

DEGOLYER AND MACNAUGHTON
5001 SPRING VALLEY ROAD
SUITE 800 EAST
DALLAS, TEXAS 75244

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REPORT
as of
DECEMBER 31, 2018
on
RESERVES and REVENUE
of
CERTAIN FIELDS
in
BRAZIL
with interests attributable to
PETRORIO S.A.

NI 51-101 CASE

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FOREWORD

Scope of Investigation

This report presents estimates, as of December 31, 2018, of the extent of the proved, probable, and possible oil, condensate, and gas reserves and the value of the proved, proved-plus-probable, and proved-plus-probable-plus-possible reserves of the Polvo and Manati fields in Brazil. Petrorio S.A. (Petrório) has represented that it holds a 100-percent working interest in the Polvo field, located in license block BM-C-8, and a 10-percent working interest in the Manati field, located in license block BCAM-40, under the terms of production concession licenses (Table 1). This evaluation was prepared using price and cost assumptions specified by Petrorio.

Estimates of reserves presented in this report have been prepared using reserves definitions established by Canadian National Instrument 51-101. These reserves definitions are discussed in detail in the Definition of Reserves section of this report.

Reserves estimated in this report are expressed as gross reserves and net reserves. Gross reserves are defined as the total

estimated petroleum remaining to be produced from these properties after December 31, 2018. Net reserves are defined as that portion of the gross reserves attributable to the interests held by Petrorio after deducting all interests attributable to others, including royalties paid in kind. Petrorio has advised that its government royalty obligation is paid in cash; therefore, net reserves have not been reduced in consideration of this royalty obligation.

This report presents values for proved, proved-plus-probable, and proved-plus-probable-plus-possible reserves that were estimated using initial prices, expenses, and costs provided by Petrorio and the forecast prices, expenses, and costs presented herein. Prices, expenses, and costs were provided in United States dollars (U.S.\$), and all monetary values in this report are expressed in U.S.\$. A detailed explanation of the forecast price, expense, and cost assumptions is included in the Valuation of Reserves section of this report.

Values for proved, proved-plus-probable, and proved-plus-probable-plus-possible reserves in this report are expressed in terms of estimated future gross revenue, future net revenue, and present worth. Future gross revenue is defined as that revenue which will accrue to Petrorio from the production and sale of the estimated net reserves. Future net revenue is calculated by deducting royalties paid in cash, operating expenses, capital costs, abandonment and reclamation costs, and the special participation fee (SPF) from the future gross revenue. Operating expenses include field operating expenses, well workover expenses, transportation expenses, compression charges, and an allocation of overhead that directly relates to production activities. Capital costs include drilling and completion costs, facilities costs, and field maintenance costs. Abandonment and reclamation costs are represented by Petrorio to be inclusive of those costs associated with the removal of equipment, plugging of wells, and reclamation and restoration associated with the abandonment. At the request of Petrorio, future income taxes were not taken into account in the preparation of these estimates. Present worth is defined as the future net revenue discounted at a specified arbitrary discount rate compounded monthly over the expected period of realization. The future net revenue estimated herein, discounted or undiscounted, should not be construed to represent fair market value. In this report, present worth values using a nominal discount rate of 10 percent are reported in detail and values using nominal discount rates of 5, 15, and 20 percent are reported as totals.

Estimates of reserves and revenue should be regarded only as estimates that may change as further production history and

additional information become available. Not only are such estimates based on that information which is currently available, but such estimates are also subject to the uncertainties inherent in the application of judgmental factors in interpreting such information.

Authority

This report was authorized by Mr. Blener Mayhew, Chief Financial Officer, Petrorio S.A.

Source of Information

Information used in the preparation of this report was obtained from Petrorio. In the preparation of this report we have relied, without independent verification, upon information furnished by Petrorio with respect to the property interests being evaluated, production from such properties, current costs of operation and development, current prices for production, agreements relating to current and future operations and sale of production, and various other information and data that were accepted as represented. The completeness and accuracy of this information was confirmed in the Representation Letter provided by Petrorio on February 18, 2019. A field examination of the properties was not considered necessary for the purposes of this report.

GEOLOGY

Polvo Field

The Polvo field is located in the Campos Basin, offshore Brazil (Figure 1). The field lies about 100 kilometers east of the city of Cabo Frio, Rio de Janeiro State.

In the Campos Basin, regional dip is toward the southeast, reflecting basinward dip caused by the opening of the Atlantic Ocean during the early Cretaceous. This structural configuration is also present in the Polvo field.

Basement rocks in the Campos Basin are Precambrian granites (Figure 2). As the basin began to open and fill, basalts of the Cabiúnas Formation flowed onto the granite basement. The earliest sediments in the basin are lacustrine shales and carbonates of the Lagoa Feia Formation, which is the primary hydrocarbon source formation for the basin. After the original rifting period, a massive sequence of continental and marine sediments accumulated in the basin. The lower part of this sequence is made up of conglomerates and carbonates, which are subsequently covered by a thick evaporite section, composed predominantly of salt and anhydrite. Above the evaporites are mudstones and oolitic grainstones, deposited during Albian time when a broad carbonate platform developed in the region. In the Polvo field, the Albian carbonates are the Quissamã members of the Macaé Formation. These carbonates accumulated in shallow water on northeast-trending local structural highs atop basement or salt uplifts.

As basin subsidence continued, coastal rivers flooded sands into the basin. These sands were deposited in environments ranging from deep-water turbidites to shallow-water deltaic and bay-lagoon settings. This style of sedimentation continued from the Cenomanian until the Miocene. In the Polvo field, the sandstones were deposited in coastal plain, lagoon, and bay-deltaic environments.

In the Polvo field, exploration and appraisal wells identified six oil-productive reservoir intervals located in separate areas of the field. From deepest to shallowest, these are the Quissamã carbonates, Turonian-age sandstones (160/170 reservoir), and Maastrichtian-age sandstones (50, 80, 100, and 110 reservoirs). Ultimately, 13 exploration and appraisal wells were drilled to delineate the productive limits of these formations. Field description and

well nomenclature are described in more detail in the Estimation of Reserves section of this report

Early wells identified several areas of Quissamã carbonate accumulation. After further evaluation, three of these areas were targeted for additional development, as follows: the Dev-7 and Dev-4&5 shoal areas, in the western part of the field, and the Dev-3 shoal area, referred to as the East Quissamã herein. Six platform wells have been drilled and completed as producers from the Quissamã accumulation.

The Turonian and Maastrichtian sandstones were found to be well developed and productive in separate accumulations east of the Quissamã wells. This part of the field was originally known as the Guarajuba field. At present, six wells produce from the Maastrichtian reservoir, four produce from the Turonian reservoir, and one produces from the Turonian East reservoir.

Productive reservoir volumes were estimated using standard volumetric methods based on geological mapping utilizing seismic data and well logs. Structure maps were drawn for each reservoir. Isopach maps of the sandstone reservoirs were drawn using limits based on stratigraphy and structural oil-water contacts. In many of the sandstone reservoirs, the productive sands were often cut by overlying erosional unconformities that formed the northern, western, and eastern limits. The southern downdip limit was often an estimated oil-water contact.

Quissamã reservoirs were identified on seismic data as structure-related shoal accumulations. Isopach maps of the Quissamã reservoirs show them to be bounded by faulting, stratigraphy, and oil/water contact (OWC) limits. In the western part of the Polvo field, the Quissamã reservoirs in the Dev-7 and Dev-4&5 areas are interpreted to be separated by faults and not in communication, as evidenced by different OWC depths. The East Quissamã reservoir area was identified on seismic data. Small quantities of oil were recovered from wireline sampling of Quissamã intervals in the Dev-3 well. The well is interpreted to be on the edge of a larger Quissamã accumulation. Maps prepared for this report are shown on Figures 3 through 19.

Manati Field

The Manati field is located in the Camamu Basin, offshore northeast Brazil (Figure 1). The field lies about 65 kilometers southwest of the city of Salvador, Bahia State. The field, discovered in 2000 by Petrobras, is within license block BCAM-40. Water depth above the field is about 40 meters.

The productive reservoirs in the Manati field are a thick sequence of upper Jurassic-age eolian and fluvial sandstones of the Sergi Formation (Figure 20). These were deposited before the start of rifting in this region. The Sergi is overlain by Cretaceous-age shales of the Itaipe Formation and sealed laterally by lacustrine sediments of the Morro do Barro Formation, which were deposited in the Tinharé Canyon and are the source rocks for petroleum in the Manati field.

The field structure is a four-way dipping feature that was later shaped by faulting and erosion (Figure 21). The western, northern, and eastern edges are the intersection of the north/south-trending Mutá regional fault with the Tinharé Canyon. The canyon formed after deposition of the field sandstones and replaced them with a thick shale section on the west side of the structure. The present structural dip is to the north and south, away from a crest in the center of the field. Other faults cross parts of the field and intersect the Mutá fault, but do not appear to compartmentalize the reservoirs. The southern field limit is a water contact.

A total of nine wells were drilled in the area to discover and delineate the field. Currently, six wells are producing gas from the multiple Sergi Formation sandstones in the field.

DEFINITION of RESERVES

Petroleum reserves included in this report are categorized by degree of proof as proved, probable, or possible. For purposes of this report, reserves are those quantities of oil or gas anticipated to be economically recoverable from known accumulations. The definitions of reserves shown below serve as the basis for the estimates contained herein. These definitions are in accordance with the Canadian National Instrument 51-101 as presented in the *Canadian Oil and Gas Evaluation Handbook (COGEH) Consolidated Third Edition August 2018: Reserves Definitions and Evaluation Practices and Procedures*, Section 1. The petroleum reserves are categorized in accordance with Sections 1.3.5, 1.3.6, 1.3.7, and 1.3.8 of COGEH, which contains the complete and official explanation of the reserves definitions utilized herein.

Reserves Categories – Reserves are estimated remaining quantities of oil and natural gas and related substances anticipated to be recoverable from known accumulations, from a given date forward, based on

- analysis of drilling, geological, geophysical, and engineering data;
- the use of established technology;
- specified economic conditions, which are generally accepted as being reasonable, and shall be disclosed.

Reserves are categorized according to the degree of certainty associated with the estimates.

Proved Reserves – Proved reserves are those reserves that can be estimated with a high degree of certainty to be recoverable. It is likely that the actual remaining quantities recovered will exceed the estimated proved reserves.

Probable Reserves – Probable reserves are those additional reserves that are less certain to be recovered than proved reserves. It is equally likely that the actual remaining quantities recovered will be greater or less than the sum of the estimated proved + probable reserves.

Possible Reserves – Possible reserves are those additional reserves that are less certain to be recovered than probable reserves. It is unlikely that the actual remaining quantities recovered will exceed the sum of the estimated proved + probable + possible reserves.

Development and Production Status – Each of the reserves categories (proved, probable, and possible) may be divided into developed and undeveloped categories.

Developed Reserves – Developed reserves are those reserves that are expected to be recovered from existing wells and installed facilities or, if facilities have not been installed, that would involve a low expenditure (e.g., when compared to the cost of drilling and completing a well) to put the reserves on production. The developed category may be subdivided into producing and non-producing.

Developed Producing Reserves – Developed producing reserves are those reserves that are expected to be recovered from completion intervals open at the time of the estimate. These reserves may be currently producing or, if shut in, they must have previously been on production, and the date of resumption of production must be known with reasonable certainty.

Developed Non-Producing Reserves – Developed non-producing reserves are those reserves that either have not been on production, or have previously been on production, but are shut in, and the date of resumption of production is unknown.

Undeveloped Reserves – Undeveloped reserves are those reserves expected to be recovered from known accumulations where a significant expenditure (e.g., when compared to the cost of drilling and completing a well) is required to render them capable of production. They must fully meet the requirements of the reserves categorization (proved, probable, possible) to which they are assigned.

In multi-well pools, it may be appropriate to allocate total pool reserves between the developed and undeveloped categories or to subdivide the developed reserves for the pool between developed

producing and developed non-producing. This allocation should be based on the estimator's assessment as to the reserves that will be recovered from specific wells, facilities, and completion intervals in the pool and their respective development and production status.

Levels of Certainty for Reported Reserves – The qualitative certainty levels contained in the definitions in Section 1.3.8 [*Reserves Categories above*] are applicable to individual Reserves Entities, which refers to the lowest level at which reserves calculations are performed, and to Reported Reserves, which refers to the highest level sum of individual entity estimates for which reserves estimates are presented. Reported Reserves should target the following levels of certainty under a specific set of economic conditions:

- at least a 90 percent probability that the quantities actually recovered will equal or exceed the estimated proved reserves;
- at least a 50 percent probability that the quantities actually recovered will equal or exceed the sum of the estimated proved + probable reserves;
- at least a 10 percent probability that the quantities actually recovered will equal or exceed the sum of the estimated proved + probable + possible reserves.

A quantitative measure of the certainty levels pertaining to estimates prepared for the various reserves categories is desirable to provide a clearer understanding of the associated risks and uncertainties. However, the majority of reserves estimates will be prepared using deterministic methods that do not provide a mathematically derived quantitative measure of probability. In principle, there should be no difference between estimates prepared using probabilistic or deterministic methods.

ESTIMATION of RESERVES

Estimates of reserves were prepared by the use of standard geological and engineering methods generally accepted by the petroleum industry. The method or combination of methods used in the analysis of each reservoir was tempered by experience with similar reservoirs, stage of development, quality and completeness of basic data, and production history.

Based on the current stage of field development, production performance, the development plans provided by Petrorio, and the analyses of areas offsetting existing wells with test or production data, reserves were categorized as proved, probable, or possible.

Petrorio has represented that its senior management is committed to the development plan provided by Petrorio and that Petrorio has the financial capability to execute the development plan, including the drilling and completion of wells and the installation of equipment and facilities.

Reserves were limited to the economic limit as defined in the Definition of Reserves section of this report or the expiration date of the production concession license, whichever occurs first.

Data provided by Petrorio from wells drilled through December 2018, and made available for this evaluation were used to prepare the reserves estimates herein. These reserves estimates were based on consideration of monthly production data available through December 31, 2018. Cumulative production, as of December 31, 2018, was deducted from the estimated gross ultimate recovery to estimate gross reserves.

Oil reserves estimated herein are to be recovered by normal field separation. Condensate reserves were estimated by applying a constant condensate-gas ratio to the sales gas forecast. The condensate-gas ratio was estimated based on production history. Oil and condensate reserves estimated herein are expressed in thousands of barrels (10^3 bbl). In these estimates, 1 barrel equals 42 United States gallons.

Gas quantities estimated herein are expressed as sales gas. Sales gas is defined as the total gas to be produced from the reservoirs, measured at the point of delivery, after reduction for fuel usage, flare,

and shrinkage resulting from field separation and processing. Gas reserves estimated herein are reported as sales gas. Gas reserves estimated herein are expressed at a temperature base of 20 degrees Celsius (°C) and at a pressure base of 1 atmosphere (atm). Gas reserves presented in this report are expressed in millions of cubic feet (10^6ft^3).

Gas quantities are identified by the type of reservoir from which the gas will be produced. Nonassociated gas is gas at initial reservoir conditions with no crude oil present in the reservoir. Associated gas includes both gas-cap gas and solution gas. Gas-cap gas is gas at initial reservoir conditions and is in communication with an underlying crude oil zone. Solution gas is gas dissolved in crude oil at initial reservoir conditions. Gas quantities estimated herein are nonassociated gas.

Polvo Field

The Polvo field was discovered in 1993 by Petrobras with the drilling of the 1-RJS-486A well. In 2000, during the Agência Nacional de Petróleo's (ANP) second licensing round, license block BM-C-8 containing the Polvo field was awarded to Devon Energy do Brasil Ltda. (Devon) and partners. Devon continued field delineation drilling and development. A portion of license block BM-C-8 was relinquished following declaration of commerciality and the establishment of the Polvo Development Area ring fence. In 2011, BP acquired Devon's interest in the Polvo field, and in 2013 Petrorio acquired BP's interest in the field. Petrorio has represented that the production concession license for license block BM-C-8 continues through 2032.

Changes in ownership in the Polvo field over the years have created complex well nomenclature in the field. Wells identified by "DEV-" followed by a number refer to an exploration or appraisal well drilled by Devon and are not producing. Wells that begin with or contain "POL-" in the name of the well refer to development wells. Table 8 summarizes the active wells in the Polvo field along with the production interval or proposed production interval. Table 9 summarizes all of the other wells that have been drilled in the Polvo field.

Production commenced in the Polvo field in August 2007. Figure 22 shows the historical field production for the Polvo field. The average gravity of the produced Polvo crude is 21 degrees API. The producing gas-oil ratio in the field is approximately 100 cubic feet per barrel and all produced

gas is either used as fuel or flared. The water depth in the Polvo field ranges from 90 to 250 meters. The field was developed with a drilling/production platform and a floating, production, storage, and offloading vessel (FPSO), both in a water depth of approximately 100 meters. A multiphase pipeline transports the produced fluids from the platform to the FPSO. The primary processing facilities are located on the FPSO, which has a production capacity of 150,000 barrels of fluid per day. All producing wells are horizontal/highly deviated and are completed with electric submersible pumps (ESP). Based on pressure measurements and historical water production data, most of the reservoirs in the Polvo field produce with moderate to active aquifer support. A single water-injection well has been completed in the Maastrichtian reservoir.

For the Polvo field, the volumetric method was used to estimate the original oil in place (OOIP). Structure maps were prepared to delineate each reservoir, and isopach maps were constructed to estimate reservoir volume. Electrical logs, radioactivity logs, core analyses, and other available data were used to prepare these maps as well as to estimate representative values for porosity and water saturation.

Estimates of ultimate recovery were obtained after applying recovery factors to the OOIP. These recovery factors were based on consideration of the type of energy inherent in the reservoirs, analyses of the petroleum, the structural positions of the properties, analogs, and well production histories. Reservoir performance parameters such as cumulative production, oil producing rate, reservoir pressure, gas-oil ratio behavior, and water production were considered in estimating recovery efficiencies used in estimating gross ultimate recovery.

Proved developed producing reserves were estimated by analysis of individual well oil rate versus time decline-curve analysis. Proved developed non-producing reserves were estimated to be zero; therefore, proved developed reserves equal proved developed producing reserves.

Probable and possible reserves were estimated for the Quissamã, Maastrichtian, and Turonian reservoirs considering more favorable behavior than that used to estimate probable reserves.

No gas reserves were estimated for the Polvo field, since Petrório has represented that there are no plans for gas sales.

Manati Field

The Manati field was discovered in 1990 by Petrobras with the drilling of the 1-BAS-128 well in a water depth of approximately 40 meters. Production commenced in 2007 from a production platform and is connected with a subsea pipeline to a gas processing facility onshore. Figure 23 shows the historical field production for the Manati field. The Manati field is located in license block BCAM-40, and the terms of the production concession license expire in 2029. Petrobras is the operator of the field.

For the Manati field, the material-balance method was used to estimate the original gas in place (OGIP). Estimates of ultimate recovery were obtained after applying recovery factors to the OGIP. These recovery factors were based on consideration of the type of energy inherent in the reservoirs, analyses of the petroleum, the structural positions of the properties, analogs, and well production histories. Reservoir performance parameters, such as cumulative production, producing rate, reservoir pressure, gas-oil ratio behavior, and water production, were considered in estimating recovery efficiencies used in estimating gross ultimate recovery.

Proved developed producing reserves were estimated for current active producing wells using the material-balance method by integrating updated production, pressure, fluid properties, well productivities, and considering the gas production rate plateau strategy provided by Petrório. Proved developed non-producing reserves were estimated to be zero; therefore, proved developed reserves equal proved developed producing reserves. Petrório has represented that the development plan for the Manati field does not consider additional drilling locations or the installation of new production facilities. Proved undeveloped reserves were estimated to be zero.

Probable and possible reserves were estimated for the Manati field considering more favorable behavior than that used to estimate proved reserves.

Table 2 presents a summary of the gross and net reserves for the Polvo and Manati fields evaluated herein. Table 3 presents a summary of the gross and net reserves by reservoir for the Polvo field. Table 4 summarizes the reservoir parameters and gross oil reserves for the Polvo field. Table 4 presents the reservoir original oil in place estimates and gross oil reserves

for the Turonian, Maastrichtian, and Quissamã reservoir intervals in the Polvo field. Table 7 presents a summary of the gross and net reserves for the Manati field.

