANAGEMENT MEASURE	Prevention	Mitigation	Correction
	Compensation	Control	Protection

ACTIONS TO BE TAKEN	<p><u>Domestic Solid Waste</u></p> <ul style="list-style-type: none"> Separation at the Source Organic, recyclable and special waste has to be separated in order to facilitate its handling and disposal. To do so, at the location must have 55 gallon barrels, strategically placed, appropriately colored and labeled as follows: <ul style="list-style-type: none"> Black Color - organic waste: food waste, fruit peels, etc. Green or White Color - recyclable waste: print paper, newspapers, magazines, kraft, etc., in good condition; cardboard, aluminum, disposable polystyrene, glass in all its presentations, ferrous metals, wood, etc. Some wastes that are neither technically or economically recyclable nor biodegradable must be collected in this container, to separate them in the treatment phase. Red Color - special waste: paper waste from sanitary facilities. <p>The location must be kept constantly clean. A waste collection day must be programmed.</p> <ul style="list-style-type: none"> Collection The waste bags, place in the containers of the location, must be collected daily by a worker from the patio in charge of the environmental aspect.

- **Storage**

The bags will be stored in a collection center, in which they will be arranged and organized according to this classification on pallets.

The collection center must have a retaining wall, roof and three walls for the protection of the waste from the weather and finally with good ventilation.

- **Treatment and Final Disposal**

For management, transportation and location of domestic solid waste generated during well drilling contractors must integrate to the ISWM program (Integrated Solid Waste Management).

- Organic waste will be stored and disposed of in the landfill in Puerto.
- The food waste will be given to people in the region, to feed animals (pig breeding).
- Recyclables will be handled through the community action board of the rural area of Palagua for marketing.
- Special waste will be disposed of by incineration in accordance with the Management Plan implemented by the contractor.

Industrial Waste

- **Drill Cuttings**

The most important industrial waste by quantity and quality, that are generated in a drilling well are composed of two fractions: the cuttings separated from the sludge in the solid waste control equipment, product from the excavation of soil by action of the drilling bit; and the solids resulting from dewatering or dehydration of sludge, removed from the line due to aging, loss of rheological properties or changes in the sludge program.

- Drill Cuttings:

The storage of drill cuttings will be done in a tank at the location, which will be permanently transferred to the land-farming area for final disposal.

In any case, heavy metals content must be evaluated before and after final disposal, using TCLP type tests.

- **Other Industrial Waste**

- Soil pollution from hydrocarbons

The polluted soils generated in the wells are minimal; they will be transported and put in the oily waste storage yard at Palagua Field, next to the Water Injection Plant. Waiting to store an economical and technical viable volume to then put it through a Bioremediation process.

- Cans, packaging, plastics and other

Consumption of diesel fuel (ACPM) containers and packaging of chemicals for the preparation of drilling sludge. Pimpin, plastic drums, gallons, pails, etc., generated by emptying chemicals. Drilling pipe thread protectors, junk hoses, waste PVC pipe, etc.

- All the products containing chemicals must be evacuated by the supplier of the service and cannot be sold or given away for any activity.
- All the chemicals cans for sludge preparation or water treatment will be collected by

