

June 22, 2026

RE: Well Planning & Hardline calculation Guidelines

This memo is to facilitate understanding by operators & directional drilling contractors of the NDIC, Department of Mineral Resources (DMR), Oil and Gas Division policies on horizontal/directional well planning and setback compliance guidelines. *Information noted in red has been updated since the last revision dated **November 17, 2025**.

Well Planning

1. NDIC Permit Policy 1.01 (m) indicates that plugged and/or abandoned wells must be reviewed. Therefore, the operator (well planner) must evaluate all existing wells within 500 feet from the completion interval of any proposed well both vertically and horizontally in all directions. In most cases, a spider plot depicting the proposed wells' completion interval distance to an existing well is required.
2. The KB (or rig floor elevation) of the rotary rig, with the ability to attain Total Depth, must be taken into consideration.
 - a. In re-entry operations, where there is a difference in rig KB elevations, the tie-in survey Measured Depth should be adjusted.
3. Reentry Operations---Gyro surveys are required at 100' intervals on all cased hole re-entry operations (and if no previous surveys were taken).
4. General Survey Guidelines:
 - a. Surface hole directional surveys are required at 100' intervals on multi-well pads and the well bore may not be intentionally deviated.
 - b. Directional surveys are required in the vertical/tangent portions of the well bore at 100' intervals if the well bore is deviated 3 degrees or less per 100', with required 30' intervals during sections with deviation over 3 degrees per 100'. A waiver to the 30' survey interval may be obtained only if 45' drill pipe is utilized
 - c. Directional surveys are required in the horizontal portion of the well bore at least 30' in the build section or during intentional course corrections and at least every 90' in the lateral portion of the well bore while rotating. *A waiver to the 30' survey interval may be obtained if 45' drill pipe is utilized.
5. All magnetic correction programs designed to reduce the ellipse of uncertainty must be submitted and certified by the owner of the directional tools.
6. All certified surveys must be submitted referencing NAD 83 per NDAC 43-02-03-16 guidelines for submitting an "accurate plat".

DMR setback compliance guidelines.

Hardline calculations

The DMR utilizes the rectangular coordinate method (a.k.a. Cartesian coordinate system) when determining setback compliance (hardline calculation). This method assumes that the spacing unit is completely rectangular and thereby does not consider the bearing of the section lines. To calculate the hardline coordinate (based off setbacks as required in the DMR order) the assumption is that the well head is at a zero-starting point (0' N/S, 0' E/W).

**If, for example, in drilling a horizontal well along the eastern boundary of a "stand up" spacing unit containing approximately 1280 acres (i.e.: sections 1 & 12):*

General assumptions:

- The setbacks are 150' from the north boundary & south boundary and 500' from the east boundary and west boundary.
- Assume north & south boundaries are 5280', east & west boundaries are 10560'.
- Assume surface location is 150' from the north line & 150' from the east line.

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Hardline Calculations:

- The hard line is calculated by:
 - $150' \text{ fnl setback} - 150' \text{ fnl at sur loc} = 0' \text{ S}$
 - $500' \text{ fel setback} - 150' \text{ fel at sur loc} = 350' \text{ W}$
- The hard line at TD is calculated by:
 - $10560' \text{ spacing unit east line distance} - 150' \text{ fnl} - 150' \text{ fsl setback} = 10260' \text{ S}$
 - $500' \text{ fel setback} - 150' \text{ fel at sur loc} = 350' \text{ W}$

Tool Error

Measurement inaccuracies need not be considered when determining compliance with the spacing/drilling unit boundary setback requirements except in the following scenarios:

1. If industry standard methods and equipment are not utilized.
2. When deemed necessary by the Director.

If measurement inaccuracies are required to be considered, a 2° MWD measurement inaccuracy is applied to the well bore from the KOP to TD and is calculated by multiplying the tangent of 2° (which equals 0.03492) by the corresponding coordinate distance. The new setback can be calculated at any point by taking the distance traveled north/south times the tangent of 2° and adding it to the east/west setback or taking the distance traveled east/west times the tangent of 2° and adding it to the north/south setback.

Should you have any questions, feel free to call.

Sincerely,

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