East Tower, 5th Ave Place
Suite 800, 425-1st Street S.W.
Calgary, Alberta T2P 3L8
Tel: 403-750-0810
Fax: 403-263-0767
www.laricinaenergy.com

October 4, 2013

Alberta Energy Regulator
Suite 1000, 250 – 5 Street SW
Calgary, Alberta
T2P 0R4

Attention: Steve Thomas, P.Eng., Section Leader In-Situ Oil Sands

Mr. Thomas,

Re: Category 2 Amendment to Saleski Phase 1 AER Approval No. 12087

Laricina Energy Ltd. (Laricina) hereby applies to the Alberta Energy Regulator (AER) for a Category 2 amendment to the current Saleski Phase 1 Project, Approval No. 12087, to drill four of the currently approved thirty-two Grosmont C Formation wells into the Grosmont D Formation, within the approved Development Area.

Laricina considers this as a Category 2 amendment because the modification requested will impact resource conservation, but will not adversely and materially affect stakeholders including other mineral rights holders or the environmental and socioeconomic impacts predicted and assessed in the approved application.

Correspondence respecting this amendment should be directed to:

Salima Loh – Regulatory Specialist
Laricina Energy Ltd.
East Tower, 5th Ave Place
Suite 800, 425 1st Street SW
Calgary, Alberta T2P 3L8
Phone: (403) 718-8907
Fax: (403) 263-0767
E-Mail: sloh@laricinaenergy.com

Sincerely,
Laricina Energy Ltd.

Salima Loh
Regulatory Specialist

cc: Deepa Thomas, Director, Regulatory and Environmental Performance
Bruce Thornton, Development & Regulatory Manager, OSUM Oil Sands Corp.

LARICINA
ENERGY LTD.

Category 2 Amendment to Drill Wells into the Grosmont D Formation at the Saleski Phase 1 Project

Submitted to the
Alberta Energy Regulator

October 2013

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1. AMENDMENT INTRODUCTION

Laricina Energy Ltd. (Laricina) herby applies on behalf of Laricina and OSUM Oil Sands Corp. (OSUM) to amend the Saleski Phase 1 Project (Phase 1), Alberta Energy Regulator (AER) Approval No. 12087, to drill four of the currently approved thirty-two Grosmont C Formation wells into the Grosmont D Formation, within the approved Development Area.

The Saleski Phase 1 Project is situated within the Municipal District of Opportunity #17 and is located approximately 80 km north-east of the community of Wabasca-Desmarais and targets the Grosmont carbonate reservoir.

1.1 The Proponents

Under a joint venture agreement, Laricina and OSUM are developing Phase 1. Laricina is operator for the joint venture and is responsible for seeking regulatory approvals for development of Phase 1.

1.1.1 Laricina Energy Ltd.

Laricina is a privately-held, Calgary based, oil sands company focused on exploration and enhanced recovery of *in situ* oil sands resources in the Athabasca Oil Sands deposit of Alberta.

Laricina has an experienced management team with a proven track record in oil sands development. Collectively, Laricina engineers and geologists have direct experience on multiple oil sands projects through various stages of development. Company contact for this application is:

Salima Loh – Regulatory Specialist
Laricina Energy Ltd.
East Tower, 5th Ave Place
Suite 800, 425 1st Street SW
Calgary, Alberta T2P 3L8
Phone: (403) 718-8907
Fax: (403) 263-0767
E-Mail: sloh@laricinaenergy.com

1.1.2 OSUM Oil Sands Corporation

OSUM is a privately-held, Alberta based company focused on acquiring significant land positions within top-tier reservoirs located close to infrastructure. OSUM's management team and board of directors are comprised of veterans in the oil business having experience in developing *in situ* oil sands reserves, creating strategic alliances and leading technical innovation. OSUM and Laricina are committed to being a leader in the production of bitumen from the carbonates in Alberta.

1.2 Amendment Proposed

In December 2010, Laricina submitted the regulatory application for Phase 1 (Original Application), the first commercial phase of development at Saleski. Phase 1 will expand the existing 1,800-barrel-per-day Pilot by 10,700 barrels per day for a combined 12,500-barrel-per-day bitumen recovery scheme. Laricina holds a 60 percent ownership in Saleski and is the project operator.