VALUATION of RESERVES

Revenue values in this report were estimated using initial prices, expenses, and costs provided by Petrório. A forecast prices and costs case was evaluated with future prices and costs that vary from current prices and costs as described herein. The future net revenue estimated herein, discounted and undiscounted, should not be construed to represent fair market value.

Petrório has represented that it holds a 100-percent working interest in the Polvo field and 10-percent working interest in the Manati field. The Polvo field is located in production concession license block BM-C-8, the terms of which are due to expire in 2032. The Manati field is located in the Camamu Basin, Brazil in production concession license block BCAM-40, the terms of which are due to expire in 2029.

Values for proved, proved, proved-plus-probable, and proved-plus-probable-plus-possible reserves were based on projections of estimated future production and revenue prepared for these properties. Probable and possible reserves involve substantially higher risk than proved reserves. Production of probable or possible reserves is less likely to be realized than proved reserves, and any projection including probable or possible reserves should be considered in that context. Revenue values associated with probable and possible reserves are presented as required by the Canadian National Instrument 51-101 and are not equivalent to revenue values associated with proved reserves. Values associated with possible reserves are those additional values that are less certain to be realized than those associated with probable reserves. It is unlikely that the quantities actually recovered and associated values will equal or exceed the sum of the proved, probable, and possible reserves and values thereof.

Estimates of future net revenue have been made in accordance with the Government of Brazil's Petroleum Law n° 9,478, the Petroleum Law of 1997. The fiscal terms outlined in the Petroleum Law of 1997 and assessable to Petrório as well as other economic assumptions used in this evaluation are presented as follows:

Brazilian Fiscal Terms

The Petroleum Law of 1997 affords the Brazilian Government three elements of government take: 1) petroleum levies consisting of royalties, a special participation fee, and surface rentals; 2) direct taxes, which are levied through the financial transaction tax, the corporate income tax, and two social contribution taxes; and 3) indirect taxes, which are levies on equipment and services used by companies engaged in exploration and production activities. Indirect tax levies for which Petrório may be responsible for have not been included in the estimates of operating expenses and capital costs. Certain indirect levies are eligible for reimbursement from sales of refined products. The reimbursement of the indirect levies from refined product sales has not been accounted for in this evaluation.

Royalties

The federal royalty rate in Brazil varies by field between 5 and 10 percent. Petrório provided federal royalty rates of 10 percent for the Polvo field and 7.5 percent for the Manati field. Petrório has advised that these royalties are paid in cash.

Oil royalty is assessed on the market value of the oil (and condensate), which is defined as the greater of the sales price or the market valuation as determined by the ANP. Gas royalty is levied on the market value of the gas production less gas injected.

Special Participation Fee

The SPF is a tax assessed at the field level on a sliding-scale basis that varies depending on the location of the field (onshore or offshore), water depth, level of production, and number of years on production. The tax basis for the SPF is similar to the tax basis for corporation tax (CIT), with some exceptions. Drilling costs are depreciated using a units-of-production basis for SPF, but expensed for CIT. An annual provision for abandonment costs is also deductible for SPF, but expensed in

the year incurred for CIT. In years in which the SPF is paid, there is an additional 1-percent research and development fee assessed.

Surface Rental Fees

Rental fees are payable to the ANP and vary by field, depending on stage of activity (exploration or development), geological characteristics, and location of sedimentary basin. The surface rental fees are included herein in the estimates of field operating expenses.

Corporate Income Tax

As advised by Petrório, Canadian and Brazilian income taxes have not been considered in this evaluation.

Social Contribution Taxes

Two social contribution taxes are levied on the market value of oil and gas sales. The Contribution for the Worker's Social Integration Program (PIS) is assessed at a rate of 1.65 percent and the Contribution for Social Security Funding (COFINS) is levied at a 7.6-percent rate. These taxes have not been considered in the estimates of future net revenue included herein.

Product Prices

Petrório provided the following sales price forecast for the Polvo and Manati fields. Prices are expressed in United States dollars per barrel (U.S.\$/bbl) and United States dollars per thousand cubic feet (U.S.\$/10³ft³).

	Polvo Field Oil Sales Price (U.S.\$/bbl)	Manati Field Condensate Sales Price (U.S.\$/bbl)	Manati Field Gas Sales Price (U.S.\$/10³ft³)
Year			
2019	65.00	72.50	5.28
2020	70.00	77.50	5.42
2021	78.00	85.50	5.56
2022 Forward	78.00	85.50	5.71

Operating Expenses, Capital Costs, and Abandonment Costs

Operating expenses for the Polvo and Manati fields were provided by Petrório and were represented to include all costs associated with the operation and maintenance of equipment and personnel. These cost estimates do not include any associated indirect taxes that may be assessed on these expenses.

Abandonment costs, which are those costs associated with the removal of equipment, plugging of wells, and reclamation and restoration associated with the abandonment, were based on information provided by Petrório. For the Polvo field, abandonment costs were included in the year following cessation of production. For the Manati field, abandonment costs were included as a yearly accrual to an abandonment fund which Petrório has represented is fully funded. As represented by Petrório, the Manati field owners reimburse the third-party operator of the compression facility through annual tariff payments until the contractual amount has been reached.

Exchange Rate

All costs and revenues included herein were estimated in U.S.\$. Certain operating costs were provided by Petrório in Brazilian reais and were converted to U.S.\$ by Petrório.

Summaries of future net revenue for the proved developed, total proved, proved-plus-probable, and proved-plus-probable-plus-possible reserves are presented in Table 8. Projections of future net revenue for the proved developed, total proved, proved-plus-probable, and proved-plus-probable-plus-possible reserves for the Polvo and Manati fields are shown in Tables 9 through 16.

SUMMARY and CONCLUSIONS

Petrorio has represented that it holds interests in the Polvo and Manati fields located in Brazil. The estimated gross and net proved developed, proved undeveloped, total proved, probable, and possible reserves, as of December 31, 2018, of the properties evaluated herein are summarized as follows, expressed in thousands of barrels (10^3 bbl) and millions of cubic feet (10^6 ft³):

	Gross Reserves			Net Reserves		
	Oil (10^3bbl)	Condensate (10^3bbl)	Sales Gas (10^6ft³)	Oil (10^3bbl)	Condensate (10^3bbl)	Sales Gas (10^6ft³)
Proved						
Developed	14,147	553	173,393	14,147	55	17,339
Undeveloped	0	0	0	0	0	0
Total Proved	14,147	553	173,393	14,147	55	17,339
Probable	6,401	24	7,546	6,401	3	755
Possible	9,598	34	10,657	9,598	2	1,065

Notes:

1. Probable and possible reserves are presented as required by Canadian National Instrument 51–101 and are not equivalent to proved reserves.
2. Possible reserves are those additional reserves that are less certain to be recovered than probable reserves. It is unlikely that the quantities actually recovered will equal or exceed the sum of the proved-plus-probable-plus-possible reserves.

The estimated future net revenue attributable to Petrorio's interest in the proved developed, total proved, proved-plus-probable, and proved-plus-probable-plus-possible net reserves, as of December 31, 2018, of the properties evaluated under the assumptions described herein under the aforementioned economic assumptions is summarized as follows, expressed in thousands of United States dollars (10^3 U.S.\$):

	Proved Developed (10^3U.S.\$)	Total Proved (10^3U.S.\$)	Proved plus Probable (10^3U.S.\$)	Proved plus Probable plus Possible (10^3U.S.\$)
Future Gross Revenue	1,124,813	1,124,813	1,618,442	2,359,803
Royalties Paid in Cash	112,642	112,642	162,934	238,482
Operating Expenses	581,376	581,376	848,088	1,203,704
Capital Costs	0	0	0	0
Abandonment Costs	44,600	44,600	44,600	44,600
SPF	1,710	1,710	1,881	2,190
Future Net Revenue	384,485	384,485	560,939	870,827
Present Worth at 10 Percent	332,130	332,130	455,523	637,390

Notes:

1. Values associated with probable and possible reserves are presented as required by Canadian National Instrument 51–101 and are not equivalent to values associated with proved reserves.
2. Values associated with possible reserves are those additional values that are less certain to be realized than those associated with probable reserves. It is unlikely that the values for the quantities actually recovered will equal or exceed the sum of values for the proved, probable, and possible reserves.
3. Future Canadian and Brazilian income taxes were not taken into account in the preparation of these estimates.

DEGOLYER AND MACNAUGHTON

Professional Qualifications

DeGolyer and MacNaughton is a Delaware Corporation with offices at 5001 Spring Valley Road, Suite 800 East, Dallas, Texas 75244, U.S.A. The firm has been providing petroleum consulting services throughout the world since 1936. The firm's professional engineers, geologists, geophysicists, petrophysicists, and economists are engaged in the independent evaluation of oil and gas properties, evaluation of hydrocarbon and other mineral prospects, basin evaluations, comprehensive field studies, equity studies, and studies of supply and economics related to the energy industry. Except for the provision of professional services on a fee basis, DeGolyer and MacNaughton has no commercial arrangement with any other person or company involved in the interests which are the subject of this report.

The evaluation has been supervised by Mr. Federico Dordoni. Mr. Dordoni is a Vice President with DeGolyer and MacNaughton, Assistant Division Manager of the firm's Asia-Pacific-Latin America Division, a Registered Professional Engineer in the State of Texas, and a member of the Society of Petroleum Engineers. He has over 14 years of oil and gas industry experience.

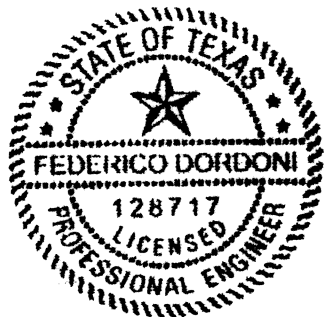
Submitted,

DeGolyer and MacNaughton

DeGOLYER and MacNAUGHTON

Texas Registered Engineering Firm F-716

SIGNED: February 18, 2019



Federico Dordoni

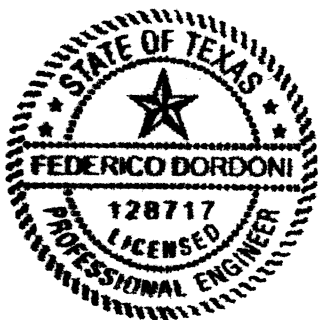
Federico Dordoni, P.E.
Vice President
DeGolyer and MacNaughton

CERTIFICATE of QUALIFICATION

I, Federico Dordoni, Petroleum Engineer with DeGolyer and MacNaughton, 5001 Spring Valley Road, Suite 800 East, Dallas, Texas, 75244 U.S.A., hereby certify:

1. That I am a Vice President of DeGolyer and MacNaughton, which firm did prepare the report entitled "Report as of December 31, 2018 on Reserves and Revenue of Certain Fields in Brazil with interests attributable to Petrório S.A. NI 51-101" dated February 18, 2019, and that I, as Vice President, was responsible for the preparation of this report.
2. That I attended Buenos Aires Institute of Technology (ITBA) University, and that I graduated with a degree in Petroleum Engineering in the year 2004; that I am a Registered Professional Engineer in the State of Texas; that I am a member of the Society of Petroleum Engineers; and that I have in excess of 14 years of experience in oil and gas reservoir studies and reserves evaluations.
3. That DeGolyer and MacNaughton or its officers have no direct or indirect interest, nor do they expect to receive any direct or indirect interest in any properties or securities of Petrório or affiliate thereof.

SIGNED: February 18, 2019



Federico Dordoni

Federico Dordoni, P.E.
Vice President
DeGolyer and MacNaughton

DEGOLYER AND MACNAUGHTON
5001 SPRING VALLEY ROAD
SUITE 800 EAST
DALLAS, TEXAS 75244

**CANADIAN NATIONAL INSTRUMENT 51-101
FORM 51-101F2
REPORT ON RESERVES DATA
BY
INDEPENDENT QUALIFIED RESERVES
EVALUATOR**

To the board of directors of Petrorio S.A. (the "Company"):

1. We have evaluated the Company's reserves data as at December 31, 2018. The reserves data are estimates of the proved reserves and probable reserves and related future net revenue as at December 31, 2018, estimated using forecast prices and costs.
2. The reserves data are the responsibility of the Company's management. Our responsibility is to express an opinion on the reserves data based on our evaluation.
3. We carried out our evaluation in accordance with standards set out in the Canadian Oil and Gas Evaluation Handbook as amended from time to time (the "COGE Handbook") maintained by the Society of Petroleum Evaluation Engineers (Calgary Chapter).
4. Those standards require that we plan and perform an evaluation to obtain reasonable assurance as to whether the reserves data are free of material misstatement. An evaluation also includes assessing whether the reserves data are in accordance with principles and definitions presented in the COGE Handbook.
5. The following table sets forth the net present value of future net revenue (before deduction of income taxes) in thousands of United States dollars (10^3 U.S.\$) attributed to proved-plus-probable reserves, estimated using forecast prices and costs and calculated using a discount rate of 10 percent, included in the reserves data of the Company evaluated by us for the year ended December 31, 2018, and

identifies the respective portions thereof that we have evaluated and reported to Company's board of directors:

Independent Qualified Reserves Evaluator	Description and Effective Date of Evaluation	Location of Reserves	Net Present Value of Future Net Revenue (before Canadian Income Tax, Discounted at 10 Percent)			
			Audited (10 ³ U.S.\$)	Evaluated (10 ³ U.S.\$)	Reviewed (10 ³ U.S.\$)	Total (10 ³ U.S.\$)
DeGolyer and MacNaughton	Report as of December 31, 2018 on Reserves and Revenue of Certain Fields in Brazil with interests attributable to Petrorio S.A. NI 51-101	Campos and Camamu Basins, Brazil	Not Applicable	455,523	Not Applicable	455,523

Note: Brazilian income taxes have not been considered in the evaluation.

6. In our opinion, the reserves and revenue evaluated by us have, in all material respects, been determined and are in accordance with the COGE Handbook, consistently applied. We express no opinion on the reserves data that we reviewed but did not audit or evaluate.
7. We have no responsibility to update our report referred to in paragraph 5 for events and circumstances occurring after the report preparation date.
8. Because the reserves data are based on judgments regarding future events, actual results will vary and the variations may be material.

Executed as to our report referred to above:

DeGolyer and MacNaughton, Dallas, Texas U.S.A., dated February 18, 2019.

Submitted,

DeGolyer and MacNaughton
DeGOLYER and MacNAUGHTON
Texas Registered Engineering Firm F-716

Federico Dordoni

Federico Dordoni, P.E.
Vice President
DeGolyer and MacNaughton



TABLE 1
WORKING INTERESTS and CONTRACT EXPIRATION DATES
as of
DECEMBER 31, 2018
for the
CERTAIN FIELDS
with interests attributable to
PETRORIO S.A.
in
BRAZIL

NI 51-101 CASE



Field	Working Interest	Expiration Date
Polvo	100.00%	July 1, 2032
Manati	10.00%	November 1, 2029

These data accompany the report of DeGolyer and MacNaughton and are subject to its specific conditions.

TABLE 2
SUMMARY of GROSS and NET RESERVES
as of
DECEMBER 31, 2018
for
CERTAIN FIELDS
in
BRAZIL
with interests attributable to
PETRORIO S.A.

NI 51-101 CASE



Field	Gross Reserves														
	Proved Developed			Proved Undeveloped			Total Proved			Probable			Possible		
	Oil (10 ³ bbl)	Condensate (10 ³ bbl)	Sales Gas (10 ⁶ ft ³)	Oil (10 ³ bbl)	Condensate (10 ³ bbl)	Sales Gas (10 ⁶ ft ³)	Oil (10 ³ bbl)	Condensate (10 ³ bbl)	Sales Gas (10 ⁶ ft ³)	Oil (10 ³ bbl)	Condensate (10 ³ bbl)	Sales Gas (10 ⁶ ft ³)	Oil (10 ³ bbl)	Condensate (10 ³ bbl)	Sales Gas (10 ⁶ ft ³)
Polvo	14,147	0	0	0	0	0	14,147	0	0	6,401	0	0	9,598	0	0
Manati	0	553	173,393	0	0	0	0	553	173,393	0	24	7,546	0	34	10,657
Total	14,147	553	173,393	0	0	0	14,147	553	173,393	6,401	24	7,546	9,598	34	10,657

Field	Net Reserves														
	Proved Developed			Proved Undeveloped			Total Proved			Probable			Possible		
	Oil (10 ³ bbl)	Condensate (10 ³ bbl)	Sales Gas (10 ⁶ ft ³)	Oil (10 ³ bbl)	Condensate (10 ³ bbl)	Sales Gas (10 ⁶ ft ³)	Oil (10 ³ bbl)	Condensate (10 ³ bbl)	Sales Gas (10 ⁶ ft ³)	Oil (10 ³ bbl)	Condensate (10 ³ bbl)	Sales Gas (10 ⁶ ft ³)	Oil (10 ³ bbl)	Condensate (10 ³ bbl)	Sales Gas (10 ⁶ ft ³)
Polvo	14,147	0	0	0	0	0	14,147	0	0	6,401	0	0	9,598	0	0
Manati	0	55	17,339	0	0	0	0	55	17,339	0	3	755	0	2	1,065
Total	14,147	55	17,339	0	0	0	14,147	55	17,339	6,401	3	755	9,598	2	1,065

Notes:

1. Probable and possible reserves are presented as required by Canadian National Instrument 51-101 and are not equivalent to proved reserves.
2. Possible reserves are those additional reserves that are less certain to be recovered than probable reserves. It is unlikely that the quantities actually recovered will equal or exceed the sum of the proved, probable, and possible reserves.
3. Probable and possible reserves have not been risk adjusted to make them comparable to proved reserves.

These data accompany the report of DeGolyer and MacNaughton and are subject to its specific conditions.

TABLE 3
SUMMARY of GROSS and NET OIL RESERVES by RESERVOIR
as of
DECEMBER 31, 2018
for the
POLVO FIELD
in
BRAZIL
with interests attributable to
PETROBRAS S.A.

NI 51-101 CASE



Field Reservoir	Gross Reserves				
	Proved			Probable (10 ³ bbl)	Possible (10 ³ bbl)
	Developed (10 ³ bbl)	Undeveloped (10 ³ bbl)	Total (10 ³ bbl)		
Polvo					
Quissamã	4,577	0	4,577	1,807	3,428
Maastrichtian	4,178	0	4,178	1,897	2,591
Turonian	5,392	0	5,392	2,697	3,579
Total	14,147	0	14,147	6,401	9,598

Field Reservoir	Net Reserves				
	Proved			Probable (10 ³ bbl)	Possible (10 ³ bbl)
	Developed (10 ³ bbl)	Undeveloped (10 ³ bbl)	Total (10 ³ bbl)		
Polvo					
Quissamã	4,577	0	4,577	1,807	3,428
Maastrichtian	4,178	0	4,178	1,897	2,591
Turonian	5,392	0	5,392	2,697	3,579
Total	14,147	0	14,147	6,401	9,598

Notes:

1. There are no proved developed non-producing reserves associated with the Polvo Field.
2. Probable and possible reserves are presented as required by Canadian National Instrument 51-101 and are not equivalent to proved reserves.
3. Possible reserves are those additional reserves that are less certain to be recovered than probable reserves. It is unlikely that the quantities actually recovered will equal or exceed the sum of the proved, probable, and possible reserves.
4. Probable and possible reserves have not been risk adjusted to make them comparable to proved reserves.

