

**ELMWORTH / WAPITI DEEP BASIN  
CADOTTE RESOURCE ASSESSMENT**

**PHASE 1 REPORT**

for

**ELMWORTH ENERGY CORPORATION**



**Petrel Robertson Consulting Ltd.  
June 2005**

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## **PHASE 1 REPORT**

### **INTRODUCTION**

Petrel Robertson Consulting Ltd. (PRCL) was commissioned by Elmworth Energy Corp. to calculate the volume of gas in place in porous Cadotte Member sandstones, within a selected area of the Elmworth and Wapiti Fields, west-central Alberta. Work was carried out under the supervision of Brad Hayes, Ph.D., P.Geol., Executive Vice-President of PRCL.

The project was split into two phases:

- Phase 1 – within 3D seismic coverage in Twp. 60-65, Rge. 1-14W6
- Phase 2 – within 3D seismic coverage in Twp. 66-70, Rge. 1-14W6

This report summarizes PRCL's Phase 1 work.

### **METHODOLOGY**

Phase 1 work was based upon regional correlations and mapping of the Cadotte already completed by PRCL. Well control was updated to include all logs available to June 2005, within the 3D seismic area (Map 1). Maps to support gas in place calculations were drawn using all wells in this area, supported by PRCL's existing maps (completed in 2001).

Gas in place was calculated using the following workflow:

- Produce hard copy logs (sandstone density / induction pair) across the Cadotte interval to determine the following parameters:
  - Cadotte top and base
  - Net clean sandstone (cutoff 75% line between sand and shale lines)
  - Net porous clean sandstone
    - Porosity cutoff 6%, within the clean sandstone interval
  - Average porosity across net porous clean sst interval
- Create database for listed parameters
- Produce Cadotte maps at 1:100,000 scale:
  - Gross isopach
  - Net porous clean sandstone isopach
  - Average porosity (net porous clean sandstone interval)

- Production / test map
- Digitize contours and perform volumetric calculations, using mapping software and standard volumetric equations, to calculate OGIP
  - Reservoir parameters – gas saturation, formation temperature, reservoir pressure, and compressibility – were averaged from parameters published (by the AEUB) for Cadotte pools within the study area – see Table 1

Results are summarized in Table 1.

## REGIONAL GEOLOGY AND MAP REVIEW

The Cadotte Member comprises sandstones and conglomerates deposited within a northerly-prograding shoreface complex, mappable through west-central Alberta and adjacent British Columbia (Masters, 1979; Smith et. al., 1984; Hayes, 1988; Leckie et. al., 1990; PRCL, 2001). It is an important gas reservoir at Elmworth and Wapiti in Alberta, and in a number of fields including Noel, Sundown, and Moose in B.C. Cross-section A-A' highlights regional stratigraphic relationships.

Map 1 summarizes existing pools and production in the Phase 1 study area. Other features of note are the outline of the 3D seismic area, the updip Deep Basin limit in the east, and the surface traces of thrust faults relating to the Foothills in the southwest. Designated Cadotte pools are shaded blue; note that those within the Foothills were not used in determination of reservoir parameters, as these may vary substantially from those in the Plains.

Gross isopach contours (Map 2) reflect west-southwest to east-northeast shoreline trends, and also demonstrates erosion beneath a mid-Albian unconformity to a southeasterly zero edge (see also Cross-section A-A'). The map of net clean sand thickness (Map 3) and net porous sand thickness (Map 4) demonstrate more intricate patterns reflecting local depositional variations, particularly within the 3D seismic area, where well control is denser. Map 5, showing average porosity over the net porous sand interval, was computer-contoured. It was judged that manual contouring would not substantially change this map, particularly as overall porosity variations are small.

## GAS IN PLACE CALCULATIONS

Table 1 summarizes input parameters, intermediate values, and final gas in place calculations for the 3D seismic outline within the Phase 1 study area. Important considerations in reviewing these values include:

- Only gas within net porous sandstones and conglomerates (those exceeding 6% porosity) are included. Values are therefore substantially lower than total gas in place calculations, such as those presented by Masters (1979).
- The water saturation value employed (30%) may be high, considering the entire area lies within the Deep Basin; however, there may be substantial irreducible water in finer-grained rocks.
- Published reservoir pressures vary considerably, and a single average value was used.
- Gas volumes produced to date have not been subtracted from the gas in place calculation.

Given these considerations, a substantial range could be placed around the final calculated value of 2.85 TCF – possibly as much as +/- 25%. It is PRCL's judgement that the calculated value is fairly conservative, so that the actual value is more likely to be higher.

## REFERENCES

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