	<p>the contractor.</p> <ul style="list-style-type: none"> - The chemicals storage containers should be collected by the contractor, to can the same products they contained. - The pipe thread protectors will be reused by the pipe supplying companies. <p>- <u>Filters</u> Oil, air and engine fuel used filters usually of fabric or cardboard with galvanized steel frame. This kind of waste, if possible, should not be generated, provided that the contractor performs a previous maintenance to the engines before arriving at the location.</p> <p>In case of being generated, the filters should be collected in 55 gallon barrels, en handed to the contractor who will be in charge of their disposal.</p> <p>- <u>Wood, paper, cardboard</u> Wood is generated when packaging equipment and spare parts used in drilling. Paper and cardboard from the bags and sacks used in packaging of sludge chemicals, cements, completion fluids and water treatment.</p> <p>The material will be collected and stacked in the wells location area and then removed by the contractors. The recyclables will be marketed at the end of the operation by community action board of the rural area of Palagua.</p> <p>- <u>Metal Scrap</u> It is produced in the manufacture of homemade tools, components, parts, etc., changing parts and repair shop activities. Should be stacked. The one not reused in the same well will be sent to the storage yard of industrial solid waste of the field, adjacent to Palagua – Caipal Battery.</p> <p>- <u>Polluted Textiles</u> Waste such as burlap, gloves, overalls, rags and other textiles, which cannot be recycled, will be taken to the industrial waste storage yard at the field, adjacent to Palagua –Caipal Battery.</p>
<p>TECHNOLOGY USED</p>	<p>Solidification and Stabilization of Solid Waste from Drilling</p> <p>It is a treatment and disposal process for solid waste from drilling consisting of reducing humidity and stabilizing waste through the use of materials such as quicklime (purity > 65% of CaO), which generates an exothermic reaction that guarantees dehydration and compacting of the waste. Solidification and stabilization is recommended for cuttings resulting from water based sludge systems. It is also recommended, for this type of sludge besides quicklime, to add dirt. Fixing the cutting with the material previously mentioned can be done at the temporary storage place (dry beach, cement pool, auger) or at the site of final disposal, only if the cutting conditions and transportation guarantee a movement without spill risk. The water based cuttings once solidified and stabilized, can be mixed cementitious material for later use.</p> <p>The same procedure is utilized for treating the sand produce from the clean out services.</p>
<p>PLACE OF IMPLEMENTATION</p>	<p>This fact sheet will be applied outside the location where the development wells are drilled.</p>



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RESPONSIBLE FOR THE IMPLEMENTATION	The Drilling Company and the contractors, under the supervision of the Environmental Coordinator of the UT- IJP .
EXPECTED RESULTS	<ul style="list-style-type: none">• Comprehensive solid waste management for waste generated during well drilling.• Adequate handling of solid waste in collection, temporary storage and final disposal.
REMARKS	The Contractors of the project are responsible for the comprehensive waste management of the waste produced during the development of the activities.

3.2 LIQUID WASTE MANAGEMENT

OBJECTIVE

- Formulate the liquid waste management measures, with the purpose of preventing or minimizing the natural dynamic alteration of the drainage of the area of influence of the project.
- Guarantee that the waste generated in the management and operative quarters is treated and poured according to the current environmental legislation.

EXECUTION	1. Planning	2. Installation and Adaptation
	3. Drilling	4. Area Restoration / Abandonment

ENVIRONMENTAL IMPACT	<ul style="list-style-type: none"> • Pollution of soil and water bodies. • Change in the physical, chemical and biological properties of the surface and ground water and the soil.
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TYPE OF ENVIRONMENTAL MANAGEMENT MEASURE	Prevention	Mitigation	Correction
	Compensation	Control	Protection

ACTIONS TO BE TAKEN	<p>During this stage of the operation special care will be taken to the liquid waste management at the management quarters and the area surrounding the location of the wells, avoiding increase in the suspended load of drainage at the work fronts. These should be conducted through ditches, sewers, culverts, dock and / or sumps, in order to minimize contact with pollutants used during the entire operation.</p> <p>The measures implemented should tend to keep separated the industrial and the domestic liquid.</p> <p>The workers should be familiar with the measures to guarantee that the liquid waste will not be disposed in surface bodies.</p>
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TECHNOLOGY USED	<p>At this location is expected that liquid wastes, because of the potential contamination with agents such as: drilling sludge, grease and other hydrocarbons from vehicles, derricks and other infrastructure implemented during the drilling of wells, as well as during their operation, are separated into independent collection systems for industrial liquid waste so as to prevent contact. The rain water management system consists of ditches, sewers, culverts, dock and / or slumps separated from the one for greasy and oily water before being taken to the grease trap.</p>
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PLACE OF IMPLEMENTATION	Perimeter areas and access roads to the location.
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RESPONSIBLE FOR THE IMPLEMENTATION	Environmental Coordinator of the UT- IJP and the Well Chief as representative of the drilling company.
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**EXPECTED
RESULTS**

Dumping of liquid waste and runoff without pollution.