TABLE 4
SUMMARY of RESERVOIR PARAMETERS and GROSS OIL RESERVES
as of
DECEMBER 31, 2018
of the
POLVO FIELD
in
BRAZIL



NI 51-101 CASE

	Reservoir			Total
	Quissamã	Maastrichtian	Turonian	
Proved				
Original Oil in Place, 10 ³ bbl	94,573	80,635	112,735	
Oil Recovery Factor, %	17.1	27.7	19.8	
Gross Ultimate Oil Recovery, 10 ³ bbl	16,132	22,298	22,364	60,794
Cumulative Oil Production , 10 ³ bbl	11,555	18,120	16,972	46,647
Gross Oil Reserves, 10 ³ bbl	4,577	4,178	5,392	14,147
Proved plus Probable				
Original Oil in Place, 10 ³ bbl	227,508	80,635	112,735	
Oil Recovery Factor, %	7.9	30.0	22.2	
Gross Ultimate Oil Recovery, 10 ³ bbl	17,939	24,195	25,061	67,195
Cumulative Oil Production , 10 ³ bbl	11,555	18,120	16,972	46,647
Gross Oil Reserves, 10 ³ bbl	6,384	6,075	8,089	20,548
Probable Oil Reserves, 10 ³ bbl	1,807	1,897	2,697	6,401
Proved plus Probable plus Possible				
Original Oil in Place, 10 ³ bbl	238,742	80,635	112,735	
Oil Recovery Factor, %	8.9	33.2	25.4	
Gross Ultimate Oil Recovery, 10 ³ bbl	21,367	26,786	28,640	76,793
Cumulative Oil Production , 10 ³ bbl	11,555	18,120	16,972	46,647
Gross Oil Reserves, 10 ³ bbl	9,812	8,666	11,668	30,146
Possible Oil Reserves, 10 ³ bbl	3,428	2,591	3,579	9,598

Notes:

1. There are no proved developed non-producing reserves associated with the Polvo Field.
2. Probable and possible reserves have not been risk adjusted to make them comparable to proved reserves.
3. Probable reserves include incremental reserves estimated from the proved reservoir volumes at the recovery factors associated with the probable reserves.
4. Possible reserves include incremental reserves estimated from the proved and probable reservoir volumes at the recovery factors associated with the possible reserves.
5. Possible reserves are those additional reserves that are less certain to be recovered than probable reserves. It is unlikely that the quantities actually recovered will equal or exceed the sum of the proved, probable, and possible reserves.

TABLE 5
SUMMARY of ACTIVE and PROPOSED WELLS
as of
DECEMBER 31, 2018
for the
POLVO FIELD
in
BRAZIL



NI 51-101 CASE

ANP Name	HRT Internal Name	Well Type	Well Status	Production Interval
7-POL-1H-RJS	POL-A	Development	Producer	West Quissamã
7-POL-2HPB-RJS	POL-By	Development	Producer	West Quissamã
7-POL-4HP-RJS	POL-Cx	Development	Producer	West Quissamã
7-POL-15H-RJS	POL-U	Development	Producer	West Quissamã
7-POL-20H-RJS	POL-J	Development	Producer	West Quissamã
7-POL-12H-RJS	POL-R	Development	Producer	Turonian West (160/170)
7-POL-14H-RJS	POL-T	Development	Producer	Turonian West (160/170)/ Central Maastrichtian (50)
7-POL-24HP-RJS	POL-Oy	Development	Producer	Turonian East (160/170)
7-POL-11HP-RJS	POL-Dy	Development	Producer	Maastrichtian (100)
7-POL-13H-RJS	POL-S	Development	Producer	Maastrichtian (100)
7-POL-16H-RJS	POL-W	Development	Producer	Maastrichtian (100)
7-POL-32HP-RJS	POL-Xc	Development	Producer	Maastrichtian (110)
8-POL-18HP-RJS	POL-F2xi	Development	Injector	Maastrichtian (110)
7-POL-7HP-RJS	POL-Gx	Development	Producer	West Maastrichtian (50)
7-POL-38HP-RJS	POL-Z	Development	Producer	Turonian East (160/170)

These data accompany the report of DeGolyer and MacNaughton and are subject to its specific conditions.

TABLE 6
SUMMARY of NON-ACTIVE WELLS
as of
DECEMBER 31, 2018
for the
POLVO FIELD
in
BRAZIL



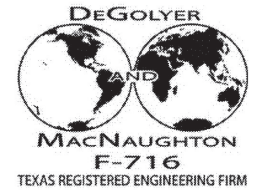
NI 51-101 CASE

ANP Name (Brazilian National Petroleum Agency)	HRT Internal Name	Well Type	Well Status
7-POL-2H-RJS	POL-B	Development	Plugged and abandoned
7-POL-2HPA-RJS	POL-Bx	Development	Plugged and abandoned
9-POL-3D-RJS	POL-C	Development	Plugged and abandoned
7-POL-5HA-RJS	POL-F2	Development	Plugged and abandoned
9-POL-6D-RJS	POL-G	Development	Plugged and abandoned
9-POL-8D-RJS	POL-D	Development	Plugged and abandoned
9-POL-10DP-RJS	POL-Dx	Development	Plugged and abandoned
7-POL-17H-RJS	POL-X	Development	Plugged and abandoned
7-POL-17HPA-RJS	POL-Xx	Development	Plugged and abandoned
9-POL-19DP-RJS	POL-Xy	Development	Plugged and abandoned
7-POL-17HPB-RJS	POL-Xz	Development	Plugged and abandoned
9-POL-21D-RJS	POL-BB	Development	Plugged and abandoned
9-POL-22D-RJS	POL-O	Development	Plugged and abandoned
7-POL-23HP-RJS	POL-Ox	Development	Plugged and abandoned
9-POL-25D-RJS	POL-P	Development	Plugged and abandoned
9-POL-26DP-RJS	POL-Px	Development	Plugged and abandoned
9-POL-27DP-RJS	POL-Py	Development	Plugged and abandoned
9-POL-28DP-RJS	POL-Pz	Development	Plugged and abandoned
9-POL-29DP-RJS	POL-Pa	Development	Plugged and abandoned
7-POL-30HP-RJS	POL-Xa	Development	Plugged and abandoned
9-POL-31DP-RJS	POL-Xb	Development	Plugged and abandoned
	1-RJS-486A	Exploration	Plugged and abandoned
1-RJS-455-RJS	1-RJS-455	Exploration	Plugged and abandoned
	1-DEV-3-RJS	Exploration	Plugged and abandoned
	1-DEV-4-RJS	Exploration	Plugged and abandoned
	1-DEV-6-RJS	Exploration	Plugged and abandoned
	1-DEV-9-RJS	Exploration	Plugged and abandoned
	1-DEV-10-RJS	Exploration	Plugged and abandoned
3-GRJ-001-RJS	3-GRJ-001-RJS	Appraisal	Plugged and abandoned
3-GRJ-002-RJS	3-GRJ-002-RJS	Appraisal	Plugged and abandoned
3-GRJ-006DP-RJS	3-GRJ-006-RJS	Appraisal	Plugged and abandoned
	1-DEV-3-RJS	Appraisal	Plugged and abandoned
3-DEV-5DP-RJS	3-DEV-5-RJS	Appraisal	Plugged and abandoned
3-DEV-7-RJS	3-DEV-7-RJS	Appraisal	Plugged and abandoned
3-DEV-11DP-RJS	3-DEV-11-RJS	Appraisal	Plugged and abandoned
3-DEV-12DP-RJS	3-DEV-12-RJS	Appraisal	Plugged and abandoned

These data accompany the report of DeGolyer and MacNaughton and are subject to its specific conditions.

TABLE 7
SUMMARY of GROSS and NET CONDENSATE and SALES GAS RESERVES
as of
DECEMBER 31, 2018
for the
MANATI FIELD
in
BRAZIL
with interests attributable to
PETRORIO S.A.

NI 51-101 CASE



Category	Gross Reserves		Net Reserves	
	Condensate (10³bbl)	Sales Gas (10⁶ft³)	Condensate (10³bbl)	Sales Gas (10⁶ft³)
Proved Developed	553	173,393	55	17,339
Proved Undeveloped	0	0	0	0
Total Proved	553	173,393	55	17,339
Probable	24	7,546	3	755
Possible	34	10,657	2	1,065

Notes:

1. Probable and possible reserves are presented as required by Canadian National Instrument 51–101 and are not equivalent to proved reserves.
2. Possible reserves are those additional reserves that are less certain to be recovered than probable reserves. It is unlikely that the quantities actually recovered will equal or exceed the sum of the proved, probable, and possible reserves.
3. Probable and possible reserves have not been risk adjusted to make them comparable to proved reserves.

TABLE 8
SUMMARY of FUTURE NET REVENUE
as of
DECEMBER 31, 2018
for
CERTAIN FIELDS
in
BRAZIL
with interests attributable to
PETRORIO S.A.



NI 51-101 CASE

Proved Developed							Pre-Tax	Pre-Tax
Field	Future Gross Revenue (10 ³ U.S.\$)	Royalties Paid in Cash (10 ³ U.S.\$)	Operating Expenses (10 ³ U.S.\$)	Capital Costs (10 ³ U.S.\$)	Abandonment Costs (10 ³ U.S.\$)	SPF (10 ³ U.S.\$)	Future Net Revenue (10 ³ U.S.\$)	Present Worth at 10 Percent (10 ³ U.S.\$)
Polvo	1,025,635	104,827	546,056	0	44,600	0	330,152	285,170
Manati	99,178	7,815	35,320	0	0	1,710	54,333	46,960
Total	1,124,813	112,642	581,376	0	44,600	1,710	384,485	332,130

Total Proved							Pre-Tax	Pre-Tax
Field	Future Gross Revenue (10 ³ U.S.\$)	Royalties Paid in Cash (10 ³ U.S.\$)	Operating Expenses (10 ³ U.S.\$)	Capital Costs (10 ³ U.S.\$)	Abandonment Costs (10 ³ U.S.\$)	SPF (10 ³ U.S.\$)	Future Net Revenue (10 ³ U.S.\$)	Present Worth at 10 Percent (10 ³ U.S.\$)
Polvo	1,025,635	104,827	546,056	0	44,600	0	330,152	285,170
Manati	99,178	7,815	35,320	0	0	1,710	54,333	46,960
Total	1,124,813	112,642	581,376	0	44,600	1,710	384,485	332,130

Proved plus Probable							Pre-Tax	Pre-Tax
Field	Future Gross Revenue (10 ³ U.S.\$)	Royalties Paid in Cash (10 ³ U.S.\$)	Operating Expenses (10 ³ U.S.\$)	Capital Costs (10 ³ U.S.\$)	Abandonment Costs (10 ³ U.S.\$)	SPF (10 ³ U.S.\$)	Future Net Revenue (10 ³ U.S.\$)	Present Worth at 10 Percent (10 ³ U.S.\$)
Polvo	1,514,857	154,776	812,768	0	44,600	0	502,713	405,521
Manati	103,585	8,158	35,320	0	0	1,881	58,226	50,002
Total	1,618,442	162,934	848,088	0	44,600	1,881	560,939	455,523

Proved plus Probable plus Possible							Pre-Tax	Pre-Tax
Field	Future Gross Revenue (10 ³ U.S.\$)	Royalties Paid in Cash (10 ³ U.S.\$)	Operating Expenses (10 ³ U.S.\$)	Capital Costs (10 ³ U.S.\$)	Abandonment Costs (10 ³ U.S.\$)	SPF (10 ³ U.S.\$)	Future Net Revenue (10 ³ U.S.\$)	Present Worth at 10 Percent (10 ³ U.S.\$)
Polvo	2,250,205	229,842	1,168,384	0	44,600	0	807,379	583,207
Manati	109,598	8,640	35,320	0	0	2,190	63,448	54,183
Total	2,359,803	238,482	1,203,704	0	44,600	2,190	870,827	637,390

Note: Probable and possible reserves and the values associated with probable and possible reserves have not been risk adjusted to make them comparable to proved reserves.

TABLE 9
PROJECTION of PROVED DEVELOPED RESERVES and FUTURE NET REVENUE
as of
DECEMBER 31, 2018
for the
POLVO FIELD
in
BRAZIL
with interests attributable to
PETRORIO S.A.

NI 51-101 CASE



Year	Net Oil Production (10 ³ bbl)	Oil Price (U.S.\$/bbl)	Future Gross Revenue (10 ³ U.S.\$)	Royalties Paid in Cash (10 ³ U.S.\$)	Operating Expenses (10 ³ U.S.\$)	Capital Costs (10 ³ U.S.\$)	Abandonment Costs (10 ³ U.S.\$)	SPF (10 ³ U.S.\$)	Pre-Tax Future Net Revenue (10 ³ U.S.\$)	Pre-Tax Present Worth at 10 Percent (10 ³ U.S.\$)
2019	3,585	65.00	233,025	23,877	93,996	0	0	0	115,152	109,150
2020	2,952	70.00	206,640	21,136	92,721	0	0	0	92,783	79,611
2021	2,436	77.00	187,572	19,147	91,464	0	0	0	76,961	59,776
2022	2,030	77.00	156,310	15,956	90,067	0	0	0	50,287	35,356
2023	1,703	77.00	131,131	13,385	88,904	0	0	0	28,842	18,356
2024	1,441	77.00	110,957	11,326	88,904	0	0	0	10,727	6,180
2025	0	-	0	0	0	0	44,600	0	(44,600)	(23,259)
2026	0	-	0	0	0	0	0	0	0	0
2027	0	-	0	0	0	0	0	0	0	0
2028	0	-	0	0	0	0	0	0	0	0
2029	0	-	0	0	0	0	0	0	0	0
2030	0	-	0	0	0	0	0	0	0	0
2031	0	-	0	0	0	0	0	0	0	0
2032	0	-	0	0	0	0	0	0	0	0
2033	0	-	0	0	0	0	0	0	0	0
2034	0	-	0	0	0	0	0	0	0	0
2035	0	-	0	0	0	0	0	0	0	0
2036	0	-	0	0	0	0	0	0	0	0
2037	0	-	0	0	0	0	0	0	0	0
2038	0	-	0	0	0	0	0	0	0	0
2039	0	-	0	0	0	0	0	0	0	0
2040	0	-	0	0	0	0	0	0	0	0
2041	0	-	0	0	0	0	0	0	0	0
2042	0	-	0	0	0	0	0	0	0	0
2043	0	-	0	0	0	0	0	0	0	0
Total	14,147		1,025,635	104,827	546,056	0	44,600	0	330,152	285,170

Notes:

1. Future income tax expenses were not taken into account in the preparation of these estimates.
2. SPF = Special Participation Fee.
3. Operating expenses and capital costs do not include the indirect taxation that may be applicable to these expenditures.

Present Worth (10³U.S.\$) at:	
5 Percent	301,812
15 Percent	262,408
20 Percent	244,728

These data accompany the report of DeGolyer and MacNaughton and are subject to its specific conditions.

TABLE 10
PROJECTION of TOTAL PROVED RESERVES and FUTURE NET REVENUE
as of
DECEMBER 31, 2018
for the
POLVO FIELD
in
BRAZIL
with interests attributable to
PETRORIO S.A.

NI 51-101 CASE



Year	Net Oil Production (10 ³ bbl)	Oil Price (U.S.\$/bbl)	Future Gross Revenue (10 ³ U.S.\$)	Royalties Paid in Cash (10 ³ U.S.\$)	Operating Expenses (10 ³ U.S.\$)	Capital Costs (10 ³ U.S.\$)	Abandonment Costs (10 ³ U.S.\$)	SPF (10 ³ U.S.\$)	Pre-Tax Future Net Revenue (10 ³ U.S.\$)	Pre-Tax Present Worth at 10 Percent (10 ³ U.S.\$)
2019	3,585	65.00	233,025	23,877	93,996	0	0	0	115,152	109,150
2020	2,952	70.00	206,640	21,136	92,721	0	0	0	92,783	79,611
2021	2,436	77.00	187,572	19,147	91,464	0	0	0	76,961	59,776
2022	2,030	77.00	156,310	15,956	90,067	0	0	0	50,287	35,356
2023	1,703	77.00	131,131	13,385	88,904	0	0	0	28,842	18,356
2024	1,441	77.00	110,957	11,326	88,904	0	0	0	10,727	6,180
2025	0	-	0	0	0	0	44,600	0	(44,600)	(23,259)
2026	0	-	0	0	0	0	0	0	0	0
2027	0	-	0	0	0	0	0	0	0	0
2028	0	-	0	0	0	0	0	0	0	0
2029	0	-	0	0	0	0	0	0	0	0
2030	0	-	0	0	0	0	0	0	0	0
2031	0	-	0	0	0	0	0	0	0	0
2032	0	-	0	0	0	0	0	0	0	0
2033	0	-	0	0	0	0	0	0	0	0
2034	0	-	0	0	0	0	0	0	0	0
2035	0	-	0	0	0	0	0	0	0	0
2036	0	-	0	0	0	0	0	0	0	0
2037	0	-	0	0	0	0	0	0	0	0
2038	0	-	0	0	0	0	0	0	0	0
2039	0	-	0	0	0	0	0	0	0	0
2040	0	-	0	0	0	0	0	0	0	0
2041	0	-	0	0	0	0	0	0	0	0
2042	0	-	0	0	0	0	0	0	0	0
2043	0	-	0	0	0	0	0	0	0	0
Total	14,147		1,025,635	104,827	546,056	0	44,600	0	330,152	285,170

Notes:

1. Future income tax expenses were not taken into account in the preparation of these estimates.
2. SPF = Special Participation Fee.
3. Operating expenses and capital costs do not include the indirect taxation that may be applicable to these expenditures.

Present Worth (10³U.S.\$) at:	
5 Percent	301,812
15 Percent	262,408
20 Percent	244,728

These data accompany the report of DeGolyer and MacNaughton and are subject to its specific conditions.

TABLE 11
PROJECTION of PROVED-plus-PROBABLE RESERVES and FUTURE NET REVENUE
as of
DECEMBER 31, 2018
for the
POLVO FIELD
in
BRAZIL
with interests attributable to
PETRORIO S.A.

NI 51-101 CASE



Year	Net Oil Production (10³bbl)	Oil Price (U.S.\$/bbl)	Future Gross Revenue (10³U.S.\$)	Royalties Paid in Cash (10³U.S.\$)	Operating Expenses (10³U.S.\$)	Capital Costs (10³U.S.\$)	Abandonment Costs (10³U.S.\$)	SPF (10³U.S.\$)	Pre-Tax Future Net Revenue (10³U.S.\$)	Pre-Tax Present Worth at 10 Percent (10³U.S.\$)
2019	3,735	65.00	242,775	24,876	93,996	0	0	0	123,903	117,445
2020	3,217	70.00	225,190	23,034	92,721	0	0	0	109,435	93,898
2021	2,776	77.00	213,752	21,820	91,464	0	0	0	100,468	78,033
2022	2,417	77.00	186,109	18,998	90,067	0	0	0	77,044	54,168
2023	2,117	77.00	163,009	16,640	88,904	0	0	0	57,465	36,573
2024	1,868	77.00	143,836	14,683	88,904	0	0	0	40,249	23,188
2025	1,648	77.00	126,896	12,953	88,904	0	0	0	25,039	13,058
2026	1,464	77.00	112,728	11,506	88,904	0	0	0	12,318	5,815
2027	1,306	77.00	100,562	10,266	88,904	0	0	0	1,392	595
2028	0	-	0	0	0	0	44,600	0	(44,600)	(17,252)
2029	0	-	0	0	0	0	0	0	0	0
2030	0	-	0	0	0	0	0	0	0	0
2031	0	-	0	0	0	0	0	0	0	0
2032	0	-	0	0	0	0	0	0	0	0
2033	0	-	0	0	0	0	0	0	0	0
2034	0	-	0	0	0	0	0	0	0	0
2035	0	-	0	0	0	0	0	0	0	0
2036	0	-	0	0	0	0	0	0	0	0
2037	0	-	0	0	0	0	0	0	0	0
2038	0	-	0	0	0	0	0	0	0	0
2039	0	-	0	0	0	0	0	0	0	0
2040	0	-	0	0	0	0	0	0	0	0
2041	0	-	0	0	0	0	0	0	0	0
2042	0	-	0	0	0	0	0	0	0	0
2043	0	-	0	0	0	0	0	0	0	0
Total	20,548		1,514,857	154,776	812,768	0	44,600	0	502,713	405,521

Notes:

1. Future income tax expenses were not taken into account in the preparation of these estimates.
2. SPF = Special Participation Fee.
3. Operating expenses and capital costs do not include the indirect taxation that may be applicable to these expenditures.
4. Probable reserves and the values associated with probable reserves have not been risk adjusted to make them comparable to proved reserves.

Present Worth (10³U.S.\$) at:	
5 Percent	446,716
15 Percent	364,010
20 Percent	330,093

These data accompany the report of DeGolyer and MacNaughton and are subject to its specific conditions.

TABLE 12
PROJECTION of PROVED-plus-PROBABLE-plus-POSSIBLE RESERVES and FUTURE NET REVENUE
as of
DECEMBER 31, 2018
for the
POLVO FIELD
in
BRAZIL
with interests attributable to
PETRORIO S.A.

