

Montney Formation Play Atlas NEBC

October 2012 | BC Oil and Gas Commission



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About the
BC Oil and Gas Commission

The BC Oil and Gas Commission (Commission) is the single-window regulatory agency with responsibilities for regulating oil and gas activities in British Columbia, including exploration, development, pipeline transportation and reclamation.

The Commission’s core services include reviewing and assessing applications for industry activity, consulting with First Nations, cooperating with partner agencies, and ensuring industry complies with provincial legislation and all regulatory requirements. The public interest is protected by ensuring public safety, respecting those affected by oil and gas activities, conserving the environment, and ensuring equitable participation in production.

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Commission Mission

We regulate oil and gas activities for the benefit of British Columbians.

We achieve this by:

- Protecting public safety,
- Respecting those affected by oil and gas activities,
- Conserving the environment, and
- Supporting resource development.

Through the active engagement of our stakeholders and partners, we provide fair and timely decisions within our regulatory framework.

We support opportunities for employee growth, recognize individual and group contributions, demonstrate accountability at all levels, and instill pride and confidence in our organization.

We serve with a passion for excellence.

Vision

To be the leading oil and gas regulator in Canada.

Values

- Respectful
- Accountable
- Effective
- Efficient
- Responsive
- Transparent



Purpose of Report

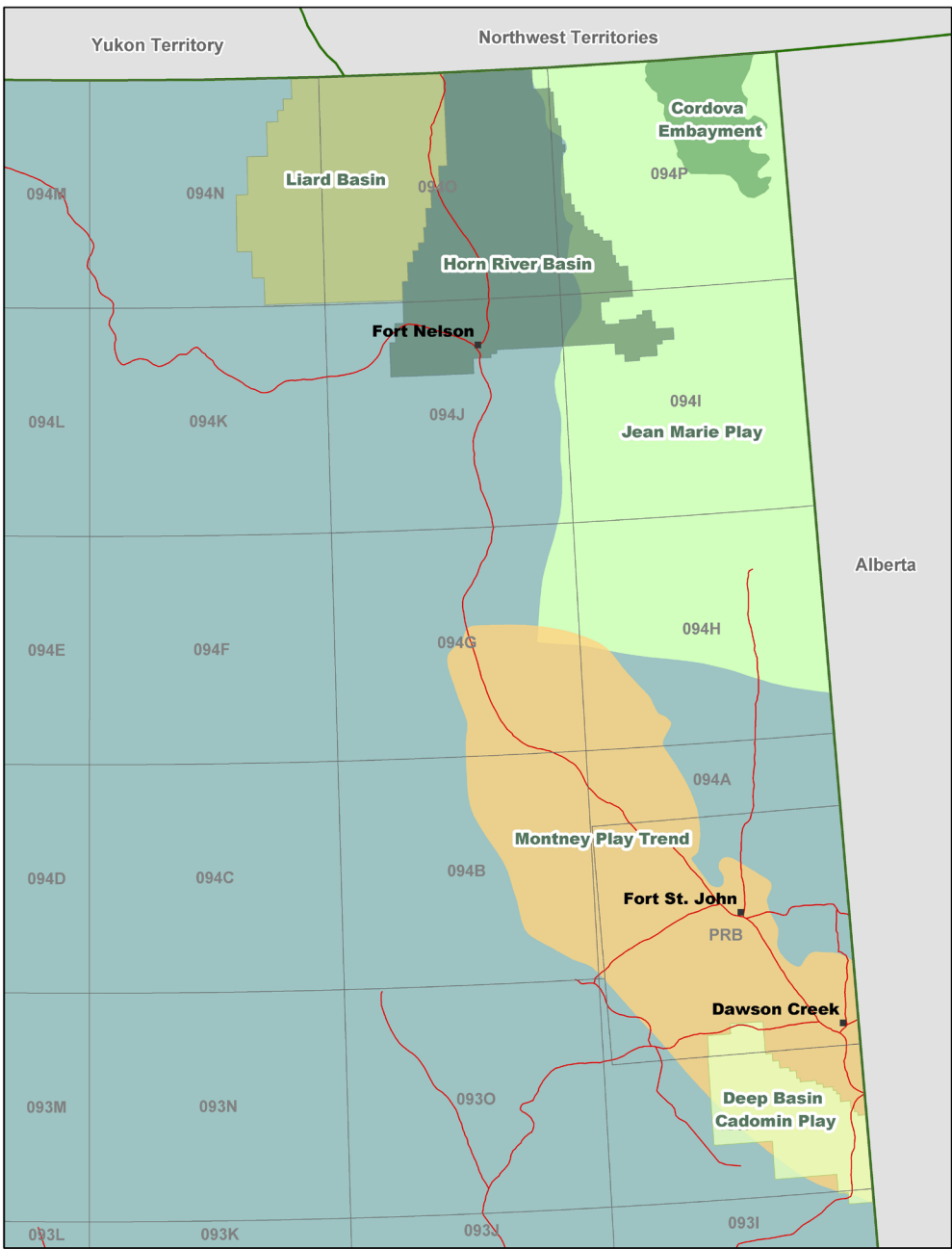
Montney Formation Play Atlas NEBC

The Commission’s regulatory role includes understanding the impacts and distribution of the natural gas and petroleum resource base in the province. The Commission, in partnership with the National Energy Board (NEB), the British Columbia Ministry of Energy, Mines and Natural Gas (MEMNG) and the Alberta Energy Resources Conservation Board (ERCB), are co-operating in a multi-agency assessment of oil, condensate and gas resources in the Montney Formation of British Columbia and Alberta.

A significant portion of the Commission’s contribution to this project includes regional mapping of the Montney Formation throughout northeast British Columbia.

The series of maps that comprise this report were derived from non confidential well and core data to aid in the delineation and distribution of regional unconventional play parameters for the Montney Formation within NEBC. Each map in this report links to a larger map available online at www.bcogc.ca.

Figure 1: Unconventional Gas Play Trends of NE British Columbia



Background on Unconventional Gas in the Montney

Since the advent of horizontal drilling and the adaptation of multistage horizontal fracturing techniques, British Columbia has been at the forefront of exploration and development of unconventional natural gas resources.

Unconventional resources within B.C. are becoming an increasingly important component of the province’s recognized natural gas resource potential.

First efforts at targeted unconventional resource development in British Columbia began in the mid 1990’s by employing the use of horizontal drilling in the regionally gas charged Devonian carbonates of the Jean Marie. Ten years later a significant unconventional tight gas resource was successfully identified and developed in the Deep Basin area of British Columbia within Cretaceous sandstones of the Cadomin Formation. This early unconventional activity was followed by shale gas development in the Devonian Muskwa, Otter Park and Evie shales in the Horn River Basin and the Triassic aged siltstones of the Montney Formation. Exploration is also ongoing in emerging unconventional play areas of the Cordova Embayment and the Liard Basin (Figure 1)

Since 2005, the unconventional share of British Columbia’s natural gas production has continued to rise (Figure 2).

Figure 3 illustrates, over the same time period, the relative rise of Montney unconventional gas production compared to the other major unconventional plays in NEBC.

Prior to 2005, development of gas in the Montney unconventional play trend area was restricted to vertical drilling for poor quality conventional fine grained sandstone reservoirs. In July 2005 the first attempt to employ multistage hydraulic fracturing in a Montney horizontal well occurred near Dawson Creek. Initial production commenced from this well at rates four to five times higher than a vertical well in the same target horizon. This was quickly followed by other successful horizontal wells. Subsequent drilling and coincident geologic investigation eventually defined a regional unconventional resource play trend of approximately 26,000 square kilometres (km²) (Figure 4).

As of June 2012, cumulative production from the unconventional Montney in NEBC approached 1.3 trillion cubic feet (TCF); up from just 25 BCF at the start of 2005. The play currently has over 1,100 active gas wells essentially all of which are post-2005 horizontals. Daily production levels are presently at 1.5 BCF/d with some projections doubling or tripling that daily rate by 2020. Significant gas liquids and condensate volumes are also being generated as operators identify and move towards the rich gas areas of the play. The growth in targeted Montney drilling over the past few years combined with the slowdown in conventional gas drilling has resulted in the Montney becoming the single most important gas producing horizon in British Columbia. The unconventional Montney play now contributes about 41 per cent of B.C.’s total current monthly production volumes (Figure 5).

Figure 2: Conventional versus Unconventional Gas in NEBC to June 2012

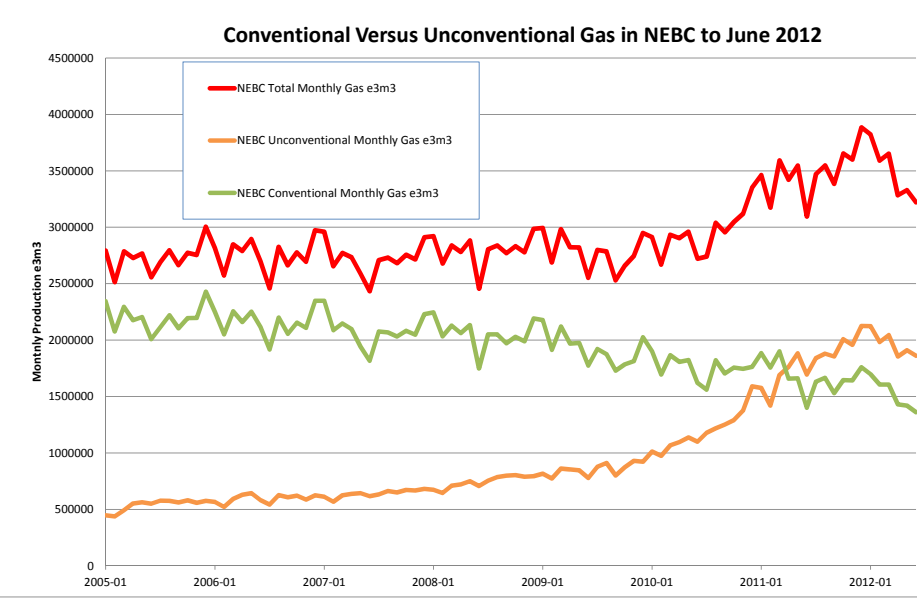


Figure 3: Unconventional Production by Play - NEBC

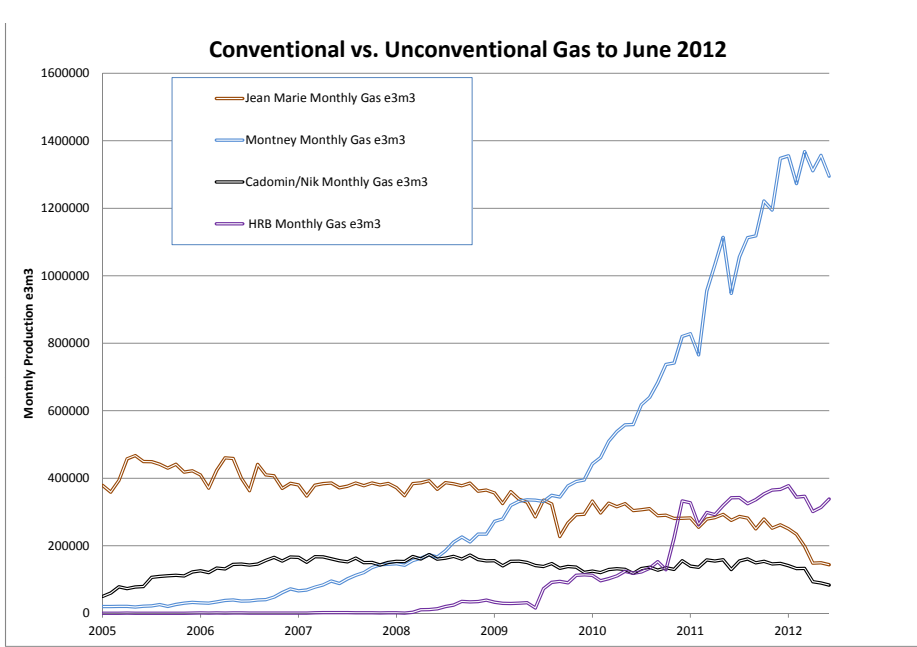


Figure 4: Montney Trend NEBC

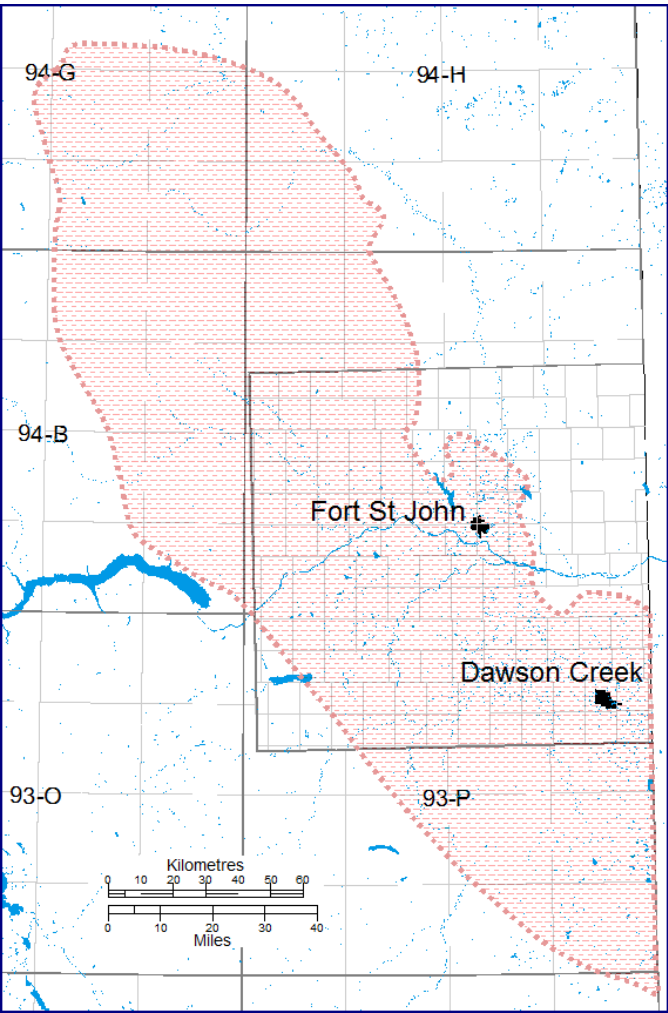


Figure 5: Montney Trend - Monthly Production Comparison June 2011 versus June 2012

