SUMMARY FOR SGX OF INDEPENDENT RESERVES AUDIT OF THE YUMNA FIELD AND EVALUATION OF PROSPECTIVE RESOURCES, BLOCK 50, OFFSHORE OMAN

Masirah Oil Limited

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Summary of Independent reserves audit of Yumna Field and evaluation of prospective resources, Block 50, offshore Oman
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Independent Reserves Audit of the Yumna Field and Evaluation of Prospective Resources, Block 50, Offshore Oman

In response to a request by Masirah Oil Limited ("Masirah"), and Amendment No. 3, dated 1 May 2020, to the original Letter of Engagement dated 17 October 2019 with Masirah (the "Agreement"), RPS Energy Consultants Ltd ("RPS") has completed an independent evaluation of the Reserves in the Yumna Field and Prospective Resources identified within the area of 3D seismic coverage in Block 50, Oman.

A full report was issued by RPS under the appointment by Masirah and is produced as part of the Services detailed therein and subject to the terms and conditions of the Agreement. A summary report was issued on 26th October 2020. The current report presents results required to meet the applicable requirements of Practice Note 4C of the Catalist Rules of the Singapore Exchange Securities Trading Limited (SGX) for a Summary Qualified Person's Report.

As per the Agreement, we have estimated Proved, Probable and Possible Reserves for the Yumna Field as of 1 July 2020 and estimated the Prospective Resources identified within the area of Block 50 covered by 3D seismic.

The work was undertaken by a team of petroleum engineers and geoscientists and is based on data supplied by Masirah. Our approach has been to audit Masirah' s seismic interpretation, static model and dynamic modelling of recoverable volumes, based on the 2019 SPE Reserves Auditing Standards. In estimating Reserves, we have used standard petroleum engineering techniques. We have estimated the degree of uncertainty inherent in the measurements and interpretation of the data and have calculated a range of reserves based on the data provided by Masirah.

We have taken the working interest that Masirah has in the field as presented by Masirah. We have not investigated, nor do we make any warranty as to Masirah's interests in the Assets.

No site visit was conducted as part of this study.

INTRODUCTION

RPS has estimated the volumes of the Proved Reserves ("1P"), Proved plus Probable Reserves ("2P") and Proved plus Probable plus Possible Reserves ("3P") for the Yumna Field (see Appendix A for glossary). These estimates were based on data and information available to June 2020 and have an effective date of 1st July 2020.

The RPS audit is based on the 2019 SPE Reserves Auditing Standards. All Reserves and Resources definitions and estimates shown in this report are based on the 2018 Petroleum Resource Management System of SPE/WPC/AAPG/SPEE/SEG/SPWLA/EAGE (“PRMS”) as the standard for classification and reporting (see Appendix B). The report has also been prepared in accordance with the disclosure requirements in Practice Note 4C of the Catalist Rules of the SGX.

Masirah provided seismic data and interpretations, a static model and dynamic model for the Yumna Field along with available test, drilling, fluid analysis data and wireline logs for GAS-1 and Yumna-1 and available data for the previous wells drilled in Block 50. Additional data included a PVT study by Dewpoint. Historical production data from the Yumna Field was provided from February 2020 to the end of June 2020.

RPS has audited geological interpretations, in-place volume estimates and production forecasts for the Yuma development and reviewed estimated costs for the development. RPS has used its expectation of the long-term Brent Oil price and the fiscal terms of the licence to determine Reserves. Block 50 is operated under an Exploration and Production Sharing Agreement (EPSA) between the Government of the Sultanate of Oman and the contractor (Masirah).

RPS has audited 14 prospects identified by Masirah within the area of 3D seismic coverage in Block 50 and audited the volume ranges and risks. On the basis of the independent audit, RPS has prepared a:

- Summary of Licence details (Table 1)
- Estimate of in-place volumes in the Yumna Field (Table 2)
- RPS Brent Price Assumption (Table 3)
- Reserves Summary for the Yumna Field (Table 4)
- Summary of Net Present Value (NPV) for the Yumna Field (Table 5)
- Prospective Resources Summary (Table 6)

LICENCE DETAILS

The Block 50 licence is located off the east coast of Oman (Figure 1). The licence was initially awarded to Masirah in 2011. Block 50 is operated under an EPSA between the Government of the Sultanate of Oman and Masirah. The initial licence period was for three years and was extended to 2021.

Seven exploration wells have been drilled in the licence area to date, four of which have been drilled by Masirah since 2013. The latest exploration well discovered the Yumna Field. Following the discovery of the Yumna Field, an FDP was submitted and the request for approval of the Yumna FDP was endorsed on June 24, 2020 by the Sultanate of Oman Ministry of Oil and Gas. A Declaration of Commerciality (DOC) was approved on July 12, 2020. There is an agreement for a 10-year production phase on Yumna after DOC or until the field waters out, whichever is the sooner. During this phase three wells are committed to be drilled, two on Yumna and one exploration well. Licence details are summarised in Table 1.

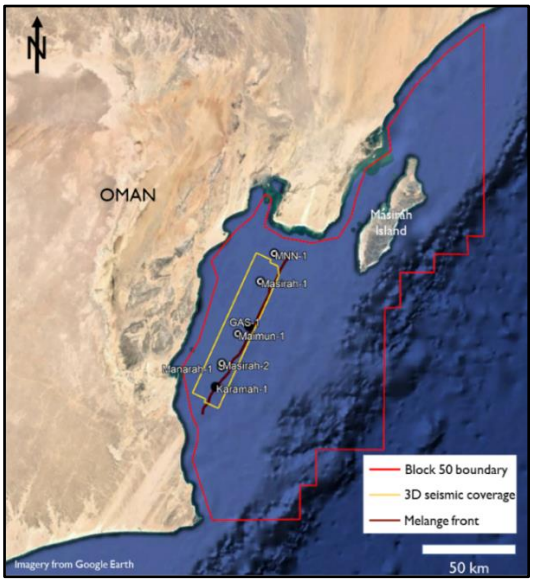

Figure 1: Block 50 Licence, 3D Seismic Coverage and Well Locations

Asset name/ Country	Issuer's interest (%)	Development Status	Licence expiry date	Licence Area (sq. km)	Type of deposit	Remarks
Block 50 Oman	Masirah Oil Limited 100%	Production	After approval of the FDP and DOC, the production phase was granted until July 2030, or until the field waters out	16,903	Oil	

Table 1: Licence Details

YUMNA FIELD

The Yumna Field is located in 30 m of water, approximately 40 km northwest of the town of Duqm. It was discovered by the GAS-1 well, spudded in December 2013, which tested a NE-trending fault block and encountered oil in the Upper Sandstone member of the Campanian, Lower Aruma Sandstone Formation. A test flowed 38-42°API oil at a maximum rate of 3,481 stb/d. The first development well, Yumna-1, was drilled in 2019.

RPS audited the latest seismic interpretation by Masirah and used it as the basis for estimation of in-place volumes. RPS audited the parameters from the static model to estimate the range input parameters for the probabilistic estimate of stock tank oil-initially-in-place (STOIIP). The STOIIP is given in Table 2.

STOIIP (MMstb)			
1P	2P	3P	Mean
11.5	18.1	26.7	18.7

Table 2: Yumna Field In-Place Volume Estimates

The Omani government originally granted Masirah a nine-month long term test period. Masirah has since embarked on a fast track development. After achieving first oil production in February 2020 through the long-term test from the drilling rig, production was transferred to a Mobile Offshore Production Unit (MOPU) in

April 2020. Processed oil flows to a storage tanker, moored 500 m away, via a flexible flowline. Produced water is cleaned and discharged overboard. Export of crude from the storage tanker will be by ship-to-ship offloading. The development plan comprises three wells; the existing production well Yumna-1, followed by a second producer Yumna-2 and an injection well Yumna-3, both to be drilled in Q1 2021. At present, the liquid handling capacity is 13,000 bbl/d. Additional equipment will be installed before the Yumna-2 well is on-line, to increase the limit to 26,000 bbl/d.

By the end of June 2020, the field had produced a total of 1.05 MMstb. Water breakthrough in the Yumna-1 well occurred four months after production started in February 2020. To end June, total water production has been 5.4 Mstb with a current water cut of approximately 4%.