NI 51-101 CASE



Year	Net Oil Production (10³bbl)	Oil Price (U.S.\$/bbl)	Future Gross Revenue (10³U.S.\$)	Royalties Paid in Cash (10³U.S.\$)	Operating Expenses (10³U.S.\$)	Capital Costs (10³U.S.\$)	Abandonment Costs (10³U.S.\$)	SPF (10³U.S.\$)	Pre-Tax Future Net Revenue (10³U.S.\$)	Pre-Tax Present Worth at 10 Percent (10³U.S.\$)
2019	3,881	65.00	252,265	25,847	93,996	0	0	0	132,422	125,520
2020	3,495	70.00	244,650	25,023	92,721	0	0	0	126,906	108,889
2021	3,142	77.00	241,934	24,696	91,464	0	0	0	125,774	97,689
2022	2,843	77.00	218,911	22,345	90,067	0	0	0	106,499	74,877
2023	2,581	77.00	198,737	20,286	88,904	0	0	0	89,547	56,991
2024	2,357	77.00	181,489	18,526	88,904	0	0	0	74,059	42,666
2025	2,147	77.00	165,319	16,876	88,904	0	0	0	59,539	31,050
2026	1,966	77.00	151,382	15,453	88,904	0	0	0	47,025	22,199
2027	1,806	77.00	139,062	14,196	88,904	0	0	0	35,962	15,367
2028	1,666	77.00	128,282	13,095	88,904	0	0	0	26,283	10,167
2029	1,533	77.00	118,041	12,049	88,904	0	0	0	17,088	5,983
2030	1,417	77.00	109,109	11,138	88,904	0	0	0	9,067	2,874
2031	1,312	77.00	101,024	10,312	88,904	0	0	0	1,808	519
2032	0	-	0	0	0	0	44,600	0	(44,600)	(11,584)
2033	0	-	0	0	0	0	0	0	0	0
2034	0	-	0	0	0	0	0	0	0	0
2035	0	-	0	0	0	0	0	0	0	0
2036	0	-	0	0	0	0	0	0	0	0
2037	0	-	0	0	0	0	0	0	0	0
2038	0	-	0	0	0	0	0	0	0	0
2039	0	-	0	0	0	0	0	0	0	0
2040	0	-	0	0	0	0	0	0	0	0
2041	0	-	0	0	0	0	0	0	0	0
2042	0	-	0	0	0	0	0	0	0	0
2043	0	-	0	0	0	0	0	0	0	0
Total	30,146		2,250,205	229,842	1,168,384	0	44,600	0	807,379	583,207

Notes:

- Future income tax expenses were not taken into account in the preparation of these estimates.
- SPF = Special Participation Fee.
- Operating expenses and capital costs do not include the indirect taxation that may be applicable to these expenditures.
- Probable and possible reserves and the values associated with probable and possible reserves have not been risk adjusted to make them comparable to proved reserves.

Pre-Tax Present Worth (10³U.S.\$) at:	
5 Percent	301,812
15 Percent	262,408
20 Percent	244,728

These data accompany the report of DeGolyer and MacNaughton and are subject to its specific conditions.

TABLE 13
PROJECTION of PROVED DEVELOPED RESERVES and FUTURE NET REVENUE
as of
DECEMBER 31, 2018
for the
MANATI FIELD
in
BRAZIL
with interests attributable to
PETROBRAS S.A.

NI 51-101 CASE



Year	Net Production		Product Prices		Future Gross Revenue (10 ³ U.S.\$)	Royalties Paid in Cash (10 ³ U.S.\$)	Operating Expenses (10 ³ U.S.\$)	Capital Costs (10 ³ U.S.\$)	Abandonment Costs (10 ³ U.S.\$)	SPF (10 ³ U.S.\$)	Pre-Tax Future Net Revenue (10 ³ U.S.\$)	Pre-Tax Present Worth at 10 Percent (10 ³ U.S.\$)
	Condensate (10 ³ bbl)	Sales Gas (10 ⁶ ft ³)	Condensate (U.S.\$/bbl)	Sales Gas (U.S.\$/10 ³ ft ³)								
2019	18	5,632	72.50	5.28	31,042	2,446	6,353	0	0	1,404	20,839	19,753
2020	14	4,332	77.50	5.42	24,564	1,934	6,117	0	0	306	16,207	13,906
2021	11	3,382	85.50	5.56	19,745	1,554	5,882	0	0	0	12,309	9,560
2022	7	2,271	85.50	5.71	13,566	1,070	5,656	0	0	0	6,840	4,809
2023	3	1,045	85.50	5.71	6,224	492	5,656	0	0	0	76	48
2024	2	677	85.50	5.71	4,037	319	5,656	0	0	0	(1,938)	(1,117)
2025	0	0	-	-	0	0	0	0	0	0	0	0
2026	0	0	-	-	0	0	0	0	0	0	0	0
2027	0	0	-	-	0	0	0	0	0	0	0	0
2028	0	0	-	-	0	0	0	0	0	0	0	0
2029	0	0	-	-	0	0	0	0	0	0	0	0
2030	0	0	-	-	0	0	0	0	0	0	0	0
2031	0	0	-	-	0	0	0	0	0	0	0	0
2032	0	0	-	-	0	0	0	0	0	0	0	0
2033	0	0	-	-	0	0	0	0	0	0	0	0
2034	0	0	-	-	0	0	0	0	0	0	0	0
2035	0	0	-	-	0	0	0	0	0	0	0	0
2036	0	0	-	-	0	0	0	0	0	0	0	0
2037	0	0	-	-	0	0	0	0	0	0	0	0
2038	0	0	-	-	0	0	0	0	0	0	0	0
2039	0	0	-	-	0	0	0	0	0	0	0	0
2040	0	0	-	-	0	0	0	0	0	0	0	0
2041	0	0	-	-	0	0	0	0	0	0	0	0
2042	0	0	-	-	0	0	0	0	0	0	0	0
2043	0	0	-	-	0	0	0	0	0	0	0	0
Total	55	17,339			99,178	7,815	35,320	0	0	1,710	54,333	46,960

Notes:

1. Future income tax expenses were not taken into account in the preparation of these estimates.
2. SPF = Special Participation Fee.
3. Abandonment costs are allocated annually into an abandonment sinking fund.

Pre-Tax Present Worth (10 ³ U.S.\$) at:	
5 Percent	50,461
15 Percent	43,794
20 Percent	40,928

These data accompany the report of DeGolyer and MacNaughton and are subject to its specific conditions.

TABLE 14
PROJECTION of TOTAL PROVED RESERVES and FUTURE NET REVENUE
as of
DECEMBER 31, 2018
for the
MANATI FIELD
in
BRAZIL
with interests attributable to
PETRORIO S.A.

NI 51-101 CASE



Year	Net Production		Product Prices		Future Gross Revenue (10 ³ U.S.\$)	Royalties Paid in Cash (10 ³ U.S.\$)	Operating Expenses (10 ³ U.S.\$)	Capital Costs (10 ³ U.S.\$)	Abandonment Costs (10 ³ U.S.\$)	SPF (10 ³ U.S.\$)	Pre-Tax Future Net Revenue (10 ³ U.S.\$)	Pre-Tax Present Worth at 10 Percent (10 ³ U.S.\$)
	Condensate (10 ³ bbl)	Sales Gas (10 ⁶ ft ³)	Condensate (U.S.\$/bbl)	Sales Gas (U.S.\$/10 ³ ft ³)								
2019	18	5,632	72.50	5.28	31,042	2,446	6,353	0	0	1,404	20,839	19,753
2020	14	4,332	77.50	5.42	24,564	1,934	6,117	0	0	306	16,207	13,906
2021	11	3,382	85.50	5.56	19,745	1,554	5,882	0	0	0	12,309	9,560
2022	7	2,271	85.50	5.71	13,566	1,070	5,656	0	0	0	6,840	4,809
2023	3	1,045	85.50	5.71	6,224	492	5,656	0	0	0	76	48
2024	2	677	85.50	5.71	4,037	319	5,656	0	0	0	(1,938)	(1,117)
2025	0	0	-	-	0	0	0	0	0	0	0	0
2026	0	0	-	-	0	0	0	0	0	0	0	0
2027	0	0	-	-	0	0	0	0	0	0	0	0
2028	0	0	-	-	0	0	0	0	0	0	0	0
2029	0	0	-	-	0	0	0	0	0	0	0	0
2030	0	0	-	-	0	0	0	0	0	0	0	0
2031	0	0	-	-	0	0	0	0	0	0	0	0
2032	0	0	-	-	0	0	0	0	0	0	0	0
2033	0	0	-	-	0	0	0	0	0	0	0	0
2034	0	0	-	-	0	0	0	0	0	0	0	0
2035	0	0	-	-	0	0	0	0	0	0	0	0
2036	0	0	-	-	0	0	0	0	0	0	0	0
2037	0	0	-	-	0	0	0	0	0	0	0	0
2038	0	0	-	-	0	0	0	0	0	0	0	0
2039	0	0	-	-	0	0	0	0	0	0	0	0
2040	0	0	-	-	0	0	0	0	0	0	0	0
2041	0	0	-	-	0	0	0	0	0	0	0	0
2042	0	0	-	-	0	0	0	0	0	0	0	0
2043	0	0	-	-	0	0	0	0	0	0	0	0
Total	55	17,339			99,178	7,815	35,320	0	0	1,710	54,333	46,960

Notes:

1. Future income tax expenses were not taken into account in the preparation of these estimates.
2. SPF = Special Participation Fee.
3. Abandonment costs are allocated annually into an abandonment sinking fund.

Pre-Tax Present Worth (10 ³ U.S.\$) at:	
5 Percent	50,461
15 Percent	43,794
20 Percent	40,928

These data accompany the report of DeGolyer and MacNaughton and are subject to its specific conditions.

TABLE 15
PROJECTION of PROVED-plus-PROBABLE RESERVES and FUTURE NET REVENUE
as of
DECEMBER 31, 2018
for the
MANATI FIELD
in
BRAZIL
with interests attributable to
PETRORIO S.A.

NI 51-101 CASE



Year	Net Production		Product Prices		Future Gross Revenue (10 ³ U.S.\$)	Royalties Paid in Cash (10 ³ U.S.\$)	Operating Expenses (10 ³ U.S.\$)	Capital Costs (10 ³ U.S.\$)	Abandonment Costs (10 ³ U.S.\$)	SPF (10 ³ U.S.\$)	Pre-Tax Future Net Revenue (10 ³ U.S.\$)	Pre-Tax Present Worth at 10 Percent (10 ³ U.S.\$)
	Condensate (10 ³ bbl)	Sales Gas (10 ⁶ ft ³)	Condensate (U.S.\$/bbl)	Sales Gas (U.S.\$/10 ³ ft ³)								
2019	19	5,817	72.50	5.28	32,092	2,525	6,353	0	0	1,552	21,662	20,533
2020	14	4,495	77.50	5.42	25,448	2,007	6,117	0	0	329	16,995	14,582
2021	11	3,515	85.50	5.56	20,484	1,615	5,882	0	0	0	12,987	10,087
2022	8	2,383	85.50	5.71	14,291	1,123	5,656	0	0	0	7,512	5,282
2023	4	1,185	85.50	5.71	7,108	559	5,656	0	0	0	893	568
2024	2	699	85.50	5.71	4,162	329	5,656	0	0	0	(1,823)	(1,050)
2025	0	0	-	-	0	0	0	0	0	0	0	0
2026	0	0	-	-	0	0	0	0	0	0	0	0
2027	0	0	-	-	0	0	0	0	0	0	0	0
2028	0	0	-	-	0	0	0	0	0	0	0	0
2029	0	0	-	-	0	0	0	0	0	0	0	0
2030	0	0	-	-	0	0	0	0	0	0	0	0
2031	0	0	-	-	0	0	0	0	0	0	0	0
2032	0	0	-	-	0	0	0	0	0	0	0	0
2033	0	0	-	-	0	0	0	0	0	0	0	0
2034	0	0	-	-	0	0	0	0	0	0	0	0
2035	0	0	-	-	0	0	0	0	0	0	0	0
2036	0	0	-	-	0	0	0	0	0	0	0	0
2037	0	0	-	-	0	0	0	0	0	0	0	0
2038	0	0	-	-	0	0	0	0	0	0	0	0
2039	0	0	-	-	0	0	0	0	0	0	0	0
2040	0	0	-	-	0	0	0	0	0	0	0	0
2041	0	0	-	-	0	0	0	0	0	0	0	0
2042	0	0	-	-	0	0	0	0	0	0	0	0
2043	0	0	-	-	0	0	0	0	0	0	0	0
Total	58	18,094			103,585	8,158	35,320	0	0	1,881	58,226	50,002

Notes:

1. Future income tax expenses were not taken into account in the preparation of these estimates.
2. SPF = Special Participation Fee.
3. Abandonment costs are allocated annually into an abandonment sinking fund.
4. Probable reserves and the values associated with probable reserves have not been risk adjusted to make them comparable to proved reserves.

Pre-Tax Present Worth (10 ³ U.S.\$) at:	
5 Percent	53,891
15 Percent	46,508
20 Percent	43,364

These data accompany the report of DeGolyer and MacNaughton and are subject to its specific conditions.

TABLE 16
PROJECTION of PROVED-plus-PROBABLE-plus-POSSIBLE RESERVES and FUTURE NET REVENUE
as of
DECEMBER 31, 2018
for the
MANATI FIELD
in
BRAZIL
with interests attributable to
PETRORIO S.A.

NI 51-101 CASE



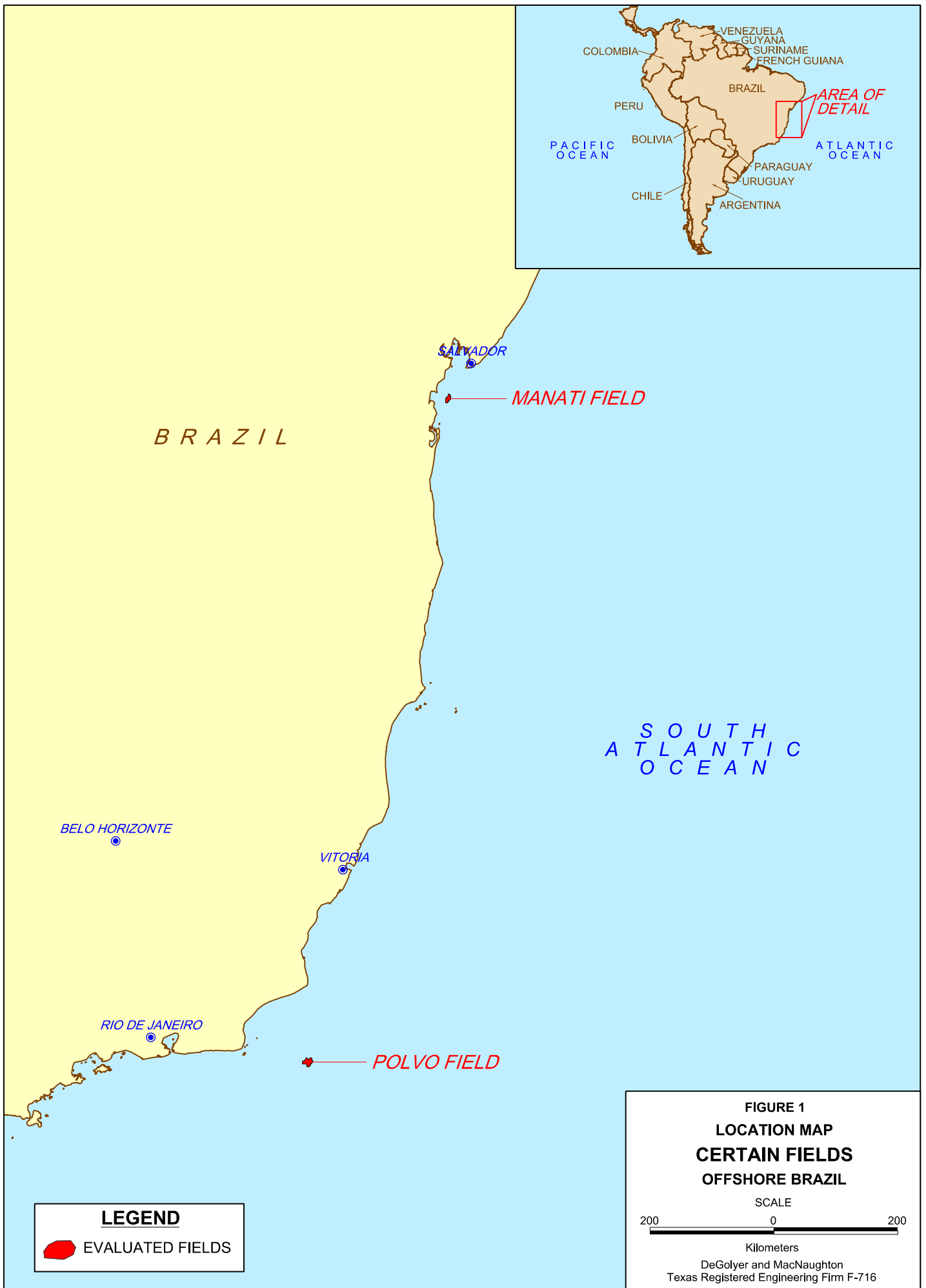
Year	Net Production		Product Prices		Future Gross Revenue (10 ³ U.S.\$)	Royalties Paid in Cash (10 ³ U.S.\$)	Operating Expenses (10 ³ U.S.\$)	Capital Costs (10 ³ U.S.\$)	Abandonment Costs (10 ³ U.S.\$)	SPF (10 ³ U.S.\$)	Pre-Tax Future Net Revenue (10 ³ U.S.\$)	Pre-Tax Present Worth at 10 Percent (10 ³ U.S.\$)
	Condensate (10 ³ bbl)	Sales Gas (10 ⁶ ft ³)	Condensate (U.S.\$/bbl)	Sales Gas (U.S.\$/10 ³ ft ³)								
2019	19	6,085	72.50	5.28	33,507	2,642	6,353	0	0	1,770	22,742	21,557
2020	15	4,774	77.50	5.42	27,038	2,131	6,117	0	0	420	18,370	15,762
2021	12	3,749	85.50	5.56	21,870	1,722	5,882	0	0	0	14,266	11,080
2022	8	2,545	85.50	5.71	15,216	1,199	5,656	0	0	0	8,361	5,878
2023	4	1,247	85.50	5.71	7,462	588	5,656	0	0	0	1,218	775
2024	2	759	85.50	5.71	4,505	358	5,656	0	0	0	(1,509)	(869)
2025	0	0	-	-	0	0	0	0	0	0	0	0
2026	0	0	-	-	0	0	0	0	0	0	0	0
2027	0	0	-	-	0	0	0	0	0	0	0	0
2028	0	0	-	-	0	0	0	0	0	0	0	0
2029	0	0	-	-	0	0	0	0	0	0	0	0
2030	0	0	-	-	0	0	0	0	0	0	0	0
2031	0	0	-	-	0	0	0	0	0	0	0	0
2032	0	0	-	-	0	0	0	0	0	0	0	0
2033	0	0	-	-	0	0	0	0	0	0	0	0
2034	0	0	-	-	0	0	0	0	0	0	0	0
2035	0	0	-	-	0	0	0	0	0	0	0	0
2036	0	0	-	-	0	0	0	0	0	0	0	0
2037	0	0	-	-	0	0	0	0	0	0	0	0
2038	0	0	-	-	0	0	0	0	0	0	0	0
2039	0	0	-	-	0	0	0	0	0	0	0	0
2040	0	0	-	-	0	0	0	0	0	0	0	0
2041	0	0	-	-	0	0	0	0	0	0	0	0
2042	0	0	-	-	0	0	0	0	0	0	0	0
2043	0	0	-	-	0	0	0	0	0	0	0	0
Total	60	19,159			109,598	8,640	35,320	0	0	2,190	63,448	54,183