In October 2012, Laricina submitted a project update to the Phase 1 regulatory application to reflect the change to develop the Grosmont C zone using a single horizontal well cyclic steam-assisted gravity drainage (C-SAGD) process from a traditional dual-well SAGD design (Phase 1 Project Update). In July 2013, the AER approved the Phase 1 application under Approval No.12087.

With this amendment Laricina hereby requests approval to drill and operate four of the thirty-two-horizontal wells in the Grosmont D Formation to further refine steaming and recovery strategies currently being developed at the Pilot. These wells are scheduled to be drilled, completed and tied-in at the same time as the remaining wells targeting the Grosmont C Formation on the first Pad of Phase 1 development.

2. AMENDMENT DESCRIPTION

2.1 Pilot Insights

2.1.1 Grosmont D Pilot Insights

The Saleski Pilot has been operating since December 2010 with wells drilled into the Grosmont C and Grosmont D. Currently, there are four wells operating at the Pilot; P1C and P2C (1C and 2C) in the Grosmont C and P1D and I2D (1D and 2D) in the Grosmont D. Well P1D was produced using traditional dual well SAGD during 2011, but in 2012 and 2013, the C-SAGD process was used to produce from the Grosmont D wells. At present, P1D and I2D wells are in their 4th production and injection cycle, respectively.

The design of the Pilot facility limits the scope of exploitation testing that can be carried out for concurrent development of the Grosmont C and D formations using C-SAGD as a recovery process. The Pilot facility was designed for steady state SAGD operation, and as such is not ideal for simultaneous steam injection into multiple wells at high rates, or for the discontinuous heat rejection loads found during cyclic operations. Adequate steam generation capacity exists to steam only one well at a time at the Pilot and operational compromises have been required to ensure adequate facility cooling flows during the initial high temperature stages of production operations for each well. These limitations have become more pronounced as reservoir recovery becomes more mature and cycle production periods become significantly longer than cycle injection periods.

2.1.2 Implementation of Grosmont D Recovery at Phase 1

Laricina intends to continue cyclic operations at the Pilot from both P1D and I2D to further develop recovery strategies for the Grosmont D. With steam capacity at the Pilot limited to injection in one well at a time, Laricina proposes to operate four D wells at Phase 1 to continue advancing Grosmont D recovery strategies.

The main objectives for the Grosmont D wells at Phase 1 are:

1. Continue to advance Grosmont D recovery strategies utilizing the additional steam capacity available from the Phase 1 facility;
2. Test injection and production inter-well interference within a multi-well area in the Grosmont D;
3. Monitor the communication and interference effects between the Grosmont C and D and across the C/D marl on a larger scale;
4. Apply horizontal drilling techniques tested in the P2C well in the Grosmont D to confirm applicability; and
5. Test the injectivity and productivity gains experienced in the P2C well using open-hole completions in the Grosmont D.

The information gained from these D wells will be used to further refine the recovery strategy for the Grosmont D for Phase 1 and future phases at Saleski. A separate amendment will be submitted when Laricina is prepared to extend the results of the first four D wells to the remainder of the Project Area.

3. Reservoir Geology, Bitumen Volume and Recovery Estimate

3.1 Grosmont D Geology

Please refer to Section 2.2.2.2 of the Original Application for details of the Grosmont D geology. No additional information has been included with this amendment.

3.2 Bitumen Volumes and Recoveries

Table 2.2-2a of the Phase 1 Project Update indicated the estimated Total-Bitumen-in Place for the Project Area is to be 69 x 10^6 m^3. In addition, the recoverable bitumen volume from the Grosmont C within the Project Area was estimated to be 12 x 10^6 m^3. Table 3.2-1 below gives the estimated bitumen volume to be recovered by the four Grosmont D wells requested in this amendment.

Table 3.2-1 Estimated Bitumen Volume for the Four Grosmont D Wells

Attribute	Value
Grosmont D Pay Thickness (m)	33.3
Grosmont D Pay Porosity (%)	24.4
Grosmont D Pay Oil Saturation (%)	74.4
Horizontal Well Length (m)	800
Well Spacing (m)	60
Total Grosmont D Bitumen in place (m^3)	1.2×10^6

Using a conservative recovery factor of 40%, it is estimated that the area drained by the four Grosmont D wells applied for in this application will be approximately 0.48×10^6 m^3 of bitumen over the life of these wells.

