Gaffney Cline

Reserves Statement

Fazenda Belém & Icapuí Fields, Brazil

as of December 31, 2020

Prepared for

SPE 3R Petroleum

May 15, 2021

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May 15, 2021

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Dear Jorge,

Reserves Statement, Fazenda Belém & Icapuí Fields, Brazil, as of December 31, 2020

Introduction

At the request of SPE 3R Petroleum (3R or "the Client"), Gaffney, Cline & Associates (GaffneyCline) has performed a Reserves audit of the Fazenda Belém and Icapuí fields located onshore in the Potiguar Basin, state of Ceará, Brazil, as of December 31, 2020.

On August 14th, 2020 3R signed a Purchase-Sales Agreement (PSA) with Petrobras, former license holder, to acquire the 100% Participating Interest in the asset. Because of such PSA, 3R is the current owner of the production, paying for all the operating and capital costs of the future development plan. 3R access to the concession has been approved by the ANP (Agencia Nacional do Petróleo, Gás Natural e Biocombustíveis). To the date is pending only the formalization of the signatures.

Based on the analysis performed, the reserves volumes quoted in this report can be ascribed and classified as 3R's Reserves since the proposed development plan is technically feasible, cash flows are positive under reasonable forecasted conditions, and there is a reasonable expectation that the legal rights to the current and the extended concession will receive the ANP final signatures in the short term. Current concession is expiring August 30, 2025, and the extension will be for another 27 years.

For the purposes of this report, we used technical and economic data specified by 3R including, but not limited to well logs, geologic maps, well test and production data, historical prices, cost information and property ownership interests as discussed in subsequent paragraphs of this report.

In addition to these assumptions, our estimates are based on certain assumptions including, but not limited to, that the properties will be develop consistent with development plans as provided to us by 3R.

This report relates specifically and solely to the subject matter as defined in the scope of work (SOW), as set out herein, and is conditional upon the specified assumptions. 3R is planning to present this report to financial institutions. This report must be considered in its entirety and must only be used for the purpose for which it is intended.

In compliance with your instructions, we estimated in Appendix I the future net cash flow based on the reserves volumes quoted using a reasonable oil price outlook as of December 31, 2020.

As requested, the cashflow presented does not include any signature fee (entry bonus payment) to grant access to the either the current concession or the extension of the current concession.

The estimates in this report have been prepared in accordance with the definitions and guidelines set forth in the June 2018 v1.01 Petroleum Resources Management System (PRMS) presented in Appendix II. In Appendix III is a list of abbreviations used in this report.

Summary and Conclusions

On the basis of technical and other information made available to GaffneyCline concerning these property units, as requested by 3R GaffneyCline provides the Reserves statement in the following table.

Table 1: Statement of Total Reserves
as of December 31, 2020, Fazenda Belem and Icapuí Fields

RESERVES	Gross (100%) Field Volumes	Gross (WI) Company Volumes	Net (NRI) Company Volumes
	Oil (MMbbl)	Oil (MMbbl)	Oil (MMbbl)
Proved			
Developed	2.57	2.57	2.57
Undeveloped	4.54	4.54	4.54
Total Proved	**7.10**	**7.10**	**7.10**
Probable	5.53	5.53	5.53
Possible	2.17	2.17	2.17

Notes:

a. Gross (100%) Field Volumes represents 100% of the volumes estimated to be commercially recoverable from the concession under the intended development plan.

b. Gross (WI) Company Volumes represent 3R's participation working interest.

c. Net (NRI) Company Volumes represent 3R´s net entitlement volumes reduced by royalties paid to the State. Royalties are paid in cash and not subject to an "in kind" payment, therefore net volumes have not been reduced in consideration of royalties.

d. Gas produced is not declared as reserves.

e. All properties concession expiration date is August 30, 2025.

f. It is assumed that the ANP will grant the extension of the concession for a period up to 27 years, and 3R will carry out the intended development plan.

g. Totals may not exactly equal the sum of the individual entries because of rounding.

It is GaffneyCline's opinion that the estimates of the Reserves as of December 31, 2020 shown in Table 1 are reasonable, and the reserves classification and categorization is appropriate and consistent with the adopted definitions and guidelines.

GaffneyCline concludes that the methodologies employed by 3R in the derivation of the volumes are appropriate, and that the quality of the data relied on, the depth and thoroughness of the estimation process are adequate for the project scope.

Discussion

This audit examination was based on reserves estimates and other information provided by 3R to GaffneyCline, and included such tests, procedures and adjustments as were considered necessary. All questions that arose during the audit process were resolved to GaffneyCline's satisfaction.

The Proved Developed Producing volumes quoted for the Base Production profile shown in Appendix 1 was estimated using either a conventional decline analysis or a log trend of the water oil ratio versus the cumulative oil production. Incremental P2 and P3 volumes over the P1 estimate associated with different decline trends provided a 2P and a 3P estimate.

The incremental resources quoted for future drilling and workover activities were based on type wells built with analogous wells historical production. Incremental P2 and P3 volumes were also included.

The future development plan includes several activities, as shown in Table 2.

Table 2: Activity Counts and Categorization

Activity	P1	P2	P3
Vertical wells	68	35	-
Horizontal wells	-	10	-
Workovers	86	51	-

The economic tests for the Reserves volumes were based on 3R's future scenario of Brent oil prices, which GaffneyCline considers reasonable. 3R provided the oil discount; net oil prices were estimated as Brent - US$ 6.5/Bbl * (1-7.71%) as shown in Table 3.

The working interest is 100%. The end of concession is August 31, 2025 and 3R advised GaffneyCline that will request the concession extension in the coming months.

The Brazilian Petroleum Law, Article 47 states, "…royalties are to be paid on a monthly basis, in national currency…" and, therefore, for the Proved Developed Producing volumes (PDP) the 9% royalties were treated as cash deductions rather than a reduction to volumes. For the incremental volumes a 5% royalties apply.

The Income tax is 34%, with a reduction to 15.25% for a period of 10 years starting in 2022. Taxes does not include the Special Participation tax. Other taxes as the PIS (Program of Social Integration), Cofins (Contribution for the Financing of Social Security) and ICMS (Tax on the circulation of goods transportation and communication services) are financially recovered by 3R and therefore were not included.

