UNFC Workshop
Geneva, 26 April 2016

UNFC-2009 Project Scoring Exercises

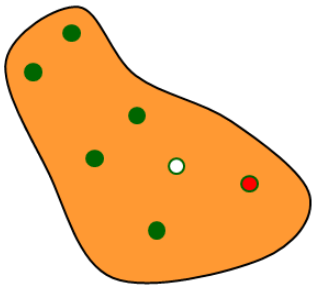
This document contains four exercises on classifying projects according to UNFC-2009 for participants attending the UNFC Workshop in Geneva on 26 April. There are two petroleum, one nickel and one uranium example. Please review the exercises prior to the Workshop and provide your answers in the project scoring sheets included at the end. UNFC-2009 is available in Arabic, Chinese, English, French, Russian, Spanish and Thai on the UNFC website at: http://www.unece.org/energy/se/unfc_gen.html

The exercises and the answers (please note there is never one correct answer for volumes/quantities!) will be reviewed during the afternoon session on 26 April.

Please do not hesitate to ask any of the Workshop presenters for guidance during the coffee and lunch breaks.

Have fun!

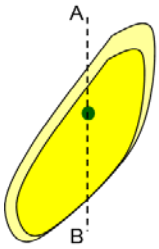
Project 1: Petroleum

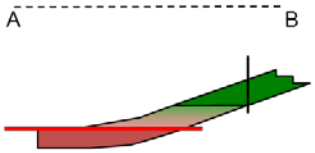


Project	Volume
Primary Recovery	42
Waterflood Recovery	95
Infill Drilling	15
LoSal Waterflood EOR	15

- Geology
  - Well understood sandstone in a deepwater environment
  - Recovery uncertainty is well understood, and all values given for estimates are best estimates
- Feasibility
  - 5 wells producing from 7 well programme (all 7 will contribute equal volumes)
  - 1 junked well – evaluating repair or sidetrack
  - 1 yet to be drilled
  - Injection facilities start-up delayed 1 year
  - Infill drilling being evaluated
  - An enhanced oil recovery project has been proposed, but has significant technical barriers
- Socio – Economics
  - All government contracts and approvals are in place
  - Existing production scheme is in place with no minimal environmental impact and good community support

Project 2: Petroleum





Project	Volume
Primary Recovery above LKH	20
Waterflood Recovery above LKH	55
Primary Recovery below LKH	10
Waterflood Recovery below LKH	22

- Geology
  - New discovery in appraisal
  - Seismic indicates an anomaly flatspot consistent with the spill point of the structure
- Feasibility
  - One discovery well with an oil down-to
  - Pressures in well consistent with regional aquifer trend and contact at spill-point
- Socio-Economics
  - Long tie-back opportunity, WF doesn't work without government license renewal

Project 3: Nickel

- **Geology**
    - The nickel-sulphide mineralization hosted by serpentines.
    - Deposit comprises two separate serpentinized mineralised bodies separated by between 80 m and 140 m of chloritic phyllite.
    - Nickel is contained both in nickel sulphides and in silicates such as antigorite, olivine and pyroxene.
    - Exploratory core drilling completed in 2 phases from 2010-2013.
    - Appropriate logging and sample preparation procedures that enable the logical flow of the core from the drill rig through to sample dispatch; the core shed, logging, sampling and preparation facilities are clean, organised and appear well managed; appropriate security procedures are in place and the assaying has been carried out using appropriate techniques and by qualified laboratories.
    - Independent review concludes that the assay and density information available of sufficient quality to support the estimates of mineral resources.
    - Due to the large amount of drill data, it is possible to see clear geological continuity between sections and deduce a clear geological model for the deposit with all of the mineralisation occurring within the serpentinite body.
    - 573 000 tonnes of total Nickel estimated with 0.179% grade. Out of this only 329 000 tonnes is estimated as suphide nickel with 0.103% grade. This has a medium levels of confidence and very low geological complexity.
    - 20 000 tonnes of total nickel estimated with 0.166% grade. Out of this 10 000 tonnes of nickel is estimated as sulphide nickel with 0.004% grade. This is low confidence quantities estimated based on extension of the ore body approximately 50 m down dip of the last drillhole intersection on the section line.
- **Feasibility**
    - Preliminary economic Assessment done in 2014.
    - Company proposing to undertake a pre-feasibility study in 2016.
    - Nearest airport 40 Kms. Can be accessed by regular roads, with about 9 km by gravel roads
    - Major port 150 Km from project.
    - Power supplies available
    - Water supplies available, but requires permits.

- Preliminary studies reveal that high proportion of the sulphide nickel is recovered in the flotation process whereas the non-sulphide nickel reports predominantly to tailings.
- A nickel feed grade of 0.17% total nickel or 0.1% Sulphide Ni, can produce a concentrate with a grade of 28% at an 80% recovery of Sulphide Ni.
- Open pit mining could be feasible. About 90% mining recovery is estimated.
- Metallurgical testwork has been undertaken on samples of the nickel sulphide ores

- **Socio - Economics**
  - Significant markets has been developed for nickel
  - Exploration permit and exploitation concessions currently held. Will be filing for environmental permit soon.
  - PEA states that the environmental impacts of the proposed project are not deemed significant. Following cessation of operations, the area is expected to be returned to a prior-to-intervention state except for the presence of pit lakes and new topographic highs from the storage facilities for waste rock and tailings, which shall be rehabilitated.
  - Social and economic impacts will largely be positive particularly through new job creation, increased economy of the region and increased tax revenue to local authorities
  - Potential negative impacts stem from loss of land for other uses, e.g. agriculture, dwellings, recreational activities and fishing.
  - Corporate Social Responsibility programme initiated .

Project 4: Uranium

- **Geology**
    - Sandstone type deposit
    - Uraninite accounts for 80% of mineralization
    - Borehole spacing 50 x 50 m - estimated 10 000 tU @ 0.040 % U (recoverable confirmed by DFS)
    - Borehole spacing 100 mx 100 m – estimated 20 000 tU @ 0.040 % U (recoverable confirmed by DFS)
    - Quantities estimated outside ore boundary – 15 000 tU @ 0.035 % U (not considered in DFS)

[Quantities estimated at 50 x 50 m and 100 x 100 m are generally found to have high and moderate levels of confidence]

- **Feasibility**
    - Detailed Feasibility Study (DFS) completed
    - Mining method – Open pit
    - Process – Heap leaching
    - Total recovery – 75 % (10% mining loss; 15% processing loss)
    - Cost $120/KgU
- **Socio - economics**
    - Markets available
    - All approvals and licenses in place
    - Social acceptance confirmed through public hearing; CSR programme in place
    - Awaiting further investment decision

Scoring Sheet

Project 1

Project	E	F	G	Class/Sub-Class	Volume in mmboe	PRMS (optional)
Total Quantities						

Project 2

Project	E	F	G	Class/Sub-Class	Volume in mmboe	PRMS (optional)
Total Quantities						

Project 3

Project	E	F	G	Class/Sub-Class	Quantity (tU) Grade %U	CRIRSCO (optional)
Total Quantities						

Project 4

Project	E	F	G	Class/Sub-Class	Quantity (tU) Grade %U	CRIRSCO (optional)
Total Quantities						