4. Process Description

4.1 Recovery Process

The recovery process that has been selected to develop the Grosmont D is the same recovery process approved for the Grosmont C in Approval No. 12087, C- SAGD with the use of solvent technology. This process varies the rates and compositions of solvent and steam injected over the life of the well bore. The process alternates between injecting steam/solvent and producing water and mobile oil from the well bore. The injection cycle consists of injecting steam/solvent, above reservoir pressures at 1,200 kPa to 4,700 kPa to heat the reservoir and reduce the viscosity of the bitumen until pressure and/or steam volume targets are achieved. The reservoir absorbs the heat from the injected steam/solvent, steam condenses and drains alongside the mobilized bitumen during a production cycle. The production cycle is continued until bitumen rates reach a minimum threshold. This threshold will vary depending on the well cycle, operating situation and steam availability.

Pending the results of additional operational experience at both the Pilot and the operation of the wells in this amendment, the table in Section 4.3 shows the expected operating conditions of the wells.

4.2 Well Placement

The Grosmont D wells will be drilled with a horizontal well spacing of 60 m to match the underlying Grosmont C wells. The Grosmont D wells will be laterally offset by 30 m from the underlying Grosmont C wells to maximize the time before interference effects dominate interaction between the two stratigraphic horizons. The Grosmont D wells will be located in the northeastern corner of the drainage pattern for the first Grosmont C wellpad, refer to Figure 4.2-1 for details.

Laricina intends to place the wells as close as possible to the top of the C-D marl (as close as possible to the base of the Grosmont D) to maximize the drainage from the Grosmont D. Refer to Figure 4.2-2 for details of the vertical well placement.

4.3 Well Start-up & Operation

The operation plan for the four Grosmont D wells is the same as the Grosmont C wells and is summarized below. Rates and injection periods for the Grosmont D are based on the rates experienced at the Pilot from wells P1D and I2D and the annual rates are shown in Section 4.3.1.

4.3.1 Forecasted Injection and Production Rates

Table 4.3-1 Forecasted Injection and Production Rates[1] per Grosmont D well

Forecasted Injection Rates					
Year	1-3	4	5-6	6-8	9
Steam (m^3/day)	250	0	300	0	0
Wellhead Injection Pressure (kPag)	2,000-6,900[2]	0	2,000-6,900[2]	0	0
Solvent Injection (m^3/day)	TBD[3]	TBD[3]	TBD[3]	TBD[3]	TBD[3]
Forecasted Production Rates					
Year	1-3	4	5-6	6-8	9
Bitumen (m^3/day)	35	45	35	40	20
Water (m^3/day)	175	175	150	175	85
Solvent Production (m^3/day)	TBD[3]	TBD[3]	TBD[3]	TBD[3]	TBD[3]

[1] Rates based on calendar days
[2] Surface injection pressures will be controlled to ensure the reservoir pressure does not exceed 4,700 kPa.
[3] Solvent injection will be tested during operations at Phase 1 with the initial 4 wells, rates are to be determined.

4.3.2 Well Start-up

Steam will be injected into the four wells as a group, at rates of approximately 500 – 1,500 m^3/day per well, with the first steam cycle slug size of approximately 15,000 – 20,000 m^3 (CWE), while monitoring steam injection pressure. The four Grosmont D wells will be steamed as one block. Steaming and production, both concurrently and separately from the underlying Grosmont C wells, will be carried out during operation of the Grosmont D wells to confirm the interference affects between the two producing horizons during various stages of maturity of the reservoir. Future steam

cycle injection slug sizes will be increased approximately 20-50% per cycle to ensure additional reservoir is contacted by steam during each consecutive cycle.

4.3.3 Well Operation

1. Well Warm-up
   - Slowly introduce steam to heat up the down hole steel
2. First Steam Injection Cycle
   - Steam injection down the casing string
   - Maintain temperature along the entire length of the well
   - Inject steam to meet first cycle injection slug size of 15,000 – 20,000 m^3 (CWE) or until injection pressure plateaus
   - Steam injection rates for the first and last wells of the injection pattern will be optimized to minimize heat loss to the surrounding reservoir and to minimize interference with adjacent well patterns on production
3. First Cycle Production phase
   - Convert wells to production at end of first injection cycle
   - Production is optimized to maximize fluid withdrawal
   - Wells are produced until reduction in reservoir temperature impedes production
   - First and last wells of the producing pattern will be monitored and production rates monitored to minimize interference with injecting well patterns
4. Subsequent Injection and Production Cycles
   - Injection begins once the first production cycle has been completed, total steam volume injected is increased by 20-50% over the previous injection cycle's steam slug size
5. Solvent Cycles
   - Solvents injected with steam – initially diluent/condensate (≥C5), rates will be determined from Pilot operations
6. Blowdown
   - Non-condensable gas (NCG) injected to maintain pressure
   - Produce mobile bitumen, condensed steam, and any remaining solvents

