Province of British Columbia Ministry of Environment, Lands and Parks

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CIRCULAR LETTER NO. 372

OUR FILE

May 25, 1992

CIRCULAR LETTER TO ALL BRITISH COLUMBIA LAND SURVEYORS

Re: Wellsite Plans Pursuant to the P & NG Act

With the adoption of NAD 83, in 1990, as the official datum for British Columbia, the implementation period is well underway.

NAD 83 values for approximately 12,000 rural control stations in the Federal and Provincial networks were published in October of 1990. Preliminary coordinates were made available for the urban areas, however, a rigorous re-adjustment of both the urban and rural points is presently being carried out cooperatively by the Federal and Provincial Governments. Only minor amendments are anticipated for the rural points.

Software for transforming data from NAD 27 to NAD 83 has been in use in British Columbia for over a year. The algorithm in Version 1 produced some distorted results in pockets throughout the Province, however, the problem was addressed by both governments and satisfactory results are being obtained with Version 1.1. The software is presently available from MAPS BC for \$15.00 plus PST, GST and a handling charge of \$1.61.

In order to accommodate NAD 83, amendments to the P & NG Act are required and are also underway. Draught regulations for wellsite surveys have been written, a copy of which is enclosed. The new regulations can not, however, be approved until such time as the new legislation has received Royal assent.

As June 1, 1992 is the target date for conversion from NAD 27 to NAD 83 for wellsite surveys, plans prepared after that date should be prepared in accordance with the draught regulations. While it is recognized that, until the legislation has been amended, surveyors may submit plans based on the old regulations, we sincerely encourage your cooperation in this regard.

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Sample plans are being prepared to accompany the new regulations, however, in the meantime, the format now used by most surveyors, with appropriate changes as required by the proposed regulations, will be acceptable.

Yours sincerely,

D. A. DUFFY Surveyor General and Director

Enclosure

DRAUGHT 8

Part 11

Surveys under the Petroleum and Natural Gas Act

Division 1 - General

Interpretation

250. In this Part

"Act" means the Petroleum and Natural Gas Act "GPS" means Global Positioning System "P&NG" means Petroleum and Natural Gas "UTM" means Universal Transverse Mercator Map Projection

Division 2 - Rules for Survey

Bearings

251. (1) Bearings shall be derived from

- (a) stellar observations,
- (b) recorded control stations, or
- (c) solar observations, where a monument described in section 255 is within 3 km of the current survey.
- (d) monuments of the township system, where the survey is within the Peace River Block.
- (2) Bearings shall be referred to
 - (a) the central meridian of the UTM zone in which the survey is situated where the survey lies outside the Peace River Block, or
 - (b) the central meridian of the township in which the survey is situated where the survey lies within the Peace River Block.
- (3) Bearings shall be derived
 - (a) at the origin and close of the survey, and
 - (b) at least once,

(i) for every 40 angles of the traverse, or

(ii) every 8 km of traverse

whichever occurs first.

(4) A discrepancy between a bearing derived under subsection (1)(a), (1)(b), or (1)(c), and a bearing by account after convergence has been applied shall not exceed 15 seconds for every kilometre of traverse.

(5) A permitted discrepancy shall be adjusted by distributing the error between the traverse angles concerned.

Distances

252. (1) The maximum limit of error for a survey shall be,

- (a) where the distance between the wellsite and the nearest monument being tied pursuant to section 255 is 20 km or less, $1:5000 \pm 2$ cm, or,
- (b) where the distance between the wellsite and the nearest monument being tied pursuant to section 255 is 50 km or less but greater than 20 km, $1:10000 \pm 5$ cm,
- (c) where the distance between the wellsite and the nearest monument being tied pursuant to section 255 is 100km or less but greater than 50 km, $1:25000 \pm 10$ cm, or
- (d) where the distance between the wellsite and the nearest monument being tied pursuant to section 255 is over 100km, 1:50000 \pm 20 cm.

(2) Where a traverse does not close upon itself, or on monuments referred to in section 255, to the required accuracy, the traverse shall be check measured to ensure the required standard of accuracy.

Vertical datum

253. (1) The ground elevation of the well position and the monuments required by Section 258 shall be derived from a datum acceptable to the Surveyor General.

(2) Where differential GPS methods are used to determine elevations, a geoid model acceptable to the Surveyor General shall be used.

Method of survey

254. (1) In a survey under the Act, all angles shall be read with a transit, and all distances shall be measured with a steel tape or electronic measuring equipment, each of which shall be calibrated periodically to ensure accuracy.

(2) All linear measurements shall be in metres and decimals thereof.