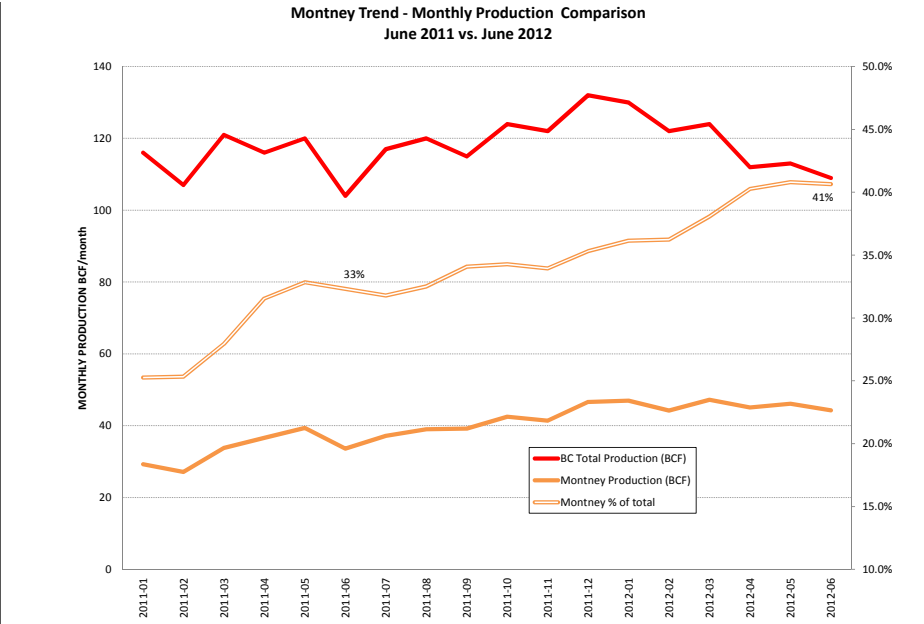


Figure 6: Montney Trend - Identified Gas Liquids/Oil Distribution

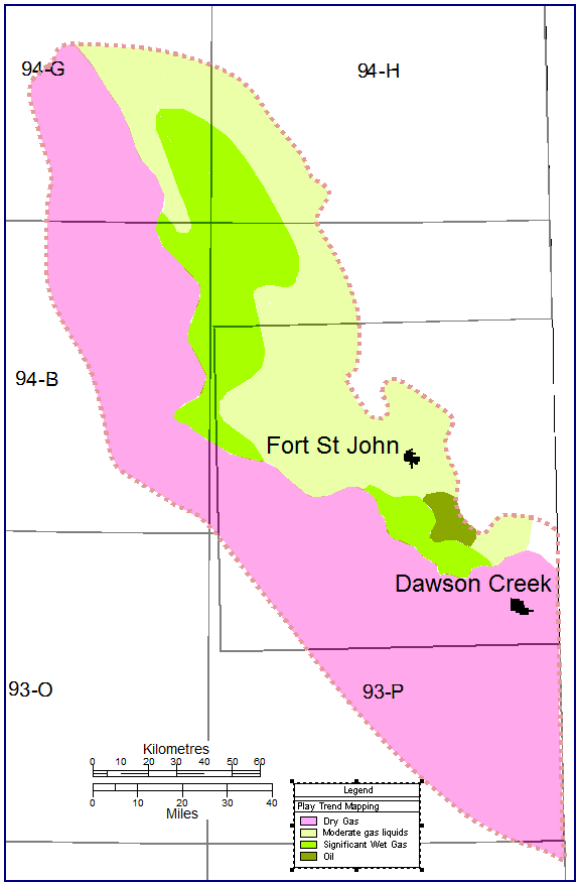
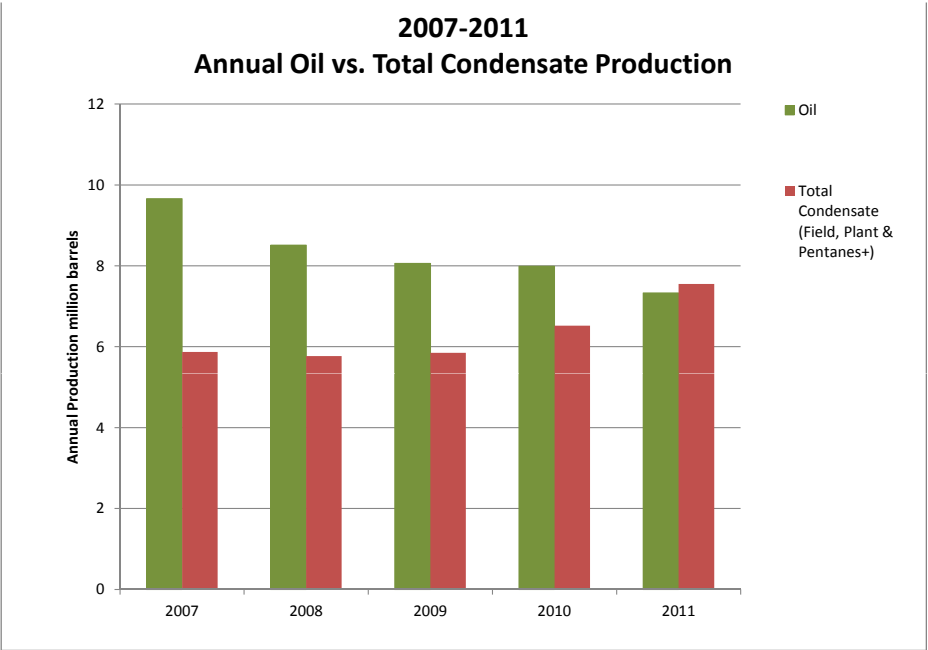


Figure 7: Annual Oil versus Total Condensate Production 2007-2011



Traditional pool definition and delineation concepts are difficult to apply to unconventional low permeability gas charged systems. The Commission utilizes the concept of zone-specific regional fields to categorize large, unconventional natural gas accumulations. The Montney Formation gross thickness often ranges in excess of 300 meters. Poor porosity and ultralow permeability reduce the effectiveness of the conventional well log suite to define unconventional reservoir. In addition, very few horizontal wellbores are logged with more than a MWD gamma ray. Completions by numerous multistage hydraulic fracturing jobs ensure large stimulated reservoir volumes are created that encompass the finer stratigraphic divisions. Consequently, for administrative purposes, the Commission does not subdivide the Montney formation into pools based on internal subunits.

A large proportion of the Montney play has economically benefitted by relatively easy surface access, pre-existing natural gas infrastructure and the presence of liquids rich gas.

Within the Montney play trend there can be a considerable gas liquids and condensate component to the overall production (Figure 6). After an initial test period it is common practice for Montney pad wells to produce in bulk, directly to a reporting facility and individual wellsite metering of condensate and gas liquids is not available. Facility separated condensate and gas liquids sales volumes are reported by operators to government on the BC 08 form. When a BC 08 record is generated, volumes are allocated back utilizing production accounting procedures along with gas and fluid analysis to connected wells by individual UWI. Depending on the cut capability of the processing facility, sales volumes may be allocated to specific wells and zones for Ethane(C2), Propane (C3) Butane (C4) Pentanes (C5+) and condensate.

This BC 08 sales volume data is not currently included in the BC government's PIMS production data. As a result, B.C. production data does not capture PIMS direct-to-facility separated condensate or gas liquids sales volumes. This makes it difficult to accurately map Montney condensate production using production data alone. Several maps in this atlas utilize BC 08 gas liquids and condensate reported sales volumes to aid in mapping condensate and gas liquids content within the unconventional Montney play trend.

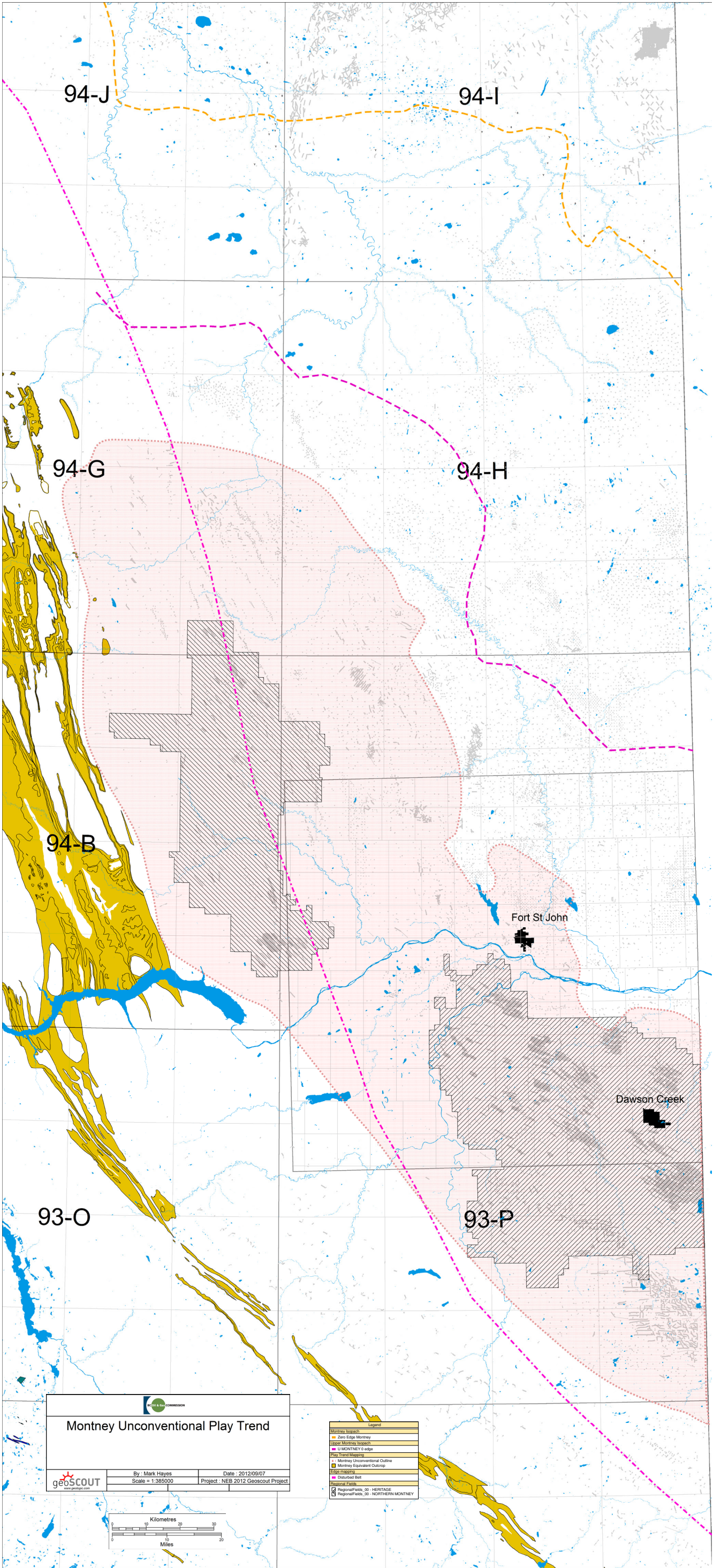
Focused development of the Montney wet gas trend began about 2009-2010 as natural gas commodity prices fell and it was recognized that significant associated natural gas liquids and condensate production enhanced economic returns. As a result over the 2007-2011 period, B.C.'s total condensate (combined field, plant and pentanes + volumes) production has increased 28 per cent from 0.9 million m³ to 1.2 cubic metres (m³) (Figure 7). This increase, in tandem with the decline in oil production, led 2011 annual condensate production volumes to surpass annual oil volumes.

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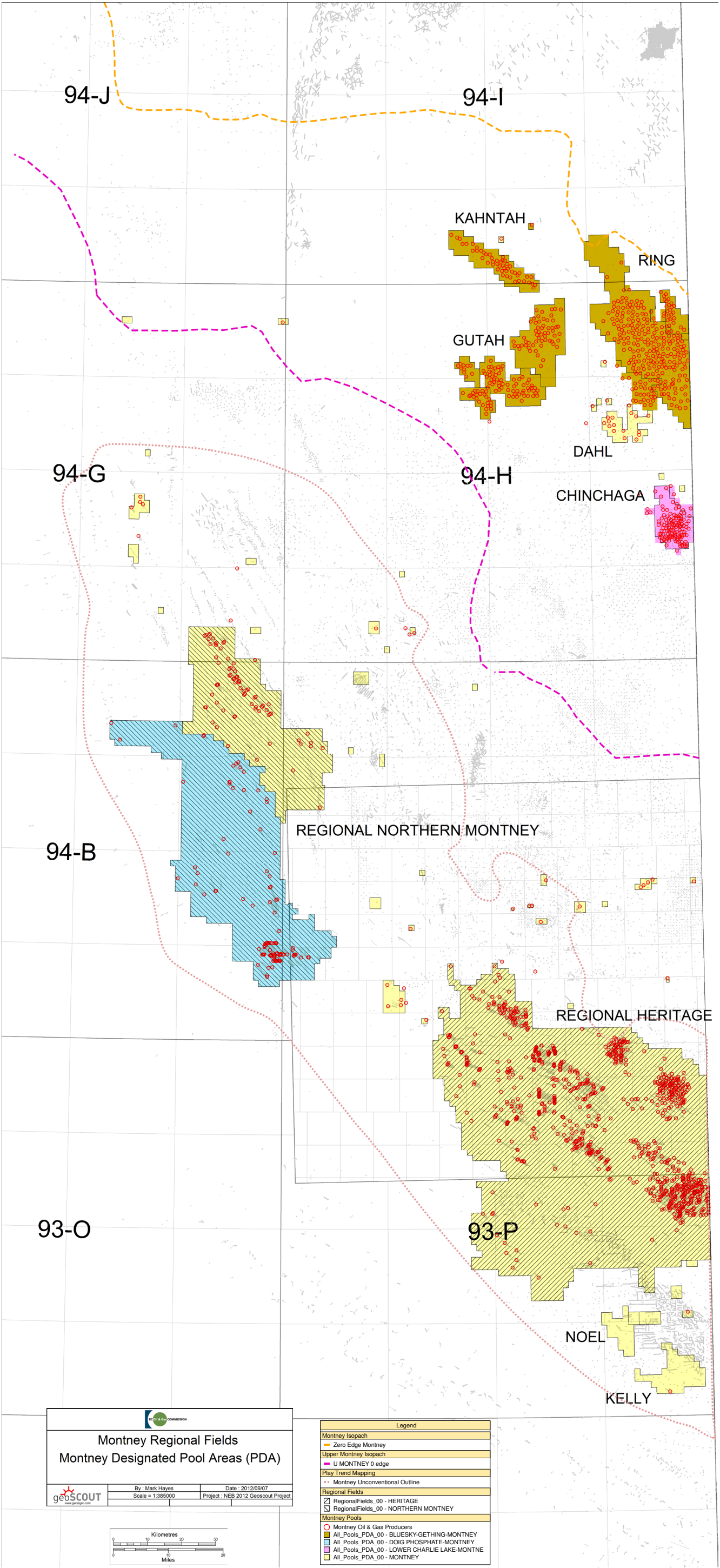
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For a larger version of any of the maps, click on the map in this report and it will bring up a version on the Commission website. All maps are located at ftp://www.bcogc.ca/outgoing/OGC_Data/Geology_and_Engineering/montney_play_atlas_maps/

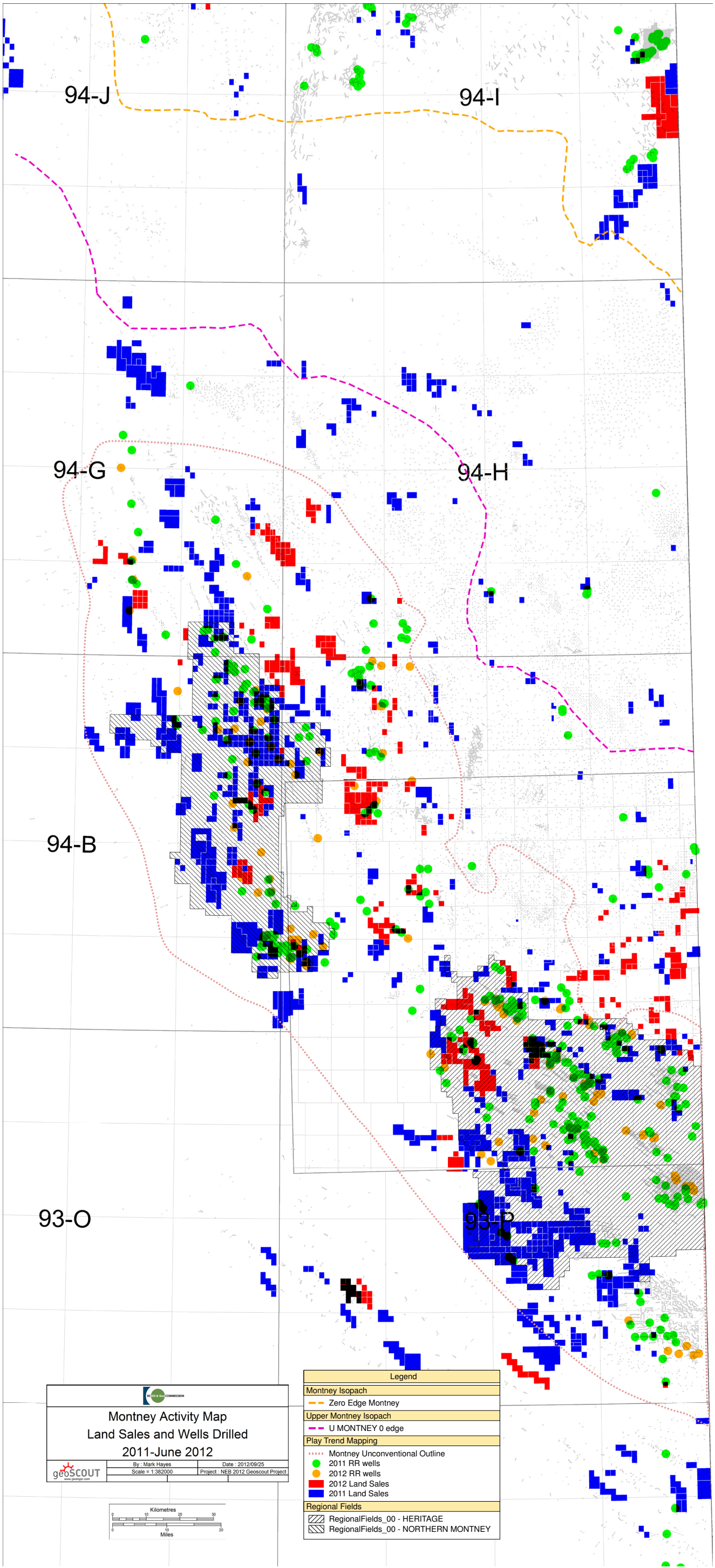
Map 1: Montney Trend/Activity: Unconventional Play Trend