4.4 Horizontal Well Drilling

- The top of the Grosmont D zone pay zone is approximately 360 m measured depth (MD); the wells will be drilled vertically from surface. The intermediate section of the wells will

be drilled with a guidance system that will target the base of the Grosmont D at approximately 570 m MD; and

- Horizontal laterals 222 mm in diameter will be drilled from the heel to a final measured depth at the toe ranging from 1,375-1,500 m MD and left open hole for production.

Non-reservoir rock is not common in the Grosmont D unit. Even low porosity rock is generally highly fractured and will readily transmit steam. However, should geological analysis while drilling suggest a section of the hole to be unproductive, the following remedial actions could be implemented:

- Lateral or vertical sidetracking the well in an attempt to intersect better reservoir is an option in the event that a true non-reservoir interval is encountered by the horizontal well; and
- Acidizing the rock in an attempt to increase contact with the reservoir.

4.5 Completion Design

Laricina's P2C well at the Pilot was completed open hole, without a slotted liner and has shown favourable production and injectivity results when compared to the P1C well. Laricina will be completing the four D wells without liners in the horizontal lateral sections to confirm the injectivity and productivity improvements seen at the Pilot in the P2C well apply to the Grosmont D.

In the event well stability or excessive solids production become issues during drilling or operations of the Grosmont D wells at Phase 1, remediation may include installing liners into the horizontal sections for those wells.

Completions for the wells will be similar to the completions planned for the Grosmont C wells, specifically, see Section 2.3.3.4 of the Phase 1 Project Update:

- The production tubing string used for artificial lift will be 114.3 mm diameter. The current design basis is to use a metal-to-metal progressive cavity pump. The pumps will be sized for between 110 and 610 m^3 of total produced fluids per day and will have a maximum diameter of 139.7 mm. Each pump will be equipped with pressure and temperature measurements. Superior make-up and torque capabilities are required with this design; therefore, Hydril 503 (or equivalent) connections on L-80 pipe have been selected. The production rod string will consist of 28.6 mm diameter continuous rod.
- A 60 mm tubing string may be run on select wells as a guide string for an instrumentation coil. The instrumentation coil will have either thermocouples or fibre

optic lines to measure temperature across the horizontal. In addition to this, pressure may be measured at both the toe and heel of the select wells.

Each pump will be equipped with pressure and temperature measurements. In addition, two of the four Grosmont D wells will have temperature measurements through the horizontal section. Refer to Figure 4.5-1 for details of the proposed completion.

4.6 Well Performance Monitoring

Injection and production of the wells will be according to the MARP document that was submitted to the AER in August 2013 and will be similar to the methods used for the Grosmont C wells.

Four observation wells have been installed within the northern development pattern for the Grosmont C and will be used to monitor the Grosmont D wells. These will include:

- A thermocouple string and piezometers covering the pay zone and extending slightly above and below. These will be cemented in place behind the casing; and
- Solar panels, data loggers and radio communication to the central receiver will be installed.

Of the four observation wells on the north side of the pad, one well exists within 15 m of the proposed Grosmont D well horizontal trajectory, and one within 35 m (see Figure 4.2-2).

5. Cap Rock Integrity

The Phase 1 Project Update application and subsequent SIRs contained a detailed description of the site specific geology and characteristics of the regional Clearwater caprock. Condition No.8 of the AER Approval 12087 for Phase 1 states that the maximum bottomhole injection pressure must not exceed 4,700 kPag. This pressure limitation is also appropriate for the proposed Grosmont D wells.