RPS is unaware of any social, environmental or health and safety considerations that would prevent the further development of the field.

Block 50 is operated under an EPSA between the Government of the Sultanate of Oman and Masirah. RPS has reviewed estimates of capital, operating and abandonment costs for the development and has used its expectation of the long-term Brent Oil price and the existing (EPSA) fiscal terms of the licence in a discounted cash flow analysis to determine Reserves. Abandonment costs include all costs for plugging and abandoning wells, demobilisation of vessels, and flowline removal. These estimated abandonment costs include the necessary environmental and rehabilitation requirements.

As noted above, Block 50 is operated under an EPSA. A summary of the key commercial terms follows:

The following assumptions have been included in the economic modelling of entitlement resources:

- **Cost Recovery:** the revenue available for cost recovery. The following costs are recoverable as follows:
  - Exploration capital expenditure (no depreciation)
  - Development capital expenditure (no depreciation)
  - Operating costs
  - Unrecovered costs may be carried forward without limit
- **Profit Sharing:** All production remaining after cost recovery is eligible for profit sharing and shared between the government and the contractor.
- **Prices**: The RPS Base Case Brent price has been used for oil calculations presented in this report (Table 3).

Year	RPS Energy Brent Crude Price MOD USD/bbl
2020	40.0
2021	43.0
2022	48.0
2023	58.0
2024	62.0
2025	68.0
2026	78.8
2027	80.4
2028	82.0
2029	+2.00% p.a.

Table 3: RPS Brent Price Assumption

  - A -1.14% differential was applied to the Brent price based on the average differential between Dubai price and Brent price over the last two years.

- **Inflation:** All costs and prices are inflated by 2% per annum from 2021 onwards.

RPS has been advised by Masirah that the Sultanate of Oman Ministry of Oil and Gas is most unlikely to exercise its right to back-in to 25% working interest. Accordingly, full field gross and Masirah Net Entitlement Reserves, assuming Masirah has 100% interest in the licence, are presented at the 1P, 2P and 3P levels in Table 4. RPS has classified the Reserves, "Approved for Development" as all necessary approvals have been obtained, capital funds have been committed and implementation of the development project is underway.

Category	Gross Attributable to Licence [1, 2] (MMstb)	Masirah Net Entitlement Volume [3, 2]		Risk Factors	Remarks
		MMstb [4]	Change from Previous Update		
Reserves					
Low (1P)	4.4	2.8	100% [5]	N/A [6]	
Base (2P)	9.6	6.1	100% [5]	N/A [6]	
High (3P)	14.6	9.2	100% [5]	N/A [6]	

Notes:

1. *Gross field Reserves (100% basis) after economic limit test*
2. *Economic cut off year for the 1P, 2P and 3P reserves is 2023, 2027 and 2029, respectively*
3. *Companies net entitlement Reserves after economic limit test*
4. *Production to 30 June 2020 of 1.05 MMstb has been subtracted.*
5. *Volumes are presented for the first time*
6. *No risk is applied to Reserves*

Table 4: Yumna Field Reserves (Approved for Development) as of 1st July 2020

The net present value (NPV) of the 1P, 2P and 3P Reserves in the Yumna Field are summarised in Table 5 at different discount rates.

NPV, ($MM MOD) at Different Discount Rates					
Case	**0.0%**	**5.0%**	**10.0%**	**15.0%**	**20.0%**
1P	-3.7	-2.3	-1.2	-0.2	0.6
2P	102.3	96.5	91.2	86.2	81.8
3P	234.8	214.8	197.5	182.6	169.8

Table 5: Summary of Economic Results as of 1st July 2020

PROSPECTIVE RESOURCES

Prior to Yumna production, seven exploration wells had been drilled on the block. Of these, only the Yumna discovery well, GA South-1, has discovered producible oil in potentially commercial quantities. There has been no other production from the licence.

RPS audited eleven Aruma and Natih Formation prospects and three Cenozoic prospects identified by Masirah within the area of 3D seismic coverage.

The estimated in-place volumes, prospective resources and associated geological probability of success for each prospect is summarised in Table 6.

Prospect Details		Prospective Resources [1]						Risk Factor (Pg, %) [2,3]
		Full Field Gross (MMstb)			Masirah Working Interest (MMstb)			
Prospect	Segment	1U	2U	3U	1U	2U	3U	
GAS South	North[4]	0.1	0.6	1.4	0.1	0.6	1.4	33
	South	0.05	0.1	0.3	0.05	0.1	0.3	25
Karamah South	East[4]	0.8	4.2	12	0.8	4.2	12	34
	West[4]	4.4	13	29	4.4	13	29	42
Karamah Updip		1.9	7.4	21	1.9	7.4	21	20
Karamah West	Northwest[4]	2.6	9.7	25	2.6	9.7	25	30
	Southeast[4]	0.3	1.6	4.5	0.3	1.6	4.5	23
Luna[4]		3.8	18	43	3.8	18	43	35
Luna Southwest	East[4]	0.4	1.1	2.5	0.4	1.1	2.5	14
	West[4]	2.0	7.0	17	2.0	7.0	17	14
Maimun East[4]		0.02	0.2	0.8	0.02	0.2	0.8	38
Manarah North	Northeast[4]	2.4	12	28	2.4	12	28	40
	Central[4]	1.8	10	22	1.8	10	22	29
	Southwest[4]	1.4	5.8	13	1.4	5.8	13	29
Mimas	North[4]	0.5	1.8	4.1	0.5	1.8	4.1	27
	South	0.03	0.2	0.5	0.03	0.2	0.5	18
Pluto[4]		1.3	4.0	9.8	1.3	4.0	9.8	39
Wild West[4]		0.6	2.7	6.5	0.6	2.7	6.5	5
Avalanche	1	1.2	3.4	7.5	1.2	3.4	7.5	4
	2	1.1	4.8	15	1.1	4.8	15	4
	3	0.3	1.2	3.0	0.3	1.2	3.0	4
	4	0.6	1.7	3.8	0.6	1.7	3.8	4
Karamah South Fan	Northwest	0.1	0.6	1.7	0.1	0.6	1.7	4
	Southeast	0.9	2.2	4.3	0.9	2.2	4.3	4
Manarah North Channel		23	39	63	23	39	63	6

1. *Volumes are presented for the first time so there is no change in volume.*
2. *Pg where statistical aggregation has been applied assumes at least one horizon is successful. This total takes into account all possible successful outcomes and the mean value of this distribution represents the true expectation of success.*
3. *See Appendix B for definition of Pg.*
4. *This is a statistically consolidated total. The process of statistical addition will, as a result of the central limit theorem, produce a 1U that is greater than the arithmetic sum of all 1U quantities and a 3U that is less than the arithmetic sum of all 3U quantities.*

Table 6: Summary of Prospective Resources and Geological Chance of Success (Pg) for Block 50 Prospects

BASIS OF OPINION

The evaluation presented in this report reflects our informed judgment, based on accepted standards of professional investigation, but is subject to generally recognised uncertainties associated with the interpretation of geological, geophysical and engineering data. The evaluation has been conducted within our understanding of petroleum legislation, taxation and other regulations that currently apply to these interests. However, RPS is not in a position to attest to the property title, financial interest relationships or encumbrances related to the property. Our estimates of Reserves are based on data provided by Masirah. We have accepted, without independent verification, the accuracy and completeness of this data. RPS accepts no responsibility for any documents or information supplied to RPS by Masirah or others, having

made reasonable enquiries and exercised our judgement on the reasonable use of such information, and found no reason to doubt the accuracy or reliability of the information.

No liability is accepted by RPS for any use of this report, other than the purpose for which it was prepared. The report does not account for any changes relating to the subject matter of the report, or any legislative or regulatory changes that have occurred since the report was produced and that may affect the report. RPS does not accept any responsibility or liability for loss whatsoever to any third party caused by, related to or arising out of any use or reliance on the report. The report represents RPS's best professional judgment and should not be considered a guarantee or prediction of results. It should be understood that any evaluation, particularly one involving future performance and development activities may be subject to significant variations over short periods of time as new information becomes available. This report relates specifically and solely to the subject assets and is conditional upon various assumptions that are described herein. This report must, therefore, be read in its entirety. This report was provided for the sole use of Masirah, its holding company Rex International Holding Limited (Rex) and their corporate advisors on a fee basis.