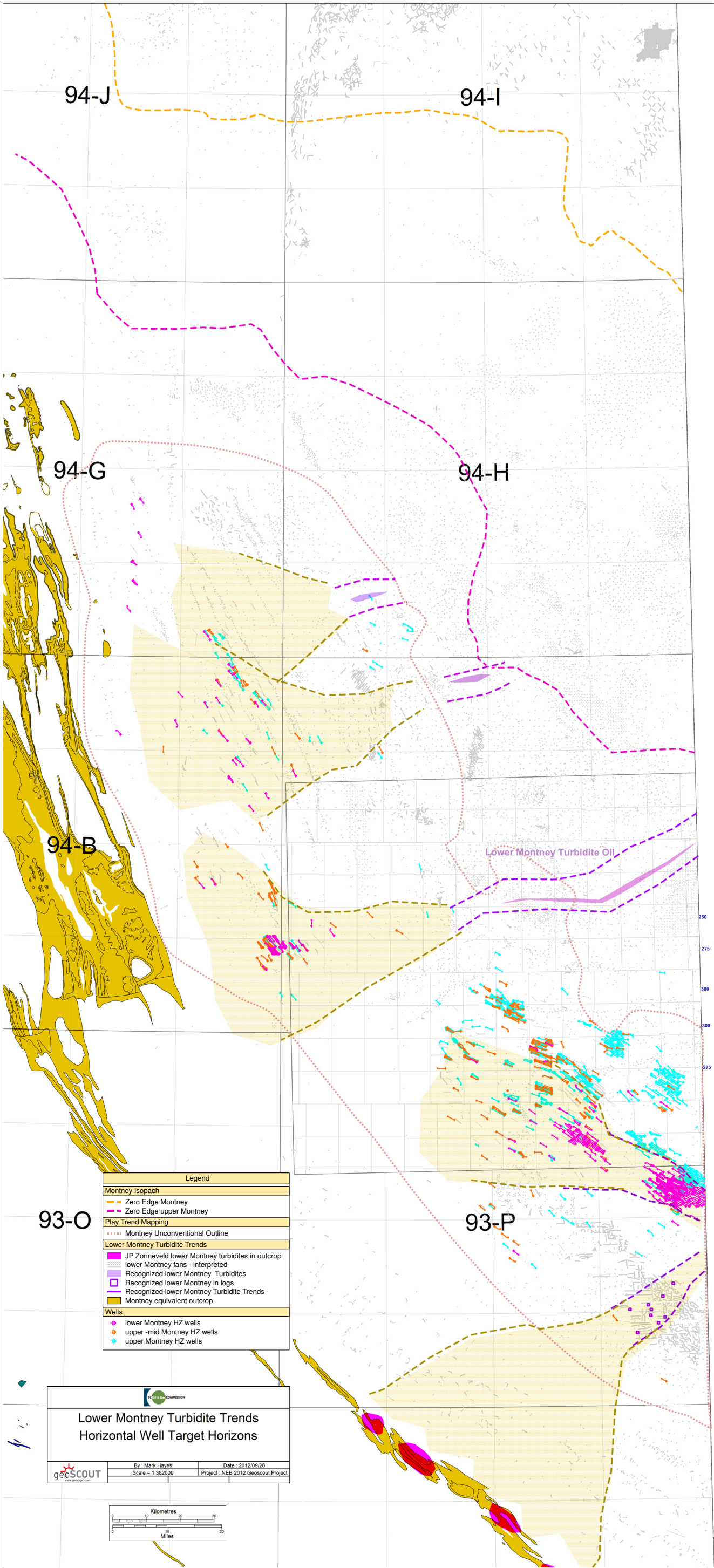
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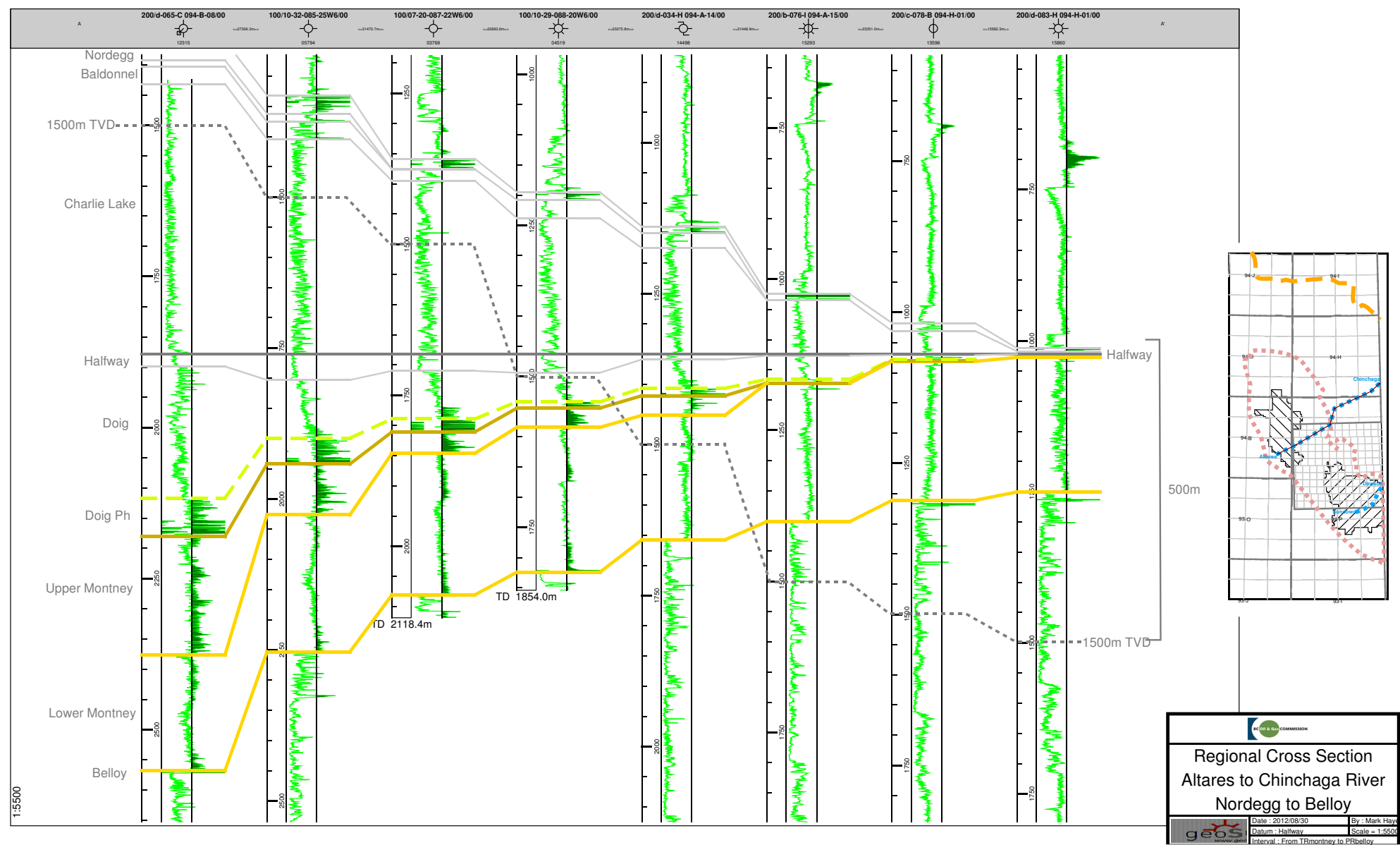
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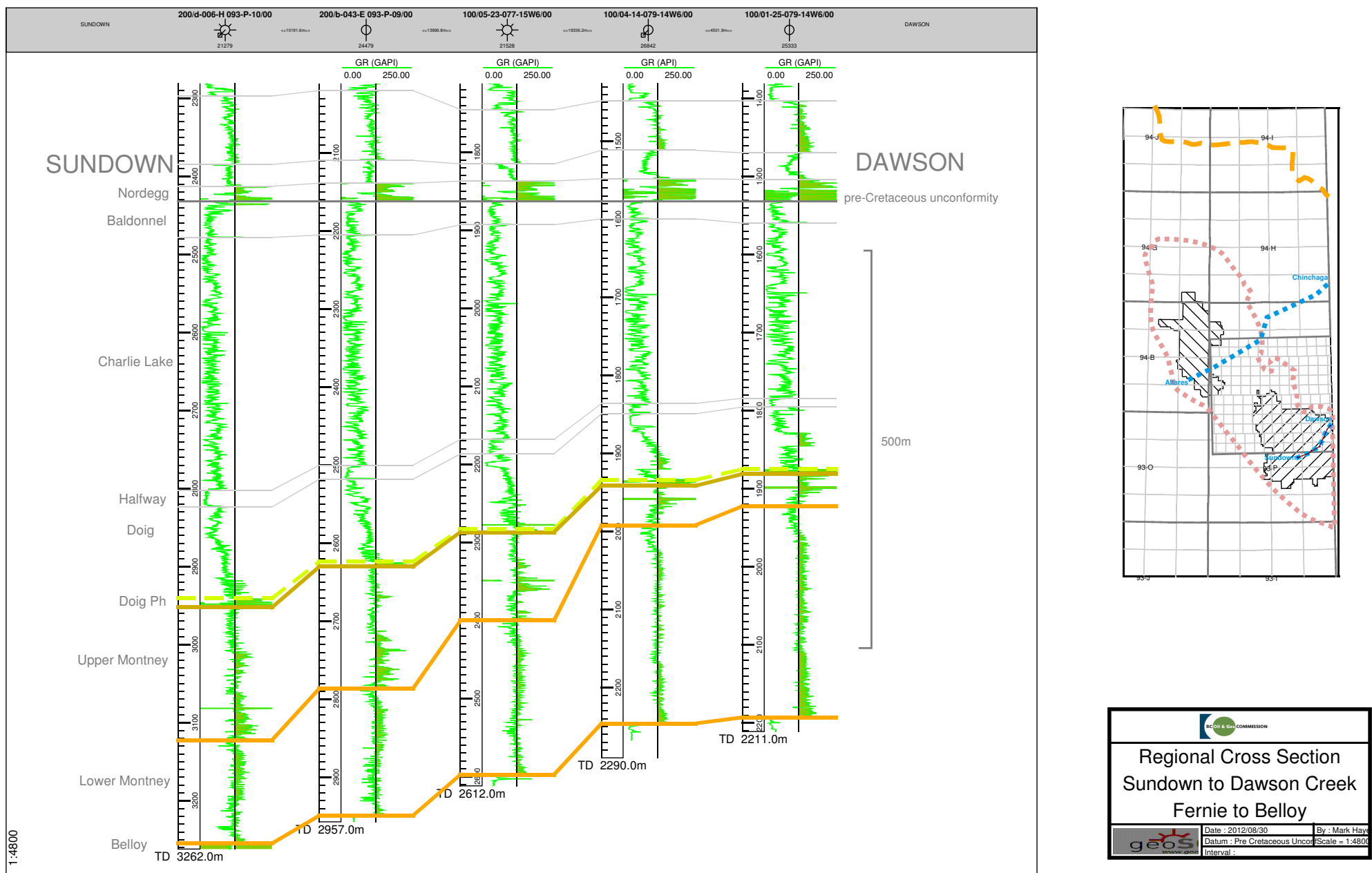
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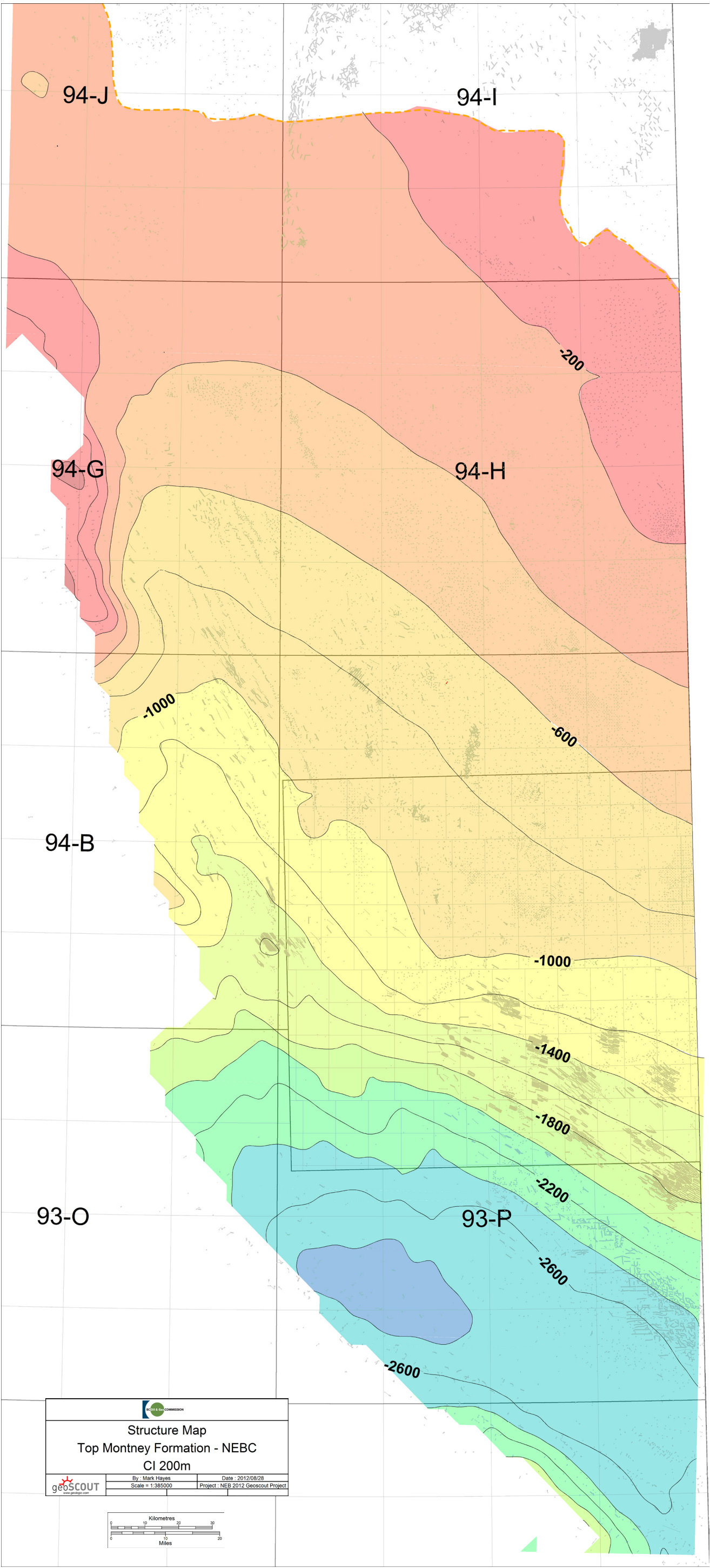
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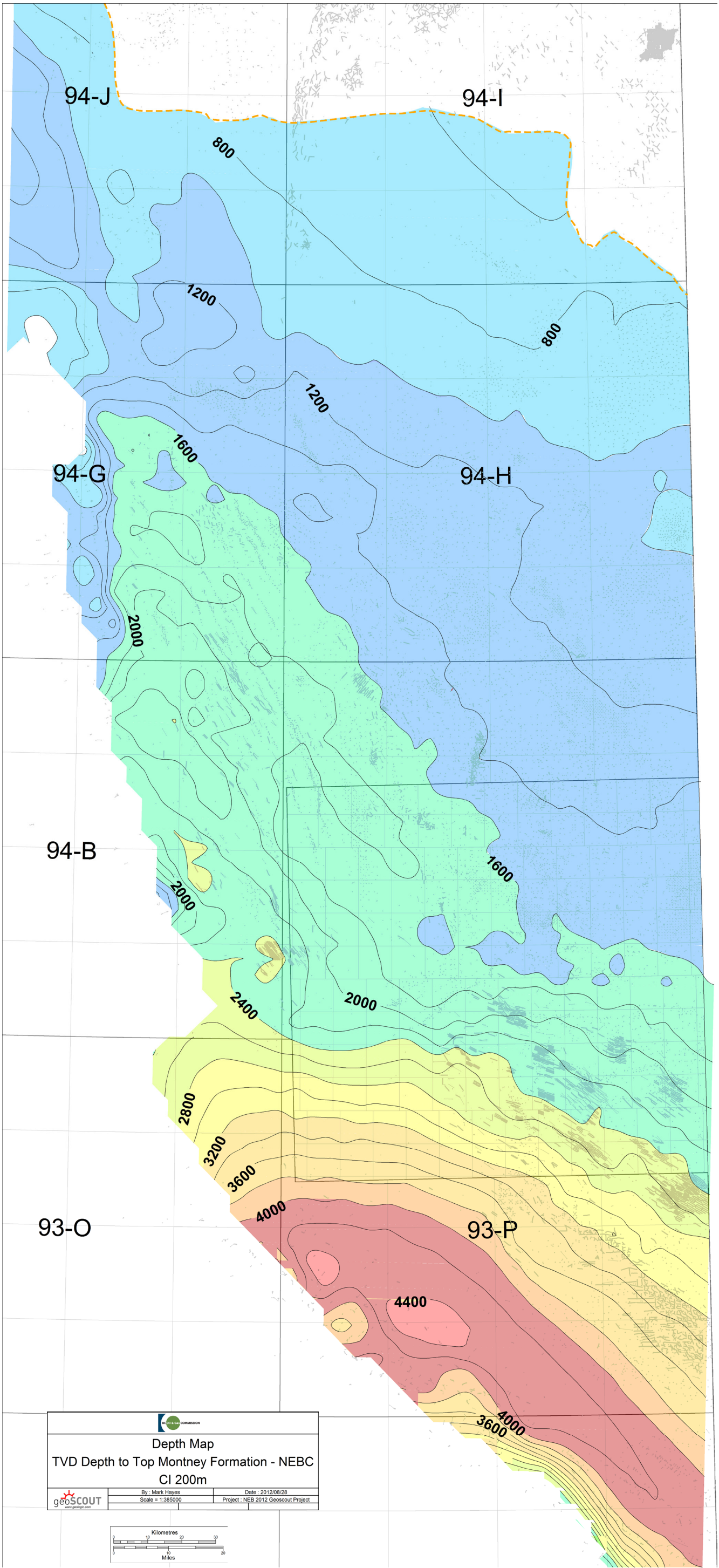
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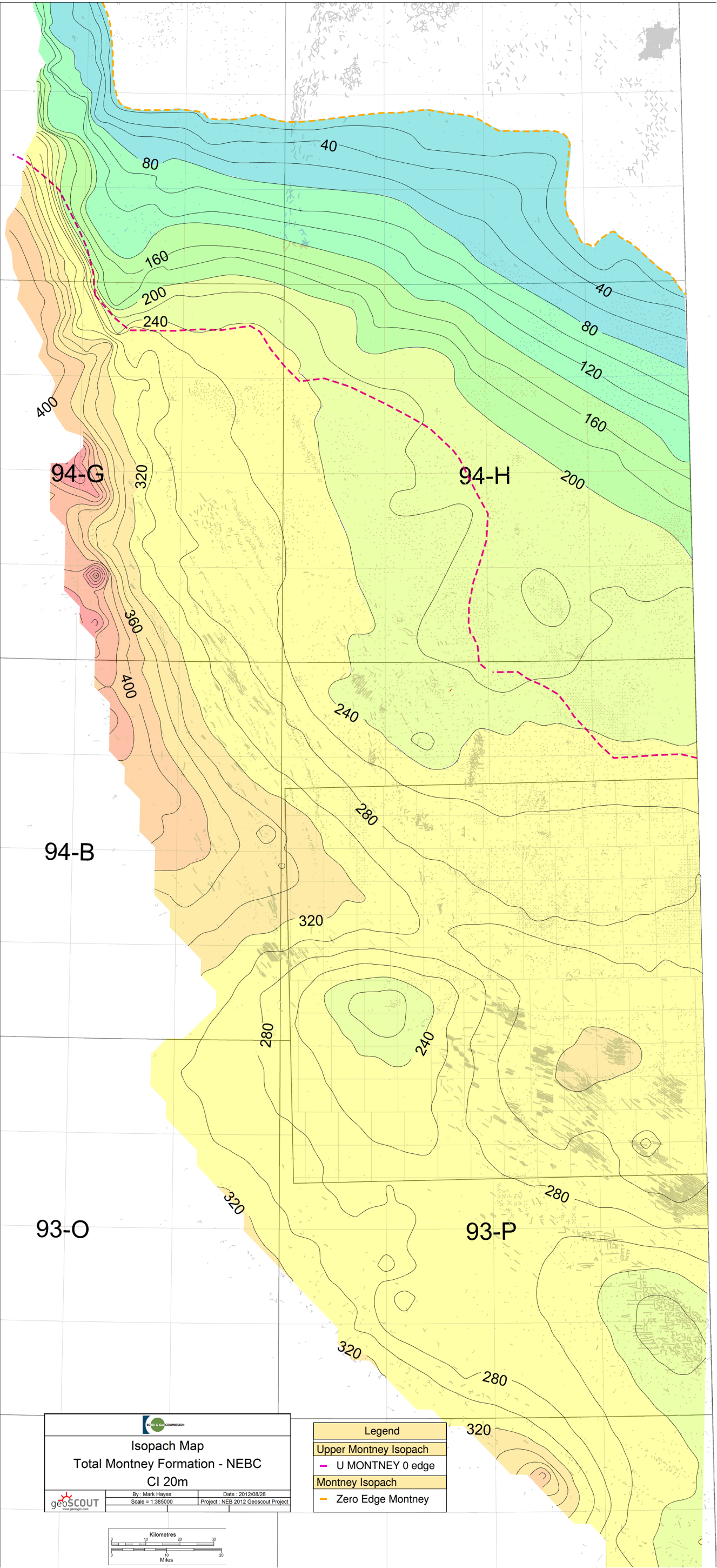
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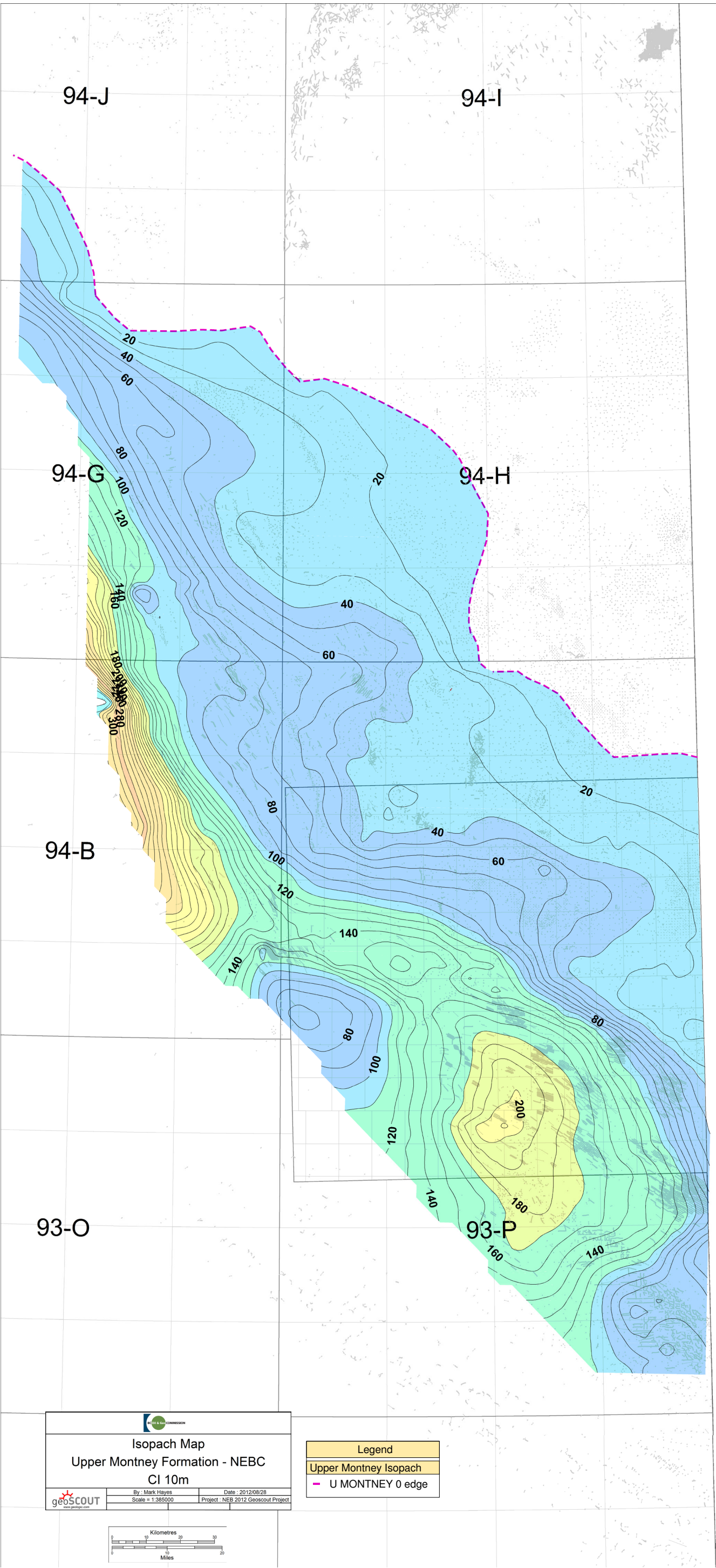
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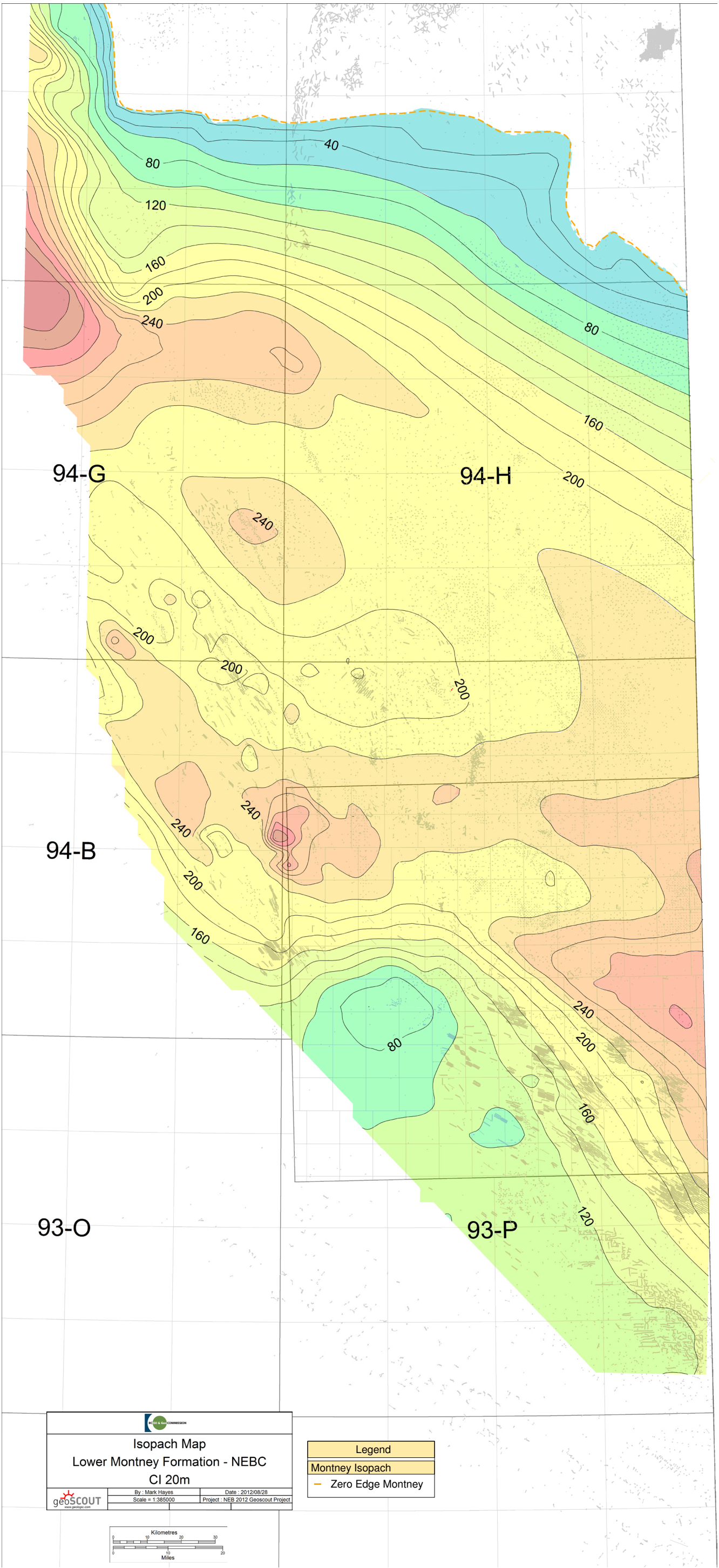
Map 9: Isopachs: Total Montney