Future capital costs and operating expenses estimated by 3R were derived from development program forecasts for each field. Main capital costs include the cost associated with the future activity shown in Table 2. The drilling and completion costs for the future vertical and horizontal

wells were estimated as US$0.29 million and US$1.0 million per well respectively. Workovers costs were estimated as US$0.05 millon per well.

Abandonment costs were estimated at US$42.43 million.

GaffneyCline has found that projected capital investments and operating expenses are sufficient to economically produce the projected volumes.

Operating expenses were estimated by 3R based on future service contracts currently under negotiation and includes fix costs associated with the wells service operation contract, Equipment & Materials, General expenses, HSE and Overhead for US$2.8 million per year. Variable cost were estimated as US$ 10.4/Bbl of oil and includes Pulling, Chemicals, Electricity, Trucking and Gas costs associated with the steam injection process.

Capital and operating costs have been indexed at 2% per year. Cash flows are included in Appendix I.

It is GaffneyCline's opinion that the estimates of the Reserves volumes are, in the aggregate, reasonable and the categorization is appropriate and consistent with the definitions within the Petroleum Resources Management System (PRMS), which was approved by the Society of Petroleum Engineers, the World Petroleum Council, the American Association of Petroleum Geologists, the Society of Petroleum Evaluation Engineers, the Society of Exploration Geophysicists, the Society of Petrophysicists and Well Log Analysts, and the European Association of Geoscientists and Engineers in June 2018, Version 1.01 (see Appendix II).

The Economic Limit test and Cashflow shown in Appendix I was estimated with the following pricing assumptions:

Table 3: Client Effective Price Scenario

Year	Brent	Net Oil
	US$/Bbl	US$/Bbl
2021	62.0	51.2
2022	60.0	49.4
2023	61.0	50.3
2024	62.0	51.2
2025	63.0	52.1
2026	64.0	53.1
2027	65.0	54.0
2028	67.0	55.8
2029+	67.0	55.8

Basis of Opinion

This document reflects GaffneyCline's informed professional judgment based on accepted standards of professional investigation and, as applicable, the data and information provided by the Client and/or obtained from other sources (e.g., public domain databases), the limited scope of engagement, and the time permitted to conduct the evaluation.

In line with those accepted standards, this document does not in any way constitute or make a guarantee or prediction of results, and no warranty is implied or expressed that actual outcome will conform to the outcomes presented herein. GaffneyCline has not independently verified any information provided by, or at the direction of, the Client and/or obtained from other sources (e.g., public domain) and has accepted the accuracy and completeness of this data. GaffneyCline has no reason to believe that any material facts have been withheld, but does not warrant that its inquiries have revealed all of the matters that a more extensive examination might otherwise disclose.

The opinions expressed herein are subject to and fully qualified by the generally accepted uncertainties associated with the interpretation of geoscience and engineering data and do not reflect the totality of circumstances, scenarios and information that could potentially affect decisions made by the report's recipients and/or actual results. The opinions and statements contained in this report are made in good faith and in the belief that such opinions and statements are representative of prevailing physical and economic circumstances.

In the preparation of this report, GaffneyCline has used definitions contained within the Petroleum Resources Management System (PRMS), which was approved by the Society of Petroleum Engineers, the World Petroleum Council, the American Association of Petroleum Geologists, the Society of Petroleum Evaluation Engineers, the Society of Exploration Geophysicists, the Society of Petrophysicists and Well Log Analysts, and the European Association of Geoscientists and Engineers in June 2018, Version 1.01 (see Appendix II).

There are numerous uncertainties inherent in estimating reserves and resources, and in projecting future production, development expenditures, operating expenses and cash flows. Oil and gas resources assessments must be recognized as a subjective process of estimating subsurface accumulations of oil and gas that cannot be measured in an exact way. Estimates of oil and gas reserves prepared by other parties may differ, perhaps materially, from those contained within this report.

The accuracy of any reserves estimate is a function of the quality of the available data and of engineering and geological interpretation. Results of drilling, testing and production that post-date the preparation of the estimates may justify revisions, some or all of which may be material. Accordingly, reserves estimates are often different from the quantities of oil and gas that are ultimately recovered, and the timing and cost of those volumes that are recovered may vary from that assumed.

Oil volumes are reported in millions (10^6) of barrels at stock tank conditions (MMstb). Natural gas volumes have been quoted in billions (10^9) of standard cubic feet (Bscf) and are volumes of

gas Consumed in Operations (CiO, or lease fuel). Standard conditions are defined as 14.7 psia and 60°F.

GaffneyCline's review and audit involved reviewing pertinent facts, interpretations and assumptions made by "the Client" or others in preparing estimates of reserves and resources. GaffneyCline performed procedures necessary to enable it to render an opinion on the appropriateness of the methodologies employed, adequacy and quality of the data relied on, depth and thoroughness of the reserves and resources estimation process, classification and categorization of reserves and resources appropriate to the relevant definitions used, and reasonableness of the estimates.

Definition of Reserves

Reserves are estimated remaining quantities of oil and gas and related substances anticipated to be economically producible, as of a given date, by application of development projects to known accumulations. In addition, there must exist, or there must be a reasonable expectation that there will exist, the legal right to produce, or a revenue interest in, the production, installed means of delivering oil and gas or related substances to market, and all permits and financing required to implement the project.

Reserves are further categorized in accordance with the level of certainty associated with the estimates and may be sub-classified based on project maturity and/or characterized by development and production status. All categories of reserves volumes quoted herein have been derived within the context of an economic limit test (ELT) assessment (pre-tax and exclusive of accumulated depreciation amounts) prior to any net present value (NPV) analysis.

GaffneyCline has not undertaken a site visit and inspection because that it was not included in the scope of work. As such, GaffneyCline is not in a position to comment on the operations or facilities in place, their appropriateness and condition, or whether they are in compliance with the regulations pertaining to such operations. Further, GaffneyCline is not in a position to comment on any aspect of health, safety, or environment of such operation.

This report has been prepared based on GaffneyCline's understanding of the effects of petroleum legislation and other regulations that currently apply to these properties.