4. ASSESSMENT AND MANAGEMENT OF RISK AND POTENTIAL IMPACTS FROM NOISE GENERATION

OBJECTIVE

- Comply with the regulations on noise generation and keep sound pressure levels within the established standards of the current environmental legislation.
- Identify and minimize the noise pollution sources.
- Implement control measures to mitigate noise levels produced by machinery operation present at the development wells.

EXECUTION	1. Planning	2. Installation and Adaptation
	3. Drilling	4. Area Restoration / Abandonment

ENVIRONMENTAL IMPACT	<ul style="list-style-type: none"> • Deterioration of the air quality by noise generation, resulting from machinery functioning and vehicular traffic. • Affection of fauna and human settlements located closet o the wells facilities.
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TYPE OF ENVIRONMENTAL MANAGEMENT MEASURE	Prevention	Mitigation	Correction
	Compensation	Control	Protection

ACTIONS TO BE TAKEN	<p>Keep permanent records of the state and maintenance of vehicles and equipment during the development of the project.</p> <p>Verify compliance of vehicles with the regulations regarding noise emissions.</p>
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TECHNOLOGY USED	If required , the technology for environmental noise measuring will be taken into account included in the resolution 627 of 2006 by the Ministry, Housing and Land Development (MHTD):		
	NPS	Method of Analysis	Sampling Frequency
	75 dB	TEFC	Daytime maximum value (7:01 to 21:00)
	70 dB	TEFC	Nighttime máximo value (21:01 to 7:00)

PLACE OF IMPLEMENTATION	Wells locations and surrounding areas.
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RESPONSIBLE FOR THE IMPLEMENTATION	Well Chief and the contractor under the supervision of the Environmental Coordinator of the UT-IJP.
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**EXPECTED
RESULTS**

No affectations of the fauna, the inhabitants of the surrounding areas of the well and workers due to high sound pressure levels caused by the activity.
Identification and reduction of pollutant sources for noise emission.

5. TERRESTRIAL IMPACT MANAGEMENT AND TRACE OF THE PROJECT

5.1 CONFORMATION AND STABILIZATION OF SLOPES AT THE LOCATIONS

OBJECTIVE

Establish the appropriate measures to manage fill slopes of the wells locations, with respect to stability during and after the execution of some works.

EXECUTION	1. Planning	2. Installation and Adaptation
	3. Drilling	4. Area Restoration / Abandonment

ENVIRONMENTAL IMPACT	<ul style="list-style-type: none"> • Changes in the drainage system of the place. • Negative visual changes. • Removal of the vegetation cover of the affected area. • Instability of slopes caused by filling and excavation activities.
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TYPE OF ENVIRONMENTAL MANAGEMENT MEASURE	Prevention	Mitigation	Correction
	Compensation	Control	Protection

ACTIONS TO BE TAKEN	<ul style="list-style-type: none"> • There are no slopes near to the access roads and the locations where their height is over 4 m, therefore there is no need to build coronation ditches. • The slopes adjacent to access roads will be turned into meadows, which in the opinion of the Environmental Inspector show high risk of erosion according to their particular conditions, with native species to the region or placing a layer of organic material. • Revegetalize the fill slopes at the locations. • In particular cases, it may be necessary to construct gabion walls in tiered system where the ground is observed, in the opinion of Technical and Environmental Inspector, to have the angle of inclination of the slope more tended than the natural angle of the terrain. • The angle of inclination of the fill slopes cannot exceed a maximum of 1V: 1H.
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TECHNOLOGY USED	Heavy machinery: Bulldozer, backhoe and motor grader.
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PLACE OF IMPLEMENTATION	Access road and location.
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RESPONSIBLE FOR THE IMPLEMENTATION	Environmental Coordinator of UT- IJP .
EXPECTED RESULTS	Stability of the executed works, adequate management of the environment and minimization of the visual impact generated by the works.