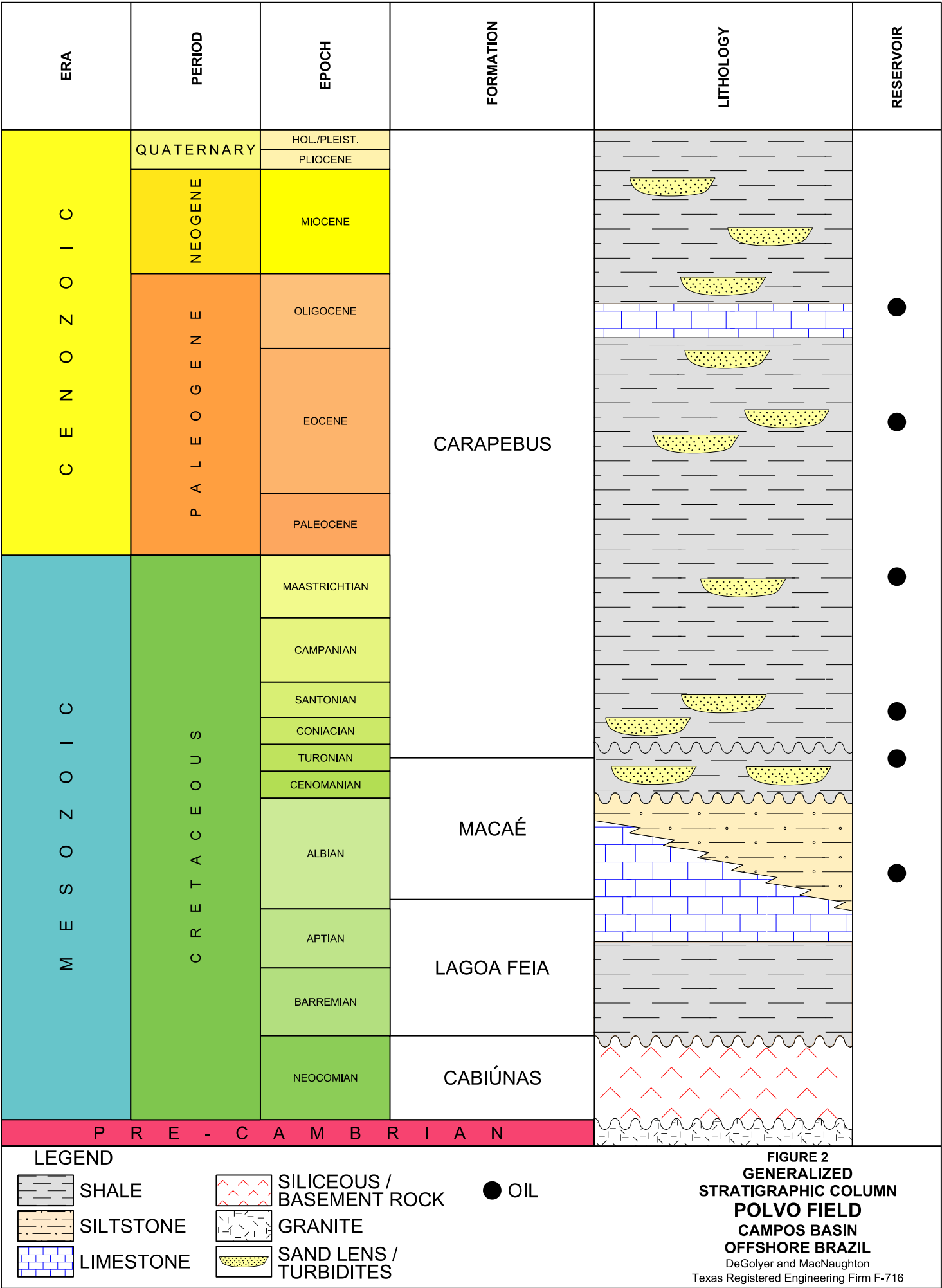
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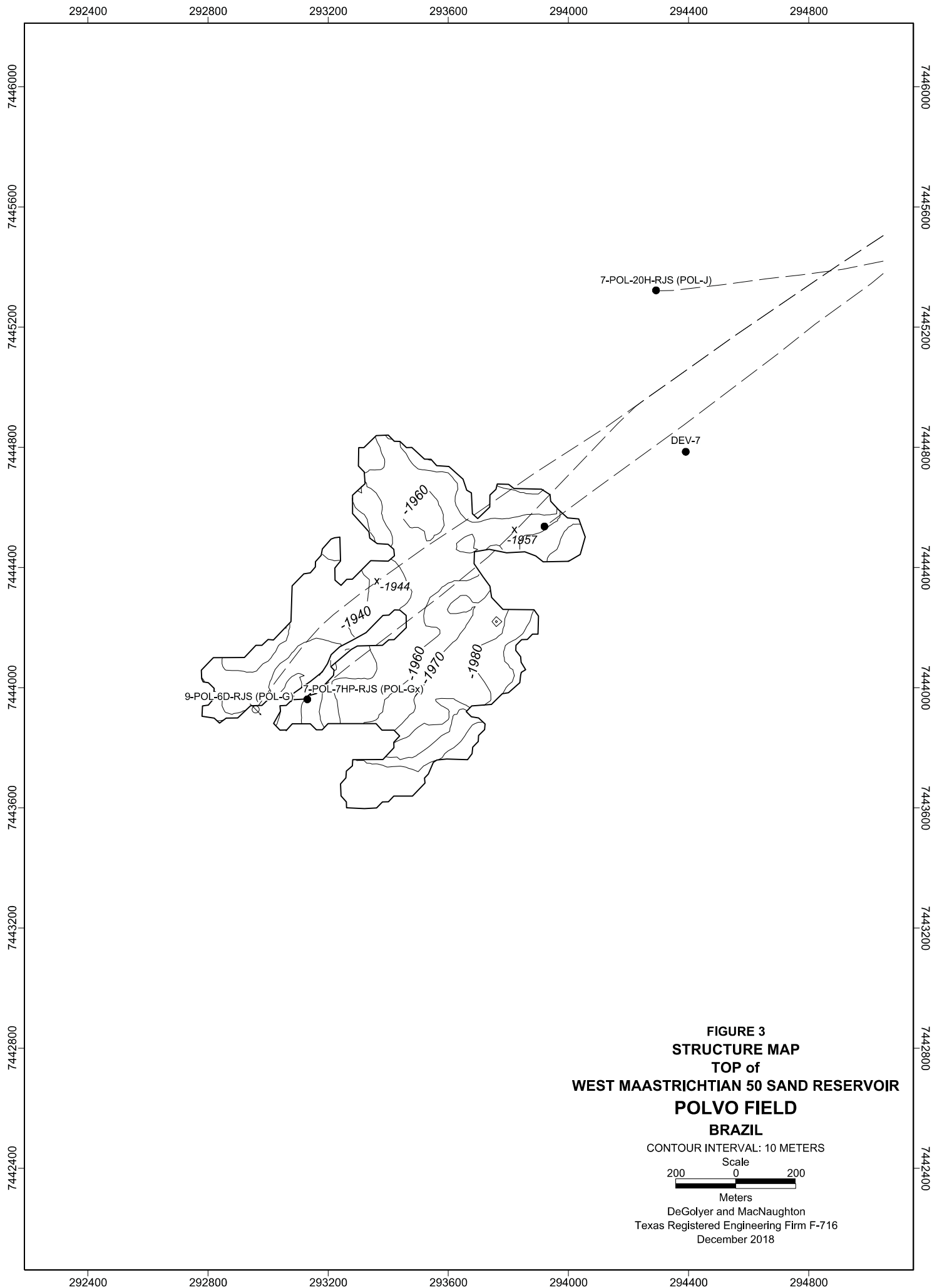
1. Future income tax expenses were not taken into account in the preparation of these estimates.
2. SPF = Special Participation Fee.
3. Abandonment costs are allocated annually into an abandonment sinking fund.
4. Probable and possible reserves and the values associated with probable and possible reserves have not been risk adjusted to make them comparable to proved reserves.

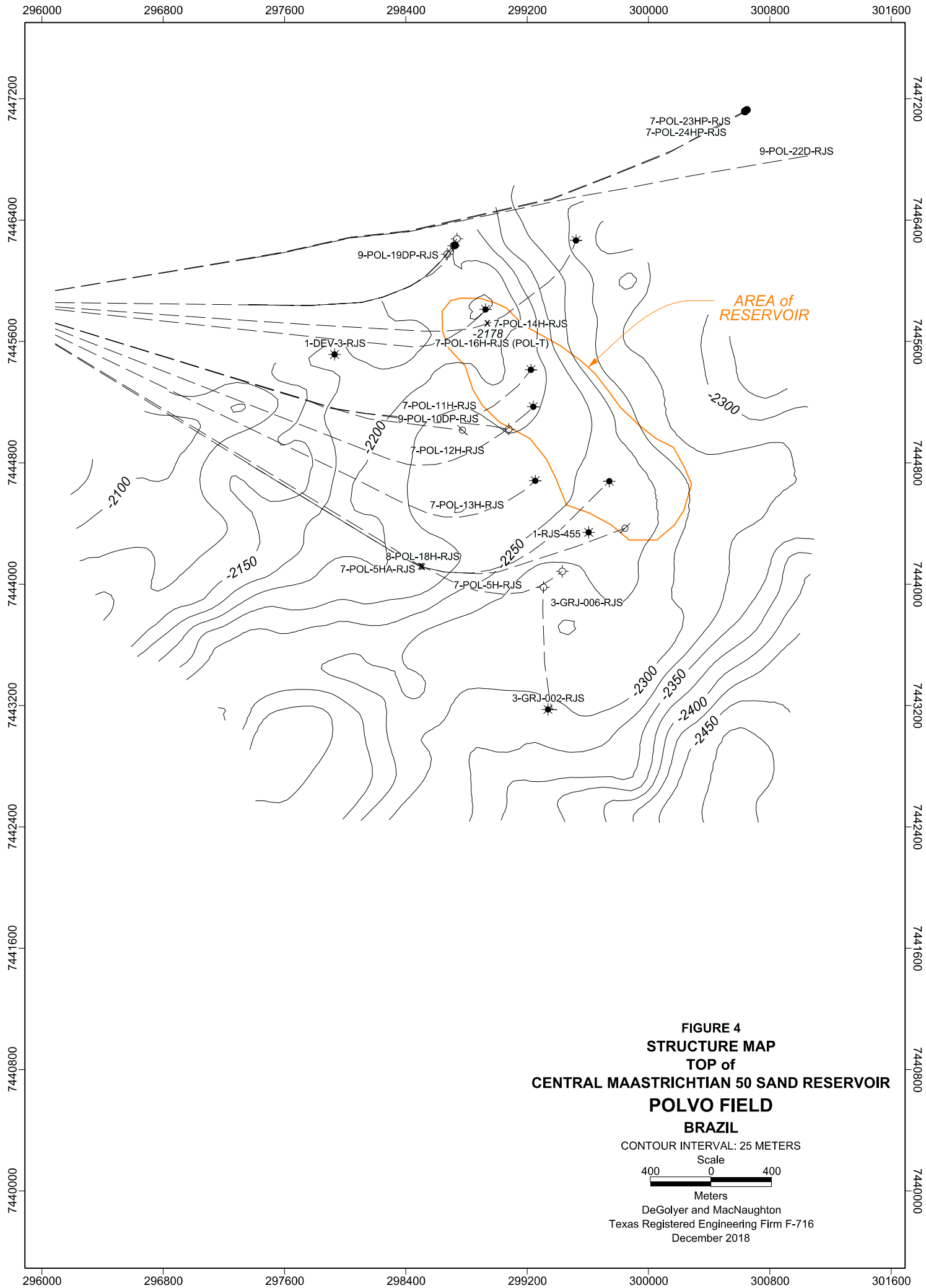
Pre-Tax Present Worth (10 ³ U.S.\$) at:	
5 Percent	58,552
15 Percent	50,279
20 Percent	46,782

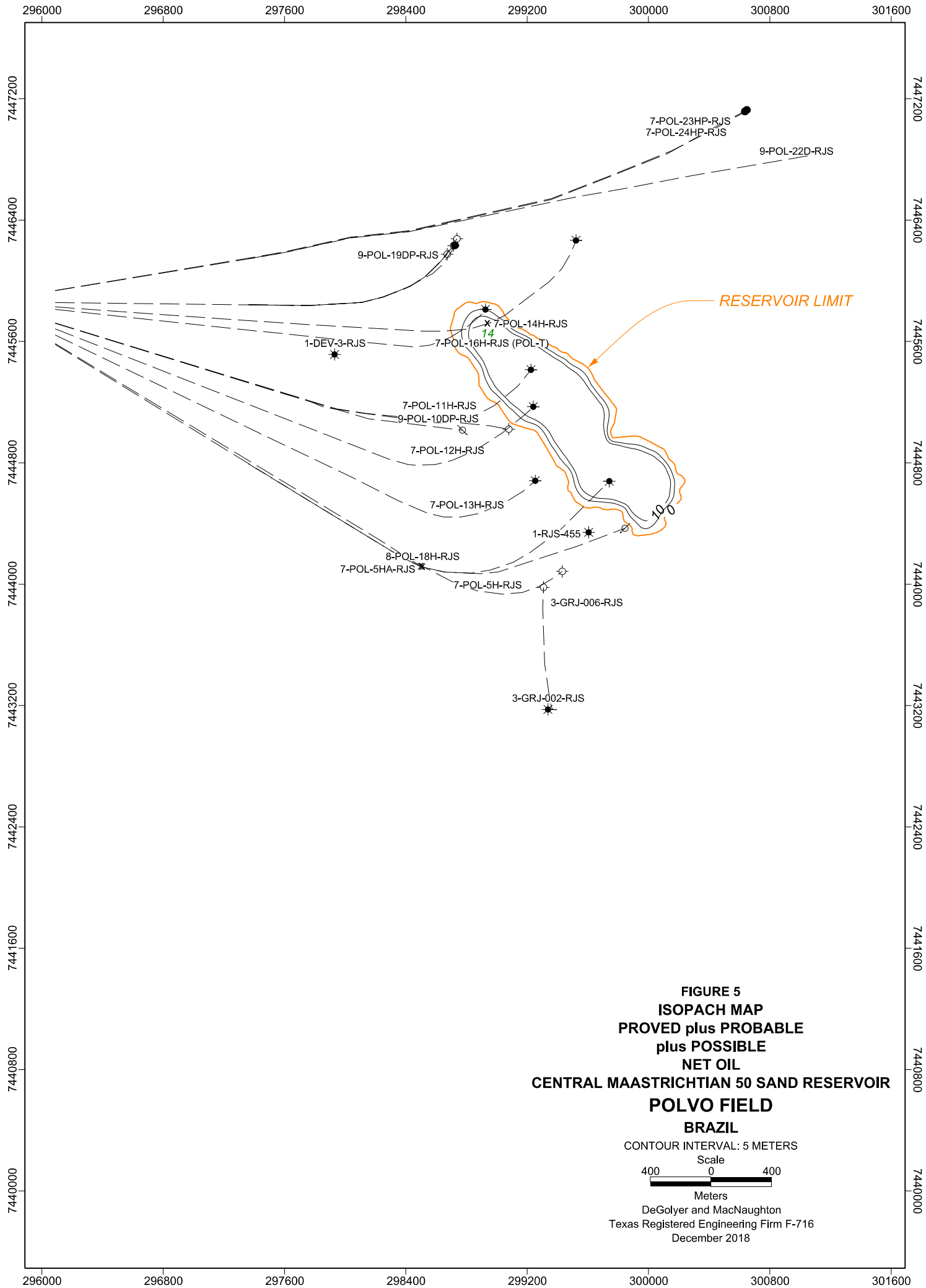
These data accompany the report of DeGolyer and MacNaughton and are subject to its specific conditions.