GaffneyCline is not aware of any carbon pricing impost or GHG emissions related regulations that is applicable to the evaluation of the assets that are the subject of this report. GaffneyCline has also not included the impact of any potential carbon pricing scheme or regulatory compliance costs for GHG emissions that may be implemented in the future.

GaffneyCline is not in a position to attest to property title or rights, conditions of these rights (including environmental and abandonment obligations), or any necessary licenses and consents (including planning permission, financial interest relationships, or encumbrances thereon for any part of the appraised properties).

GaffneyCline is not aware of any potential changes in regulations applicable to this field that could affect the ability of "the Client" to produce the estimated reserves.

Use of Net Present Values

It should be clearly understood that the Net Present Values (NPVs) contained herein do not represent a GaffneyCline opinion as to the market value of the subject property, nor any interest in it.

In assessing a likely market value, it would be necessary to take into account a number of additional factors including reserves risk (i.e., that Proved and/or Probable and/or Possible reserves may not be realised within the anticipated timeframe for their exploitation); perceptions of economic and sovereign risk, including potential change in regulations; potential upside; other benefits, encumbrances or charges that may pertain to a particular interest; and, the competitive state of the market at the time. GaffneyCline has explicitly not taken such factors into account in deriving the NPVs presented herein.

Qualifications

In performing this study, GaffneyCline is not aware that any conflict of interest has existed. As an independent consultancy, GaffneyCline is providing impartial technical, commercial, and strategic advice within the energy sector. GaffneyCline's remuneration was not in any way contingent on the contents of this report.

In the preparation of this document, GaffneyCline has maintained, and continues to maintain, a strict independent consultant-client relationship with "the Client". Furthermore, the management and employees of GaffneyCline have no interest in any of the assets evaluated or are related with the analysis performed, as part of this report.

Staff members who prepared this report hold appropriate professional and educational qualifications and have the necessary levels of experience and expertise to perform the work.

Notice

This document is confidential and has been prepared for the exclusive use of the Client or parties named herein. It may not be distributed or made available, in whole or in part, to any other company or person without the prior knowledge and written consent of GaffneyCline. No person or company other than those for whom it is intended may directly or indirectly rely upon its contents. GaffneyCline is acting in an advisory capacity only and, to the fullest extent permitted by law, disclaims all liability for actions or losses derived from any actual or purported reliance on this document (or any other statements or opinions of GaffneyCline) by the Client or by any other person or entity.

This report was prepared for public disclosure in its entirety by SPE 3R Petroleum. SPE 3R Petroleum will obtain GaffneyCline's prior written approval for any other use of any results, statements or opinions expressed to SPE 3R Petroleum in this report, which are attributed to GaffneyCline.

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It has been a pleasure preparing this Reserves Audit for SPE 3R Petroleum. Please contact the undersigned if you have any questions.

Yours sincerely,

Gaffney, Cline & Associates

Project Manager
Alejandro Giaquinta*, Principal Advisor*

Reviewed by
Eduardo Sanchez, Geosciences Senior Advisor

Appendices

Appendix I: Net Cashflows
Appendix II: PRMS Guidelines
Appendix III: Glossary

Appendix I
Net Cashflows

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SPE 3R PETROLEUM Net Revenue Interest Cashflow as of December 31, 2020
Fazenda Belem & Icapui Fields

Proved Developed Producing

Year	Net Oil Production MMbbl	Net Revenues US$ MM	Royalties US$ MM	Operating Expenses US$ MM	Capital Costs US$ MM	Abandon-ment Cost US$ MM	Income Tax US$ MM	Net Cashflow US$ MM	10% Discounted Net Cashflow US$ MM
2021	0.26	13.1	1.2	4.1			2.7	5.2	5.0
2022	0.23	11.5	1.0	5.3			0.8	4.3	4.2
2023	0.21	10.6	1.0	5.2			0.7	3.8	3.4
2024	0.19	9.9	0.9	4.8			0.6	3.5	2.9
2025	0.17	9.1	0.8	4.7			0.6	3.1	2.3
2026	0.16	8.4	0.8	4.6			0.5	2.6	1.8
2027	0.14	7.8	0.7	4.2			0.4	2.5	1.5
2028	0.13	7.4	0.7	4.1			0.4	2.2	1.2
2029	0.12	6.7	0.6	4.0			0.3	1.8	0.9
2030	0.11	6.1	0.5	3.5			0.3	1.7	0.8
2031	0.10	5.5	0.5	3.4			0.2	1.4	0.6
2032	0.09	5.1	0.5	3.3			0.4	0.8	0.3
2033	0.08	4.6	0.4	2.9			0.4	0.8	0.3
2034	0.07	4.2	0.4	2.8			0.3	0.7	0.2
2035	0.07	3.8	0.3	2.7			0.2	0.5	0.1
2036	0.06	3.5	0.3	2.3			0.3	0.5	0.1
2037	0.06	3.2	0.3	2.3			0.2	0.4	0.1
2038	0.05	2.9	0.3	2.2			0.1	0.3	0.1
2039	0.05	2.6	0.2	1.8			0.2	0.4	0.1
2040	0.04	2.4	0.2	1.8			0.1	0.2	0.0
2041	0.04	2.2	0.2	1.7			0.08	0.1	0.0
2042	0.04	2.0	0.2	1.4			0.1	0.3	0.0
2043	0.03	1.8	0.2	1.3			0.1	0.2	0.0
2044	0.03	1.6	0.1	1.3			0.1	0.1	0.0
2045	0.03	1.5	0.1	1.0			0.1	0.3	0.0
2046						48.7		-48.7	-4.9
TOTAL	**2.57**	**137.3**	**12.4**	**77.0**	**0.0**	**48.7**	**10.4**	**-11.1**	**21.3**

Total Proved (1P)