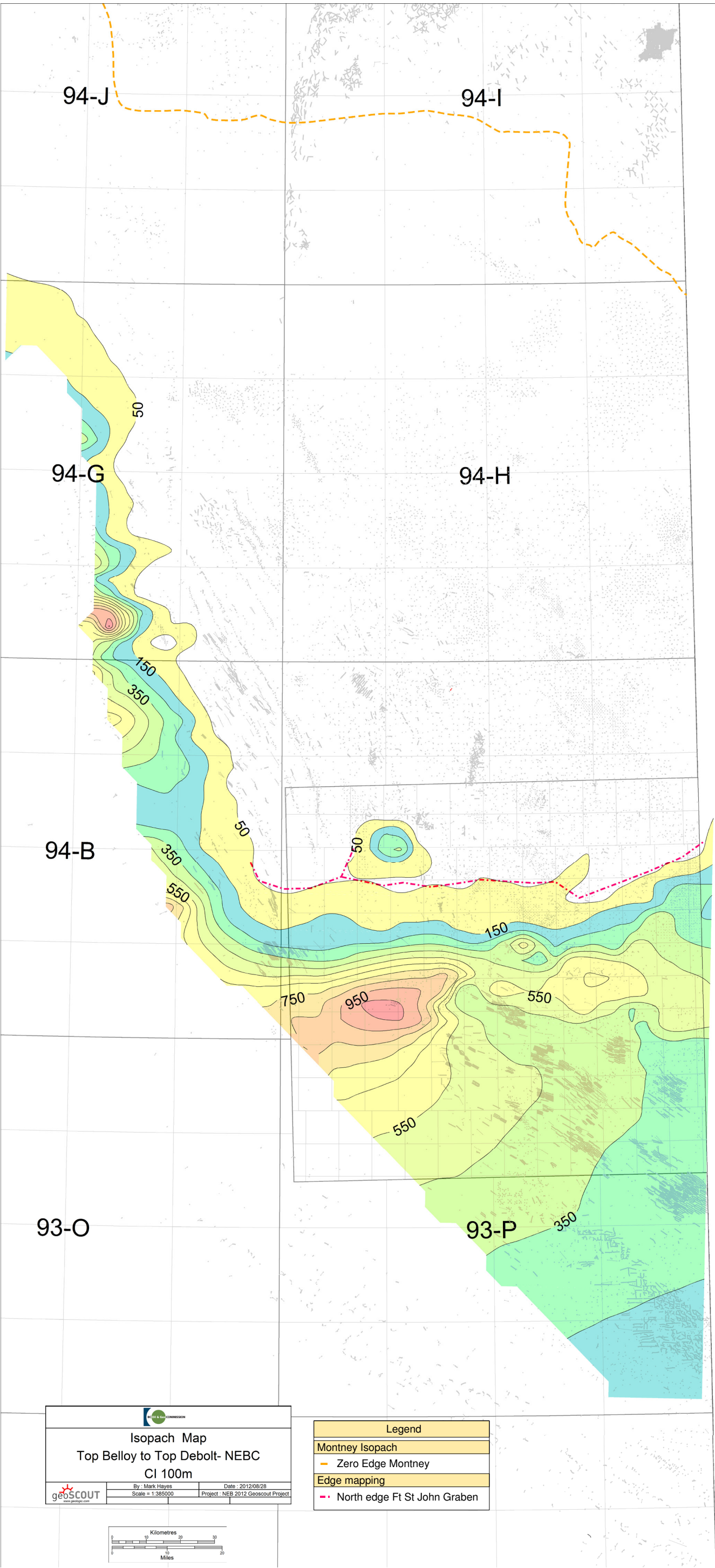
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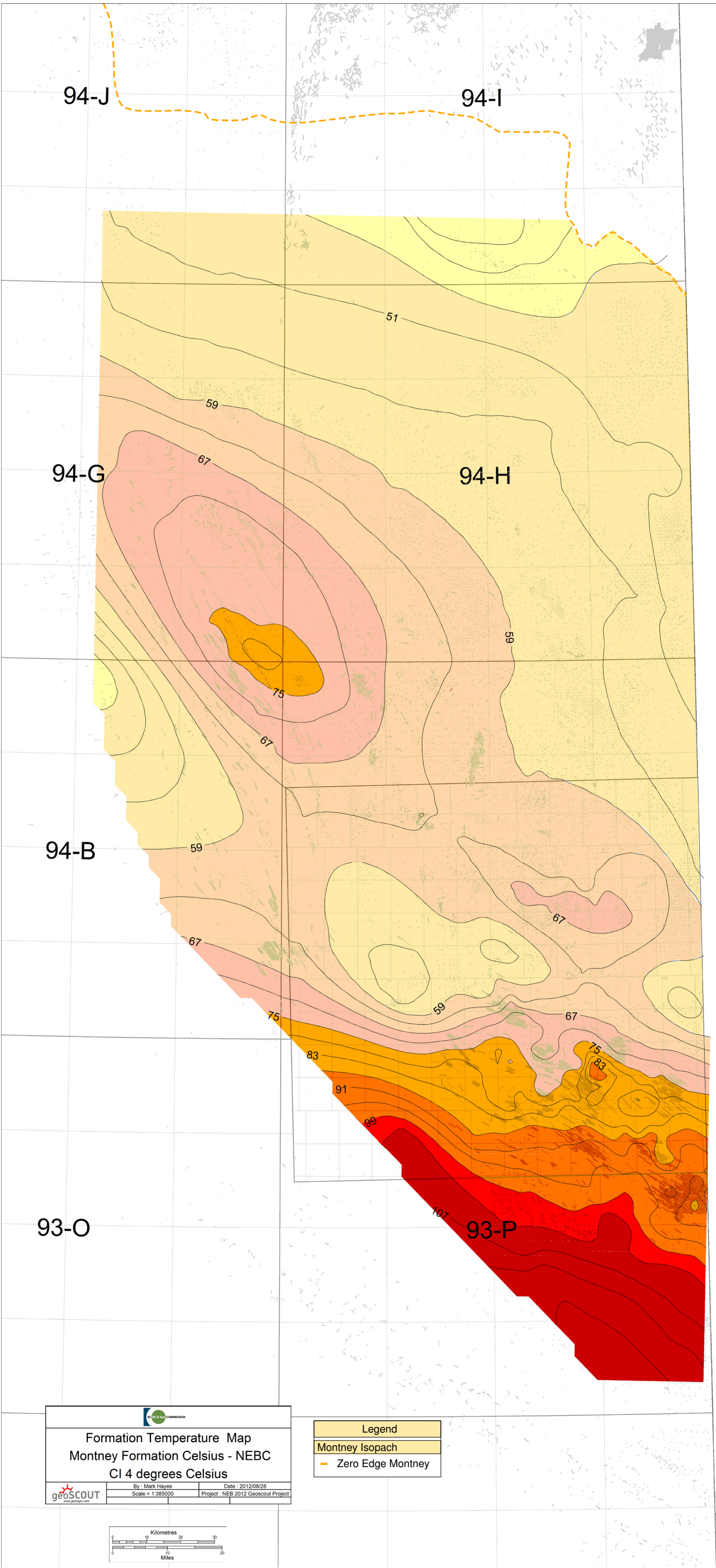
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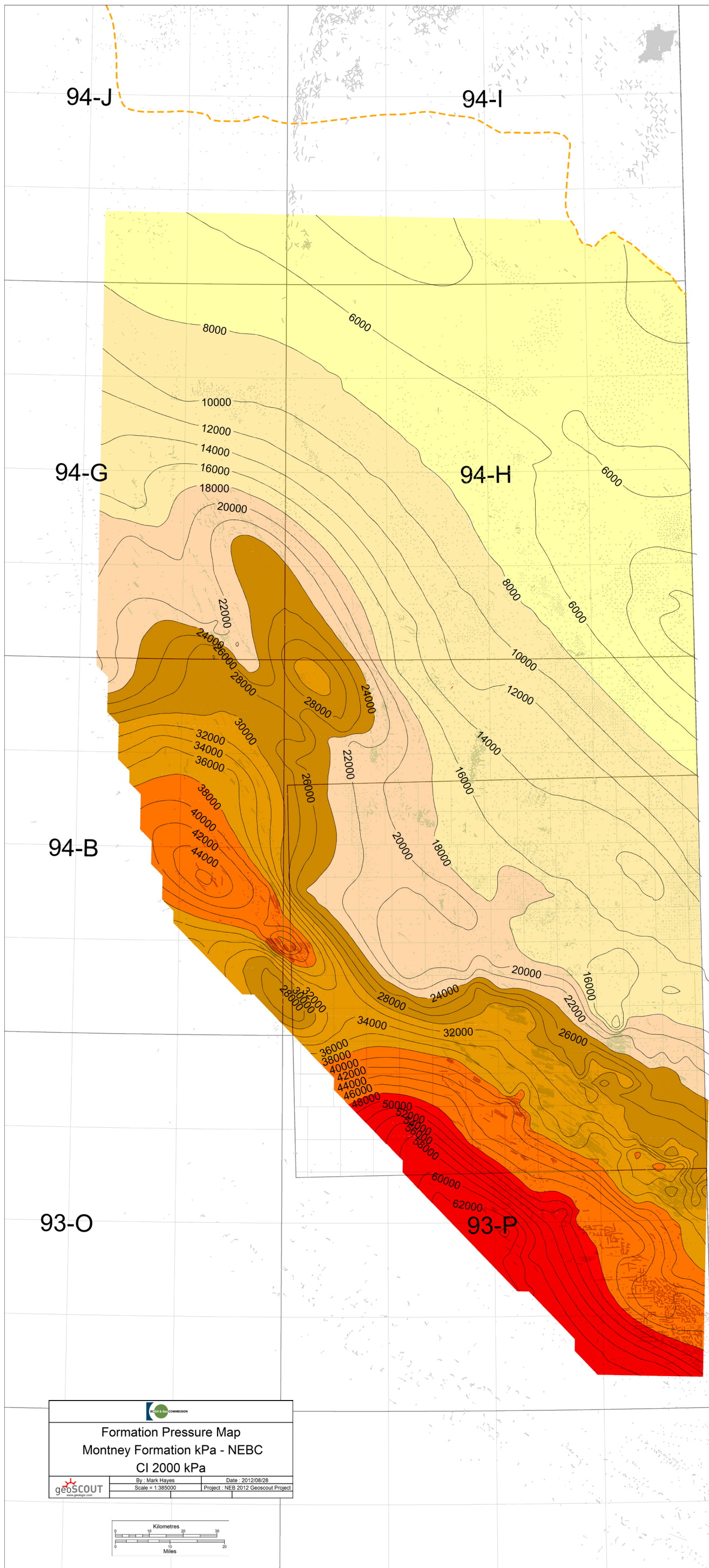
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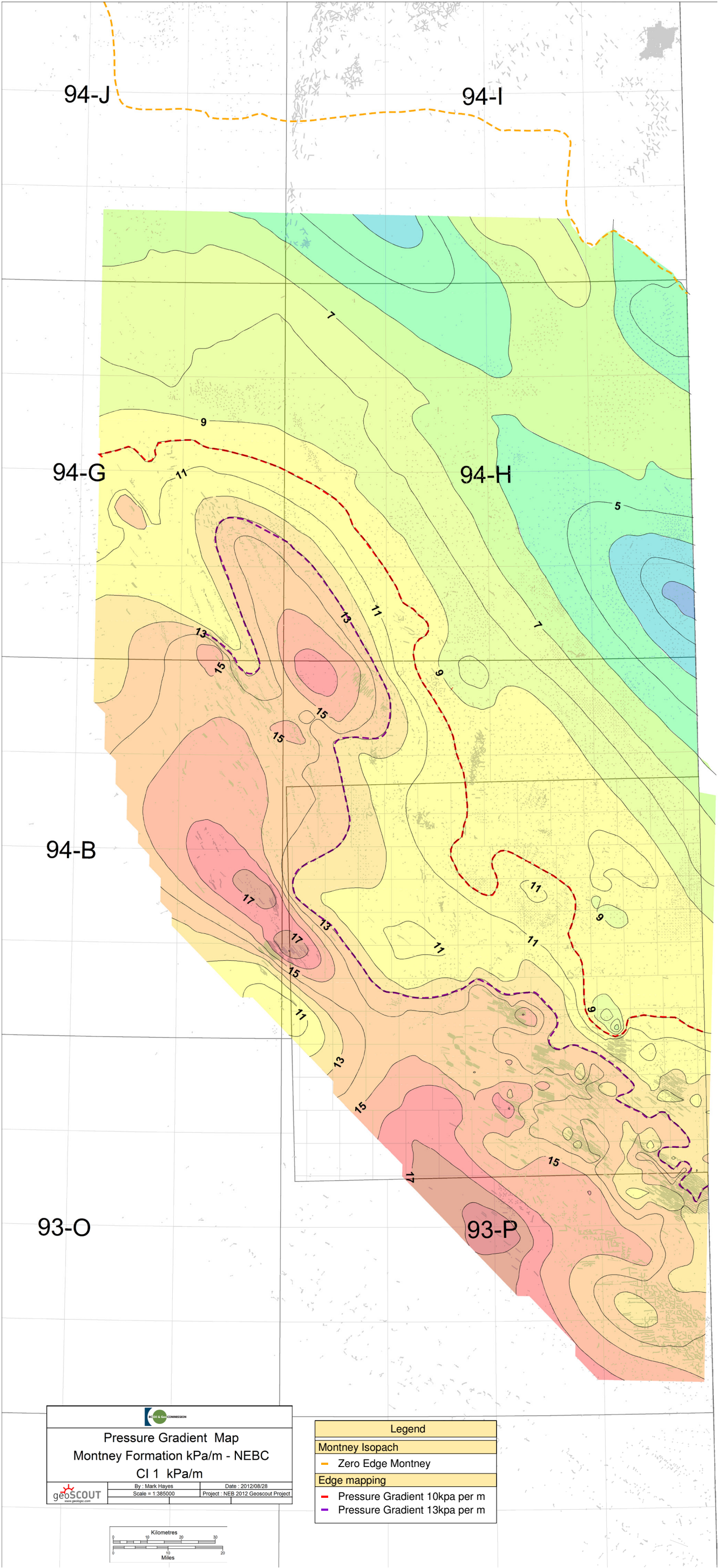
Map 13: Montney Formation: Temperature