5.2. ENVIRONMENTAL REVEGETATION AND RECOVERY OF THE SURROUNDING

OBJECTIVE

- Mitigate the landscape impact caused during building.
- Restore the vegetation cover lost during the adaptation of the locations.
- Contribute to landscape improvement and the conservation of the species of ecological importance in the area.
- Protect the existing fill slope at the location with vegetation cover in order to prevent landslides or destabilization of the fill slope.

EXECUTION	1. Planning	2. Installation and Adequation
	3. Drilling	4. Area Restoration / Abandonment

ENVIRONMENTAL IMPACT	Loss of the vegetation cover during Building. Destabilization of cutting slopes.
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TYPE OF ENVIRONMENTAL MANAGEMENT MEASURE	Prevention	Mitigation	Correction
	Compensation	Control	Protection

ACTIONS TO BE TAKEN	<p><u>Species Selection</u> The arboreal species selected should be, as much as possible, of rapid growth during the early years, that can develop good foliage and seeds of easy dispersion The graminea to be used should be adapted to the region, easily obtainable and of good performance. It is recommended to use braciaria grass as introduced species, with good adaptability. The recommended height to plant depends on the species (between 50 cm and 1.5 m).</p> <p><u>Planting Location</u> The species should be plant in the areas closest to the affected places, in the specific case of the area of the development wells P-027, P-046, P-104, P-133, P-185, C-9, C-6, around the locations and on the sides of the road leading to the wells will be planted. The arboreal species will be planted at a spacing of approximately 10 to 15 meters.</p> <p><u>Recommended Species</u></p> <ul style="list-style-type: none"> • Saman (<i>Samanea saman</i>): Provides protection to water margins, it is important to provide shadow to livestock. • Guamo (<i>Inga sp.</i>): Useful for coverage of water margins in areas of low dissection. Fruits are savory. • Matarratón (<i>Gliricida sepium</i>): Used as living fence, useful for erosion control and as nitrogen fixer, suitable for soil recovery, is used for forage production. • Guayacán (<i>Tabebuia rosea</i>): Timber-yielding tree.
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**TECHNOLOGY
USED**

Sowing Time

It is recommended that the planting be done in rainy periods, in that way it will take advantage of the whole wet season in order to have a good adaptation. Planting can be done at other times if IJP UT does the watering when necessary, at least every third day during the dry or low precipitation season.

Type of Spacing

To take maximum advantage of the area to be reforested and to create favorable conditions for an optimal growth and for natural pruning, it is recommended to place trees with regular and dense spacing, when required by the terrain.

Preparation of the Terrain and Planting of Trees

- Weeds that can compete with seedlings should be eliminated and delay the cleanup in the early years of tree growth. Generally, weeds are removed by a plate of 80 to 100 cm using hoe or machete.
- If the soil is very hard or compact it should be loosened. For this a hoe, pickaxe or chute bar should be used working the soil in a cylinder of 20 to 40 cm in diameter and depth. The hole is adapted according to the terrain drainage.
- After the terrain is prepared it is advisable to do the outline and plant the trees. For the outline strings can be used which are used to mark where to plant the tree.
- The arboreal and bushy species will be placed in holes of 40 x 40 cms and should have a height of no less than 30 cms from the root collar.
- It is important to do the planting as quickly as possible, especially the bare rooted seedlings. It is recommended to do it with the block of soil soaked.
- If the terrain does not need cleaning the outline and planting can be done at the same time.
- When bare rooted seedlings are transported buckets should be filled with material that retains well moisture. For seedlings in bags it must ensured that the soil is moist enough to supply the water needed in the early days of planting.
- A hole of depth and diameter sufficient must be opened where the plant roots will fit without being bent, battered or damaged (for example 50 x 50 x 50 cm.)
- If the plants in bags are used it is important to remember to take the bags off before planting, trying to keep the root intact. Collect the bags used to avoid soil contamination.
- The plant or seedling is placed straight and with the surface of the base of the root at a depth of 1 to 2 cms with respect to the surface of the terrain.
- The hole should be filled very well with abundant black dirt (organic).
- To ensure there are no air gaps left it is important to step all around it.
- On occasions it is necessary to apply fertilizers to soils that are degraded, without organic layer or with mineral deficiencies. To avoid expenditures on fertilizers it is recommended to mix the plantation with certain legume species, to take advantage of the capacity that they have of fixing atmospheric nitrogen. If possible it should be used organic fertilizer (compost).
- The trees will be planted at a distance of 10 to 15 m between them.