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CONSULTANT'S INFORMATION

RPS is an independent consultancy specialising in petroleum reservoir evaluation and economic analysis. The evaluation presented in this report reflects our informed judgment, based on accepted standards of professional investigation, but is subject to generally recognised uncertainties associated with the interpretation of geological, geophysical and engineering data. The evaluation has been conducted within our understanding of petroleum legislation, taxation and other regulations that currently apply to these interests. However, RPS is not in a position to attest to the property title, financial interest relationships or encumbrances related to the property. Our estimates of Reserves and Resources are based on data provided by Masirah. RPS has made reasonable enquiries and exercised our judgement on the reasonable use of such information and have found no reason to doubt the accuracy or reliability of the information.

The report represents RPS' best professional judgment and should not be considered a guarantee or prediction of results. It should be understood that any evaluation, particularly one involving future performance and development activities may be subject to significant variations over short periods of time as new information becomes available. This report relates specifically and solely to the subject assets and is conditional upon various assumptions that are described herein. This report must, therefore, be read in its entirety. This report was provided for the sole use of Masirah, its holding company Rex International Holding Limited and their corporate advisors. The provision of professional services has been solely on a fee basis.

To the best of our knowledge, no conflict of interest has existed in the work conducted as part of this report. Furthermore, RPS nor any of the management and employees involved in the work have any interest in the assets evaluated or related to the analysis carried out as part of this report.

The provision of professional services has been solely on a fee basis. Gordon Taylor, Director has supervised this evaluation. Mr Taylor is a Chartered Geologist and Chartered Engineer with over 40 years' experience in upstream oil and gas. The project has been managed by Clare Wilson, a Chartered Geologist who has 24 years' experience in upstream oil and gas. Other RPS employees involved in this work hold at least a degree in geology, geophysics, petroleum engineering or a related subject or have at least five years of relevant experience in the practice of geology, geophysics or petroleum engineering. A summary of staff involved in this evaluation, their level of experience and professional qualifications is given in Appendix C.

Yours sincerely,
for RPS Energy Consultants Ltd

Gordon Taylor CGeol, CEng
Director, Consulting

Name	Role	Signature
Clare Wilson	Project Manager/Geophysics	*Signatories unavailable, working from home*
David Offer	Geology	
Adolfo Perez	Engineering	
John Alcock	Costs and facilities	
Juan Raggi Lopez	Economics	

Appendix A

Glossary of Terms and Abbreviations

1C	The low estimate of Contingent Resources. There is estimated to be a 90% probability that the quantities actually recovered could equal or exceed this estimate
2C	The best estimate of Contingent Resources. There is estimated to be a 50% probability that the quantities actually recovered could equal or exceed this estimate
3C	The high estimate of Contingent Resources. There is estimated to be a 10% probability that the quantities actually recovered could equal or exceed this estimate
1P	The low estimate of Reserves (proved). There is estimated to be a 90% probability that the quantities remaining to be recovered will equal or exceed this estimate
2P	The best estimate of Reserves (proved+probable). There is estimated to be a 50% probability that the quantities remaining to be recovered will equal or exceed this estimate
3P	The high estimate of Reserves (proved+probable+possible). There is estimated to be a 10% probability that the quantities remaining to be recovered will equal or exceed this estimate
1U	The low estimate of Prospective Resources. There is estimated to be a 90% probability that the quantities actually recovered could equal or exceed this estimate
2U	The best estimate of Prospective Resources. There is estimated to be a 50% probability that the quantities actually recovered could equal or exceed this estimate
3U	The high estimate of Prospective Resources. There is estimated to be a 10% probability that the quantities actually recovered could equal or exceed this estimate
AVO	Amplitude versus Offset
B	Billion
bbl(s)	Barrels
bbls/d	barrels per day
Bcm	billion cubic metres
B_g	gas formation volume factor
B_{gi}	gas formation volume factor (initial)
B_o	oil formation volume factor
B_{oi}	oil formation volume factor (initial)
B_w	water volume factor
boe	Barrels of oil equivalent
stb/d	barrels of oil per day
BHP	Bottom hole pressure
Bscf	billions of standard cubic feet
bwpd	barrels of water per day
condensate	liquid hydrocarbons which are sometimes produced with natural gas and liquids derived from natural gas
cP	Centipoise
Eclipse	a fluid modelling software package
Egi	Gas Expansion Factor
EMV	Expected Monetary Value
EUR	Estimated Ultimate Recovery

FBHP	flowing bottom hole pressure
FTHP	flowing tubing head pressure
ft	Feet
FWHP	Flowing well head pressure
FWL	Free Water Level
GDT	Gas Down To
GIIP	Gas Initially in Place
GOC	Gas oil Contact
GOR	gas/oil ratio
GRV	gross rock volume
GWC	gas water contact
IPR	Inflow performance relationship
IRR	internal rate of return
KB	Kelly Bushing
k_a	absolute permeability
k_h	horizontal permeability
km	Kilometres
LPG	Liquefied Petroleum Gases
m	Metres
m^3	cubic metres
m^3/d	cubic metres per day
ma	million years
M	Thousand
M$	thousand US dollars
MBAL	Material balance software
Mbbls	thousand barrels
mD	permeability in millidarcies
MD	measured depth
MDT	Modular formation dynamics tester tool
MM	Million
MMbbls	million barrels
MMscf/d	millions of standard cubic feet per day
MMstb	million stock tank barrels (at 14.7 psi and 60° F)
MMt	millions of tonnes
MM$	million US dollars
MPa	mega pascals
m/s	metres per second
msec	Milliseconds
Mt	thousands of tonnes

mV	Millivolts
NTG or N:G	Net-to-gross ratio
NGL	Natural Gas Liquids
NPV	Net Present Value
OWC	oil water contact
P90	There is estimated to be at least a 90% probability (P90) that this quantity will equal or exceed this low estimate
P50	There is estimated to be at least a 50% probability (P50) that this quantity will equal or exceed this best estimate
P10	There is estimated to be at least a 10% probability (P10) that this quantity will equal or exceed this high estimate
PDR	Physical Data Room
Petrel	A geoscience and reservoir engineering software package
petroleum	deposits of oil and/or gas
phi	porosity fraction
p_i	initial reservoir pressure
PI	productivity index
ppm	parts per million
psi	pounds per square inch
psia	pounds per square inch absolute
p_{wf}	flowing bottom hole pressure
PSDM	Pre-stack depth migrated seismic data
PSTM	Pre-stack time migrated seismic data
PVT	pressure volume temperature
rb	barrel(s) of oil at reservoir conditions
rcf	reservoir cubic feet
REP™	A Monte Carlo simulation software package
RF	Recovery factor
RFT	repeat formation tester
RKB	relative to kelly bushing
rm^3	reservoir cubic metres
SCADA	supervisory control and data acquisition
SCAL	Special Core Analysis
scf	standard cubic feet measured at 14.7 pounds per square inch and 60° F
scf/d	standard cubic feet per day
scf/stb	standard cubic feet per stock tank barrel
SGS	Sequential Gaussion Simulation
SIBHP	Shut in bottom hole pressure
SIS	Sequential Indicator Simulation
SMT	A geoscience software package
sm^3	standard cubic metres

S_o	oil saturation
S_{oi}	irreducible oil saturation
S_{or}	residual oil saturation
S_{orw}	residual oil saturation (waterflood)
sq. km	square kilometers
stb	stock tank barrels measured at 14.7 pounds per square inch and 60° F
stb/d	stock tank barrels per day
STOIIP	stock tank oil initially in place
S_w	water saturation
S_{wc}	connate water saturation
$	United States Dollars
t	Tonnes
THP	tubing head pressure
Tscf	trillion standard cubic feet
TVDSS	true vertical depth (sub-sea)
TVT	true vertical thickness
TWT	two-way time
US$	United States Dollar
VDR	Virtual data room
VLP	Vertical lift performance
V_{sh}	shale volume
VSP	Vertical Seismic Profile
W/m/K	watts/metre/° K
WC	water cut
WUT	Water Up To
Z	a measure of the “non-idealness” of gas
ø	Porosity
μ	Viscosity
μ_{gb}	viscosity of gas
μ_{ob}	viscosity of oil
μ_w	viscosity of water

Appendix B
PRMS Definitions

PRMS is a fully integrated system that provides the basis for classification and categorization of all petroleum reserves and resources.