Year	Net Oil Production MMbbl	Net Revenues US$ MM	Royalties US$ MM	Operating Expenses US$ MM	Capital Costs US$ MM	Abandon-ment Cost US$ MM	Income Tax US$ MM	Net Cashflow US$ MM	10% Discounted Net Cashflow US$ MM
2021	0.27	13.9	1.2	4.2	0.9		2.8	4.7	4.5
2022	0.29	14.2	1.2	5.9	2.7		1.0	3.4	3.3
2023	0.41	20.8	1.5	7.4	16.2		1.5	-5.7	-5.1
2024	0.56	28.6	1.8	8.9	6.4		2.3	9.3	7.7
2025	0.52	27.3	1.7	8.6			2.3	14.6	11.0
2026	0.48	25.5	1.6	8.3			2.1	13.5	9.2
2027	0.44	23.8	1.5	7.7			2.0	12.7	7.9
2028	0.41	22.8	1.4	7.4			1.9	12.0	6.8
2029	0.37	20.9	1.3	7.1			1.7	10.8	5.6
2030	0.35	19.3	1.2	6.4			1.6	10.1	4.7
2031	0.32	17.8	1.1	6.1			1.4	9.2	3.9
2032	0.30	16.5	1.0	5.8			2.9	6.8	2.6
2033	0.27	15.3	0.9	5.2			2.8	6.4	2.2
2034	0.25	14.1	0.9	5.0			2.5	5.8	1.8
2035	0.24	13.1	0.8	4.7			2.3	5.3	1.5
2036	0.22	12.2	0.8	4.2			2.2	5.1	1.3
2037	0.20	11.3	0.7	4.0			2.0	4.6	1.1
2038	0.19	10.6	0.6	3.9			1.8	4.2	0.9
2039	0.18	9.8	0.6	3.4			1.8	4.1	0.8
2040	0.17	9.2	0.6	3.3			1.6	3.8	0.7
2041	0.15	8.6	0.5	3.1			1.5	3.5	0.6
2042	0.14	8.0	0.5	2.7			1.5	3.4	0.5
2043	0.13	7.5	0.4	2.6			1.4	3.1	0.4
2044	0.13	7.1	0.4	2.5			1.3	2.9	0.4
2045	0.11	6.3	0.4	2.0			1.2	2.7	0.3
2046						48.7		-48.7	-4.9
TOTAL	**7.10**	**384.6**	**24.8**	**130.2**	**26.1**	**48.7**	**47.3**	**107.4**	**69.6**

Total Proved + Probable (2P)

Year	Net Oil Production	Net Revenues	Royalties	Operating Expenses	Capital Costs	Abandon-ment Cost	Income Tax	Net Cashflow	10% Discounted Net Cashflow
	MMbbl	US$ MM	US$ MM	US$ MM	US$ MM	US$ MM	US$ MM	US$ MM	US$ MM
2021	0.27	13.9	1.3	4.2	0.9		2.9	4.7	4.6
2022	0.29	14.4	1.2	6.0	2.7		1.1	3.5	3.5
2023	0.61	30.5	2.0	9.5	26.6		2.5	-10.0	-9.1
2024	0.98	50.2	2.9	13.5	16.5		4.4	12.9	10.7
2025	1.00	52.3	3.0	14.0	3.2		4.7	27.4	20.6
2026	0.89	47.5	2.7	13.1			4.3	27.4	18.7
2027	0.80	43.3	2.5	11.9			3.9	25.0	15.5
2028	0.73	40.8	2.3	11.3			3.7	23.4	13.2
2029	0.67	37.2	2.1	10.5			3.3	21.2	10.9
2030	0.61	34.3	2.0	9.6			3.1	19.6	9.2
2031	0.57	31.7	1.8	9.1			2.8	18.0	7.6
2032	0.53	29.6	1.7	8.6			5.9	13.5	5.2
2033	0.49	27.6	1.6	7.8			5.5	12.7	4.4
2034	0.46	25.9	1.5	7.5			5.1	11.8	3.8
2035	0.44	24.3	1.4	7.1			4.8	11.0	3.2
2036	0.41	23.0	1.3	6.5			4.6	10.6	2.8
2037	0.39	21.6	1.2	6.2			4.3	9.9	2.4
2038	0.37	20.5	1.1	6.0			4.1	9.3	2.0
2039	0.35	19.5	1.1	5.5			3.9	9.0	1.8
2040	0.33	18.5	1.0	5.3			3.7	8.5	1.5
2041	0.32	17.6	1.0	5.1			3.5	8.1	1.3
2042	0.30	16.8	0.9	4.6			3.4	7.9	1.2
2043	0.29	16.0	0.9	4.4			3.3	7.5	1.0
2044	0.28	15.4	0.8	4.3			3.1	7.2	0.9
2045	0.25	14.2	0.8	3.7			3.0	6.8	0.8
2046						48.7		-48.7	-4.9
TOTAL	12.63	686.7	39.9	195.3	49.8	48.7	95.0	258.0	132.6

Total Proved + Probable + Possible (3P)

Year	Net Oil Production	Net Revenues	Royalties	Operating Expenses	Capital Costs	Abandon-ment Cost	Income Tax	Net Cashflow	10% Discounted Net Cashflow
	MMbbl	US$ MM	US$ MM	US$ MM	US$ MM	US$ MM	US$ MM	US$ MM	US$ MM
2021	0.27	14.0	1.3	4.2	0.9		2.9	4.7	4.6
2022	0.30	14.7	1.2	6.0	2.7		1.1	3.7	3.6
2023	0.66	33.0	2.1	10.0	26.6		2.8	-8.5	-7.7
2024	1.07	54.9	3.1	14.5	16.5		5.0	15.8	13.0
2025	1.10	57.2	3.2	15.1	3.2		5.3	30.4	22.8
2026	0.99	52.3	3.0	14.1			4.9	30.4	20.7
2027	0.89	48.3	2.7	13.0			4.5	28.0	17.4
2028	0.82	45.9	2.6	12.4			4.3	26.6	15.0
2029	0.76	42.4	2.4	11.7			3.9	24.4	12.5
2030	0.71	39.5	2.2	10.7			3.7	22.9	10.7
2031	0.66	37.0	2.1	10.2			3.4	21.3	9.1
2032	0.63	35.0	2.0	9.8			7.2	16.1	6.2
2033	0.59	33.0	1.8	9.0			6.9	15.3	5.4
2034	0.56	31.3	1.7	8.6			6.5	14.5	4.6
2035	0.53	29.8	1.6	8.3			6.1	13.7	4.0
2036	0.51	28.5	1.6	7.7			5.9	13.3	3.5
2037	0.49	27.2	1.5	7.4			5.6	12.6	3.0
2038	0.47	26.0	1.4	7.2			5.4	12.0	2.6
2039	0.45	25.0	1.4	6.6			5.3	11.7	2.3
2040	0.43	24.1	1.3	6.4			5.1	11.3	2.0
2041	0.41	23.1	1.2	6.2			4.8	10.8	1.8
2042	0.40	22.3	1.2	5.7			4.8	10.6	1.6
2043	0.39	21.5	1.1	5.6			4.6	10.2	1.4
2044	0.37	20.9	1.1	5.4			4.4	9.9	1.2
2045	0.35	19.5	1.0	4.8			4.2	9.4	1.1
2046						48.7		-48.7	-4.9
TOTAL	14.80	806.3	45.8	221.0	49.8	48.7	118.6	322.2	157.4

