

REQUEST OF PROPOSAL FOR EXPRESSION OF INTEREST – DIRECTIONAL DRILLING AND LOGGING FOR NINE (9) WELLS

Introduction

LaGEO S.A. de C.V. (LAGEO) a power production company of El Salvador is in the final stages of negotiating a loan with the World Bank (P170089 – financial identifier of the project within the World Bank) to increase the generation of electrical energy based on the geothermal resources available in the country. The scope of the project consists of the construction and commissioning of two condensing geothermal plants, one to be installed in the Chinameca geothermal field in eastern El Salvador with a generation capacity of 25 MW and the other to be placed in the San Vicente geothermal field in central El Salvador with a generation capacity of 10 MW.

As part of the overall project, additional geothermal wells will be drilled that require directional drilling services and logging. The objective of this expression of interest request is to understand the market for the specific requirement of directional drilling services and logging for the completion during drilling of a total of nine (9) wells in the Chinameca and San Vicente geothermal fields. Likewise, establish communication with interested companies, who will subsequently be informed about the tender process and invited to participate in it.

Project Description

Chinameca Geothermal Field

The Chinameca geothermal field is located 130 km east of San Salvador, the capital city of El Salvador, in the department of San Miguel, within the Pacayal-Limbo volcanic complex. The towns of Chinameca and Nueva Guadalupe are located to the north of the geothermal field.

The Chinameca geothermal field development project considers the generation of electrical energy, by means of the installation of a 25 MW simple condensation Flashing cycle generation unit. There are currently several production and reinjection wells, but it has been considered to drill six (6) additional wells to complete the production and reinjection capacity needs required by the generation plant.

San Vicente Geothermal Field

The San Vicente geothermal field is located 40 km east from San Salvador, in the Department of San Vicente, on the north flank of the Chichontepec volcanic complex at elevations between 800-1140 m.a.s.l. south of the town of Tepetitán.

The scope of the project consists of the construction and commissioning of a 10 MW condensing single-flashing cycle geothermal plant. Currently, there are several production and reinjection wells, but it has been considered to drill three (3) additional wells to complete the production and reinjection capacity needs required by the generation plant.

Required services scope

Services required include drilling directional wells with 9 5/8" diameter slotted liner and well logging of six (6) wells in Chinameca and three (3) in San Vicente. Interested companies can choose to send an Expression of Interest for **BOTH** services or just **ONE** of them.

Contractors responsibility:

- The correct execution of operations according to the required services, standards, industrial safety and environmental protection measures, which will be provided by LAGEO in due course.
- The timely supply of the necessary personnel, equipment, tools and accessories according to the scope of the planned service.
- To fulfill the execution of the services, adopting all the necessary measures to maintain the course and inclination of the hole and the stipulated times (forty-five days from the start of the deviation to the final depth) according to the Directional Services program.

Directional drilling services scope.

During the process off drilling, directional drilling services will be required after drilling the vertical hole section. The service includes:

- Execute the programs and directional designs of each well according to the preliminary information provided by LAGEO (Schematic profiles and data table of each well to be drilled), also a schematic location of the wells at each drilling site and the directional logs of the existing wells on the corresponding platforms.
- Supply of equipment and availability of the necessary personnel to drill the directional section of each well, planned to start the Kick Off Point (K.O.P.) for the wells of the fields.

The KOP for the wells will be carried out in the 17 1/2" diameter hole. The navigable string (Bottom Motor + MWD) will be used until the maximum angle of the curve is reached and, subsequently, continue in the tangential section with stabilized string in conventional rotary drilling, maintaining the direction and inclination of the

well's trajectory according to the programmed path. The control of logs in the tangential part will be through the use of "single shot" or "multi shot" methods.

The staff must have experience in similar jobs, under geothermal drilling conditions, in a volcanic area and have a good command of the Spanish language.

Logging services scope (Wireline Logging).