Sowing of Grass

- The grass will be planted by seed scattering at a rate of 20 kg / ha prior soil preparation.

	<p>Since the seed is very light it should be sown with a mixture of soil to give it, in that way, a very light coverage.</p> <ul style="list-style-type: none"> • Planting of brachiaria runners is used to recover gramineae coverage areas. The sections should be planted by the triangle or staggered system. The runner chosen must present at least a section of 15 cm which should be found at least one leaf, node or bud. • The soil fertilization must be the same as that used for the planting of native species as in the case of brachiaria grass it develops very well in poor soils and is not demanding in nutrients.
PLACE OF IMPLEMENTATION	Access road and location.
RESPONSIBLE FOR THE IMPLEMENTATION	Field Superintendent and the contractor of the works under the supervision of the Environmental Coordinator of the UT-IJP .
EXPECTED RESULTS	Total recovery of the intervened area and/or harmonization of the landscape. Stabilization of all slopes.
REMARKS	Due to the fact that the Building of the Palagua well location does not imply removal of arboreal species, the application of this fact sheet is not mandatory, but for landscape beautification reasons.

6. SPILLS

6.1 ENVIRONMENTAL MANAGEMENT OF PRODUCTION TESTING

OBJECTIVE

- Present the management measures for the production testing within the location to minimize the environmental risks that may be generated.
- Provide the safety guidelines for the transportation of produced fluids.

EXECUTION	1. Planning	2. Installation and Adaptation
	3. Drilling	4. Area Restoration / Abandonment

ENVIRONMENTAL IMPACT	Alteration of physical, chemical and biological properties of water and soil.
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TYPE OF ENVIRONMENTAL MANAGEMENT MEASURE	Prevention	Mitigation	Correction
	Compensation	Control	Protection

ACTIONS TO BE TAKEN	Adopt adequate storage and transportation measures for fluids produced during the testing. Follow the management measures for polluted waste generated during production testing.
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TECHNOLOGY USED	<ul style="list-style-type: none"> • The crude and formation water will be separated and stored at the location in tanks, to be then sent in tank trucks to the Palagua Battery. • If there is gas production during the testing, it will be burnt in a torch that allows full combustion in order to avoid emission of particles, following the regulations with respect to height and placement of the torch and according to the specifications in the Decrees 02/82 and 948/95. • The measures for solid and liquid waste designed for the drilling stage will be followed. • Oily waste water management will be reinforced with respect to its collection, which will be used in case it is needed to handle it at the location. • Equipment that guarantees minimal hydrocarbons spilling should be used within the location. • Storage will be done in hermetic tanks and provided with flood levees. • In the event of a leak in the production line, the measures for solid and liquid waste management designed for the drilling stage will be followed. • The tank trucks for formation fluids transportation should be in optimal condition of air tightness and should follow the safety regulations in those places of higher risk of spilling.
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PLACE OF IMPLEMENTATION	Location of the wells to be drilled.
RESPONSIBLE FOR THE IMPLEMENTATION	Production supervisor, under the supervision of the Environmental Coordinator of the UT- IJP .
EXPECTED RESULTS	<ul style="list-style-type: none"> • Zero spills of produced fluids. • Adequate disposal of production water. • Adequate disposal of solid waste (domestic and industrial) during the operation.
REMARKS	It is expected of the wells to be producers, depending on the results obtained from the testing.