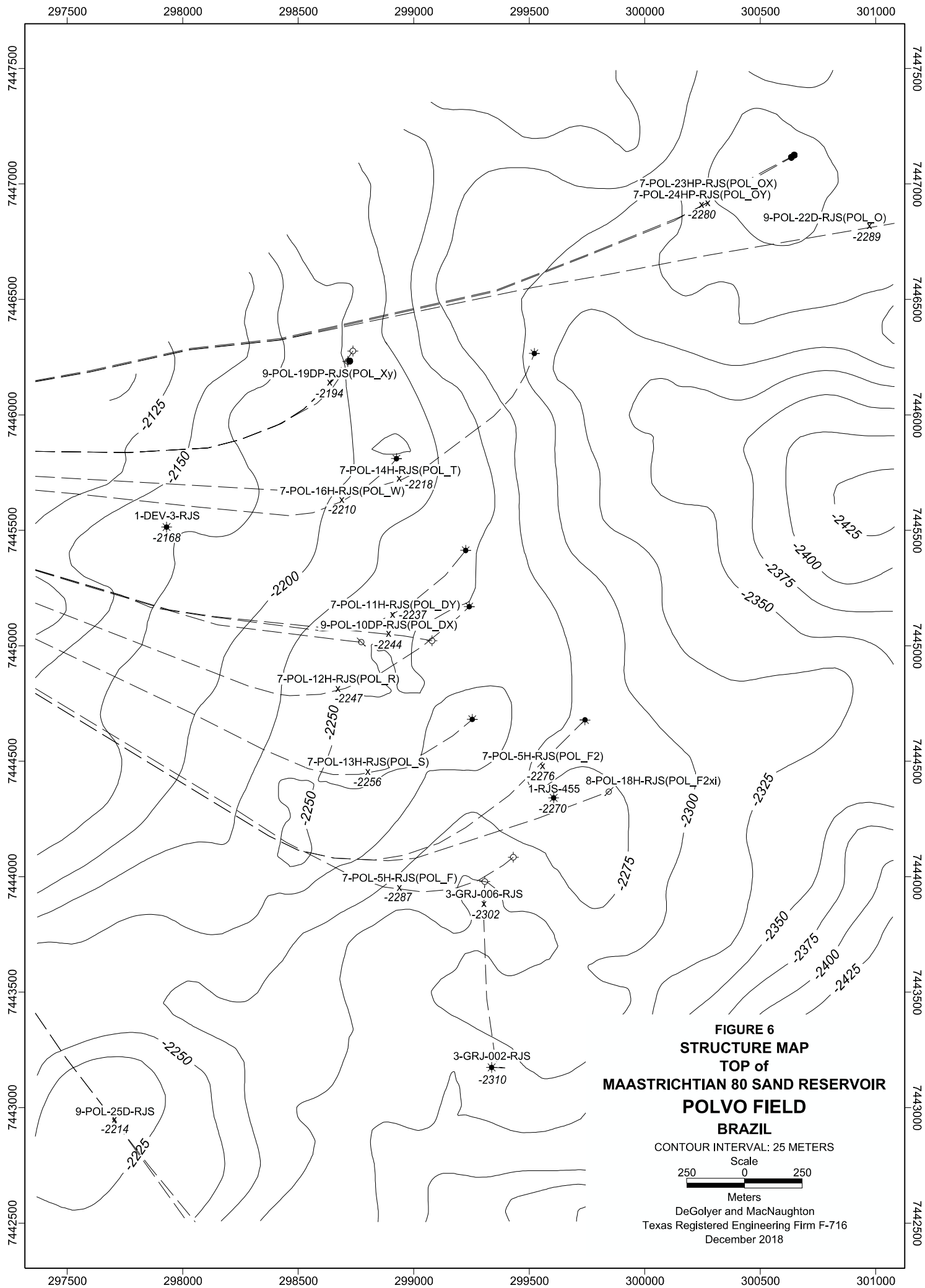


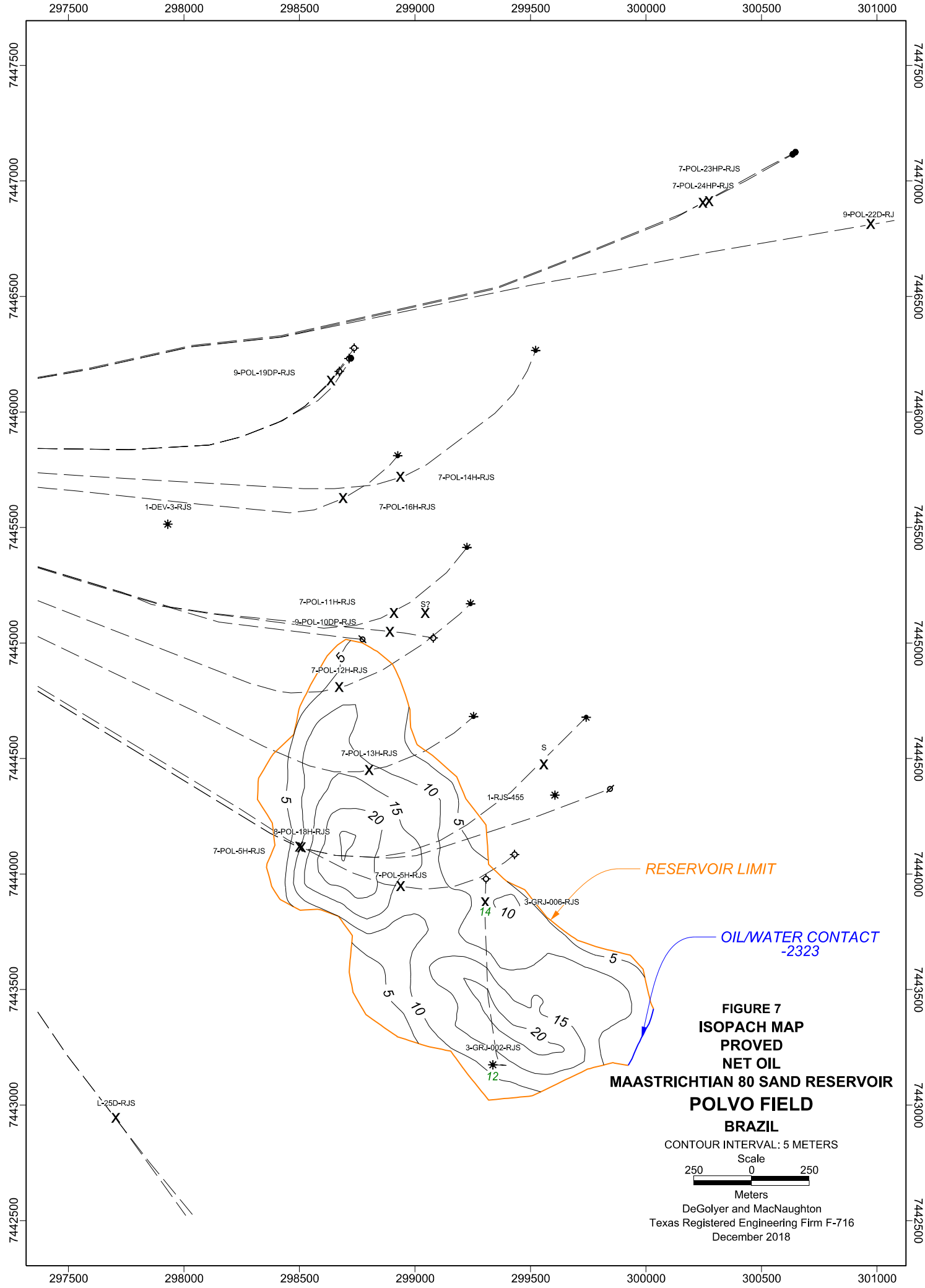


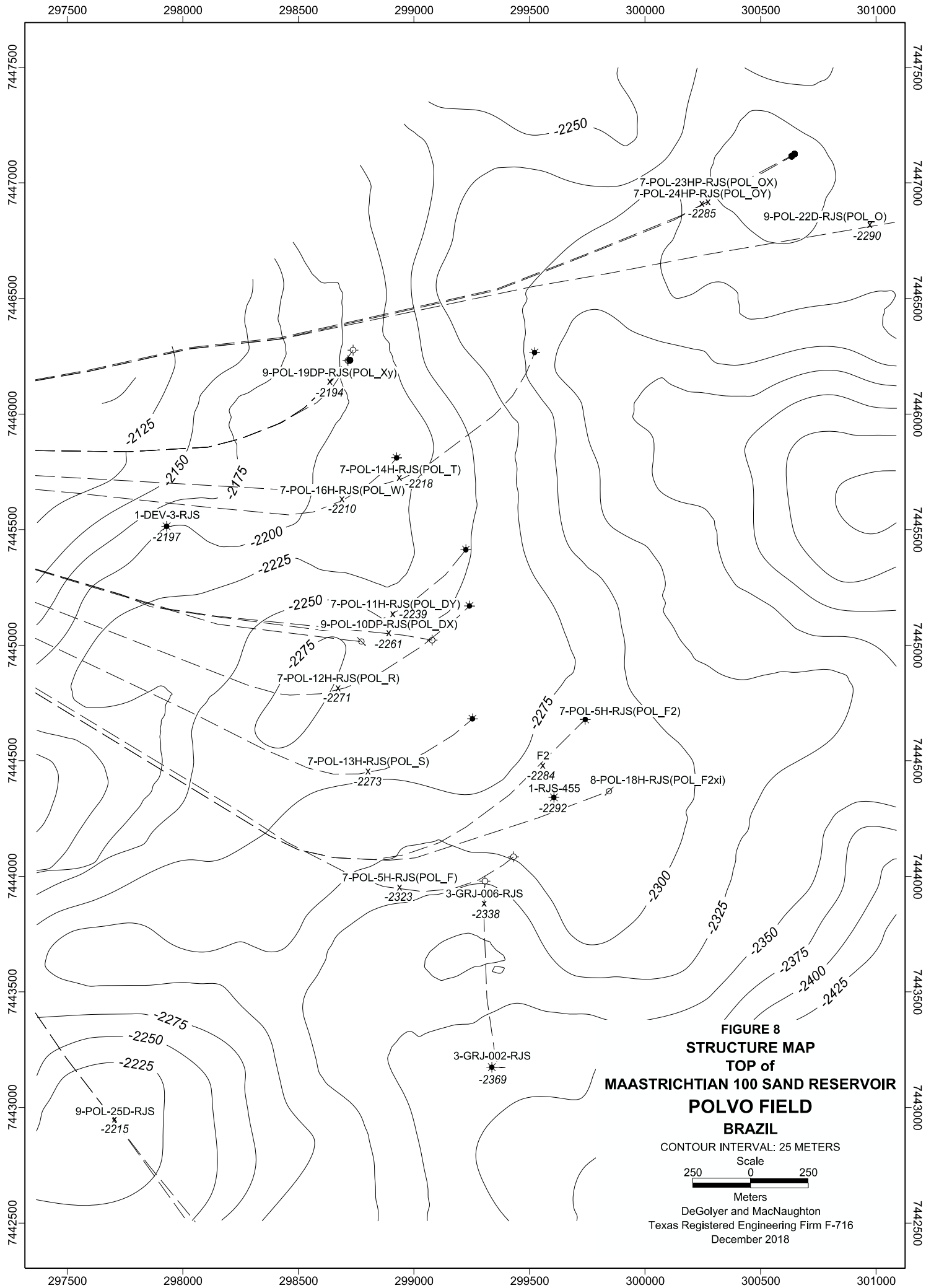


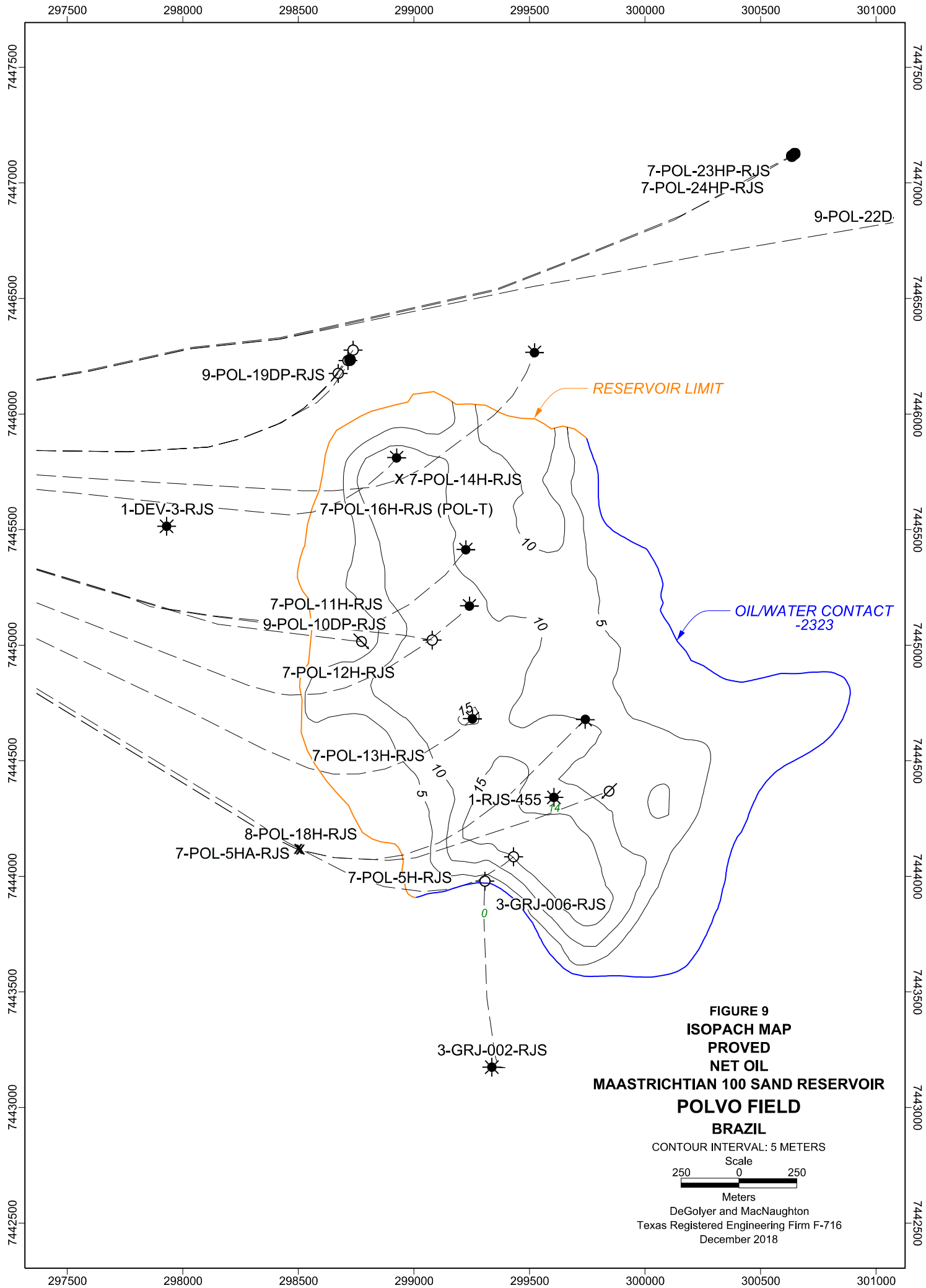


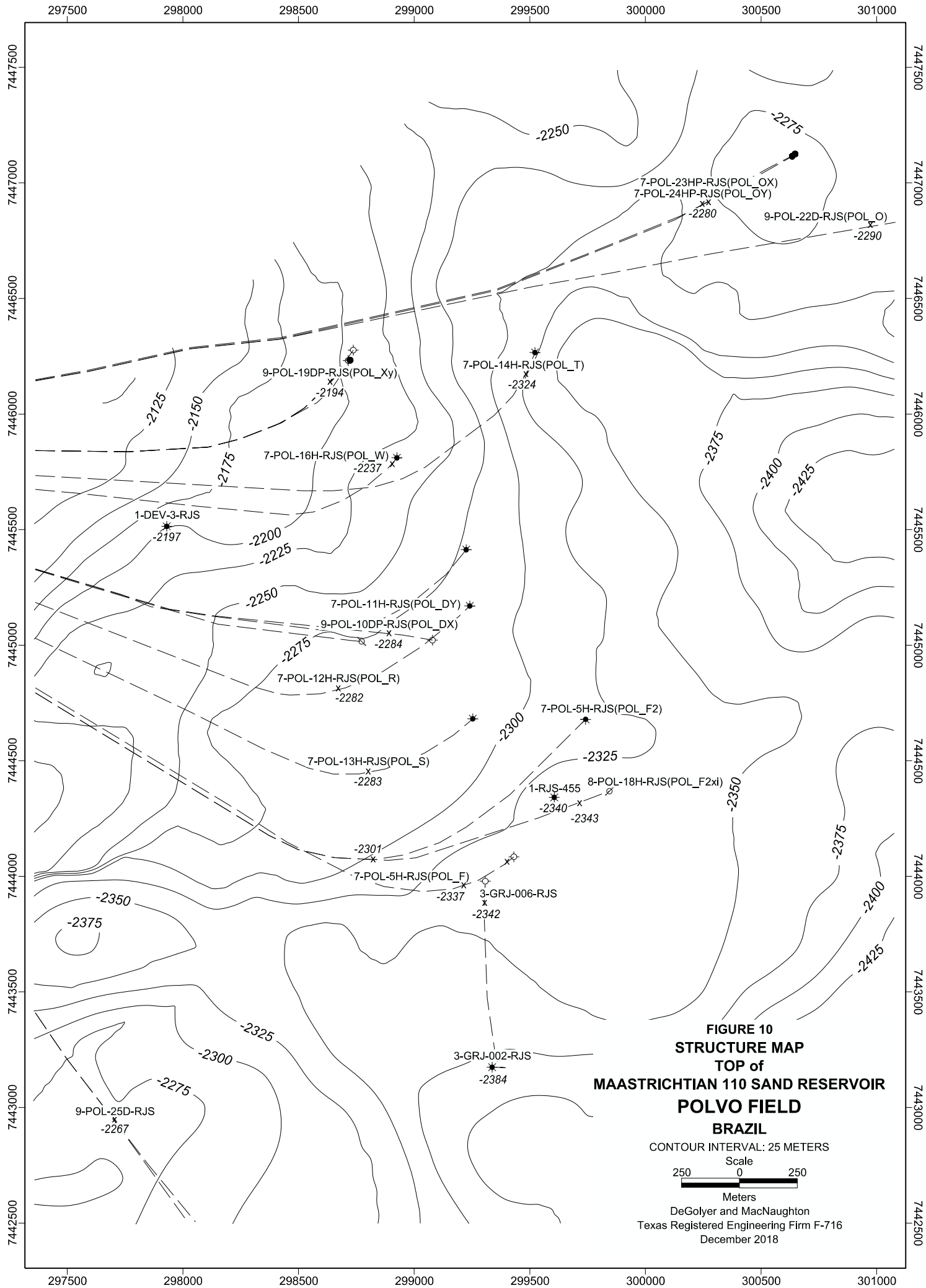


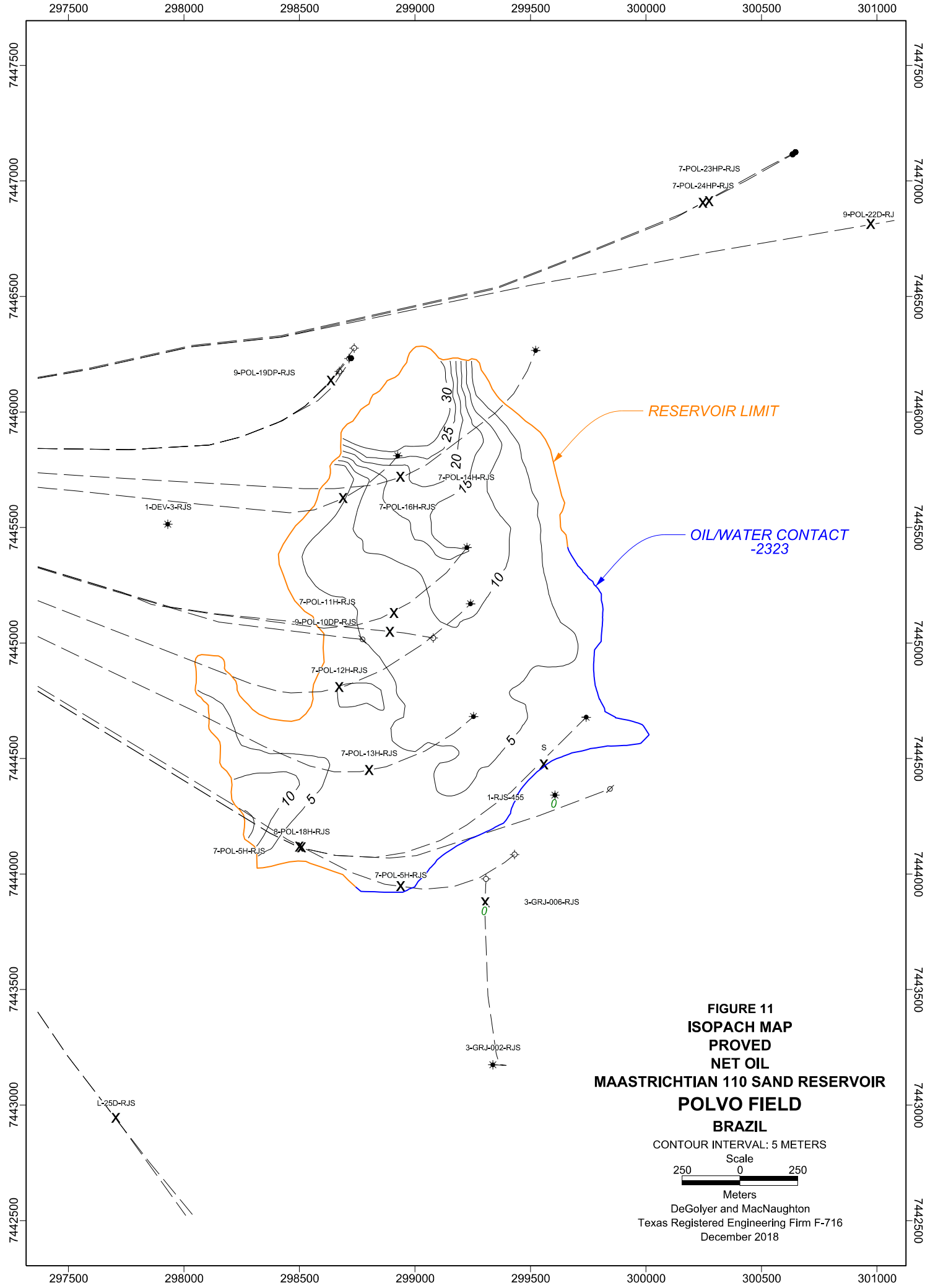


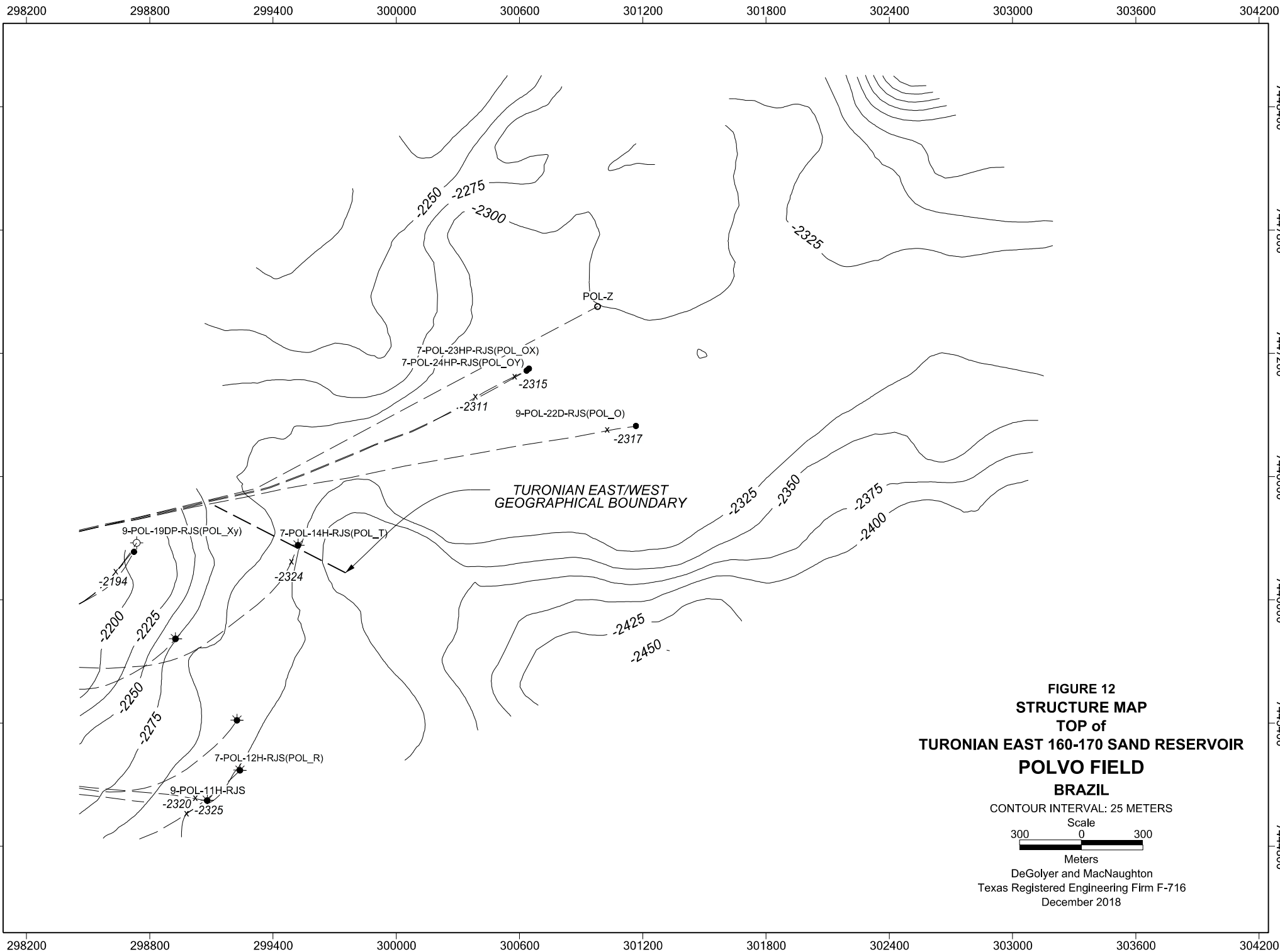


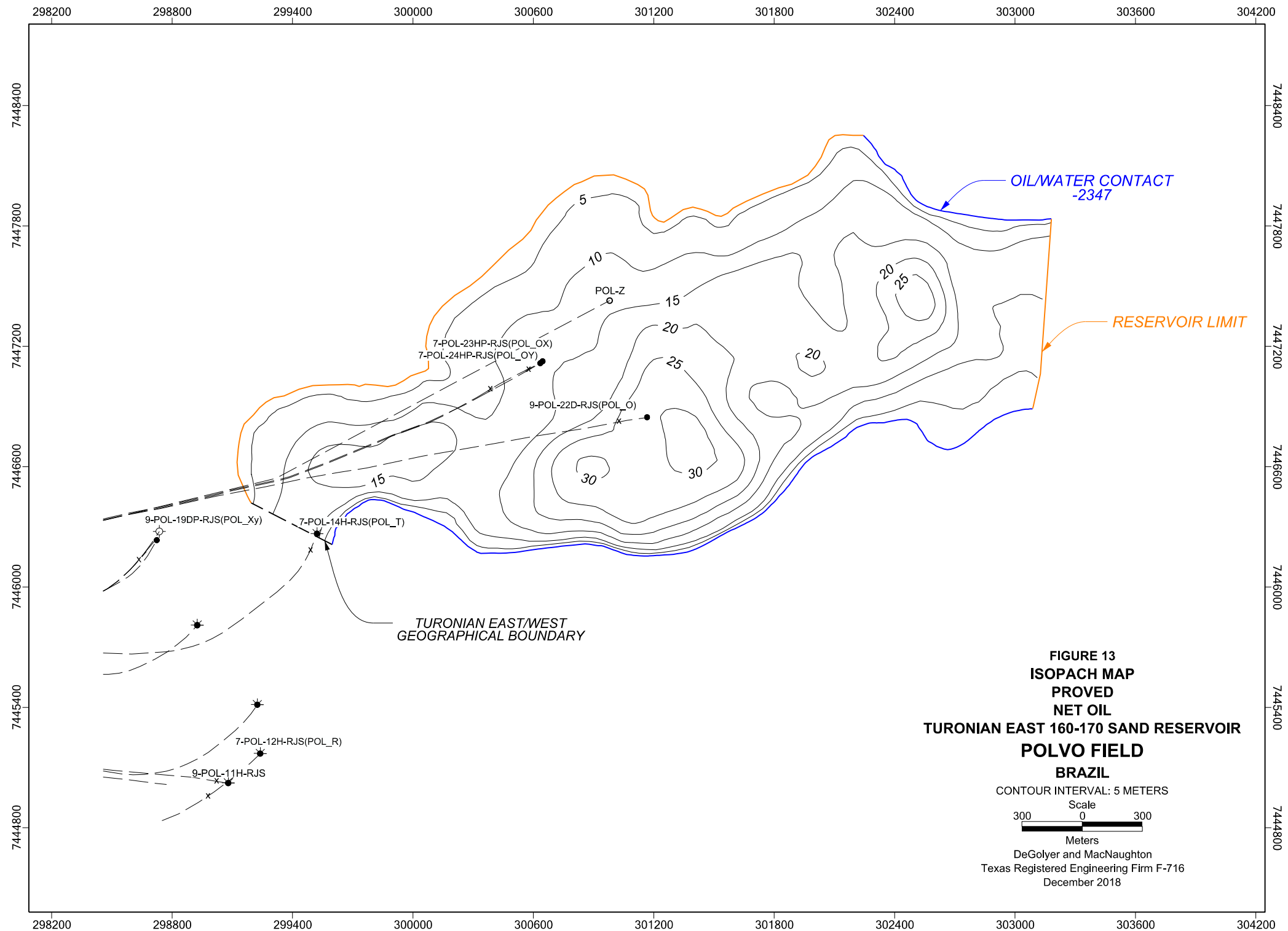


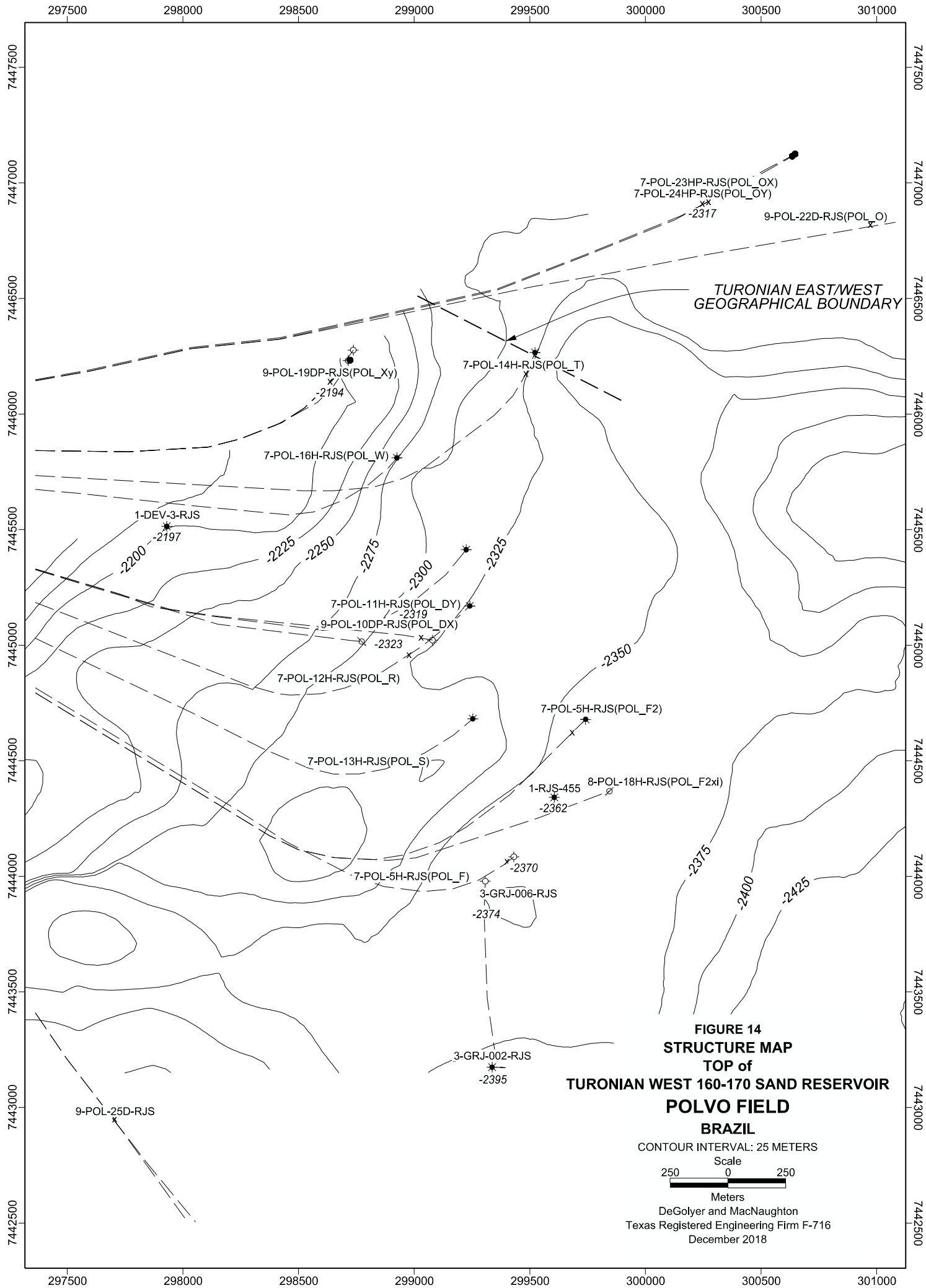


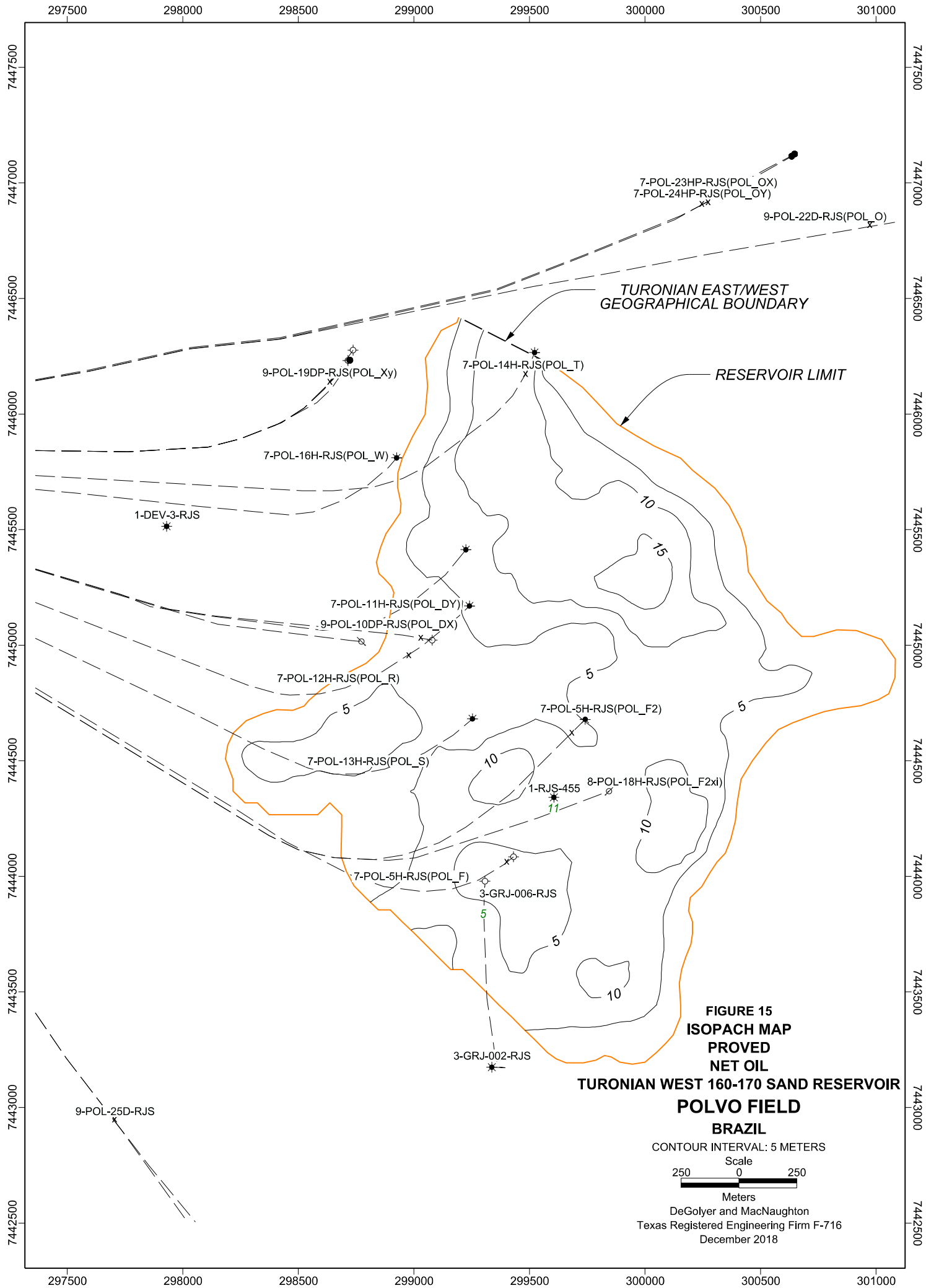


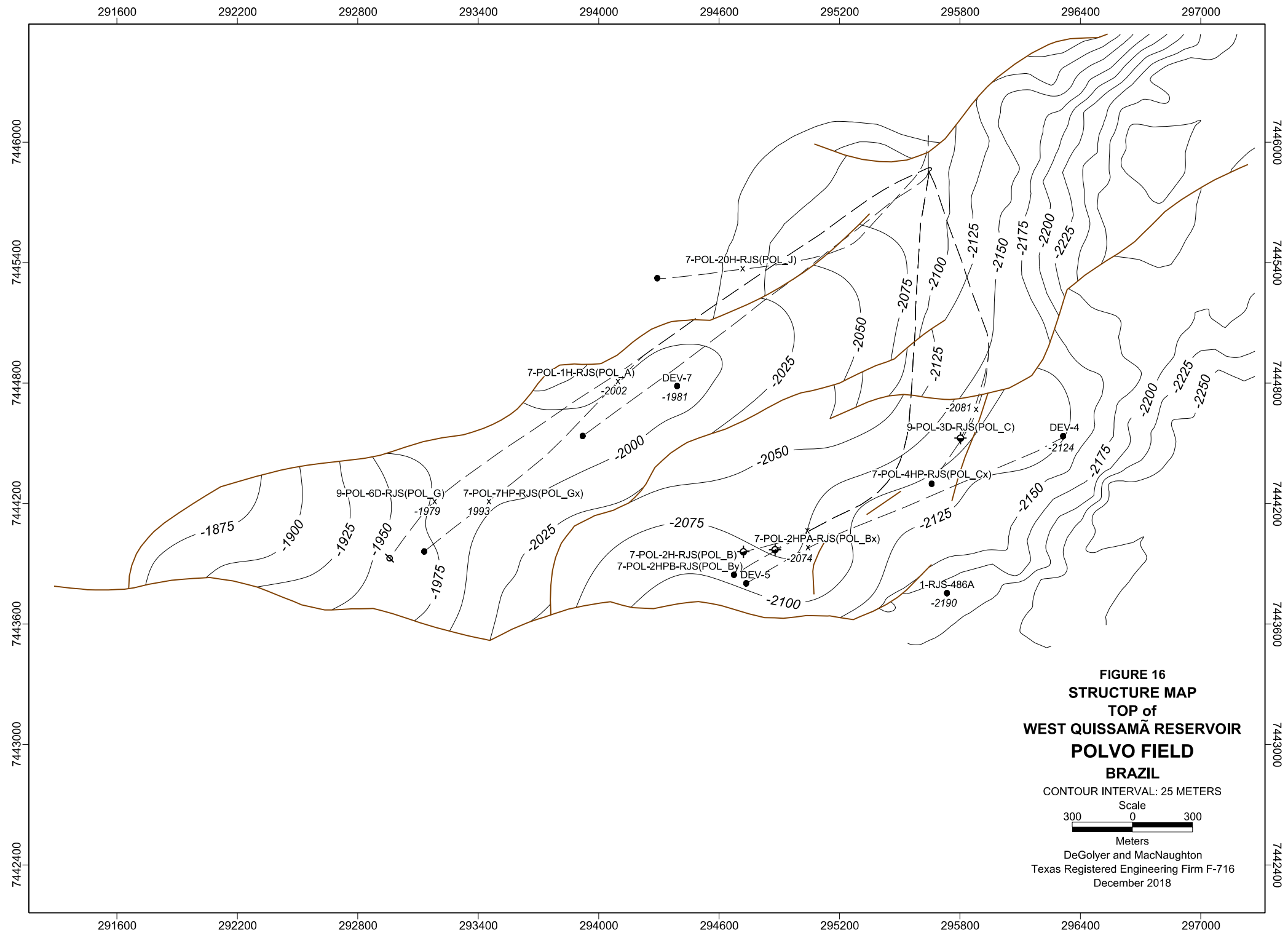