B.1 Basic Principles and Definitions

A classification system of petroleum resources is a fundamental element that provides a common language for communicating both the confidence of a project's resources maturation status and the range of potential outcomes to the various entities. The PRMS provides transparency by requiring the assessment of various criteria that allow for the classification and categorization of a project's resources. The evaluation elements consider the risk of geologic discovery and the technical uncertainties together with a determination of the chance of achieving the commercial maturation status of a petroleum project.

The technical estimation of petroleum resources quantities involves the assessment of quantities and values that have an inherent degree of uncertainty. Quantities of petroleum and associated products can be reported in terms of volumes (e.g., barrels or cubic meters), mass (e.g., metric tonnes) or energy (e.g., Btu or Joule). These quantities are associated with exploration, appraisal, and development projects at various stages of design and implementation. The commercial aspects considered will relate the project's maturity status (e.g., technical, economical, regulatory, and legal) to the chance of project implementation.

The use of a consistent classification system enhances comparisons between projects, groups of projects, and total company portfolios. The application of PRMS must consider both technical and commercial factors that impact the project's feasibility, its productive life, and its related cash flows.

B.1.1 Petroleum Resources Classification Framework

Petroleum is defined as a naturally occurring mixture consisting of hydrocarbons in the gaseous, liquid, or solid state. Petroleum may also contain non-hydrocarbons, common examples of which are carbon dioxide, nitrogen, hydrogen sulfide, and sulfur. In rare cases, non-hydrocarbon content can be greater than 50%.

The term resources as used herein is intended to encompass all quantities of petroleum naturally occurring within the Earth's crust, both discovered and undiscovered (whether recoverable or unrecoverable), plus those quantities already produced. Further, it includes all types of petroleum whether currently considered as conventional or unconventional resources.

Figure A.1 graphically represents the PRMS resources classification system. The system classifies resources into discovered and undiscovered and defines the recoverable resources classes: Production, Reserves, Contingent Resources, and Prospective Resources, as well as Unrecoverable Petroleum.

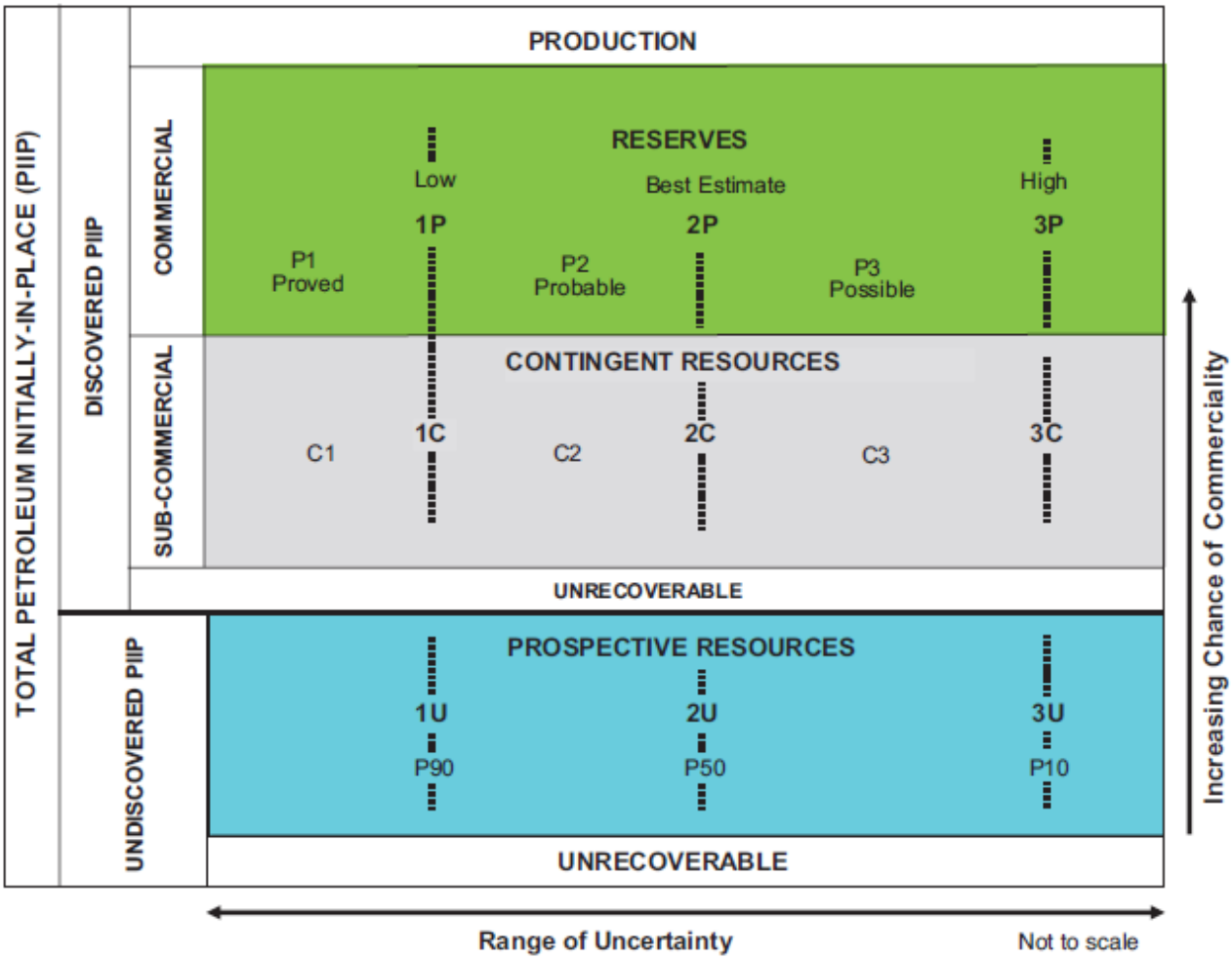

Figure A.1: Resources classification framework

The horizontal axis reflects the range of uncertainty of estimated quantities potentially recoverable from an accumulation by a project, while the vertical axis represents the chance of commerciality, P_c, which is the chance that a project will be committed for development and reach commercial producing status.

The following definitions apply to the major subdivisions within the resources classification:

- **Total Petroleum Initially-In-Place (PIIP)** is all quantities of petroleum that are estimated to exist originally in naturally occurring accumulations, discovered and undiscovered, before production.
- **Discovered PIIP** is the quantity of petroleum that is estimated, as of a given date, to be contained in known accumulations before production.
- **Production** is the cumulative quantities of petroleum that have been recovered at a given date. While all recoverable resources are estimated, and production is measured in terms of the sales product specifications, raw production (sales plus non-sales) quantities are also measured and required to support engineering analyses based on reservoir voidage (see PRMS 2018 Section 3.2, Production Measurement).

Multiple development projects may be applied to each known or unknown accumulation, and each project will be forecast to recover an estimated portion of the initially-in-place quantities. The projects shall be subdivided into commercial, sub-commercial, and undiscovered, with the estimated recoverable quantities

being classified as Reserves, Contingent Resources, or Prospective Resources respectively, as defined below.

- **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 (as of the evaluation's effective date) based on the development project(s) applied.

  Reserves are recommended as sales quantities as metered at the reference point. Where the entity also recognizes quantities consumed in operations (CiO) (see PRMS 2018 Section 3.2.2), as Reserves these quantities must be recorded separately. Non-hydrocarbon quantities are recognized as Reserves only when sold together with hydrocarbons or CiO associated with petroleum production. If the non-hydrocarbon is separated before sales, it is excluded from Reserves.

  Reserves are further categorized in accordance with the range of uncertainty and should be sub-classified based on project maturity and/or characterized by development and production status.