6.2. WASTE MANAGEMENT AND POLLUTION CONTROL

OBJECTIVE

Make known the measures to carry out an effective control of pollution that may be generated by the execution of Building work of the access roads and the location.

EXECUTION	1. Planning	2. Installation and Adaptation
	3. Drilling	4. Area Restoration / Abandonment

ENVIRONMENTAL IMPACT	<ul style="list-style-type: none"> Emissions of particles to the atmosphere caused by the machinery and equipment used. High noise levels produced by machinery and equipment at the work area. Disposal of polluting materials (Building material, solid and liquid waste, or fuel and lubricants) in water bodies or soil by workers. High visual impact for dumping solid and liquid waste in zones close to the work area. Soil contamination due to an accidental spill or materials used during Building or for fuel and lubricants from machinery. Contamination of ground water supplies by spills described in the preceding item.
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TYPE OF ENVIRONMENTAL MANAGEMENT MEASURE	Prevention	Mitigation	Correction
	Compensation	Control	Protection

ACTIONS TO BE TAKEN	<ul style="list-style-type: none"> Conduct periodic inspections of smoke emissions from machinery, to control this aspect. The emissions that are too high need to be immediately corrected and the machinery that produces these emissions should not be put to function until the problem is solved. Also, the operation of machinery with hydraulic oil or fuel leaks that affect the soil will not be allowed. Conduct periodic checkups to the machinery in the work area, to prevent spilling to the ground and water bodies, caused by leakages of fuel and / or lubricants. The area where fuel and oil can be placed without the possibility of affecting water streams must be selected. This fuel storage area should have geomembrane flooring or a cement floor and have a grease trap. It is recommended that this area has a ceiling with the respective No Smoking signs and lined with security tape. The machinery leaking polluting fluids will not be allowed to function and will not return to work until the leakage is repaired. Under no circumstances will be allowed to wash work machinery and equipment in water bodies located in the vicinity of the work area and in general in no river or water stream. This activity should be carried out in a washing area with the right conditions for that purpose. Change of lubricants or supplying fuel must be carried out in remote areas of vegetation or water bodies and placing 55 gallon metallic barrels to receive the lubricant that is been changed or to contain accidental spilling of fuel, likewise, the soil
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	<p>must be protected with polyethylene to prevent contamination there.</p> <ul style="list-style-type: none"> • Give talks to workers about the importance of pollution control in the work area, including such issues as causes, consequences and control methods. • Inform workers in due course on the rules established in the work area to avoid the impacts caused by pollution at the site of the works and the sanctions that will be responsible if they violate these rules. • The disposal of surplus Building materials or organic residues by workers in places like water bodies, work place surrounding areas, springs, or other places different to the ones authorized for that purpose will not be allowed, according to the Waste Management Project of the Drilling Activity Management Program. • The containers to store solid waste produced by workers will be strategically placed in the work area, as the facilities needed for the management of domestic waste water should be provided.
TECHNOLOGY USED	<ul style="list-style-type: none"> • Waste collection systems in plastic containers. • Knowledge and experience of the Environmental Inspector to detect pollutant factors. • Septic tanks and / or portable toilets for domestic waste management.
PLACE OF IMPLEMENTATION	Access road, location and flow line.
RESPONSIBLE FOR THE IMPLEMENTATION	The Well Chief, under the supervision of the Environmental Coordinator of the UT-IJP .
EXPECTED RESULTS	Adequate waste management and minimization of visual impact generated by the work.

View: Susceptible areas of spilling on next page



**ASSESSMENT OF ENVIRONMENTAL IMPACT
AND INDUSTRIAL SAFETY IN
DEVELOPMENT WELLS
PALAGUA – CAIPAL FIELD
PUERTO BOYACA (BOYACA, COLOMBIA)**