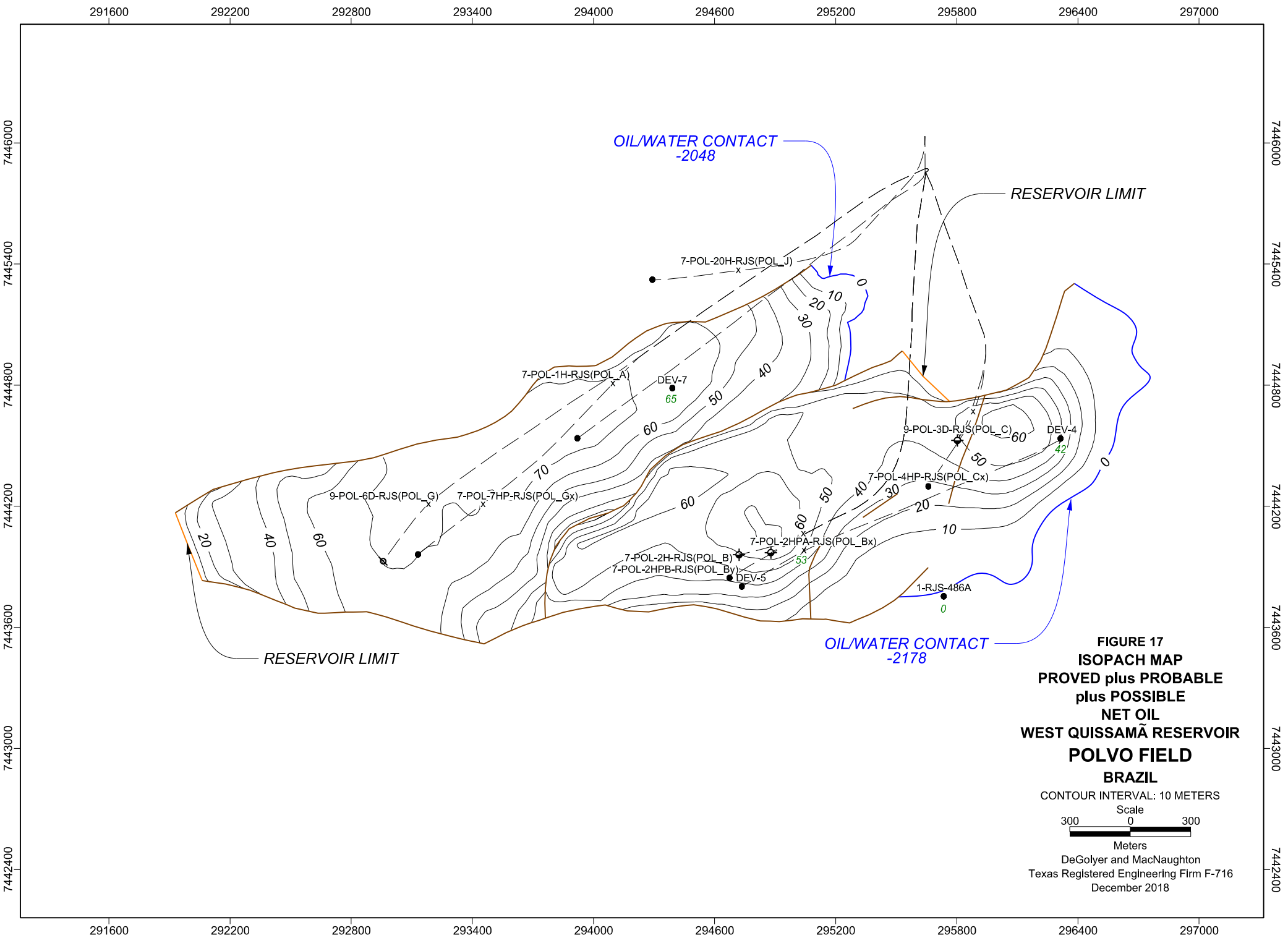


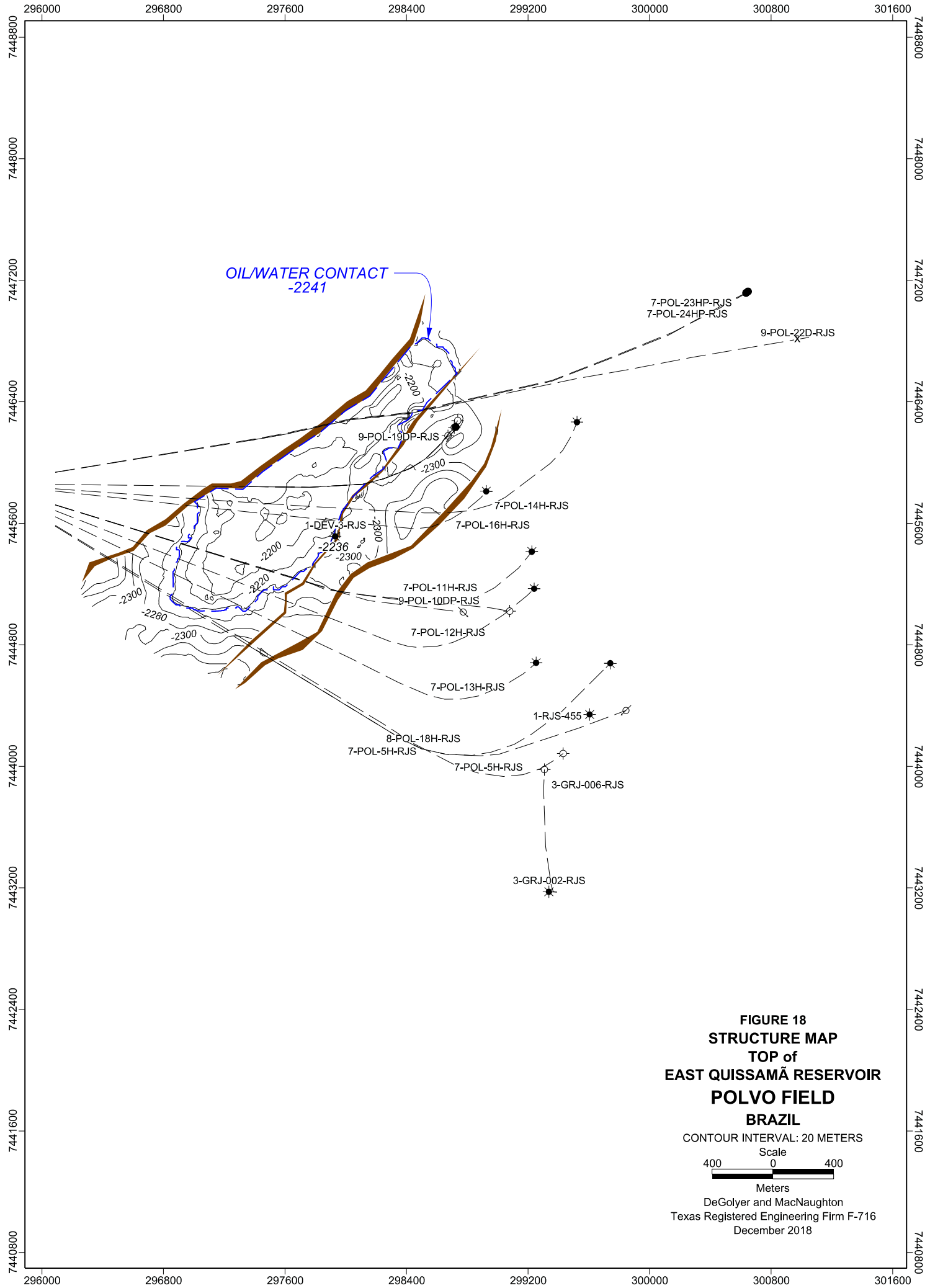


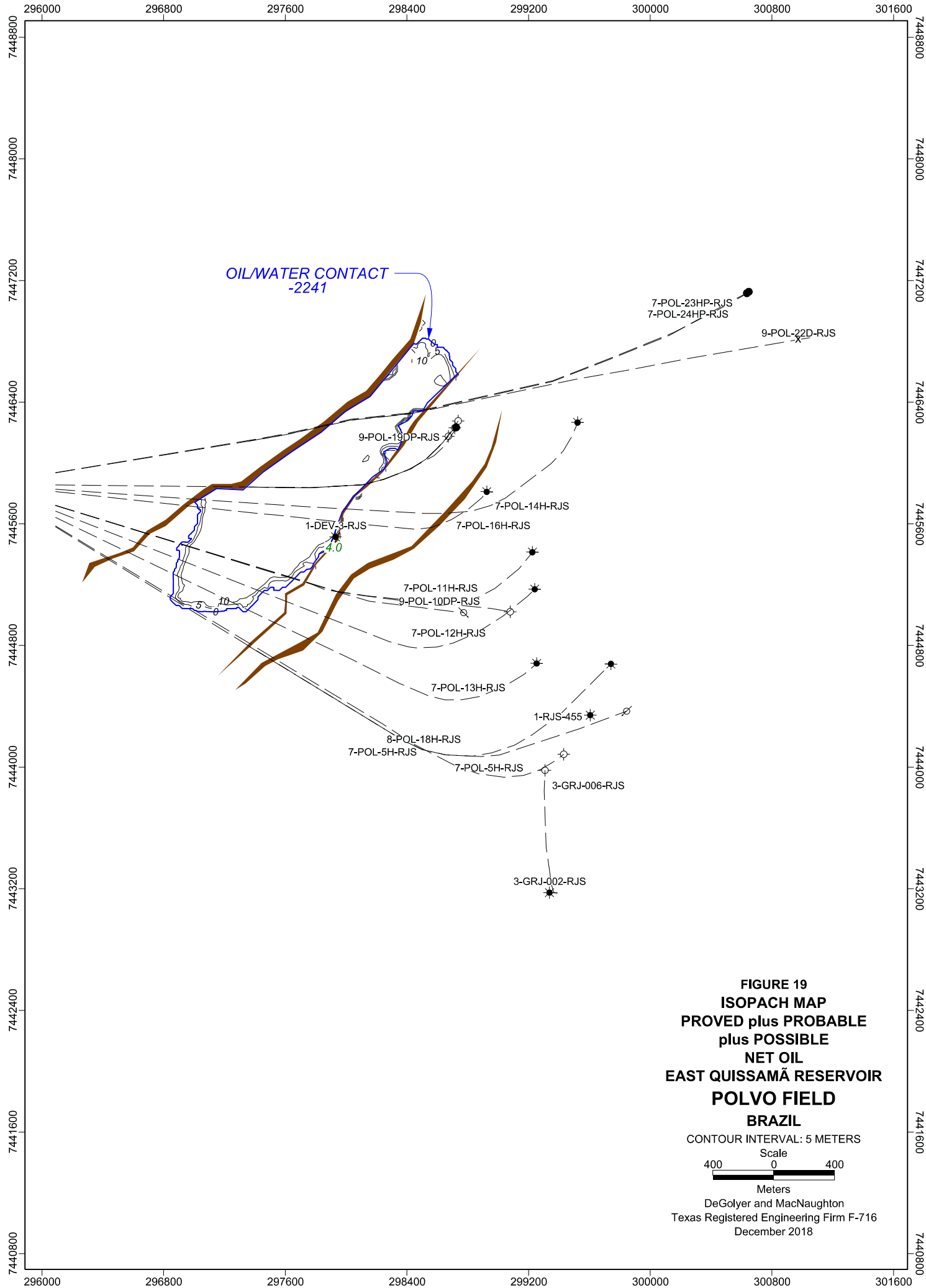


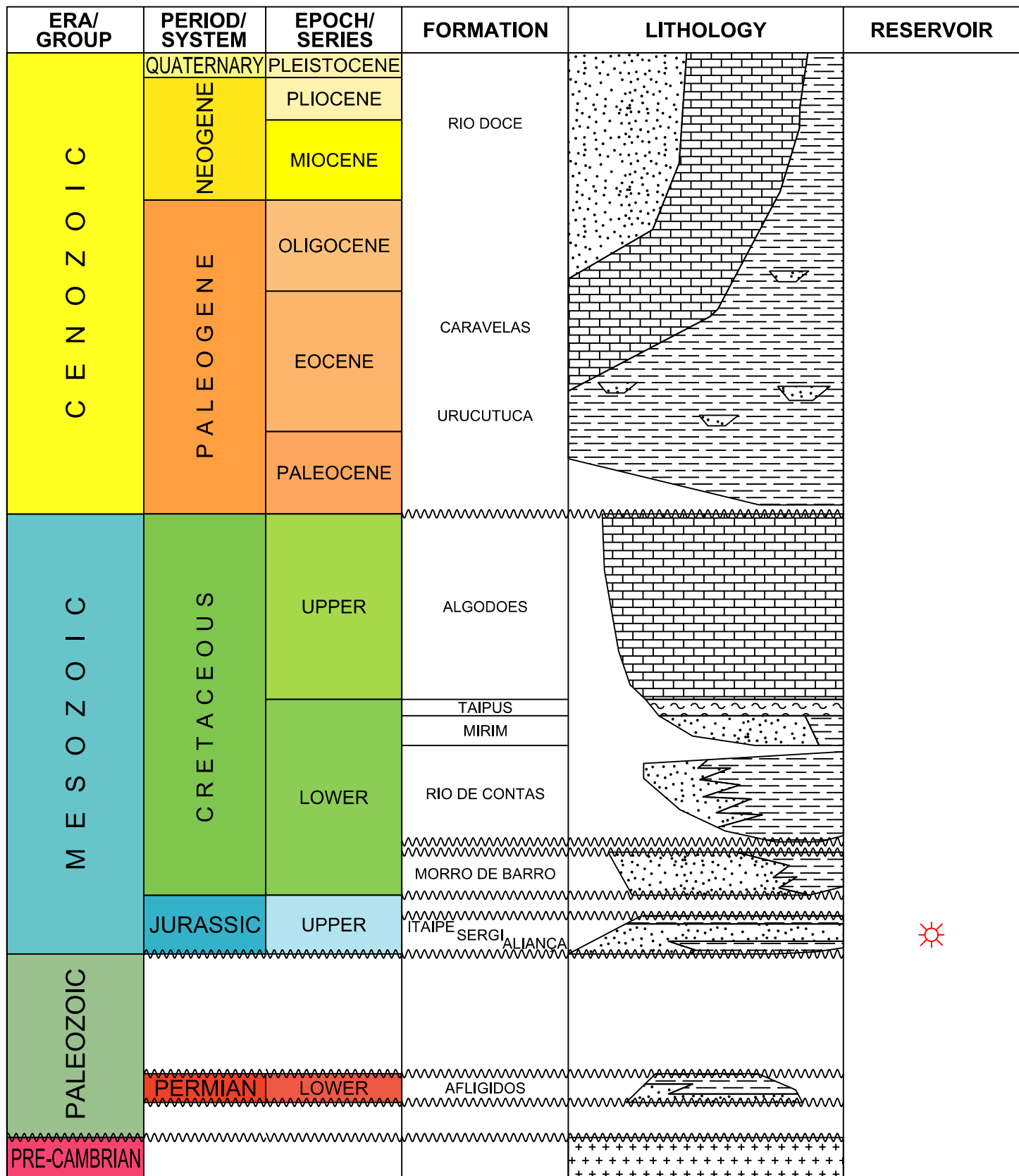












LEGEND



SHALE



MARL



GAS



LIMESTONE



BASEMENT
(IGNEOUS)



SAND

~~~~~ UNCONFORMITY

**FIGURE 20**  
**GENERALIZED**  
**STRATIGRAPHIC COLUMN**  
**MANATI FIELD**  
**CAMAMU BASIN**  
**OFFSHORE BRAZIL**  
 DeGolyer and MacNaughton  
 Texas Registered Engineering Firm F-716

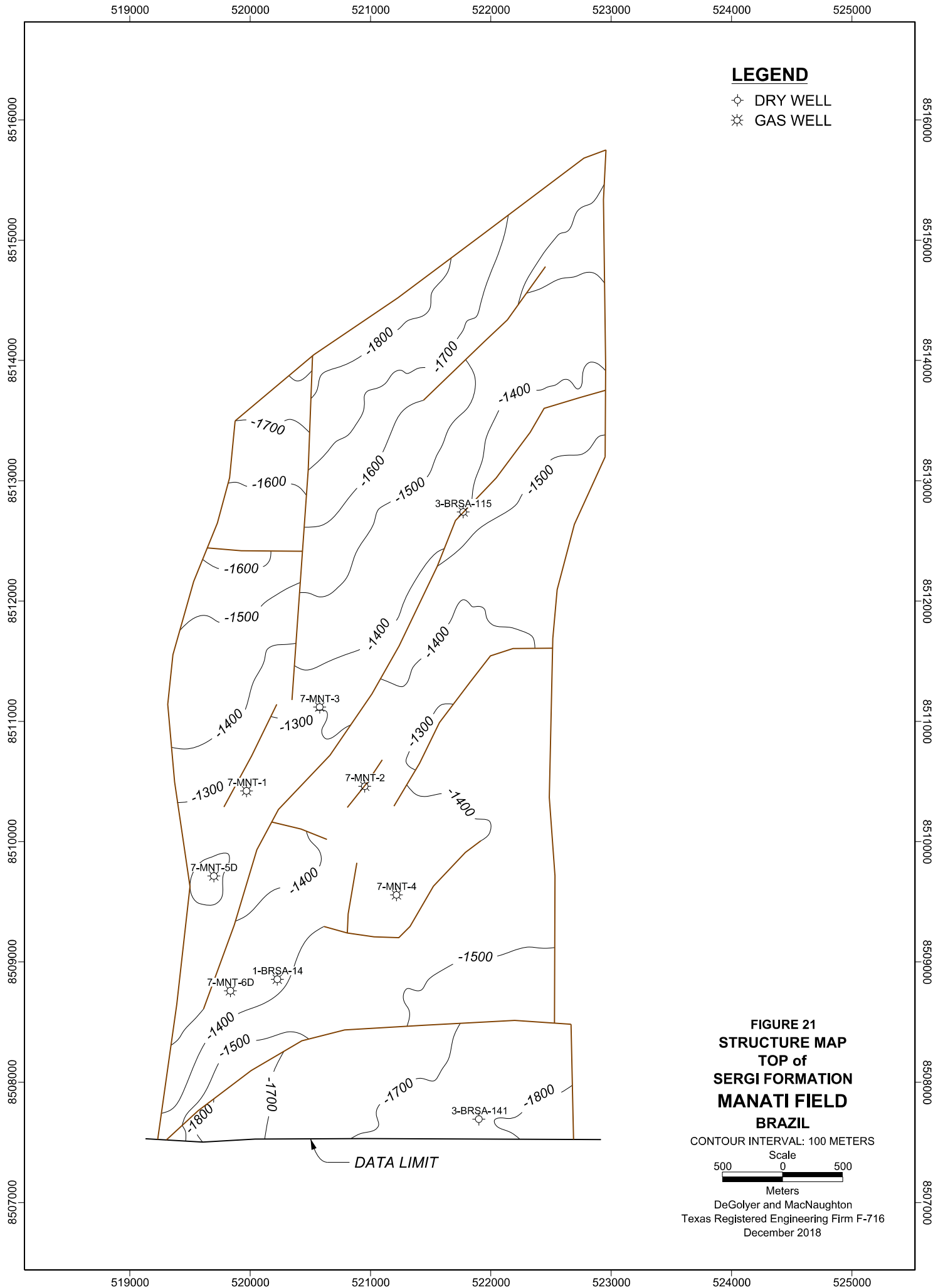