During the execution of each well, logging will be required to control the drilling process. The well control logs to be made will be for the casing and cementing of the production pipes (13 3/8"). In addition, a calibration log will be made of the 17 1/2" holes ("Caliper") to find the volume and other characteristics of the well. And for the control and quality of the cementing of the 13 3/8" production casing, a CBL (Cement Bond Log) log will be made, using a sonic tool. The interpretation of this log will seek to obtain an evaluation of the state of cementation, and according to the result, recommended or planned corrective actions to be taken in the process.

According to the designs of the wells to be drilled, the 13 3/8" production pipe will be cemented with the stab-in method to the surface (a run phase of the T.R. 13 3/8").

These logs are required to be made in real time, with visualization on the site during their execution.

Table No.1 presents a typical design of the production wells, and Table No. 2 presents a typical design of the reinjection wells to be drilled in both fields.

Table No. 1 Producing wells average completion (Directional)

STAGE	Open Hole		Casing	
	Hole Diameter	Depth (m)	Casing Diameter	Especifications
1	32"	80 – 90	26"	X-65, 202.4 lb/ft, thread XCS
2	23"	475 – 500	18 5/8"	K-55, 87.5 lb/ft, thread BTC
3	17 1/2"	1,150 – 1,200	13 3/8"	K-55, 68 lb/ft, thread BTC
4	12 1/4"	2,100 – 2,120	9 5/8"	N-80, 40 lb/ft, Hydrill, slotted liner
Hanger location of 13 3/8" x 9 5/8" will be between 1,100 – 1,150 mD				
DIRECTIONAL PARAMETERS:				
Depth of K.O.P. between 520 – 530 m				

Maximum slopes: between 28° – 32°
Paths: Azimuth between: 45° - 193°,
Displacements: 700 – 750 m

Table No. 2 Reinjection wells average completion (Directional)

PHASE	Open Hole		Casing	
	Diameter	Depth (m)	Diameter	Especifications
1	32"	40 – 50	26"	X-65, 202.4 lb/ft, thread XCS
2	23"	300 – 350	18 ⁵ / ₈ "	K-55, 87.5 lb/ft, thread BTC
3	17 ¹ / ₂ "	945 – 975	13 ³ / ₈ "	K-55, 68 lb/ft, thread BTC
4	12 ¹ / ₄ "	1,750 – 1800	9 ⁵ / ₈ "	N-80, 40 lb/ft, Hydrill, slotted liner
Hanger location of 13 ³ / ₈ " x 9 ⁵ / ₈ " will be between 895 – 925 mD				
DIRECTIONAL PARAMETERS:				
Depth of K.O.P. between 370 – 375 m				
Maximum slopes: between 28° – 32°				
Paths: Azimuth between: 135° - 322°,				
Displacements: 625 – 670 m				

It is planned that the international public bidding process will be carried out in the first trimester of 2021 and that air drilling services will be required during the years 2021-2022.

Reply letter content.

When submitting your reply letter, you must also attach duly completed with the information requested in the form attached to this request for expression of interest.

Interested company overview.

The overview of the company, corporation or consortium that is sought is of a company that performs directional drilling and / or logging work in geothermal wells with proven experience and technical knowledge. With an economic and financial solvency, logistics capacity in the loading, handling and unloading of heavy equipment, as well as the safe handling of the aforementioned equipment.

Additional reference information.

The reply to this letter of expression by the interested parties can be presented in Spanish or English. The envelope must be labeled with the designation "Letter of Expression of

Interest for the projects of Directional Drilling wells and / or Logging for the Chinameca and San Vicente Geothermal Fields – EoI (Expression of Interest)" and they must be sent to the following postal address (or sent by email) no later than February 21 of 2021.

LAGEO S.A. de C.V.

Final 15 Avenida Sur y Blvd. Sur, Colonia Utila, Santa Tecla

La Libertad, El Salvador.

Telephone: +503-22116700

e-mail: compras@lageo.com.sv

List of Companies to which they have Provided the Service

Detail below the list of companies to which the Bidder has provided directional drilling and / or logging, and that are related to the drilling of wells in geothermal fields.

Company:						
Address:						
Contact:						
Item	Description	Company name	Geothermal Field	Country	Agreement Amount (US\$)	Reference Contact
A	Directional Drilling					
1						
2						
3						
4						
5						
B	Logging					
1						
2						
3						
4						
5						