- **Contingent Resources** are those quantities of petroleum estimated, as of a given date, to be potentially recoverable from known accumulations, by the application of development project(s) not currently considered to be commercial owing to one or more contingencies. Contingent Resources have an associated chance of development. Contingent Resources may include, for example, projects for which there are currently no viable markets, or where commercial recovery is dependent on technology under development, or where evaluation of the accumulation is insufficient to clearly assess commerciality. Contingent Resources are further categorized in accordance with the range of uncertainty associated with the estimates and should be sub- classified based on project maturity and/or economic status.

- **Undiscovered PIIP** is that quantity of petroleum estimated, as of a given date, to be contained within accumulations yet to be discovered.

- **Prospective Resources** are those quantities of petroleum estimated, as of a given date, to be potentially recoverable from undiscovered accumulations by application of future development projects. Prospective Resources have both an associated chance of geologic discovery and a chance of development. Prospective Resources are further categorized in accordance with the range of uncertainty associated with recoverable estimates, assuming discovery and development, and may be sub-classified based on project maturity.

- **Unrecoverable Resources** are that portion of either discovered or undiscovered PIIP evaluated, as of a given date, to be unrecoverable by the currently defined project(s). A portion of these quantities may become recoverable in the future as commercial circumstances change, technology is developed, or additional data are acquired. The remaining portion may never be recovered because of physical/chemical constraints represented by subsurface interaction of fluids and reservoir rocks.

The sum of Reserves, Contingent Resources, and Prospective Resources may be referred to as "remaining recoverable resources." Importantly, these quantities should not be aggregated without due consideration of the technical and commercial risk involved with their classification. When such terms are used, each classification component of the summation must be provided.

Other terms used in resource assessments include the following:

- **Estimated Ultimate Recovery (EUR)** is not a resources category or class, but a term that can be applied to an accumulation or group of accumulations (discovered or undiscovered) to define those quantities of petroleum estimated, as of a given date, to be potentially recoverable plus those quantities already produced from the accumulation or group of accumulations. For clarity, EUR must reference the associated technical and commercial conditions for the resources; for example, proved EUR is Proved Reserves plus prior production.

- **Technically Recoverable Resources (TRR)** are those quantities of petroleum producible using currently available technology and industry practices, regardless of commercial considerations. TRR may be used for specific Projects or for groups of Projects, or, can be an undifferentiated estimate within an area (often basin-wide) of recovery potential.

Whenever these terms are used, the conditions associated with their usage must be clearly noted and documented.

B.1.2 Project Based Resource Evaluations

The resources evaluation process consists of identifying a recovery project or projects associated with one or more petroleum accumulations, estimating the quantities of PIIP, estimating that portion of those in-place quantities that can be recovered by each project, and classifying the project(s) based on maturity status or chance of commerciality.

The concept of a project-based classification system is further clarified by examining the elements contributing to an evaluation of net recoverable resources (see Figure A.2).

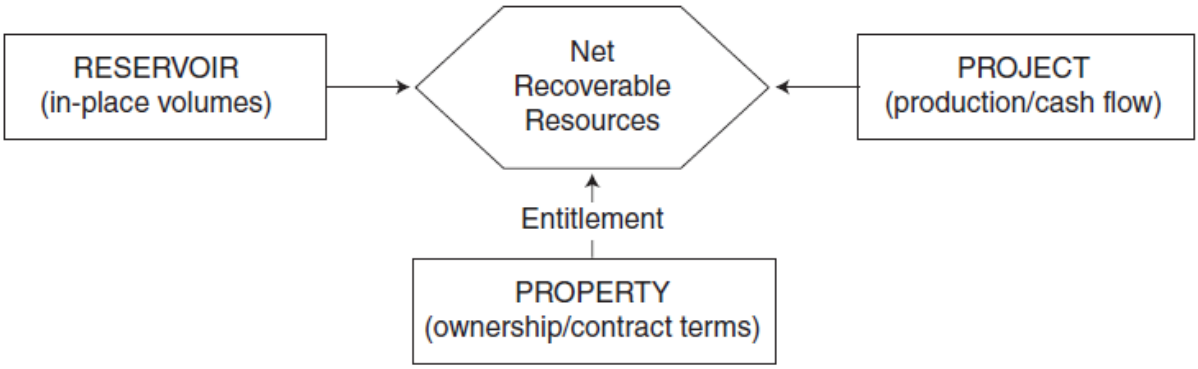

Figure A.2: Resources Evaluation

The reservoir (contains the petroleum accumulation): Key attributes include the types and quantities of PIIP and the fluid and rock properties that affect petroleum recovery.

The project: A project may constitute the development of a well, a single reservoir, or a small field; an incremental development in a producing field; or the integrated development of a field or several fields together with the associated processing facilities (e.g., compression). Within a project, a specific reservoir's development generates a unique production and cash-flow schedule at each level of certainty.

The integration of these schedules taken to the project's earliest truncation caused by technical, economic, or the contractual limit defines the estimated recoverable resources and associated future net cash flow projections for each project. The ratio of EUR to total PIIP quantities defines the project's recovery efficiency. Each project should have an associated recoverable resources range (low, best, and high estimate).

The property (lease or license area): Each property may have unique associated contractual rights and obligations, including the fiscal terms. This information allows definition of each participating entity's share of produced quantities (entitlement) and share of investments, expenses, and revenues for each recovery project and the reservoir to which it is applied. One property may encompass many reservoirs, or one reservoir may span several different properties. A property may contain both discovered and undiscovered accumulations that may be spatially unrelated to a potential single field designation.

An entity's net recoverable resources are the entitlement share of future production legally accruing under the terms of the development and production contract or license.

In the context of this relationship, the project is the primary element considered in the resources classification, and the net recoverable resources are the quantities derived from each project. A project represents a defined activity or set of activities to develop the petroleum accumulation(s) and the decisions taken to mature the resources to reserves. In general, it is recommended that an individual project has assigned to it a specific maturity level sub-class (See PRMS 2018 Section 2.1.3.5, Project Maturity Sub-Classes) at which a decision is made whether or not to proceed (i.e., spend more money) and there should be an associated range of estimated recoverable quantities for the project (See PRMS 2018 Section 2.2.1, Range of Uncertainty). For completeness, a developed field is also considered to be a project.

An accumulation or potential accumulation of petroleum is often subject to several separate and distinct projects that are at different stages of exploration or development. Thus, an accumulation may have recoverable quantities in several resources classes simultaneously. When multiple options for development exist early in project maturity, these options should be reflected as competing project alternatives to avoid double counting until decisions further refine the project scope and timing. Once the scope is described and the timing of decisions on future activities established, the decision steps will generally align with the project's classification. To assign recoverable resources of any class, a project's development plan, with detail that supports the resource commercial classification claimed, is needed.

The estimates of recoverable quantities must be stated in terms of the production derived from the potential development program even for Prospective Resources. Given the major uncertainties involved at this early stage, the development program will not be of the detail expected in later stages of maturity. In most cases, recovery efficiency may be based largely on analogous projects. In-place quantities for which a feasible project cannot be defined using current or reasonably forecast improvements in technology are classified as Unrecoverable.

Not all technically feasible development projects will be commercial. The commercial viability of a development project within a field's development plan is dependent on a forecast of the conditions that will exist during the time period encompassed by the project (see PRMS 2018 Section 3.1, Assessment of Commerciality).

Conditions include technical, economic (e.g., hurdle rates, commodity prices), operating and capital costs, marketing, sales route(s), and legal, environmental, social, and governmental factors forecast to exist and impact the project during the time period being evaluated. While economic factors can be summarized as forecast costs and product prices, the underlying influences include, but are not limited to, market conditions (e.g., inflation, market factors, and contingencies), exchange rates, transportation and processing infrastructure, fiscal terms, and taxes.

The resources being estimated are those quantities producible from a project as measured according to delivery specifications at the point of sale or custody transfer (see PRMS 2018 Section 3.2.1, Reference Point) and may permit forecasts of CiO quantities (see PRMS 2018 Section 3.2.2., Consumed in Operations). The cumulative production forecast from the effective date forward to cessation of production is the remaining recoverable resources quantity (see PRMS 2018 Section 3.1.1, Net Cash-Flow Evaluation).

The supporting data, analytical processes, and assumptions describing the technical and commercial basis used in an evaluation must be documented in sufficient detail to allow, as needed, a qualified reserves evaluator or qualified reserves auditor to clearly understand each project's basis for the estimation, categorization, and classification of recoverable resources quantities and, if appropriate, associated commercial assessment.