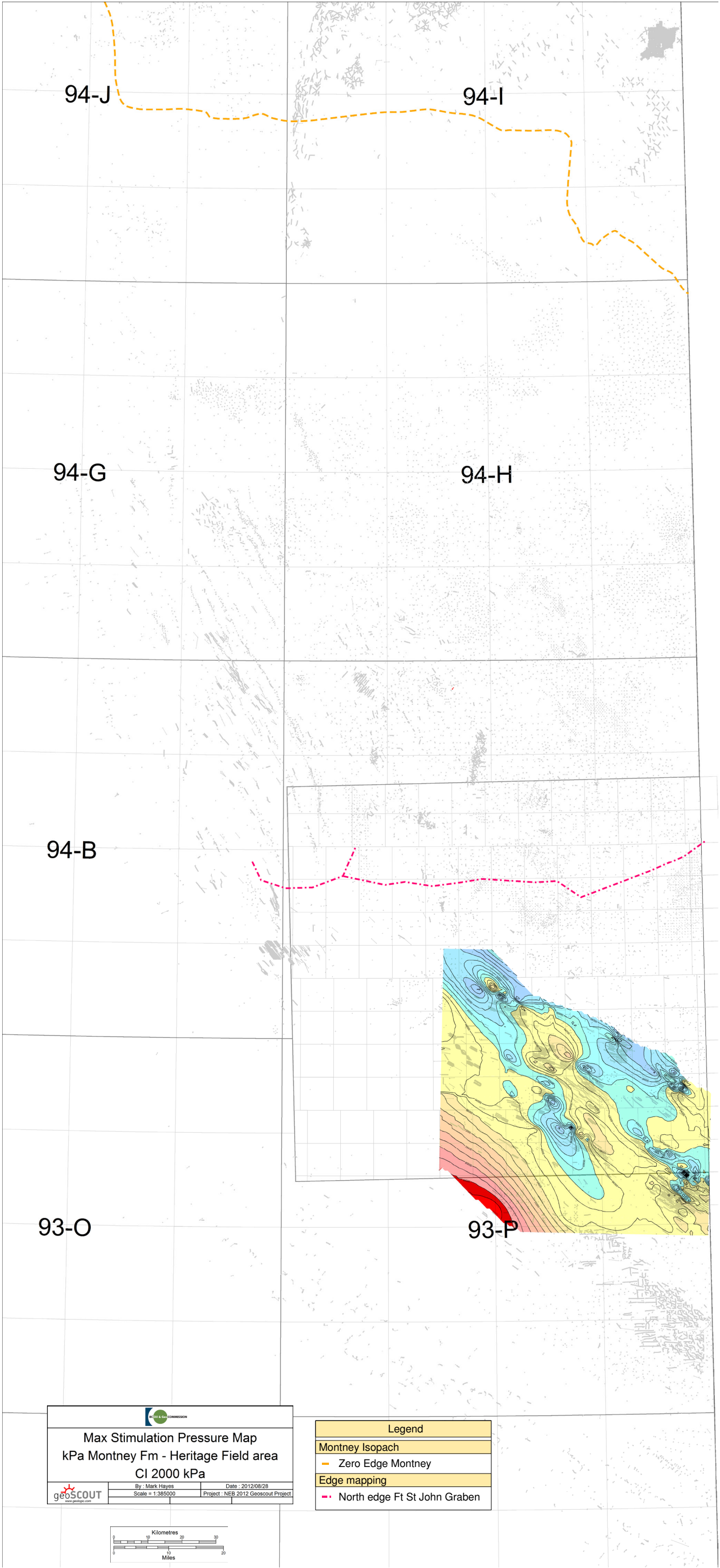
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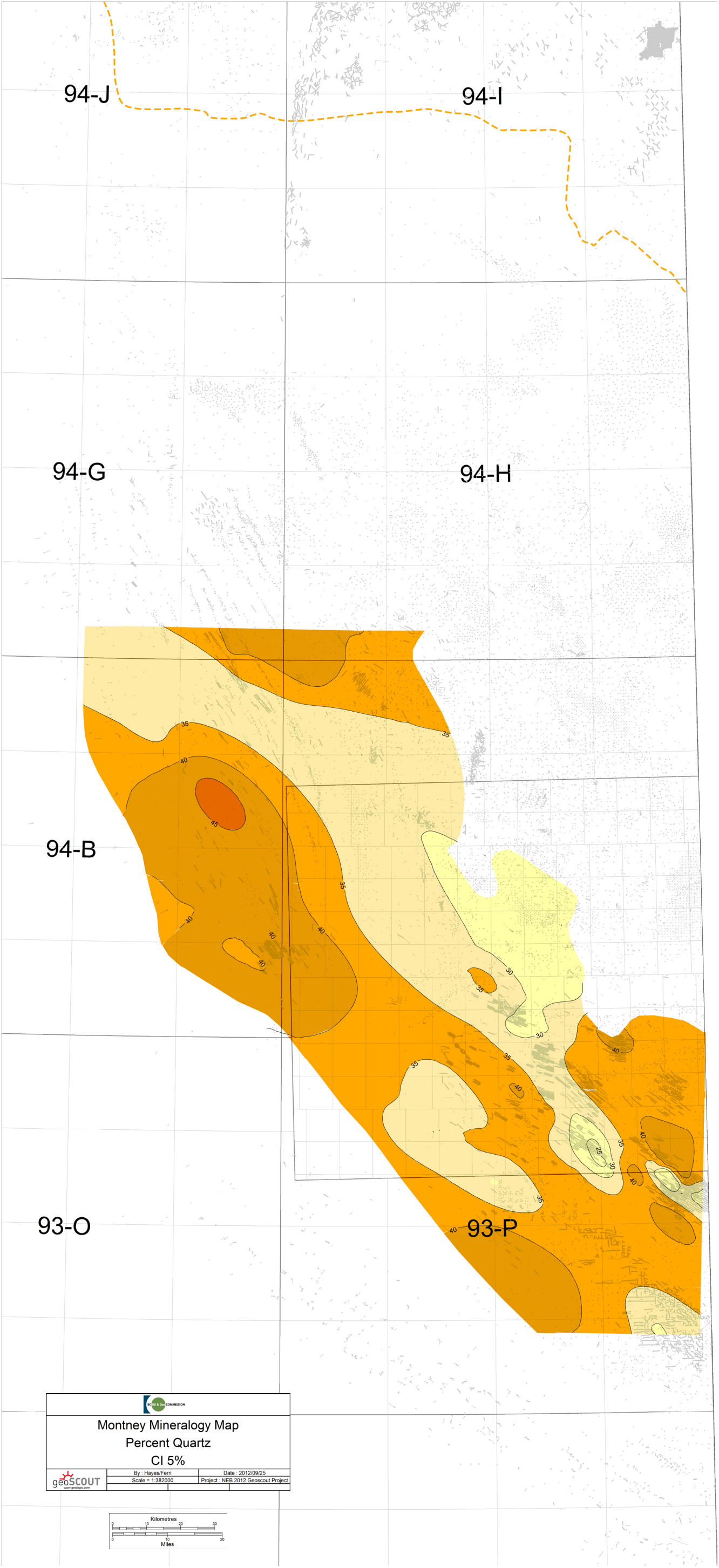
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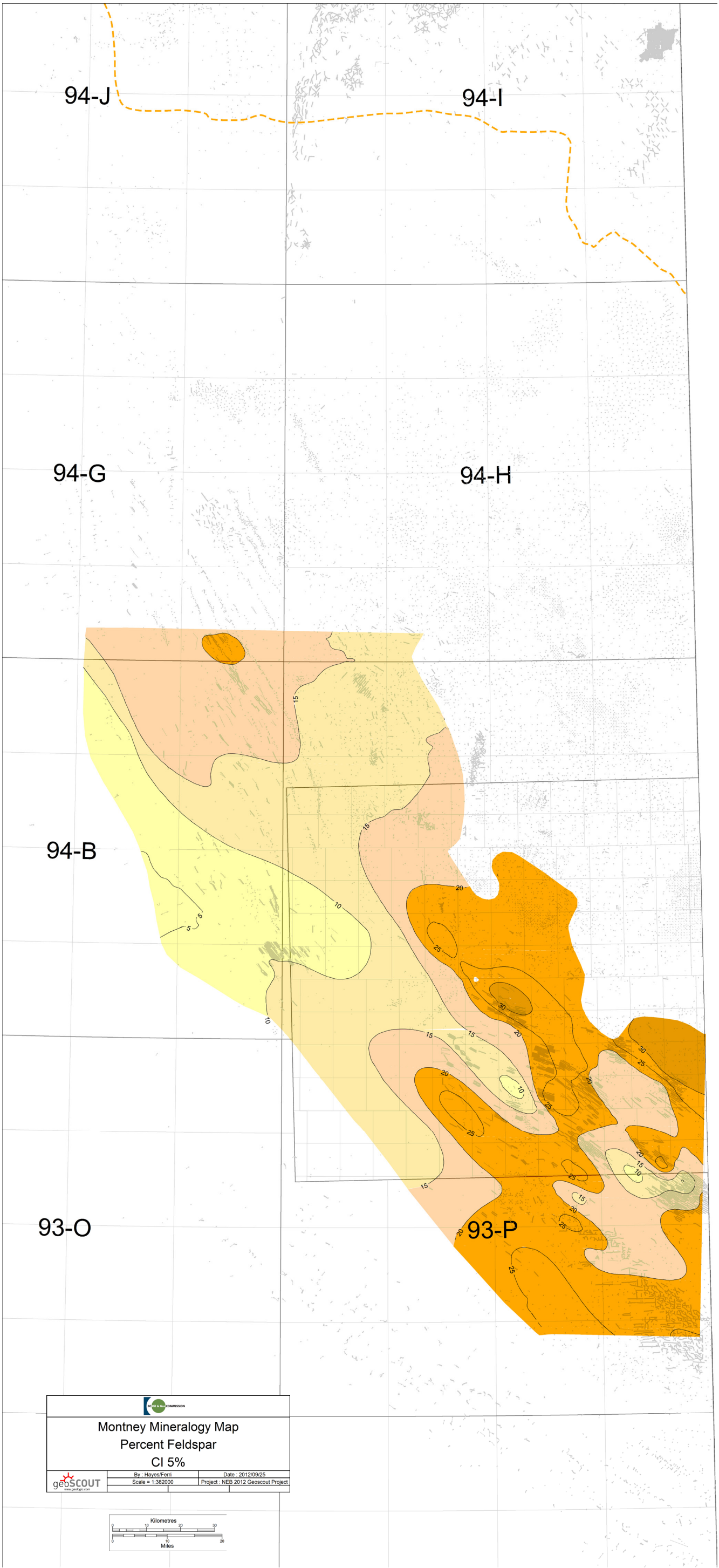
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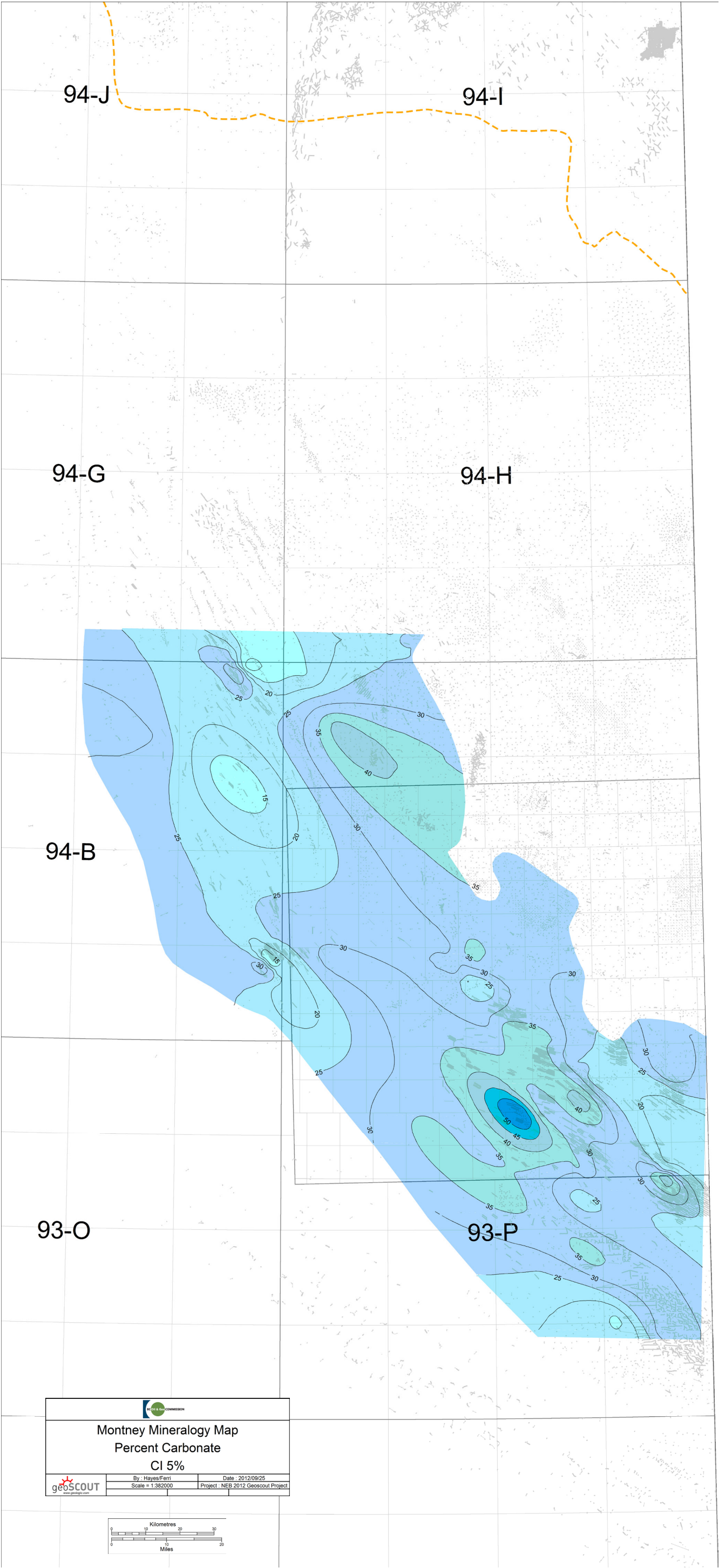
Map 17: Mineralogy: Percent Quartz