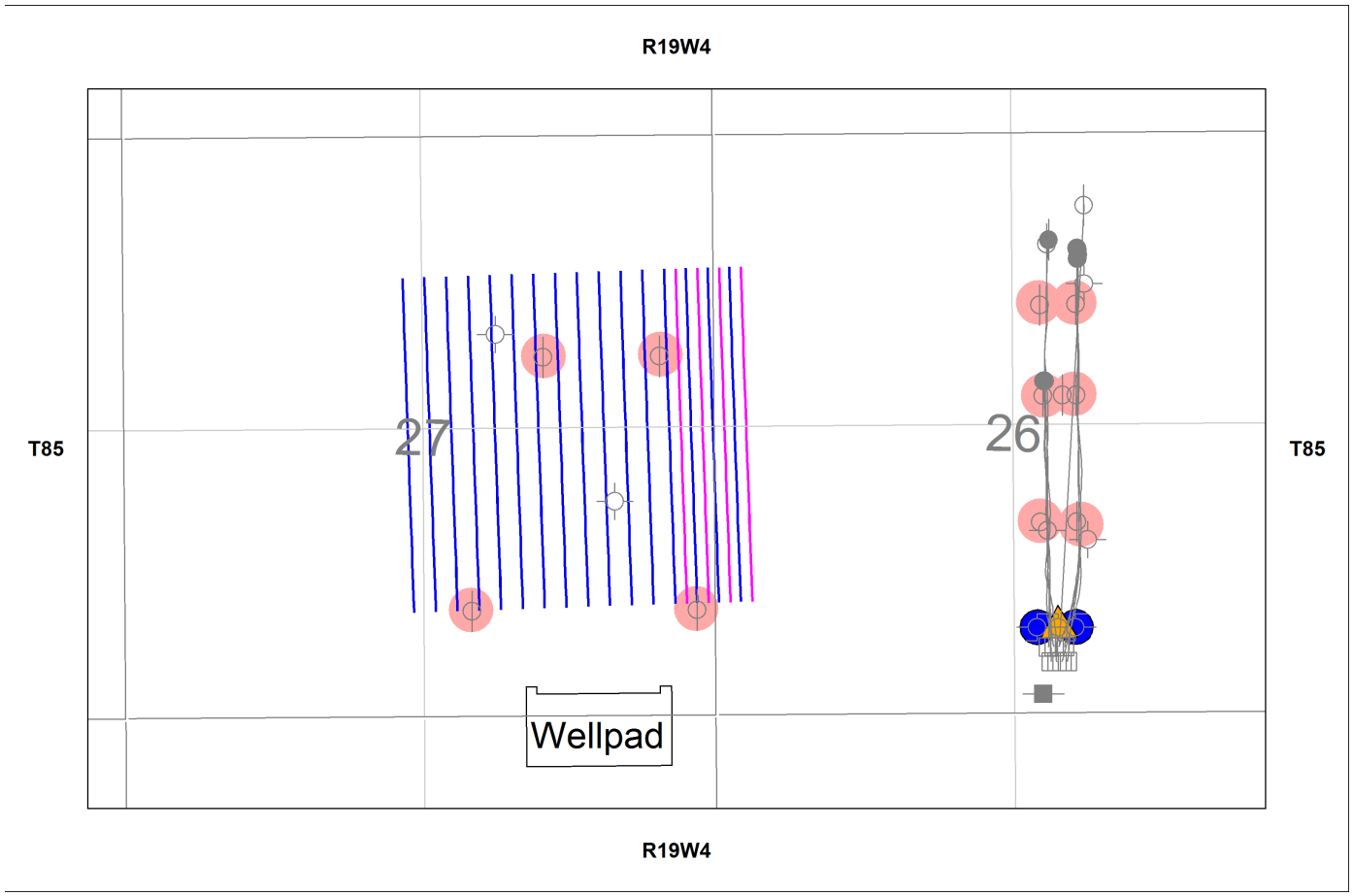
6. Central Processing Facility and Well Pad

No modifications to the central processing facility or well pad design are required to incorporate processing and operations of the Grosmont D wells.

7. Project Schedule

Amendment Submission	*October 1, 2013*
AER Review and Approval	*November 7, 2013*
Well Licenses Approved	*November 21, 2013*
Start of Phase 1 Drilling Program	*as soon as December 1, 2013*

FIGURES



0.25 0 0.25 0.5 0.75
Kilometers

Legend

- Existing Water Source Wells
- Existing OBS Wells
- Existing Disposal Well
- Proposed Grosmont C Horizontals
- Proposed Grosmont D Horizontals