(3) Notwithstanding subsection 1, instead of running a conventional traverse between the wellsite and a monument or monuments required by section 255, the surveyor may use differential GPS methods to determine the location of the wellsite.

(4) Differences in elevation shall be determined by differential levelling, trigonometric levelling or by differential GPS positioning, taking into account the geoid.

Ties

255. The survey shall commence and close at a monument or monuments of

- (a) the township systems in the Peace River Block,
- (b) a Government survey control system that is acceptable to the Surveyor General.
- (c) an approved wellsite survey or surveys,
- (d) a Provincial boundary survey that is acceptable to the Surveyor General or
- (e) a right of way, which has been coordinated on geodetic datum and is acceptable to the Surveyor General.

GPS Methods

256. (1) Where GPS methods are used, the well position shall be determined by taking differential GPS observations, to determine the difference in position

- (a) between 2 or more Government Survey Control Stations of 3rd order or better, and
- (b) between each of the two intervisible reference monuments and at least 2 or more Government Survey Control stations of 3rd order or better which have been occupied in compliance with subparagraph (1)(a).

(2) The bearing and length of the line between the two intervisible monuments and the difference in elevation shall also be determined by conventional survey methods as outlined in sections 254(1) and (2).

(3) Where the results of the GPS observations required by section subsection (1)(a) do not agree with the published positions to the accuracy required by section 252(1), additional Government Survey Control Stations shall be observed to ensure that the required accuracy is obtained.

(4) In the triangles formed by the 2 observed Government Survey Control Stations and each one of the 2 intervisible reference monuments, no interior angle shall be less than 15°.

(5) Phase data from a minimum of four satellites, with an elevation angle of at least 10° above the horizon, shall be tracked, over a period of time not less than 30 minutes, with no uncorrectable cycle shifts.

(6) A field log of GPS observations shall be prepared while observations are being taken and shall include

(a) the date,

(b) the start and end times,

(c) the antenna height,

- (e) the satellites observed,
- (f) the serial numbers of the antenna, receiver and data logger,
- (g) the meteorological conditions, and
- (h) any receiver, operator or tracking problems.
- (7) A processing log shall be prepared and shall include the GPS data, the software and the version of the software used and the processing method.
- (8) Differential GPS measurements shall not be
 - (a) longer than 80 km in length, where single frequency receivers are used, or
 - (b) longer than 250 km in length, where dual frequency receivers are used.

(9) Notwithstanding subsection (8), where Government Survey Control Stations, which have been established by GPS methods and have been approved for the purposes of this subsection by the Surveyor General, are used, the baselines between the 2 or more Government Control Stations may exceed 250 km.

Division 3 - Monumentation

Posting of Wellsites

257. (1) Where wellsites are posted, they shall be posted with posts of type 1, 2, 3, 4 or 5.

(2) If posted, at least 1 corner of a wellsite shall be posted with a post of type 1, 2 or 4.

Referencing of Surveys

258. (1) Subject to subsection (2), wellsites shall be carefully referenced by 2 intervisible monuments, of type 1, 2 or 4, set at least 150 m apart.

(2) Wellsites located within surveyed townships in the Peace River Block shall be referenced by ties to at least 2 existing survey monuments of types 1, 2 or 4 or old style Dominion iron posts, which monuments mark corners of the section, quarter section or legal subdivision in which the well is situated.

(3) One of the 2 intervisible monuments referred to in subsection 1 may be a post set on a corner of the wellsite pursuant to section 257.

(4) Where a traverse is made, that traverse shall be referenced by monuments of type 1, 2 or 4, set in intervisible pairs at least 150 m apart, at intervals not exceeding 5 km.

Markings

259. Monuments shall be marked in accordance with section 11 except that, in lieu of boundary lines,

- (a) in the case of monuments required by Section 258(1) not set on the true corner of a wellsite, the letters "PNG" followed by the numerical portion of the well name shall be marked on the cap, or,
- (b) in the case of monuments required by section 258(4), the number of the traverse station shall be marked on the cap.

Bearing Trees

260. The position of every post found or set pursuant to sections 257(2), 258(1) and 258(2) shall, where possible, be referenced by at least 3 bearing trees.

Tripods

261. (1) Notwithstanding Section 13, under frozen conditions, the monuments required by Sections 258(1) and 258(4) may be accompanied by a substantial tripod marked with cotton or other durable material in lieu of a reference post providing any monument so accompanied is not on the corner of a wellsite.

(2) Where bearing trees are not available, the monuments required by Sections 258(1) and 258(4) must be referenced by a substantial tripod marked with cotton or other durable material.