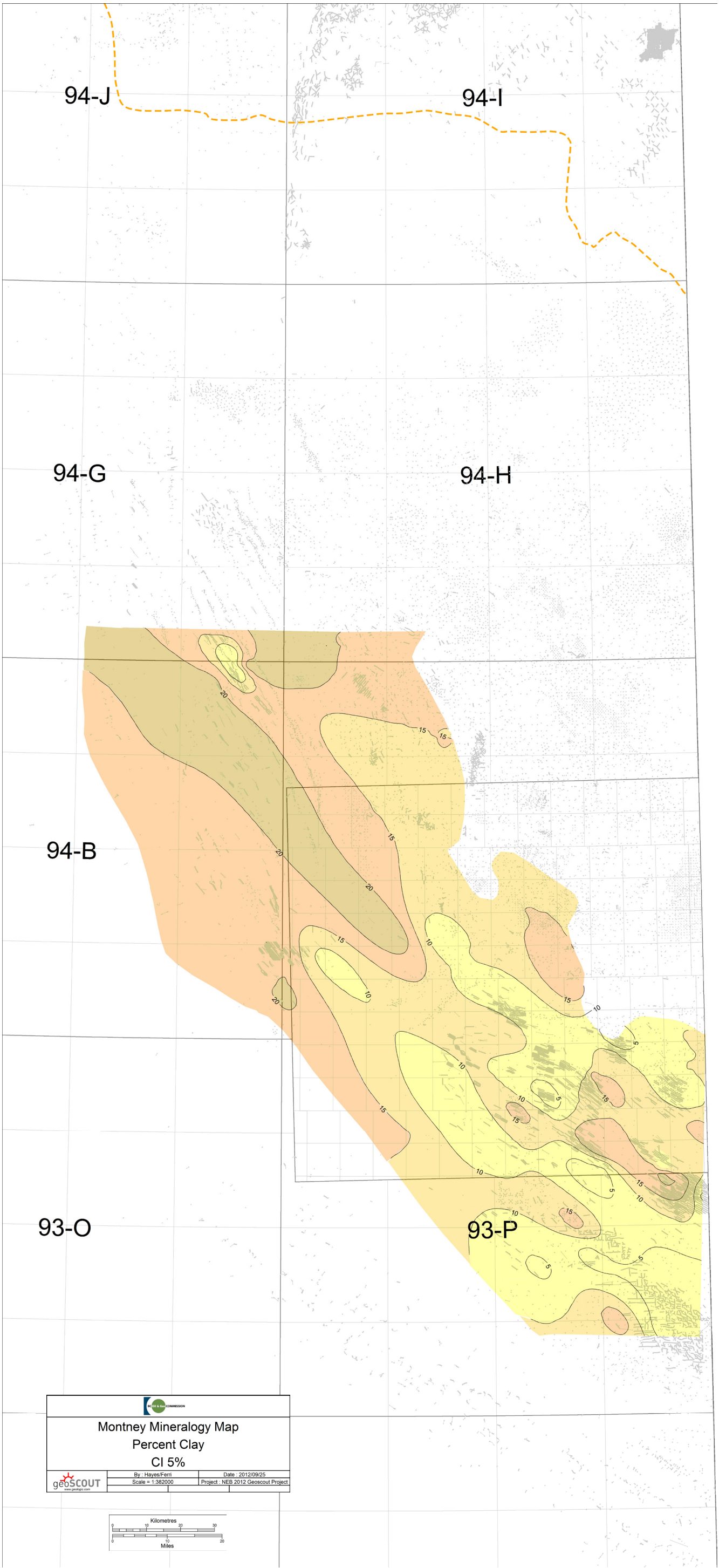
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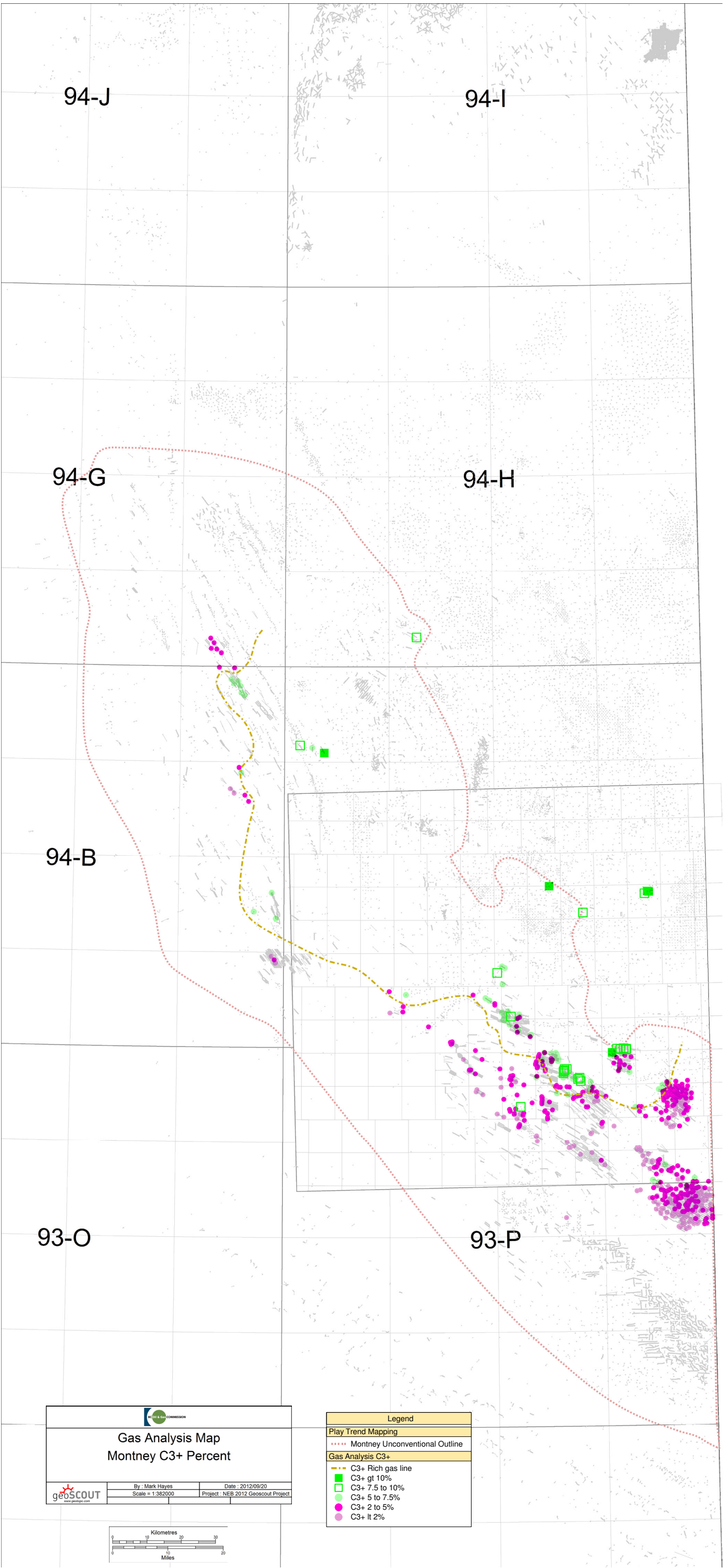
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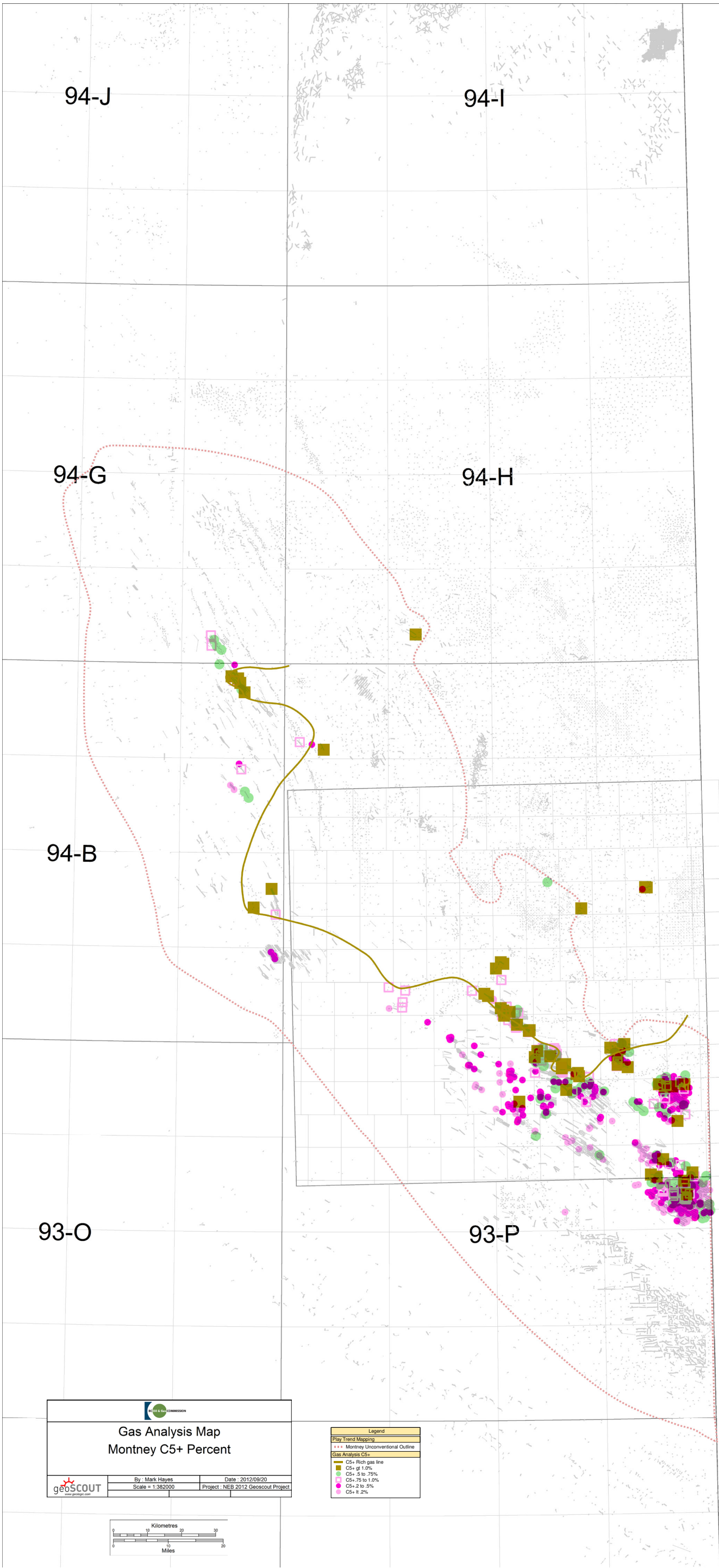
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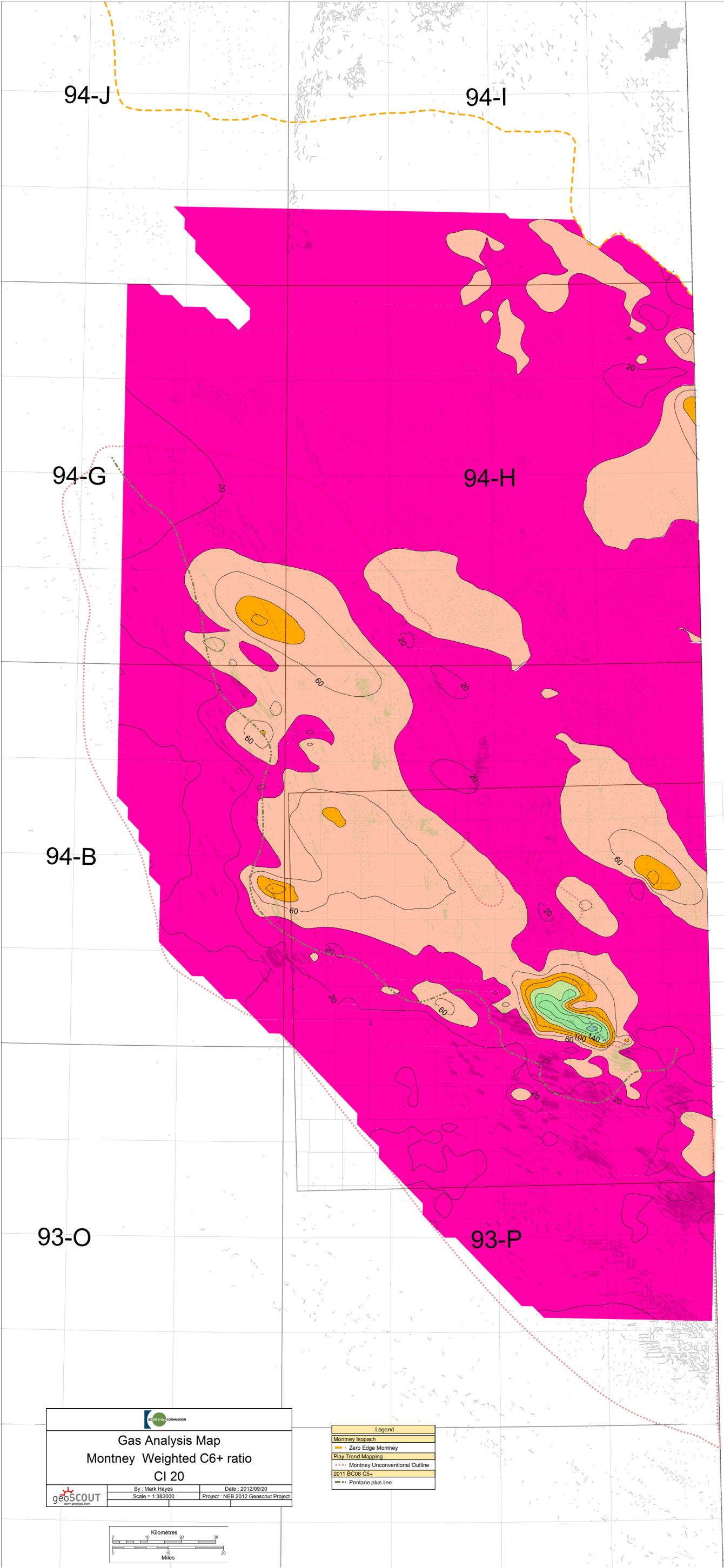
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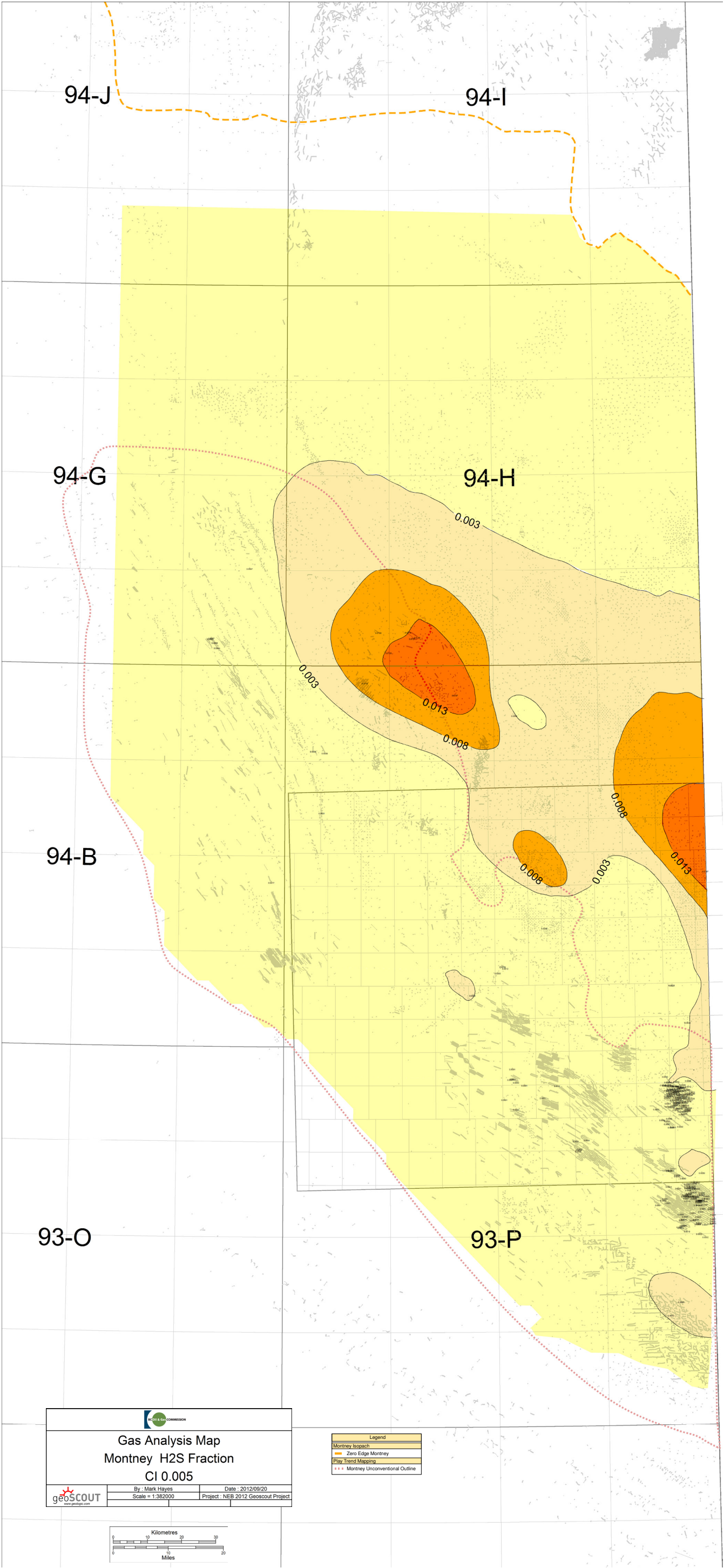