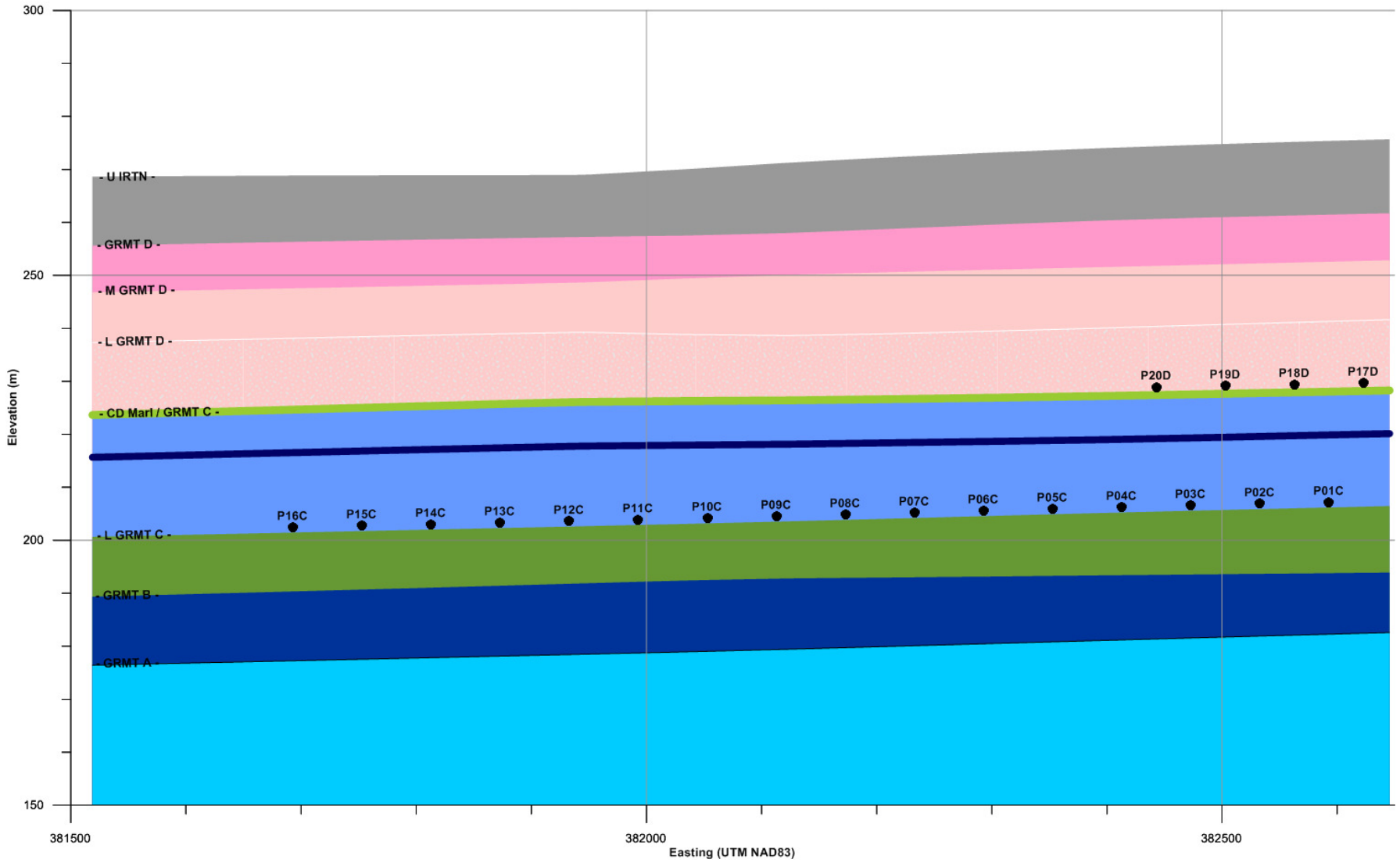
PROJECT: LARICINA ENERGY LTD.