B.2 Classification and Categorization Guidelines

To consistently characterize petroleum projects, evaluations of all resources should be conducted in the context of the full classification system shown in Figure A.1. These guidelines reference this classification system and support an evaluation in which projects are "classified" based on their chance of commerciality, P_c (the vertical axis labeled Chance of Commerciality), and estimates of recoverable and marketable quantities associated with each project are "categorized" to reflect uncertainty (the horizontal axis). The actual workflow of classification versus categorization varies with individual projects and is often an iterative

analysis leading to a final report. Report here refers to the presentation of evaluation results within the entity conducting the assessment and should not be construed as replacing requirements for public disclosures under guidelines established by regulatory and/or other government agencies.

B.2.1 Resources Classification

The PRMS classification establishes criteria for the classification of the total PIIP. A determination of a discovery differentiates between discovered and undiscovered PIIP. The application of a project further differentiates the recoverable from unrecoverable resources. The project is then evaluated to determine its maturity status to allow the classification distinction between commercial and sub-commercial projects. PRMS requires the project's recoverable resources quantities to be classified as either Reserves, Contingent Resources, or Prospective Resources.

B.2.1.1 Determination of Discovery Status

A discovered petroleum accumulation is determined to exist when one or more exploratory wells have established through testing, sampling, and/or logging the existence of a significant quantity of potentially recoverable hydrocarbons and thus have established a known accumulation. In the absence of a flow test or sampling, the discovery determination requires confidence in the presence of hydrocarbons and evidence of producibility, which may be supported by suitable producing analogs (see PRMS 2018 Section 4.1.1, Analogs). In this context, "significant" implies that there is evidence of a sufficient quantity of petroleum to justify estimating the in-place quantity demonstrated by the well(s) and for evaluating the potential for commercial recovery.

Where a discovery has identified recoverable hydrocarbons, but is not considered viable to apply a project with established technology or with technology under development, such quantities may be classified as Discovered Unrecoverable with no Contingent Resources. In future evaluations, as appropriate for petroleum resources management purposes, a portion of these unrecoverable quantities may become recoverable resources as either commercial circumstances change or technological developments occur.

B.2.1.2 Determination of Commerciality

Discovered recoverable quantities (Contingent Resources) may be considered commercially mature, and thus attain Reserves classification, if the entity claiming commerciality has demonstrated a firm intention to proceed with development. This means the entity has satisfied the internal decision criteria (typically rate of return at or above the weighted average cost-of-capital or the hurdle rate). Commerciality is achieved with the entity's commitment to the project and all of the following criteria:

- Evidence of a technically mature, feasible development plan.
- Evidence of financial appropriations either being in place or having a high likelihood of being secured to implement the project.
- Evidence to support a reasonable time-frame for development.
- A reasonable assessment that the development projects will have positive economics and meet defined investment and operating criteria. This assessment is performed on the estimated entitlement forecast quantities and associated cash flow on which the investment decision is made (see PRMS 2018 Section 3.1.1, Net Cash-Flow Evaluation).
- A reasonable expectation that there will be a market for forecast sales quantities of the production required to justify development. There should also be similar confidence that all produced streams (e.g., oil, gas, water, CO_2) can be sold, stored, re-injected, or otherwise appropriately disposed.
- Evidence that the necessary production and transportation facilities are available or can be made available.

- Evidence that legal, contractual, environmental, regulatory, and government approvals are in place or will be forthcoming, together with resolving any social and economic concerns.

The commerciality test for Reserves determination is applied to the best estimate (P50) forecast quantities, which upon qualifying all commercial and technical maturity criteria and constraints become the *2P* Reserves. Stricter cases [e.g., low estimate (P90)] may be used for decision purposes or to investigate the range of commerciality (see PRMS 2018 Section 3.1.2, Economic Criteria). Typically, the low- and high-case project scenarios may be evaluated for sensitivities when considering project risk and upside opportunity.

To be included in the Reserves class, a project must be sufficiently defined to establish both its technical and commercial viability as noted in Section A.2.1.2. There must be a reasonable expectation that all required internal and external approvals will be forthcoming and 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 justifiable; for example, development of economic projects that take longer than five years to be developed or are deferred to meet contractual or strategic objectives. In all cases, the justification for classification as Reserves should be clearly documented.

While PRMS guidelines require financial appropriations evidence, they do not require that project financing be confirmed before classifying projects as Reserves. However, this may be another external reporting requirement. In many cases, financing is conditional upon the same criteria as above. In general, if there is not a reasonable expectation that financing or other forms of commitment (e.g., farm-outs) can be arranged so that the development will be initiated within a reasonable time-frame, then the project should be classified as Contingent Resources. If financing is reasonably expected to be in place at the time of the final investment decision (FID), the project's resources may be classified as Reserves.

B.2.1.3 Project Status and Chance of Commerciality

Evaluators have the option to establish a more detailed resources classification reporting system that can also provide the basis for portfolio management by subdividing the chance of commerciality axis according to project maturity. Such sub-classes may be characterized qualitatively by the project maturity level descriptions and associated quantitative chance of reaching commercial status and being placed on production.

As a project moves to a higher level of commercial maturity in the classification (see Figure A.1 vertical axis), there will be an increasing chance that the accumulation will be commercially developed and the project quantities move to Reserves. For Contingent and Prospective Resources, this is further expressed as a chance of commerciality, P_c, which incorporates the following underlying chance component(s):

- The chance that the potential accumulation will result in the discovery of a significant quantity of petroleum, which is called the "chance of geologic discovery," P_g.

- Once discovered, the chance that the known accumulation will be commercially developed is called the "chance of development," P_d.

There must be a high degree of certainty in the chance of commerciality, P_c, for Reserves to be assigned; for Contingent Resources, $P_c = P_d$; and for Prospective Resources, P_c is the product of P_g and P_d.

Contingent and Prospective Resources can have different project scopes (e.g., well count, development spacing, and facility size) as development uncertainties and project definition mature.

B.2.1.3.1 Project Maturity Sub-classes

As Figure A.3 illustrates, development projects and associated recoverable quantities may be sub- classified according to project maturity levels and the associated actions (i.e., business decisions) required to move a project toward commercial production.

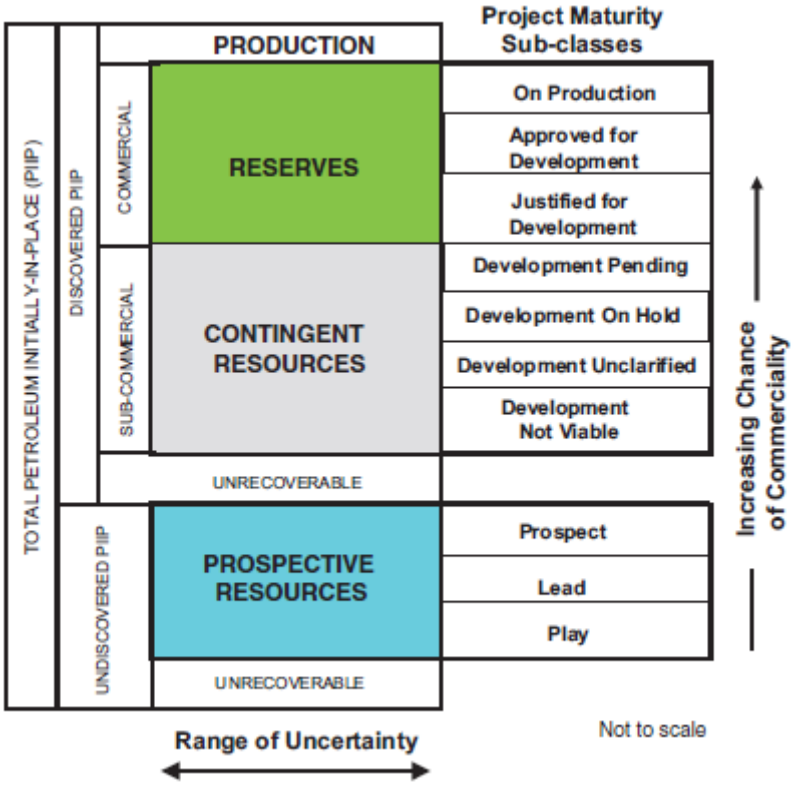

Figure A.3: Sub-classes based on project maturity

Maturity terminology and definitions for each project maturity class and sub-class are provided in PRMS 2018 Table I. This approach supports the management of portfolios of opportunities at various stages of exploration, appraisal, and development. Reserve sub-classes must achieve commerciality while Contingent and Prospective Resources sub-classes may be supplemented by associated quantitative estimates of chance of commerciality to mature.