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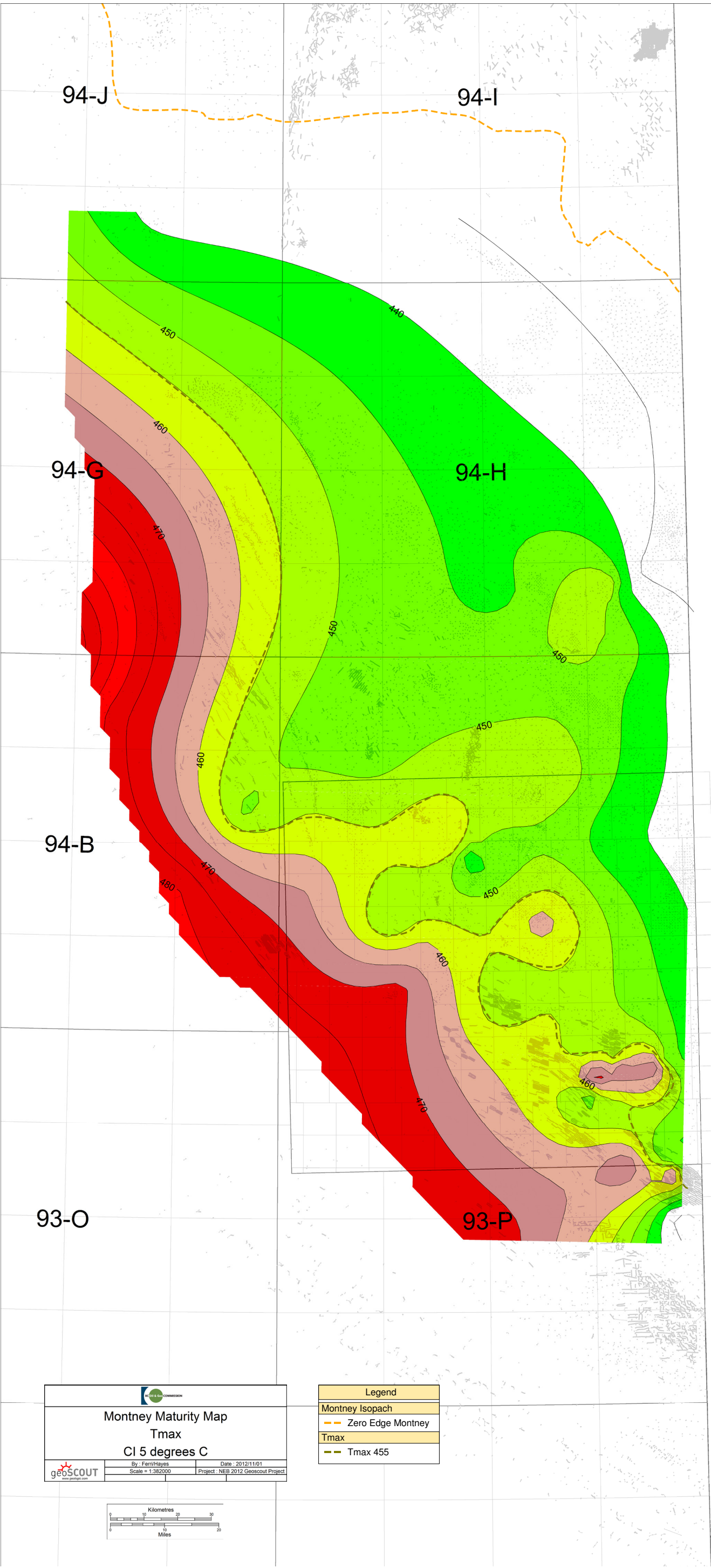
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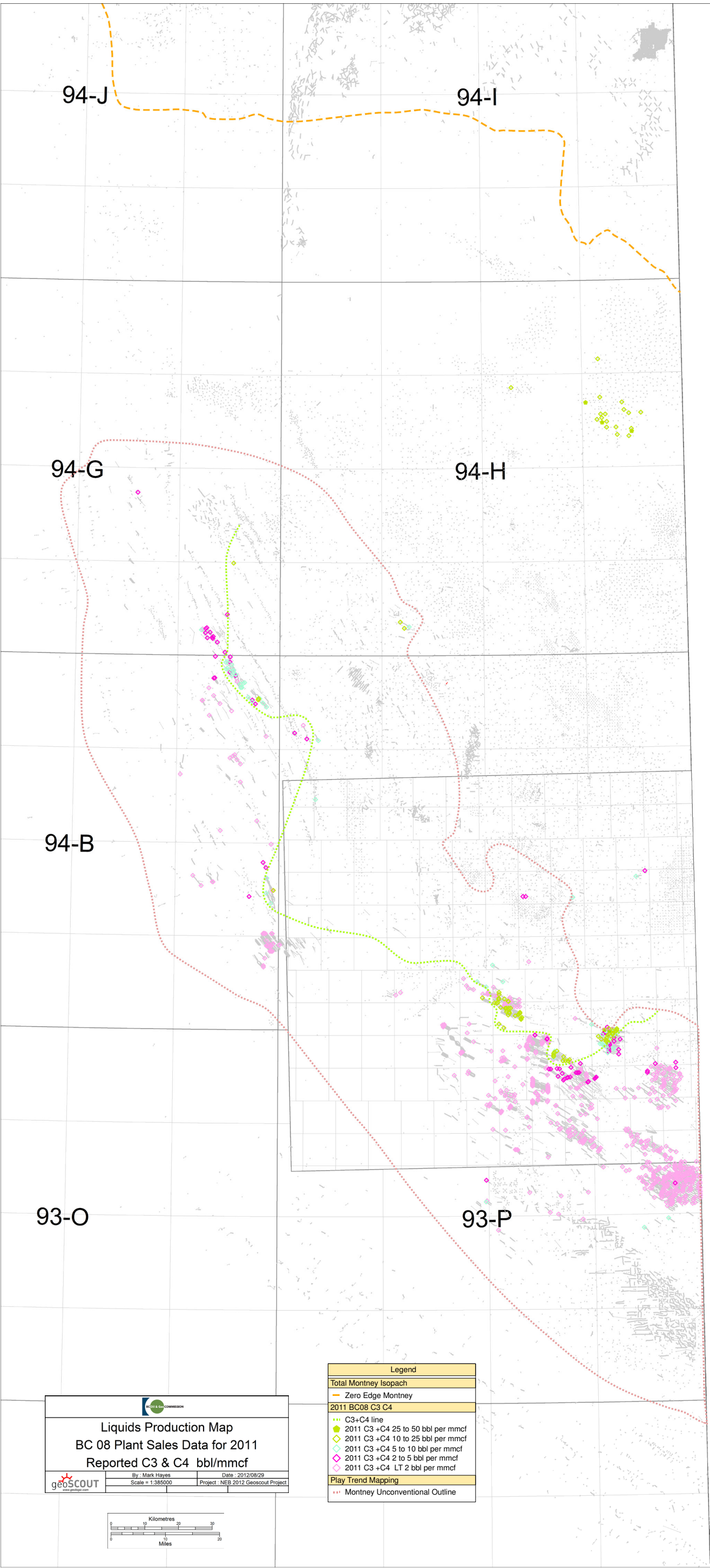
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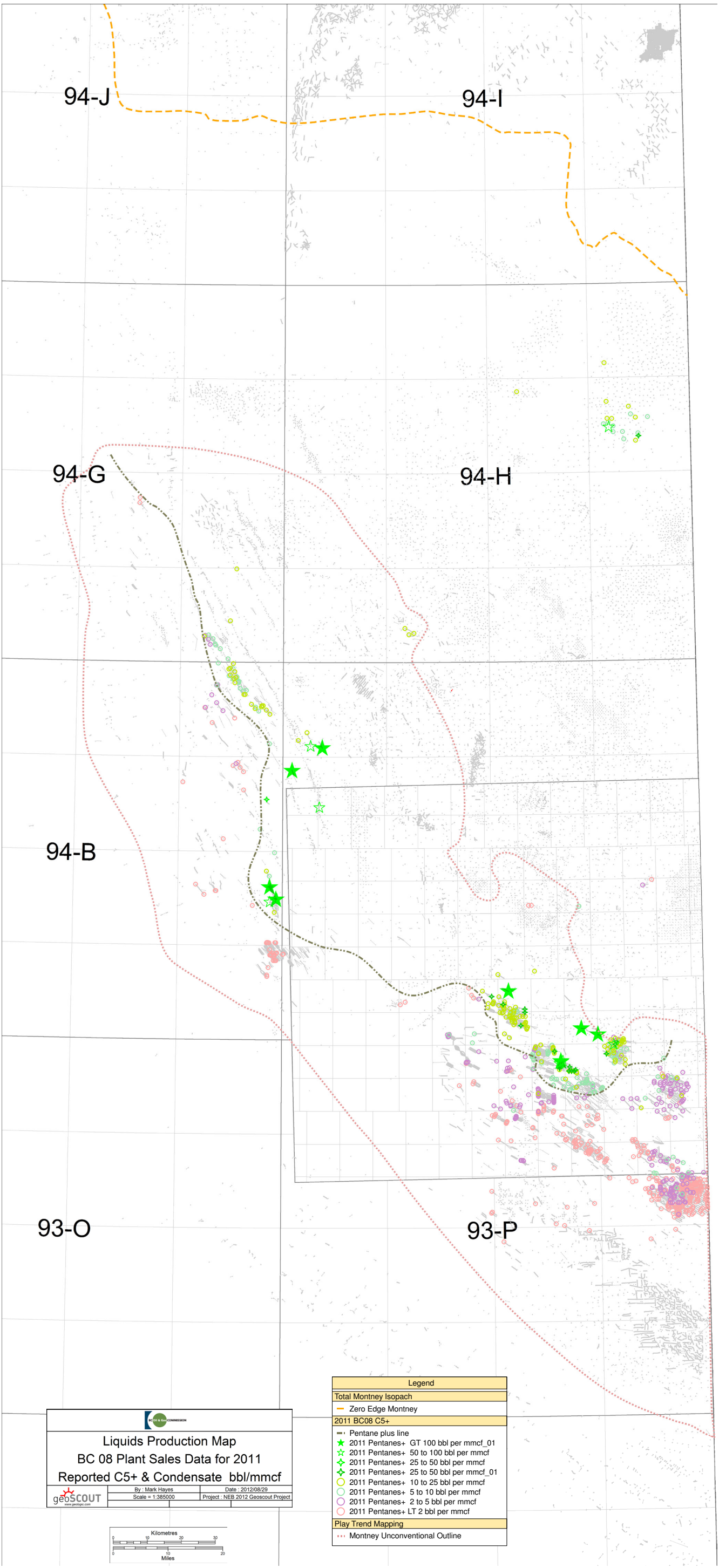
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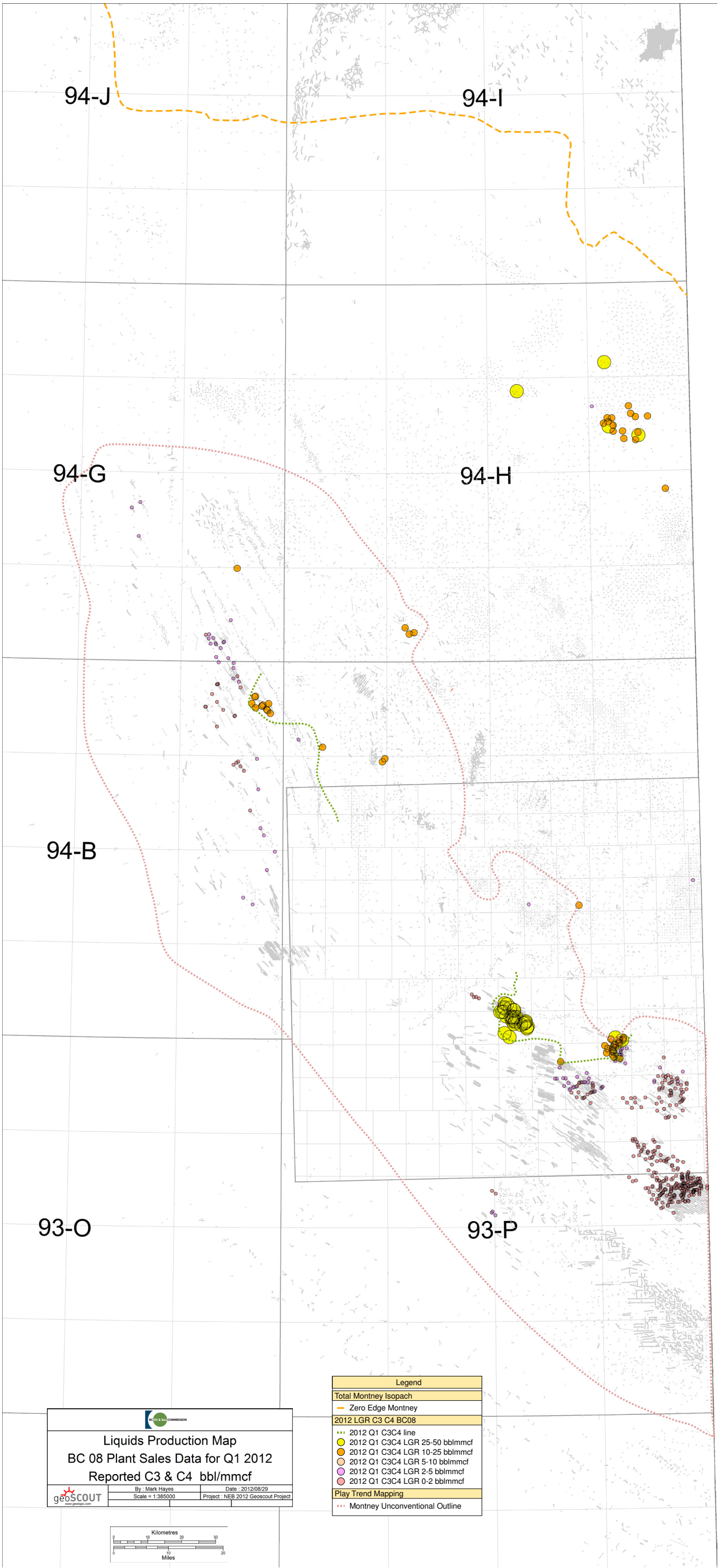