Laricina Energy Ltd.
Saleski Project

TITLE:
Proposed Saleski Phase 1
Horizontal D Well Locations

DRAWN: JS
CHECKED: SL
DATE: SEP 27-13
PROJECT: Saleski

FIGURE:
4.2-1



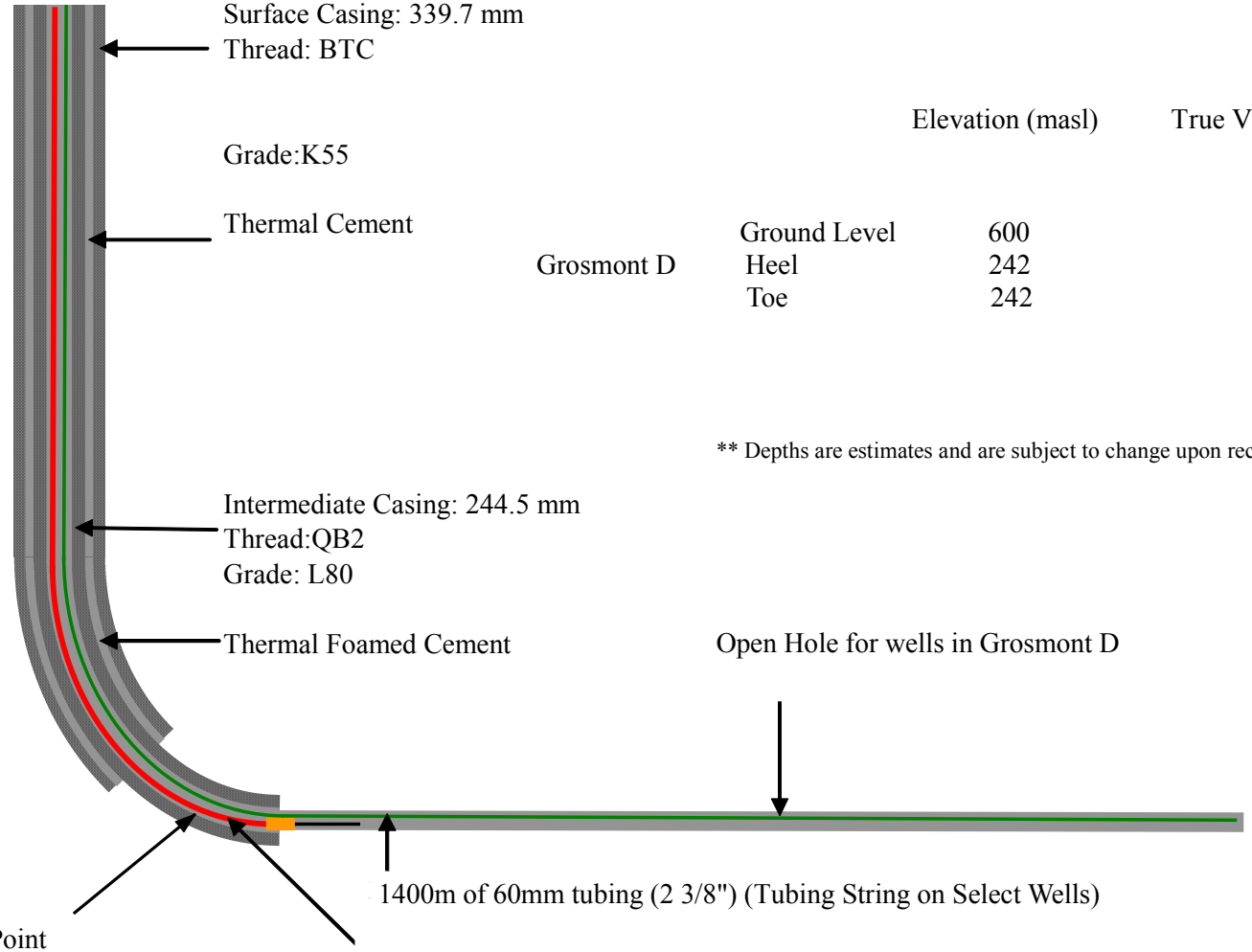
PROJECT: Laricina Energy Ltd.
Saleski Project

TITLE:
Development Well Plan
Phase 1 Pad 1 North Drainage Area (Toe)

DRAWN: JS
CHECKED: SL
DATE: Sep 10-13
PROJECT: Saleski

FIGURE: 4.2-2

D Well Schematic



		Elevation (masl)	True Vertical Depth (mKB)	Measured Depth** (mKB)
Grosmont D	Ground Level	600	0	4.1
	Heel	242	358	550
	Toe	242	358	1350

** Depths are estimates and are subject to change upon receipt of directional plan

REF: Laricina, 2010.

PROJECT:
Laricina Energy Ltd.
Saleski Phase 1 Project

TITLE:
Schematic of a Typical D Well

DRAWN: SL/JG
CHECKED: SR
DATE: Oct 18/12
PROJECT: 10-024

FIGURE:
4.5-1