Notes

1. The NPVs reported here do not represent an opinion as to the market value of a property or any interest therein.

Appendix II
PRMS Guidelines

**Society of Petroleum Engineers, World Petroleum Council,
American Association of Petroleum Geologists, Society of Petroleum Evaluation Engineers,
Society of Exploration Geophysicists, Society of Petrophysicists and Well Log Analysts,
and European Association of Geoscientists & Engineers**

Petroleum Resources Management System

Definitions and Guidelines ([1])

(Revised June 2018)

Table 1—Recoverable Resources Classes and Sub-Classes

Class/Sub-Class	Definition	Guidelines
Reserves	Reserves are those quantities of petroleum anticipated to be commercially recoverable by application of development projects to known accumulations from a given date forward under defined conditions.	Reserves must satisfy four criteria: discovered, recoverable, commercial, and remaining based on the development project(s) applied. Reserves are further categorized in accordance with the level of certainty associated with the estimates and may be sub-classified based on project maturity and/or characterized by the development and production status. To be included in the Reserves class, a project must be sufficiently defined to establish its commercial viability (see Section 2.1.2, Determination of Commerciality). This includes the requirement that there is evidence of firm intention to proceed with development within a reasonable time-frame. A reasonable time-frame for the initiation of development depends on the specific circumstances and varies according to the scope of the project. While five years is recommended as a benchmark, a longer time-frame could be applied where, for example, development of an economic project is deferred at the option of the producer for, among other things, market-related reasons or to meet contractual or strategic objectives. In all cases, the justification for classification as Reserves should be clearly documented. To be included in the Reserves class, there must be a high confidence in the commercial maturity and economic producibility of the reservoir as supported by actual production or formation tests. In certain cases, Reserves may be assigned on the basis of well logs and/or core analysis that indicate that the subject reservoir is hydrocarbon-bearing and is analogous to reservoirs in the same area that are producing or have demonstrated the ability to produce on formation tests.

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[1] These Definitions and Guidelines are extracted from the full Petroleum Resources Management System (revised June 2018) document.

Class/Sub-Class	Definition	Guidelines
On Production	The development project is currently producing or capable of producing and selling petroleum to market.	The key criterion is that the project is receiving income from sales, rather than that the approved development project is necessarily complete. Includes Developed Producing Reserves. The project decision gate is the decision to initiate or continue economic production from the project.
Approved for Development	All necessary approvals have been obtained, capital funds have been committed, and implementation of the development project is ready to begin or is under way.	At this point, it must be certain that the development project is going ahead. The project must not be subject to any contingencies, such as outstanding regulatory approvals or sales contracts. Forecast capital expenditures should be included in the reporting entity's current or following year's approved budget. The project decision gate is the decision to start investing capital in the construction of production facilities and/or drilling development wells.
Justified for Development	Implementation of the development project is justified on the basis of reasonable forecast commercial conditions at the time of reporting, and there are reasonable expectations that all necessary approvals/contracts will be obtained.	To move to this level of project maturity, and hence have Reserves associated with it, the development project must be commercially viable at the time of reporting (see Section 2.1.2, Determination of Commerciality) and the specific circumstances of the project. All participating entities have agreed and there is evidence of a committed project (firm intention to proceed with development within a reasonable time-frame}) There must be no known contingencies that could preclude the development from proceeding (see Reserves class). The project decision gate is the decision by the reporting entity and its partners, if any, that the project has reached a level of technical and commercial maturity sufficient to justify proceeding with development at that point in time.
Contingent Resources	Those quantities of petroleum estimated, as of a given date, to be potentially recoverable from known accumulations by application of development projects, but which are not currently considered to be commercially recoverable owing to one or more contingencies.	Contingent Resources may include, for example, projects for which there are currently no viable markets, where commercial recovery is dependent on technology under development, where evaluation of the accumulation is insufficient to clearly assess commerciality, where the development plan is not yet approved, or where regulatory or social acceptance issues may exist. Contingent Resources are further categorized in accordance with the level of certainty associated with the estimates and may be sub-classified based on project maturity and/or characterized by the economic status.

Class/Sub-Class	Definition	Guidelines
Development Pending	A discovered accumulation where project activities are ongoing to justify commercial development in the foreseeable future.	The project is seen to have reasonable potential for eventual commercial development, to the extent that further data acquisition (e.g., drilling, seismic data) and/or evaluations are currently ongoing with a view to confirming that the project is commercially viable and providing the basis for selection of an appropriate development plan. The critical contingencies have been identified and are reasonably expected to be resolved within a reasonable time-frame. Note that disappointing appraisal/evaluation results could lead to a reclassification of the project to On Hold or Not Viable status. The project decision gate is the decision to undertake further data acquisition and/or studies designed to move the project to a level of technical and commercial maturity at which a decision can be made to proceed with development and production.
Development on Hold	A discovered accumulation where project activities are on hold and/or where justification as a commercial development may be subject to significant delay.	The project is seen to have potential for commercial development. Development may be subject to a significant time delay. Note that a change in circumstances, such that there is no longer a probable chance that a critical contingency can be removed in the foreseeable future, could lead to a reclassification of the project to Not Viable status. The project decision gate is the decision to either proceed with additional evaluation designed to clarify the potential for eventual commercial development or to temporarily suspend or delay further activities pending resolution of external contingencies.
Development Unclarified	A discovered accumulation where project activities are under evaluation and where justification as a commercial development is unknown based on available information.	The project is seen to have potential for eventual commercial development, but further appraisal/evaluation activities are ongoing to clarify the potential for eventual commercial development. This sub-class requires active appraisal or evaluation and should not be maintained without a plan for future evaluation. The sub-class should reflect the actions required to move a project toward commercial maturity and economic production.
Development Not Viable	A discovered accumulation for which there are no current plans to develop or to acquire additional data at the time because of limited production potential.	The project is not seen to have potential for eventual commercial development at the time of reporting, but the theoretically recoverable quantities are recorded so that the potential opportunity will be recognized in the event of a major change in technology or commercial conditions. The project decision gate is the decision not to undertake further data acquisition or studies on the project for the foreseeable future.