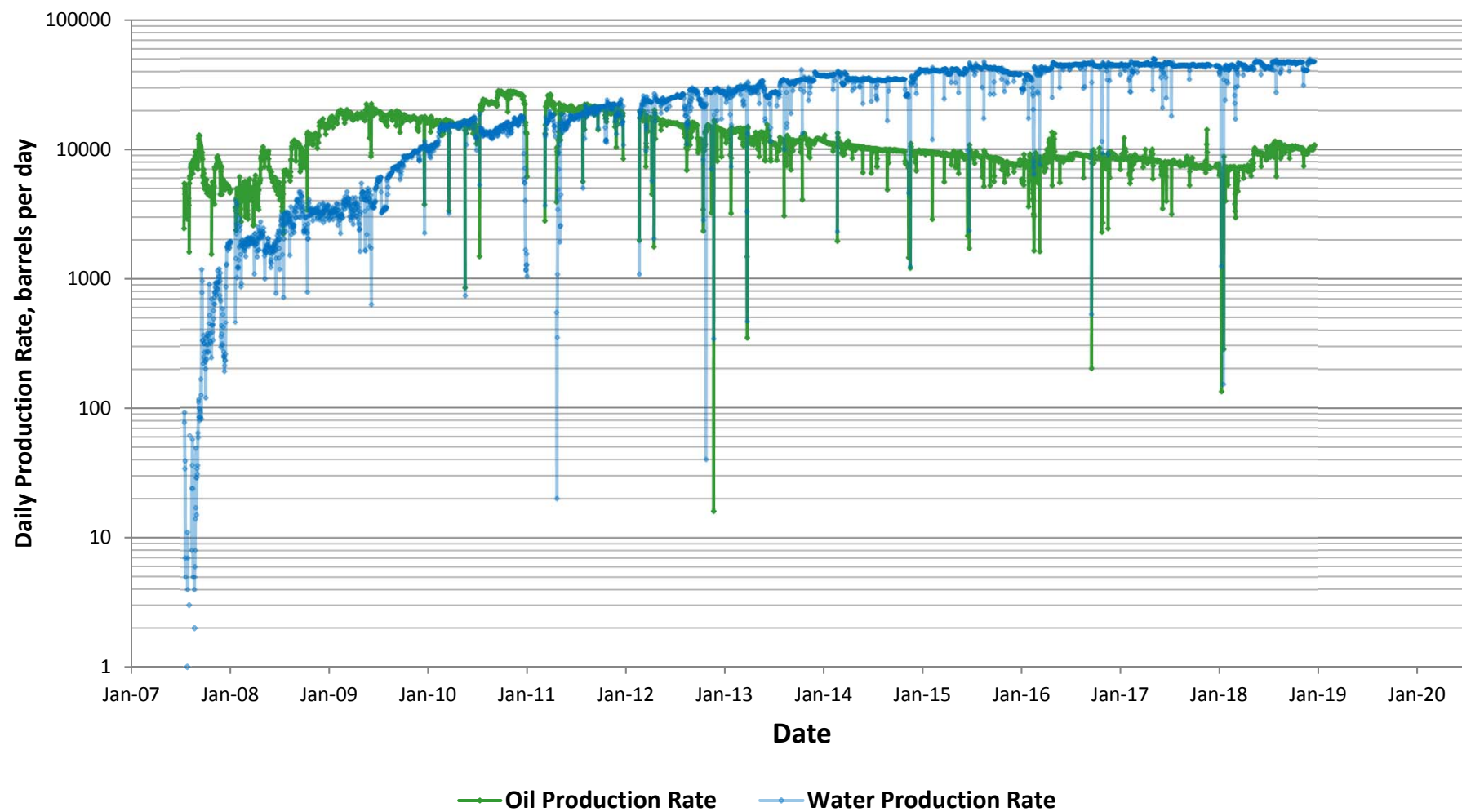


**FIGURE 22**  
**PRODUCTION HISTORY**  
**POLVO FIELD**  
**BRAZIL**

DeGolyer and MacNaughton  
Texas Registered Engineering Firm F-716  
December 2018



Notes:

1. Field shut down in 2011 due to FPSO tank repair.
2. Field shut down in 2012 due to production header and boiler leak repair.

**FIGURE 23**  
**PRODUCTION HISTORY**  
**MANATI FIELD**  
**BRAZIL**  
DeGolyer and MacNaughton  
Texas Registered Engineering Firm F-716  
December 2018