Map 26: Gas Liquids: 2011 BC08 C3 & C4

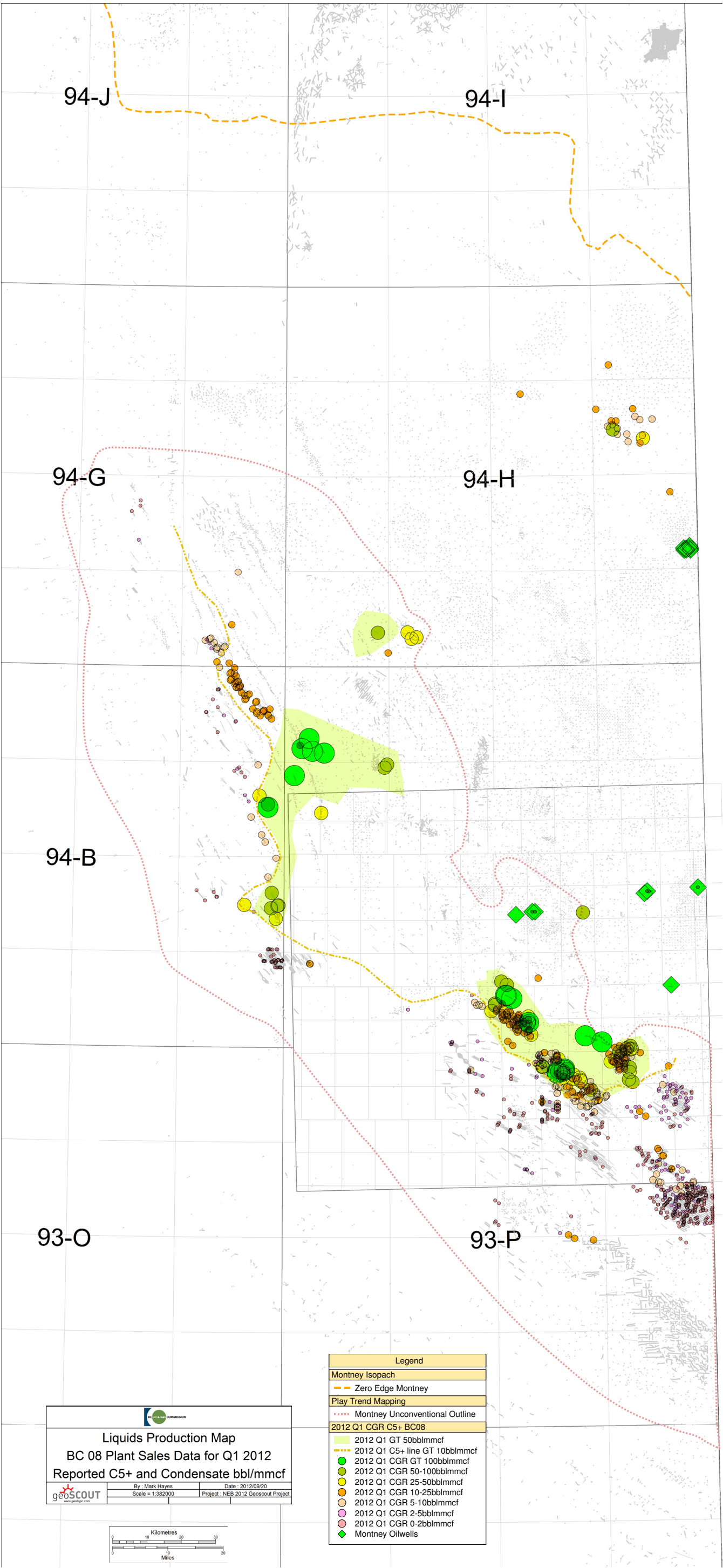


Map 27: Gas Liquids: 2011 BC08 C5





Map 29: Gas Liquids: Q1 2012 BC08 C5



Map 30: Gas Liquids: Montney Liquids Trend