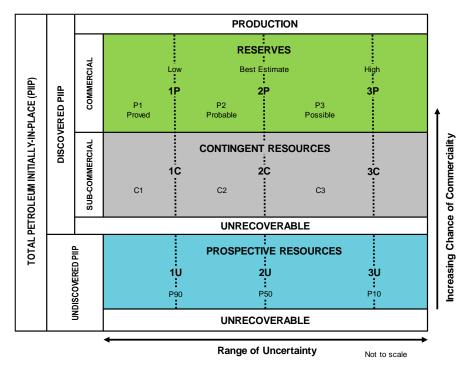| Class/Sub-Class	Definition	Guidelines
Prospective Resources	Those quantities of petroleum that are estimated, as of a given date, to be potentially recoverable from undiscovered accumulations.	Potential accumulations are evaluated according to the chance of geologic discovery and, assuming a discovery, the estimated quantities that would be recoverable under defined development projects. It is recognized that the development programs will be of significantly less detail and depend more heavily on analog developments in the earlier phases of exploration.
Prospect	A project associated with a potential accumulation that is sufficiently well defined to represent a viable drilling target.	Project activities are focused on assessing the chance of geologic discovery and, assuming discovery, the range of potential recoverable quantities under a commercial development program.
Lead	A project associated with a potential accumulation that is currently poorly defined and requires more data acquisition and/or evaluation to be classified as a Prospect.	Project activities are focused on acquiring additional data and/or undertaking further evaluation designed to confirm whether or not the Lead can be matured into a Prospect. Such evaluation includes the assessment of the chance of geologic discovery and, assuming discovery, the range of potential recovery under feasible development scenarios.
Play	A project associated with a prospective trend of potential prospects, but that requires more data acquisition and/or evaluation to define specific Leads or Prospects.	Project activities are focused on acquiring additional data and/or undertaking further evaluation designed to define specific Leads or Prospects for more detailed analysis of their chance of geologic discovery and, assuming discovery, the range of potential recovery under hypothetical development scenarios.

Table 2—Reserves Status Definitions and Guidelines

Status	Definition	Guidelines
Developed Reserves	Expected quantities to be recovered from existing wells and facilities.	Reserves are considered developed only after the necessary equipment has been installed, or when the costs to do so are relatively minor compared to the cost of a well. Where required facilities become unavailable, it may be necessary to reclassify Developed Reserves as Undeveloped. Developed Reserves may be further sub-classified as Producing or Non-producing.
Developed Producing Reserves	Expected quantities to be recovered from completion intervals that are open and producing at the effective date of the estimate.	Improved recovery Reserves are considered producing only after the improved recovery project is in operation.
Developed Non-Producing Reserves	Shut-in and behind-pipe Reserves.	Shut-in Reserves are expected to be recovered from (1) completion intervals that are open at the time of the estimate but which have not yet started producing, (2) wells which were shut-in for market conditions or pipeline connections, or (3) wells not capable of production for mechanical reasons. Behind-pipe Reserves are expected to be recovered from zones in existing wells that will require additional completion work or future re-completion before start of production with minor cost to access these reserves. In all cases, production can be initiated or restored with relatively low expenditure compared to the cost of drilling a new well.
Undeveloped Reserves	Quantities expected to be recovered through future significant investments.	Undeveloped Reserves are to be produced (1) from new wells on undrilled acreage in known accumulations, (2) from deepening existing wells to a different (but known) reservoir, (3) from infill wells that will increase recovery, or (4) where a relatively large expenditure (e.g., when compared to the cost of drilling a new well) is required to (a) recomplete an existing well or (b) install production or transportation facilities for primary or improved recovery projects.

Table 3—Reserves Category Definitions and Guidelines

Category	Definition	Guidelines
Proved Reserves	Those quantities of petroleum that, by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be commercially recoverable from a given date forward from known reservoirs and under defined economic conditions, operating methods, and government regulations.	If deterministic methods are used, the term "reasonable certainty" is intended to express a high degree of confidence that the quantities will be recovered. If probabilistic methods are used, there should be at least a 90% probability (P90) that the quantities actually recovered will equal or exceed the estimate. The area of the reservoir considered as Proved includes (1) the area delineated by drilling and defined by fluid contacts, if any, and (2) adjacent undrilled portions of the reservoir that can reasonably be judged as continuous with it and commercially productive on the basis of available geoscience and engineering data. In the absence of data on fluid contacts, Proved quantities in a reservoir are limited by the LKH as seen in a well penetration unless otherwise indicated by definitive geoscience, engineering, or performance data. Such definitive information may include pressure gradient analysis and seismic indicators. Seismic data alone may not be sufficient to define fluid contacts for Proved. Reserves in undeveloped locations may be classified as Proved provided that: A. The locations are in undrilled areas of the reservoir that can be judged with reasonable certainty to be commercially mature and economically productive. B. Interpretations of available geoscience and engineering data indicate with reasonable certainty that the objective formation is laterally continuous with drilled Proved locations. For Proved Reserves, the recovery efficiency applied to these reservoirs should be defined based on a range of possibilities supported by analogs and sound engineering judgment considering the characteristics of the Proved area and the applied development program.