Resources sub-class maturation is based on those actions that progress a project through final approvals to implementation and initiation of production and product sales. The boundaries between different levels of project maturity are frequently referred to as project “decision gates.”

Projects that are classified as Reserves must meet the criteria as listed in Section A.2.1.2, Determination of Commerciality. Projects sub-classified as Justified for Development are agreed upon by the managing entity and partners as commercially viable and have support to advance the project, which includes a firm intent to proceed with development. All participating entities have agreed to the project and there are no known contingencies to the project from any official entity that will have to formally approve the project.

Justified for Development Reserves are reclassified to Approved for Development after a FID has been made. Projects should not remain in the Justified for Development sub-class for extended time periods without positive indications that all required approvals are expected to be obtained without undue delay. If there is no longer the reasonable expectation of project execution (i.e., historical track record of execution, project progress), the project shall be reclassified as Contingent Resources.

Projects classified as Contingent Resources have their sub-classes aligned with the entity’s plan to manage its portfolio of projects. Thus, projects on known accumulations that are actively being studied, undergoing feasibility review, and have planned near-term operations (e.g., drilling) are placed in Contingent Resources Development Pending, while those that do not meet this test are placed into either Contingent Resources On Hold, Unclarified, or Not Viable.

Where commercial factors change and there is a significant risk that a project with Reserves will no longer proceed, the project shall be reclassified as Contingent Resources.

For Contingent Resources, evaluators should focus on gathering data and performing analyses to clarify and then mitigate those key conditions or contingencies that prevent commercial development. Note that the Contingent Resources sub-classes described above and shown in Figure A.3 are recommended; however, entities are at liberty to introduce additional sub-classes that align with project management goals.

For Prospective Resources, potential accumulations may mature from Play, to Lead and then to Prospect based on the ability to identify potentially commercially viable exploration projects. The Prospective Resources are evaluated according to chance of geologic discovery, P_g, and chance of development, P_d, which together determine the chance of commerciality, P_c. Commercially recoverable quantities under appropriate development projects are then estimated. The decision at each exploration phase is whether to undertake further data acquisition and/or studies designed to move the Play through to a drillable Prospect with a project description range commensurate with the Prospective Resources sub-class.

B.2.1.3.2 Reserves Status

Once projects satisfy commercial maturity (criteria given in PRMS 2018 Table 1), the associated quantities are classified as Reserves. These quantities may be allocated to the following subdivisions based on the funding and operational status of wells and associated facilities within the reservoir development plan (PRMS 2018 Table 2 provides detailed definitions and guidelines):

- **Developed Reserves** are quantities expected to be recovered from existing wells and facilities.
  - **Developed Producing Reserves** are expected to be recovered from completion intervals that are open and producing at the time of the estimate.
  - **Developed Non-Producing Reserves** include shut-in and behind-pipe reserves with minor costs to access.
- **Undeveloped Reserves** are quantities expected to be recovered through future significant investments.

The distinction between the “minor costs to access” Developed Non-Producing Reserves and the “significant investment” needed to develop Undeveloped Reserves requires the judgment of the evaluator taking into account the cost environment. A significant investment would be a relatively large expenditure when compared to the cost of drilling and completing a new well. A minor cost would be a lower expenditure when compared to the cost of drilling and completing a new well.

Once a project passes the commercial assessment and achieves Reserves status, it is then included with all other Reserves projects of the same category in the same field for estimating combined future production and applying the economic limit test (see PRMS 2018 Section 3.1, Assessment of Commerciality).

Where Reserves remain Undeveloped beyond a reasonable time-frame or have remained Undeveloped owing to postponements, evaluations should be critically reviewed to document reasons for the delay in initiating development and to justify retaining these quantities within the Reserves class. While there are specific circumstances where a longer delay (see Section A.2.1.2, Determination of Commerciality) is justified, a reasonable time-frame to commence the project is generally considered to be less than five years from the initial classification date.

Development and Production status are of significant importance for project portfolio management and financials. The Reserves status concept of Developed and Undeveloped status is based on the funding and operational status of wells and producing facilities within the development project. These status designations are applicable throughout the full range of Reserves uncertainty categories (1P, 2P, and 3P or Proved, Probable, and Possible). Even those projects that are Developed and On Production should have remaining uncertainty in recoverable quantities.

B.2.1.3.3 Economic Status

Projects may be further characterized by economic status. All projects classified as Reserves must be commercial under defined conditions (see PRMS 2018 Section 3.1, Assessment of Commerciality

Assessment). Based on assumptions regarding future conditions and the impact on ultimate economic viability, projects currently classified as Contingent Resources may be broadly divided into two groups:

- **Economically Viable Contingent Resources** are those quantities associated with technically feasible projects where cash flows are positive under reasonably forecasted conditions but are not Reserves because it does not meet the commercial criteria defined in Section A.2.1.2.

- **Economically Not Viable Contingent Resources** are those quantities for which development projects are not expected to yield positive cash flows under reasonable forecast conditions.

The best estimate (or P50) production forecast is typically used for the economic evaluation for the commercial assessment of the project. The low case, when used as the primary case for a project decision, may be used to determine project economics. The economic evaluation of the project high case alone is not permitted to be used in the determination of the project's commerciality.

For Reserves, the best estimate production forecast reflects a specific development scenario recovery process, a certain number and type of wells, facilities, and infrastructure.

The project's low-case scenario is tested to ensure it is economic, which is required for Proved Reserves to exist (see Section A.2.2.2, Category Definitions and Guidelines). It is recommended to evaluate the low case and the high case (which will quantify the 3P Reserves) to convey the project downside risk and upside potential. The project development scenarios may vary in the number and type of wells, facilities, and infrastructure in Contingent Resources, but to recognize Reserves, there must exist the reasonable expectation to develop the project for the best estimate case.

The economic status may be identified independently of, or applied in combination with, project maturity sub-classification to more completely describe the project. Economic status is not the only qualifier that allows defining Contingent or Prospective Resources sub-classes. Within Contingent Resources, applying the project status to decision gates (and/or incorporating them in a plan to execute) more appropriately defines whether the project is placed into the sub-class of either Development Pending versus On Hold, Not Viable, or Unclarified.

Where evaluations are incomplete and it is premature to clearly define the associated cash flows, it is acceptable to note that the project economic status is "undetermined."

B.2.2 Resources Categorization

The horizontal axis in the resources classification in Figure A.1 defines the range of uncertainty in estimates of the quantities of recoverable, or potentially recoverable, petroleum associated with a project or group of projects. These estimates include the uncertainty components as follows:

- The total petroleum remaining within the accumulation (in-place resources).

- The technical uncertainty in the portion of the total petroleum that can be recovered by applying a defined development project or projects (i.e., the technology applied).

- Known variations in the commercial terms that may impact the quantities recovered and sold (e.g., market availability; contractual changes, such as production rate tiers or product quality specifications) are part of project's scope and are included in the horizontal axis, while the chance of satisfying the commercial terms is reflected in the classification (vertical axis).

The uncertainty in a project's recoverable quantities is reflected by the 1P, 2P, 3P, Proved (P1), Probable (P2), Possible (P3), 1C, 2C, 3C, C1, C2, and C3; or 1U, 2U, and 3U resources categories. The commercial chance of success is associated with resources classes or sub-classes and not with the resources categories reflecting the range of recoverable quantities.

There must be a single set of defined conditions applied for resource categorization. Use of different commercial assumptions for categorizing quantities is referred to as “split conditions” and are not allowed. Frequently, an entity will conduct project evaluation sensitivities to understand potential implications when making project selection decisions. Such sensitivities may be fully aligned to resource categories or may use single parameters, groups of parameters, or variances in the defined conditions.