Division 4 - Preparation of Plans

Size and material

262. The plan shall be prepared on mylar film with a minimum thickness of 0.075 mm and a matte finish on both sides in one of the following standard sheet sizes:

Α	size	-	216	mm	by	280	mm
B	size	-	280	mm	by	432	mm
С	size	-	432	mm	by	560	mm
D	size		560	mm	by	864	mm

Scale

263. (1) The scale of the plan shall be 1:100, 1:125, 1:200, 1:250, 1:500 or 1:750, or multiples of such scales by an integral power of 10.

(2) The smallest scale that will permit all required detail and information to be shown on the plan without congestion shall be used.

(3) A scale shall not be used where a wellsite under survey would be represented on the plan as less than 5 cm^2 .

(4) Where the requirements of subsection (3) would result in the preparation of an unduly large plan, the main body of the plan may be drawn to a smaller permitted scale with necessary detail shown on inserted enlargements.

(5) The inserted enlargements referred to in subsection (4) shall conform to a scale prescribed by subsection (1) except where impracticable, in which case "not to scale" shall be noted on the inserted enlargement.

Title and border

264. (1) The plan shall contain a title similar in form to:

"Survey Plan of Wellsite (insert name of wellsite), _____ District."

(2) The plan shall have a border of solid straight lines.

Draughting and printing

265. (1) Plans shall be draughted in black ink and all words on the plan, other than a signature, shall be printed.

(2) The exterior boundaries of the land being dealt with by the plan shall be shown as a fine solid line.

- (3) The area dealt with by the plan shall be shown shaded or stippled.
- (4) Where an inserted enlargement is necessary, subsections (2) and (3) apply.

Required information on plan

266. The plan shall contain the following information or details:

- (a) the perimeter of a surveyed parcel, other then a wellsite or right of way, shown as a solid line;
- (b) the boundaries of surveyed rights of way shown by broken lines;
- (c) traverse lines, GPS baselines and triangulation rays shown as fine broken lines, the dimensions and bearings of which may be shown adjacent to the broken line in the body of the plan or in tabular form at a convenient location on the plan;
- (d) bearings shown in the full circle system clockwise from north, which shall, except for those to bearing trees, be grid bearings;
- (e) all dimensions in metres and decimals thereof;
- (f) details of old and new bearing trees, stone mounds, cairns or other ancillary evidence;

- (g) the land through which the traverse passes and the wellsite lies designated by the lot, block or section number, the land title plan number, or as "Unsurveyed Crown Land", whichever applies;
- (h) areas shall be shown on the plan to the precision given in the following table:

Up to 0.1 ha	quote to	1 m^2
From 0.1 ha up to 1 ha	quote to	0.001 ha
From 1 ha up to 10 ha	quote to	0.01 ha
From 10 ha up to 100 ha	quote to	0.1 ha
From 100 ha and over	quote to	1 ha

- (i) posts found and set;
- (j) where an obliterated corner post has been reestablished, the method of re-establishment;
- (k) the names of roads and bodies of water crossed by a traverse or within the wellsite area;
- (l) the scale with corresponding bar scale;
- (m) a north point;
- (n) the derivation of the bearings;
- (o) the factor to be added to or subtracted from plan bearings to obtain bearings to an identified local meridian;
- (p) a legend giving details of the various monuments shown on the plan, using the standard symbols prescribed in Part 1;
- (q) the British Columbia Geographic System designation or designations shown immediately below the title using the 6 minute latitude by 12 minute longitude breakdown;
- (r) the surveyor's certificate in the form prescribed under the Land Title Act;
- (s) the point of commencement and closing of the survey;
- (t) the relationship of the well position to the southwest corner of the spacing area in which the well is situated, shown in the body of the plan;
- (u) where the wellsite lies outside the Peace River Block, a balanced traverse table and UTM coordinates for each traverse or GPS station, each monument found or set, and the wellsite;
- (v) the ground elevation of the well position and the monuments required by Section 258 in metres above sea level;
- (w) where the wellsite lies outside the Peace River Block, the P&NG grid in fine broken lines;
- (x) where the wellsite lies within the Peace River Block, surveyed boundaries of the township system shall be shown as solid lines and theoretical or unsurveyed lines shall be shown as fine broken lines.
- (y) where the wellsite lies outside the Peace River Block, the combined factor adopted by the surveyor for his computations and shall bear the following note:

"This plan shows ground-level measured distances. Prior to computation of U.T.M. coordinates multiply by combined factor....";

(z) the source of the datum used for elevations,

(aa) in the lower right hand corner of the plan, the note:

Approved as to well location and derivation of elevations:

Deputy Surveyor General Victoria, British Columbia, , 19.