Category	Definition	Guidelines
Probable Reserves	Those additional Reserves that analysis of geoscience and engineering data indicates are less likely to be recovered than Proved Reserves but more certain to be recovered than Possible Reserves.	It is equally likely that actual remaining quantities recovered will be greater than or less than the sum of the estimated Proved plus Probable Reserves (2P). In this context, when probabilistic methods are used, there should be at least a 50% probability that the actual quantities recovered will equal or exceed the 2P estimate. Probable Reserves may be assigned to areas of a reservoir adjacent to Proved where data control or interpretations of available data are less certain. The interpreted reservoir continuity may not meet the reasonable certainty criteria. Probable estimates also include incremental recoveries associated with project recovery efficiencies beyond that assumed for Proved.
Possible Reserves	Those additional reserves that analysis of geoscience and engineering data indicates are less likely to be recoverable than Probable Reserves.	The total quantities ultimately recovered from the project have a low probability to exceed the sum of Proved plus Probable plus Possible (3P), which is equivalent to the high-estimate scenario. When probabilistic methods are used, there should be at least a 10% probability (P10) that the actual quantities recovered will equal or exceed the 3P estimate. Possible Reserves may be assigned to areas of a reservoir adjacent to Probable where data control and interpretations of available data are progressively less certain. Frequently, this may be in areas where geoscience and engineering data are unable to clearly define the area and vertical reservoir limits of economic production from the reservoir by a defined, commercially mature project. Possible estimates also include incremental quantities associated with project recovery efficiencies beyond that assumed for Probable.

Category	Definition	Guidelines
Probable and Possible Reserves	See above for separate criteria for Probable Reserves and Possible Reserves.	The 2P and 3P estimates may be based on reasonable alternative technical interpretations within the reservoir and/or subject project that are clearly documented, including comparisons to results in successful similar projects.

In conventional accumulations, Probable and/or Possible Reserves may be assigned where geoscience and engineering data identify directly adjacent portions of a reservoir within the same accumulation that may be separated from Proved areas by minor faulting or other geological discontinuities and have not been penetrated by a wellbore but are interpreted to be in communication with the known (Proved) reservoir. Probable or Possible Reserves may be assigned to areas that are structurally higher than the Proved area. Possible (and in some cases, Probable) Reserves may be assigned to areas that are structurally lower than the adjacent Proved or 2P area.

Caution should be exercised in assigning Reserves to adjacent reservoirs isolated by major, potentially sealing faults until this reservoir is penetrated and evaluated as commercially mature and economically productive. Justification for assigning Reserves in such cases should be clearly documented. Reserves should not be assigned to areas that are clearly separated from a known accumulation by non-productive reservoir (i.e., absence of reservoir, structurally low reservoir, or negative test results); such areas may contain Prospective Resources.

In conventional accumulations, where drilling has defined a highest known oil elevation and there exists the potential for an associated gas cap, Proved Reserves of oil should only be assigned in the structurally higher portions of the reservoir if there is reasonable certainty that such portions are initially above bubble point pressure based on documented engineering analyses. Reservoir portions that do not meet this certainty may be assigned as Probable and Possible oil and/or gas based on reservoir fluid properties and pressure gradient interpretations. |

Figure 1.1—RESOURCES CLASSIFICATION FRAMEWORK

PRODUCTION		
RESERVES		
Low	Best Estimate	High
1P	2P	3P
P1 Proved	P2 Probable	P3 Possible
CONTINGENT RESOURCES		
1C	2C	3C
C1	C2	C3
UNRECOVERABLE		
PROSPECTIVE RESOURCES		
1U	2U	3U
P90	P50	P10
UNRECOVERABLE		

TOTAL PETROLEUM INITIALLY-IN-PLACE (PIIP)

DISCOVERED PIIP

UNDISCOVERED PIIP

COMMERCIAL

SUB-COMMERCIAL

Increasing Chance of Commerciality

Range of Uncertainty

Not to scale

Figure 2.1—SUB-CLASSES BASED ON PROJECT MATURITY

	Project Maturity Sub-classes
PRODUCTION	
RESERVES	On Production
	Approved for Development
	Justified for Development
CONTINGENT RESOURCES	Development Pending
	Development On Hold
	Development Unclarified
	Development Not Viable
UNRECOVERABLE	
PROSPECTIVE RESOURCES	Prospect
	Lead
	Play
UNRECOVERABLE	

TOTAL PETROLEUM INITIALLY-IN-PLACE (PIIP)

DISCOVERED PIIP

UNDISCOVERED PIIP

COMMERCIAL

SUB-COMMERCIAL

Increasing Chance of Commerciality

Range of Uncertainty

Not to scale

Appendix III
Glossary

Glossary – Standard Oil Industry Terms and Abbreviations

%	Percentage
1H05	First half (6 months) of 2005 (example)
2Q06	Second quarter (3 months) of 2006 (example)
2D	Two dimensional
3D	Three dimensional
4D	Four dimensional
1P	Proved Reserves
2P	Proved plus Probable Reserves
3P	Proved plus Probable plus Possible Reserves
ABEX	Abandonment Expenditure
ACQ	Annual Contract Quantity
°API	Degrees API (American Petroleum Institute)
AAPG	American Association of Petroleum Geologists
AVO	Amplitude versus Offset
A$	Australian Dollars
B	Billion (10^9)
Bbl	Barrels
/Bbl	per barrel
BBbl	Billion Barrels
BHA	Bottom Hole Assembly
BHC	Bottom Hole Compensated
Bscf or Bcf	Billion standard cubic feet
Bscfd or Bcfd	Billion standard cubic feet per day
Bm³	Billion cubic metres
bcpd	Barrels of condensate per day

BHP	Bottom Hole Pressure
blpd	Barrels of liquid per day
bpd	Barrels per day
boe	Barrels of oil equivalent @ xxx mcf/Bbl
boepd	Barrels of oil equivalent per day @ xxx mcf/Bbl
BOP	Blow Out Preventer
bopd	Barrels oil per day
bwpd	Barrels of water per day
BS&W	Bottom sediment and water
BTU	British Thermal Units
bwpd	Barrels water per day
CBM	Coal Bed Methane
CiO	Consumed in Operations
CO_2	Carbon Dioxide
CAPEX	Capital Expenditure
CCGT	Combined Cycle Gas Turbine
cm	centimetres
CMM	Coal Mine Methane
CNG	Compressed Natural Gas
Cp	Centipoise (a measure of viscosity)
CSG	Coal Seam Gas
CT	Corporation Tax
D1BM	Design 1 Build Many
DCQ	Daily Contract Quantity
Deg C	Degrees Celsius
Deg F	Degrees Fahrenheit
DHI	Direct Hydrocarbon Indicator