Moreover, a single project is uniquely assigned to a sub-class along with its uncertainty range. For example, a project cannot have quantities classified in both Contingent Resources and Reserves, for instance as 1C, 2P, and 3P. This is referred to as “split classification.”

B.2.2.1 Range of Uncertainty

Uncertainty is inherent in a project’s resources estimation and is communicated in PRMS by reporting a range of category outcomes. The range of uncertainty of the recoverable and/or potentially recoverable quantities may be represented by either deterministic scenarios or by a probability distribution (see PRMS 2018 Section 4.2, Resources Assessment Methods).

When the range of uncertainty is represented by a probability distribution, a low, best, and high estimate shall be provided such that:

- There should be at least a 90% probability (P90) that the quantities actually recovered will equal or exceed the low estimate.
- There should be at least a 50% probability (P50) that the quantities actually recovered will equal or exceed the best estimate.
- There should be at least a 10% probability (P10) that the quantities actually recovered will equal or exceed the high estimate.

In some projects, the range of uncertainty may be limited, and the three scenarios may result in resources estimates that are not significantly different. In these situations, a single value estimate may be appropriate to describe the expected result.

When using the deterministic scenario method, typically there should also be low, best, and high estimates, where such estimates are based on qualitative assessments of relative uncertainty using consistent interpretation guidelines. Under the deterministic incremental method, quantities for each confidence segment are estimated discretely (see Section A.2.2.2, Category Definitions and Guidelines).

Project resources are initially estimated using the above uncertainty range forecasts that incorporate the subsurface elements together with technical constraints related to wells and facilities. The technical forecasts then have additional commercial criteria applied (e.g., economics and license cutoffs are the most common) to estimate the entitlement quantities attributed and the resources classification status: Reserves, Contingent Resources, and Prospective Resources.

While there may be significant chance that sub-commercial and undiscovered accumulations will not achieve commercial production, it is useful to consider the range of potentially recoverable quantities independent of such likelihood when considering what resources class to assign the project quantities.

B.2.2.2 Category Definitions and Guidelines

Evaluators may assess recoverable quantities and categorize results by uncertainty using the deterministic incremental method, the deterministic scenario (cumulative) method, geostatistical methods, or probabilistic methods (see PRMS 2018 Section 4.2, Resources Assessment Methods). Also, combinations of these methods may be used.

Use of consistent terminology (Figure A.1 and Figure A.3) promotes clarity in communication of evaluation results. For Reserves, the general cumulative terms low/best/high forecasts are used to estimate the resulting 1P/2P/3P quantities, respectively. The associated incremental quantities are termed Proved (P1),

Probable (P2) and Possible (P3). Reserves are a subset of, and must be viewed within the context of, the complete resources classification system. While the categorization criteria are proposed specifically for Reserves, in most cases, the criteria can be equally applied to Contingent and Prospective Resources. Upon satisfying the commercial maturity criteria for discovery and/or development, the project quantities will then move to the appropriate resources sub-class. PRMS 2018 Table 3 provides criteria for the Reserves categories determination.

For Contingent Resources, the general cumulative terms low/best/high estimates are used to estimate the resulting 1C/2C/3C quantities, respectively. The terms C1, C2, and C3 are defined for incremental quantities of Contingent Resources.

For Prospective Resources, the general cumulative terms low/best/high estimates also apply and are used to estimate the resulting 1U/2U/3U quantities. No specific terms are defined for incremental quantities within Prospective Resources.

Quantities in different classes and sub-classes cannot be aggregated without considering the varying degrees of technical uncertainty and commercial likelihood involved with the classification(s) and without considering the degree of dependency between them (see PRMS 2018 Section 4.2.1, Aggregating Resources Classes).

Without new technical information, there should be no change in the distribution of technically recoverable resources and the categorization boundaries when conditions are satisfied to reclassify a project from Contingent Resources to Reserves.

All evaluations require application of a consistent set of forecast conditions, including assumed future costs and prices, for both classification of projects and categorization of estimated quantities recovered by each project (see PRMS 2018 Section 3.1, Assessment of Commerciality).

PRMS 2018 Tables 1, 2, and 3 present category definitions and provide guidelines designed to promote consistency in resources assessments. The following summarize the definitions for each Reserves category in terms of both the deterministic incremental method and the deterministic scenario method, and also provides the criteria if probabilistic methods are applied. For all methods (incremental, scenario, or probabilistic), low, best and high estimate technical forecasts are prepared at an effective date (unless justified otherwise), then tested to validate the commercial criteria, and truncated as applicable for determination of Reserves quantities.

- Proved Reserves are those quantities of Petroleum that, by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be commercially recoverable from known reservoirs and under defined technical and commercial conditions. 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 that the quantities actually recovered will equal or exceed the estimate.

- Probable Reserves are those additional Reserves which analysis of geoscience and engineering data indicate 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.

- Possible Reserves are those additional Reserves that analysis of geoscience and engineering data suggest 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) Reserves, which is equivalent to the high-estimate scenario. When probabilistic methods are used, there should be at least a 10% probability that the actual quantities recovered will equal or exceed the 3P estimate. Possible Reserves that are located outside of the 2P area (not upside quantities to the 2P scenario) may exist only when the commercial and technical maturity criteria have

been met (that incorporate the Possible development scope). Stand- alone Possible Reserves must reference a commercial 2P project (e.g., a lease adjacent to the commercial project that may be owned by a separate entity), otherwise stand-alone Possible is not permitted.

One, but not the sole, criterion for qualifying discovered resources and to categorize the project's range of its low/best/high or P90/P50/P10 estimates to either 1C/2C/3C or 1P/2P/3P is the distance away from known productive area(s) defined by the geoscience confidence in the subsurface.

A conservative (low-case) estimate may be required to support financing. However, for project justification, it is generally the best-estimate Reserves or Resources quantity that passes qualification because it is considered the most realistic assessment of a project's recoverable quantities. The best estimate is generally considered to represent the sum of Proved and Probable estimates (2P) for Reserves, or 2C when Contingent Resources are cited, when aggregating a field, multiple fields, or an entity's resources.

It should be noted that under the deterministic incremental method, discrete estimates are made for each category and should not be aggregated without due consideration of associated confidence. Results from the deterministic scenario, deterministic incremental, geostatistical and probabilistic methods applied to the same project should give comparable results (see PRMS 2018 Section 4.2, Resources Assessment Methods).

If material differences exist between the results of different methods, the evaluator should be prepared to explain these differences.

Appendix C

Qualifications of RPS Staff

Name	Role	Years of Experience	Qualifications	Professional Memberships
Gordon Taylor	Supervisor	>40	BSc. Geological Sciences, Birmingham University MSc. Foundation Engineering, Birmingham University	Fellow, Geological Society (Chartered Geologist - 1991) Member, Institute of Materials, Minerals and Mining (Chartered Engineer-1983) Member, AAPG Division of Professional Affairs (Certified Geologist-2005) Member, Society of Petroleum Engineers
Clare Wilson	Project Manager /Geophysics Lead	24	BSc. Geophysics (Geological), Leicester University MBA, Hull University	Fellow, Geological Society of London (Chartered Geologist – 2020) PESGB
David Offer	Geology Lead	24	BSc. Exploration and Mining Geology, University of Wales MSc. Industrial Mineralogy, University of Leicester	Fellow, Geological Society of London (Chartered Geologist – 2020) PESGB (Vice President)
James Hodson	Geologist		BSc. Geology, University of Manchester MSc. Petroleum Geoscience and Management, University of Manchester PhD. Biogenic Grain transport in gravity flows, University of East Anglia	Fellow, Geological Society of London PESGB
Adolfo Perez	Engineering Lead	18	BSc Geology, Barcelona University MSc. Geotechnical Engineering, Barcelona University MSc. Reservoir Evaluation and Management, Heriot Watt University Institute of Petroleum Engineering	Member, Society of Petroleum Engineers Associate Member, Energy Institute
John Alcock	Costs and Facilities Lead	>40	RICS	Member of Institute of Cost Engineers
Juan Raggi-Lopez	Economics Lead	15	BSc. Economics, Universidad Nacional de La Plata MSc. Finance, Torcuato Di Tella University (UTDT) MSc. Economics and Policy of Energy and the Environment, UCL London.	