DLIS	Digital Log Interchange Standard		GDT	Gas Down to
DST	Drill Stem Test		GIIP	Gas Initially In Place
DWT	Dead-weight ton		GJ	Gigajoules (one billion Joules)
E&A	Exploration & Appraisal		GOC	Gas Oil Contact
E&P	Exploration and Production		GOR	Gas Oil Ratio
EBIT	Earnings before Interest and Tax		GRV	Gross Rock Volumes
EBITDA	Earnings before interest, tax, depreciation and amortisation		GTL	Gas to Liquids
ECS	Elemental Capture Spectroscopy		GWC	Gas water contact
EI	Entitlement Interest		HDT	Hydrocarbons Down to
EIA	Environmental Impact Assessment		HSE	Health, Safety and Environment
ELT	Economic Limit Test		HSFO	High Sulphur Fuel Oil
EMV	Expected Monetary Value		HUT	Hydrocarbons up to
EOR	Enhanced Oil Recovery		H_2S	Hydrogen Sulphide
EUR	Estimated Ultimate Recovery		IOR	Improved Oil Recovery
FDP	Field Development Plan		IPP	Independent Power Producer
FEED	Front End Engineering and Design		IRR	Internal Rate of Return
FPSO	Floating Production Storage and Offloading		J	Joule (Metric measurement of energy) I kilojoule = 0.9478 BTU)
FSO	Floating Storage and Offloading		k	Permeability
FWL	Free Water Level		KB	Kelly Bushing
ft	Foot/feet		KJ	Kilojoules (one Thousand Joules)
Fx	Foreign Exchange Rate		kl	Kilolitres
g	gram		km	Kilometres
g/cc	grams per cubic centimetre		km^2	Square kilometres
gal	gallon		kPa	Thousands of Pascals (measurement of pressure)
gal/d	gallons per day		KW	Kilowatt
G&A	General and Administrative costs		KWh	Kilowatt hour
GBP	Pounds Sterling		LAS	Log ASCII Standard
GCoS	Geological Chance of Success		LKG	Lowest Known Gas

LKH	Lowest Known Hydrocarbons		MMBTU	Millions of British Thermal Units
LKO	Lowest Known Oil		Mode	Value that exists most frequently in a set of values = most likely
LNG	Liquefied Natural Gas		Mscfd	Thousand standard cubic feet per day
LoF	Life of Field			
LPG	Liquefied Petroleum Gas		MMscfd	Million standard cubic feet per day
LTI	Lost Time Injury		MW	Megawatt
LWD	Logging while drilling		MWD	Measuring While Drilling
m	Metres		MWh	Megawatt hour
M	Thousand		mya	Million years ago
m^3	Cubic metres		NGL	Natural Gas Liquids
Mcf or Mscf	Thousand standard cubic feet		N_2	Nitrogen
MCM	Management Committee Meeting		NTG	Net/Gross Ratio
MMcf or MMscf	Million standard cubic feet		NPV	Net Present Value
			OBM	Oil Based Mud
m^3/d	Cubic metres per day		OCM	Operating Committee Meeting
mD	Measure of Permeability in millidarcies		ODT	Oil-Down-To
			OGIP	Original Gas in Place
MD	Measured Depth		OIIP	Oil Initially In Place
MDT	Modular Dynamic Tester		OOIP	Original Oil in Place
Mean	Arithmetic average of a set of numbers		OPEX	Operating Expenditure
			OWC	Oil Water Contact
Median	Middle value in a set of values		p.a.	Per annum
MFT	Multi Formation Tester		Pa	Pascals (metric measurement of pressure)
mg/l	milligrams per litre			
MJ	Megajoules (One Million Joules)		P&A	Plugged and Abandoned
Mm^3	Thousand Cubic metres		PDP	Proved Developed Producing
Mm^3/d	Thousand Cubic metres per day		Phie	effective porosity
MM	Million		PI	Productivity Index
MMm^3	Million Cubic metres		PIIP	Petroleum Initially In Place
MMm^3/d	Million Cubic metres per day		PJ	Petajoules (10^{15} Joules)
MMBbl	Millions of barrels			

PSDM	Post Stack Depth Migration		Swi	irreducible water saturation
psi	Pounds per square inch		Sw	Water Saturation
psia	Pounds per square inch absolute		T	Tonnes
psig	Pounds per square inch gauge		TD	Total Depth
PUD	Proved Undeveloped		Te	Tonnes equivalent
PVT	Pressure, Volume and Temperature		THP	Tubing Head Pressure
P10	10% Probability		TJ	Terajoules (10^{12} Joules)
P50	50% Probability		Tscf or Tcf	Trillion standard cubic feet
P90	90% Probability		TCM	Technical Committee Meeting
RF	Recovery factor		TOC	Total Organic Carbon
RFT	Repeat Formation Tester		TOP	Take or Pay
RT	Rotary Table		Tpd	Tonnes per day
R/P	Reserve to Production		TVD	True Vertical Depth
R_w	Resistivity of water		TVDss	True Vertical Depth Subsea
SCAL	Special core analysis		UFR	Umbilical Flow Lines and Risers
cf or scf	Standard Cubic Feet		USGS	United States Geological Survey
cfd or scfd	Standard Cubic Feet per day		US$	United States dollar
scf/ton	Standard cubic foot per ton		VLCC	Very Large Crude Carrier
SL	Straight line (for depreciation)		Vsh	shale volume
S_o	Oil Saturation		VSP	Vertical Seismic Profiling
SPM	Single Point Mooring		WC	Water Cut
SPE	Society of Petroleum Engineers		WI	Working Interest
SPEE	Society of Petroleum Evaluation Engineers		WPC	World Petroleum Council
SPS	Subsea Production System		WTI	West Texas Intermediate
SS	Subsea		wt%	Weight percent
stb	Stock tank barrel			
STOIIP	Stock tank oil initially in place			